



Islamic Republic of Afghanistan  
Ministry of Agriculture Irrigation and Livestock

د افغانستان اسلامي جمهوریت  
د کرنې، اوبو لگولو او مالدارۍ وزارت



## OPPORTUNITY FOR MAXIMIZING AGRIBUSINESS INVESTMENTS AND DEVELOPMENT (OMAID) PROJECT

### PEST MANAGEMENT PLAN

Developed by



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## EXECUTIVE SUMMARY

### The Context

Afghanistan being an agricultural economy with more than half of the population dependent on it, agricultural development has not been consistent and continues to suffer from the recurring and long-lasting political instability leading to structural constraints and low productivity. Despite the fact that selected value chains in the horticulture sector has progressed during most recent years, there is a long way to go to utilize the full potential of the agricultural sector.

The agribusiness sector has potential to grow much beyond the hitherto achieved progress provided enabling environment is created in carrying out structural reforms, revamping rural institutions and infrastructure, improving access to modern production, processing and post-harvest technology so that there is value addition and production quality achieves exportable standards. Given limited capacity of the national government, there is a compelling case to invest in agriculture/agribusiness activities in Afghanistan in a focused manner through external assistance.

A project in this direction has been conceptualized which seeks to address the inherent structural constraints in improving the agribusiness sector so that agriculture, horticulture and milk production activities attain certain benchmark in quality production for harnessing export opportunities and improvising quality standard in production, processing and marketing.

### The OMAID Project

The OMAID Project is structured as an Investment Project Financing (IPF), proposed to be funded by an IDA grant in the amount of US\$25 million and a US\$150 million contribution from the Afghanistan Reconstruction Trust Fund (ARTF) over a five-year period. It will focus primarily on the agro-processing segments of the horticulture and livestock value chains, including the critical linkages to upstream raw material.

Field operations will be implemented sequentially in the five selected areas of the country which have a comparative advantage to produce for these value chains (Mazar e-Sharif, Kandahar, Kabul, Herat, and Nangarhar).

### Constraints to be addressed

The project will address the following constraints to agri-business development identified as part of the consultation process for the preparation of the Afghanistan Agribusiness Charter:

- a) High cost of doing business in Afghanistan;
- b) Access to markets remains challenging for Afghan agri-food enterprises;
- c) Access to industrial serviced land for agri-food enterprises and SMEs is limited;
- d) Access to finance; and,
- e) Producer organizations are inefficient.

### Project Development Objectives (PDOs)

**Component 1:** Improving the enabling environment for agribusiness development (US\$ 22.5 million)

**Subcomponent 1.1:** Establishing the overall governance and implementation of the Agribusiness Charter (US\$ 5 million).

**Subcomponent 1.2.** Strengthening the capacities of the Ministry of Industry and Commerce (US\$ 7.5 million).

**Subcomponent 1.3.** Addressing food safety and sanitary and phytosanitary issues (US\$ 10 million).

**Component 2:** Support for the development of integrated agri-spatial solutions (US\$ 142.5 million)

**Subcomponent 2.1:** Investing in critical agri-industrial infrastructure in selected provinces (US 127.5 million).

**Subcomponent 2.2:** Supporting agribusiness investments in the IAFPs's broader catchment areas (US\$ 15.0 million).

**component 3:** Project Coordination, Monitoring, and Crisis Management (US\$10 milion)  
Project activities to be promoted

In as much as different types of economic and ancillary support activities identified for agri food parks are concerned, a list is provided below. However, more activities could also emerge when the project is rolled out.

- Agro-dealers and input supply stores;
- Extension services and training, by Government bodies, donors, and NGOs;
- Testing and certification laboratories;
- Warehousing, grain silos, and cold storage providers;
- Truck parking, container stacking, and rail yards;
- Agro-processing units, including for the packaging and/or processing of fresh fruit (juice, drying of fruits and nuts, bottling, etc.);
- Dairy processing;
- Commercial and auction center/ wholesale market;
- Green area/ parks, vehicle parking, service buildings;
- Maintenance and repair facilities and shops;
- Any other, relevant to the project.

### **Context of PMP**

As specified in the PAD, a PMP is triggered as safeguard policy, conforming to the Operational Guidelines of the World Bank OP 4.09. In sectorial projects funded by the World Bank, it is required to prepare a generic PMP at the appraisal stage and upgrade that document during implementation phase. The plan should be designed to minimize potential adverse impacts on human health and the environment and to advance ecologically based IPM.

### **Objectives of PMP**

To identify major pests and diseases affecting crops, typology of pests and diseases and present pest management approaches adopted in the project area. Similarly, provide a status of sanitation and hygienic practices adopted in milk production and quality milk production adopted in the project areas;

To analyze legislative and regulatory and institutional framework available in the country for pesticide management, capacities of these institutions and their roles relating to pesticide uses, pesticide trade and regulation towards pesticide management;

To examine if any IPM policy is presently in place, assess preparedness of the country in implementing IPM and provide guidelines towards adoption of IPM regime for growing healthy crops to improve incomes of the farmers;

To assess management capacity and capability to implement mitigation measures through the existing institutional structure and responsibility to implement PMP including grievance mechanism;

To identify monitoring indicators of potential impacts of pesticide management and implementation of IPM regime and providing a framework for pest management advisory services through implementing ICT based pest surveillance and monitoring system.

To recommend appropriate manpower structure for PMP implementation and quality milk production, capacity building through training and orientation and generating awareness among the stakeholders about adopting scientific pest management strategies leading to IPM regime in agriculture sector and quality milk production in dairy processing sector.

To suggest appropriate policy reforms defining roles and responsibilities of all institutions associated with implementation of PMP with specific recommendations for different institutions in pesticide management.

### **Scope of PMP**

The scope of the IPM covers field crops (cereal, pulses and legumes) and horticulture crops including fruit crops. It will also cover dairy processing value chain, beginning with milk procurement, bulking, and milk processing.

### **Methodology**

As a generic PMP was to be prepared for project appraisal and in consonance with this purpose, the methodology of the study involved collection of primary and secondary data and consultations with stakeholders including concerned government officials, NGOs, officials of other donor-funded projects with IPM as one of the components. There are certain law/regulations/policy paradigm in place in Afghanistan, which have been referred, such as Pesticide Law 2015, Plant Protection and Quarantine Law & Regulation, 2012, Animal Health & Veterinary Public Health Act 2012, Draft Food Law 2012, etc.

About 15 group discussions were conducted to represent stakeholders with crop segment, dairy segment and home economics segment. The methodology has also considered two IPM reports of contemporary period- - National Horticulture Project (NHP) and Improving Afghanistan Input Delivery System (IAIDS), both assisted by the World Bank, and housed under MAIL with commonalities in the approach.

## **MAJOR OBSERVATIONS**

### **Crop pest**

Sun pest is the major pest affecting wheat crop. It feeds on plant by injecting chemicals that cause grain's gluten to break down. The major disease of wheat in are rusts and smut/bunt, causing substantial damage to wheat crop.

The main disease in potato production is late blight caused by fungus which initially occurs on leaves, stems and tubers leaving behind nothing under field condition. The other issues are

bacterial wilt, a pathogen that affects aerial part of the plant leading to severe losses in potato output. The major insect pest of potato is Colorado potato beetle besides potato tuber moth. Cucurbit group of crops (watermelon/melon/cucumber/squash/pumpkin) have Baluchistan Melon as major pest problem. The melon fly is considered as the most destructive pest of melon and related crops. Saffron, being one of the most precious horticulture crops of Afghanistan for export earning, suffers from bulb mite and mole and rat damage.

Apiculture occupies special position in Afghanistan. Besides producing honey and related items, it positively influences higher productivity of fruit crops like apple, pear, almond, peach, grapes and pomegranates through pollination. The most successful bee species is *Apis mellifera*, which is also subjected to many pests and disease attack and can be mitigated through IPM techniques to maintain numerous pests and pathogen-related problems below an acceptable threshold.

### **Pest in horticulture crops**

The main problem in grapes is Powdery Mildew. A dormant spray of Lime Sulphur is made against Powdery mildew, which also reduces mealybug populations. New growth is protected against Powdery mildew with applications of Sulphur dust or wettable Sulphur beginning 2 weeks after bud burst and then to protect new growth at approximately 15-day intervals. A minimum of three applications is made.

The main problem in Pomegranate is the fruit borer- - the larva of the Carob moth which affects young pomegranate via the calyx at flowering. Orchard sanitation (pruning of overgrowth shoots, dead overwintering ranches, etc.) is used to reduce the number of infected fruit in the orchard and the population of the moth. Mechanical control can also be employed – a plug of mud placed in the calyx of the very young fruit which acts as a physical barrier and prevents the larvae entering.

There is a high incidence of bacterial canker and gummosis in both almond and apricot trees. This is a chronic infection which can kill the tree and which is believed to be associated with the combination of cultivation of intercrops in the orchards and the overuse of water particularly the flood irrigation methods that are used. Copper has some impact in slowing the development of the disease. A dormant spray of Copper (Bordeaux mixture) is applied to the tree and Bordeaux paste is applied directly to lesions and pruning cuts. The copper spray also offers some protection against shot hole disease.

Horticultural Mineral Oil (HMO) is used to reduce populations of insects overwintering as sedentary stages or eggs, in particular aphids, scales and mites. The impact of recently developed HMO has been observed to be very effective against mealybugs, mites, scale and other small sucking insects. This practice also should be carried out for protecting the honey bees that will visit the crops for pollination.

Mechanical control is used to remove nests of tent caterpillars (defoliating Lepidoptera larvae) which can be burnt either in situ or after being pruned out of the tree. Mechanical control will be used to control local pest outbreaks during the crop season. Spot sprays of pesticides will be used to control local pest outbreaks, but only as a last resort.

### **Economic loss**

There are no statistical data on wheat losses exclusively by sun pest attack. In one study by the Swedish Committee for Afghanistan (SCA) had revealed that sun pest had inflicted damage on wheat crops and over 60% of the spring wheat field were either infested or exhibited signs of an early infestation. However, wheat field planted earlier, grain development had reduced by 25 to 30 percent. The rough estimate indicated that crop losses largely due to sun pests would have caused food deficits affecting approximately 350,000 people.

For fruit and horticulture crops, there is no comprehensive estimate on economic loss on account of pest and disease infestation. In one study by MANAGE, Hyderabad, it was found that disease in fruits (aphid, anthracnose, melon flies) and vegetables (Colorado beetle in potato and grasshopper), apple crop had been adversely affected by powdery mildew causing yield potential to drop by 5 per cent in some provinces.

### **Storage Pest**

The farmers/aggregators adopt localized storage practices of limited crops like potato, onion and grain, etc. For grain, grain weevil, rice weevil, beetle and mites are reported, and they are addressed through (i) cleaning of storage space, (ii) sun drying and (iii) disinfection. They use aluminum phosphate tablet and aluminum bromide as disinfectant. Potatoes/Onions are stored by the farmers at underground storage by digging wells, while the traders use cold storages. Onions are stored at low temperature and sometimes concrete structures are used to store onion. Dry fruits are kept by the farmers at their house premises in cartoons, while the traders use bags and cartoons with aeration facility. Apart from sun drying, cleaning the storage space, fumigation is also done.

### **Hygiene and sanitation in milk production**

Milk production in Afghanistan is essential for family consumption with no hygiene and sanitary methods followed. However, some milk schemes are working at a limited scale, but have put in place milk testing mechanism. As the scale of operation is limited, these schemes have not made any significant impact in quality milk production and quality milk processing. The major disease observed among cattle are Foot & Mouth, Brucellosis, Hemorrhagic Septicemia and parasitic diseases.

### **Pesticide management in Afghanistan**

The Government of Afghanistan does not have any registered pesticides for specific uses especially in the field of agri-horticultural, veterinary and public health systems. It follows the list of acceptable products and guidelines of FAO which is limited and not adapted to Afghanistan's agriculture and human health systems. Most pesticides found in Afghanistan are imported, sold and distributed by the private sector. Pesticides that are often banned for use in other countries or internationally and outdated are sold "free of any label." Moreover, validity of these pesticides have expired or is even dangerous and classified by WHO as extremely hazardous or highly hazardous (Ia and Ib), yet they are found in local trade. This is an ominous sign, requiring urgent attention from regulatory as well as enforcement machinery.

**Pesticides use in agri-horticultural sector**

Though there are sporadic efforts made to mitigate destructive pest population, other than pesticides, all have become futile and hence producers depend on chemical pesticides to control damaging pest population rapidly and effectively at the time of severe pest attack.

Many kinds of pesticides are used in field crops, vegetables and in other horticultural crops without proper protection or safety measures and without considering hazards and toxic exposures to the farmers, manipulators, non-target organisms especially natural enemies, wildlife, fish and other flora and fauna.

The country also faces the attack of different types of migratory and invasive pests like locusts and caterpillar which are controlled by pesticides. The horticultural fruit producers use more than one round of pesticides during the cropping season to ensure crop production. The complete dependence of the farmers on the pesticides towards production of fruit crops invokes many problems when the products are meant for export market.

**Pesticides label and usage pattern**

Presently, the farmers of Afghanistan do not use pesticides in the context of IPM. They use it as and when required to manage the pest problems without considering the impact on other non-target organisms, environment and health. Under IPM, the farmers will be encouraged to use cultural methods, mechanical, botanical and biological methods to conserve populations of natural enemies prior to the use of spot sprays.

**Pest management methods**

The guidelines for pest management are governed by country laws, regulations and in some cases, by the international conventions, agreements and treaties (i.e, Rotterdam Conventions on International Code of Conduct on the distribution and use of pesticides, Stockholm Convention of Persistent Organic Pollutants, Kyoto Protocol Convention on Climate Change, Agenda 21 Global Program of Action for Sustainable Development etc) as applicable in case of Afghanistan. Accordingly, guidelines are prepared for procurement of pesticides, product quality testing, labelling, storage, use, disposal, applicators exposure level and training) by the PPQD.

**Risk associated with pesticide use**

Traditional uses of pesticides are one of the major sources of environmental pollution. The traditional applicators of pesticide are susceptible to health hazards, if protective measures are ignored. The environmental damages involve soil, surface water, ground water, air, biodiversity, fauna, pasture land, etc and human health affect skin, lung and digestive system. The pesticide usage could also cause damage to ecological agents like species fulfilling important ecological functions, bees and other pollination agents, natural enemies of certain pests (parasites, predators and pathogens). If instructions related to product usage, and product handling during storage, transportation, dosage are not followed, then these processes could also affect human health and natural resources.

Risks also originate from improper handling of packaged chemicals and pesticides. More often than not the farmers discard used plastic containers/bottles arbitrarily without taking and safety precautions, which is detrimental to environment and public health. Storage conditions of the pesticides often are not proper leading to toxic waste which is detrimental to human health and environment. Similarly, dry pesticides are to be stored at a secluded place so that



dust particles do not come into contact with human food and animal feed, and these pesticides are to be used through sprayers using mask and protective aprons.

### **IPM**

Integrated pest management (IPM) is a multidisciplinary ecological approach where varieties of pest management techniques or strategies are combined together simultaneously or successively to bring down the population of pest species below economic threshold level without or with a minimum disturbance to the ecosystem.

Studies have shown that over 95% of sprayed insecticides and herbicides reach a destination other than the target species diluting their effect and causing environmental contamination. IPM techniques can eliminate the need for these chemicals, preserving the environment and local community health.

#### **The commonly used IPM tools and techniques are as follows.**

- Traditional or cultural management
- Agronomic practices
- Mechanical methods
- Physical methods
- Botanical pesticides
- Biological control

### **IPM experiences in Afghanistan**

The Plant Protection and Quarantine Department (PPQD) of the Ministry of Agriculture, Irrigation and Livestock (MAIL) is responsible for matters related to plant protection. The HQ and diagnostic laboratories of PPQD are located within Ministry compound in Kabul and it is represented in the Provinces by Provincial Directorates of Agriculture with one or two officers to look after pest management activities.

### **Plant Protection and IPM policies**

There is no policy relating to plant protection and IPM in Afghanistan. As of now, plant protection measures have remained *ad hoc* and on fire-fighting mode, depending on the exigencies reported and communicated through the offices of Provincial Governors to the MAIL.

The plant protection department resorts to application of chemical measures for quick result. This serves 2 purposes. First, immediate relief is visible, and second, it enhances public image of the Government machinery in mitigating the woes of the farmers. Somehow, the practice seems to have been accepted in this manner without attempting to address them under the scope of any policy regime.

### **Capacity to implement IPM**

The capacity of Afghanistan to implement IPM, described in terms of access to information, skills and understanding of the concepts of IPM is low. Support for the PPQD through proactive projects which could tackle pest problems and remove the need for reactive emergency interventions are considered to be non-existent. The building up of human capacity within the ministry staff would help facilitate moving away from the present practice prescribing of pesticides to a more sustainable approach of IPM.

### **Constraints in IPM implementation**

The inspectors who are supposed to provide a vital link between the IPM actors in the society with that of the PPQD and the proposed laboratories have become dormant due to prolonged absence from any effective role clarity, outdated outlook and aging. Similar is the situation regarding IPM extension staff, attached with the DAIL, who report to Director of Agricultural at the provinces. There is no direct reporting mechanism to PPQD by the DAIL staff. Further, the staff shortage and shortage of field functionaries is an inherent problem.

### **Strategy strengthening capacity**

Two important and much-awaited legislation have been passed (Pesticide Law, Draft Plant Protection and Quarantine law), providing sound legal platform based on which IPM policies, programs, actions, regulatory measures, capacity building, creating of scientific and technical laboratories, testing protocol, licensing modalities, regulation of IPD trade can be visualized. It would be fair to state that Afghanistan has now been able to get the benefit of having necessary legal support, which forms one of necessary conditions of IPM governance from the supply side phenomenon which have to be further carried forward.

As in many countries, Afghanistan needs to align with the different international conventions that have enacted guidelines for bringing in systems and procedures controlling transportation, distribution, storing procedures and use of pesticides. Not only such alignment helps in improving the image in IPM ecosystem, but they are also beneficial from the point of view of potential acceptance in pushing Afghan brand in international markets.

### **Screening of sub- projects**

For screening of the project a check list has been suggested which will act as a guiding tool. The environmental and social team within PMU, in consultation with PMP, will need to fill up such checklist and assess the impact on environment. This will be used as a decision-making tool on the basis of the likely impact on the environment, following World Bank guidelines. Projects with significant impact on environment will be discarded, while projects with moderate or low impacts will be considered for appraisal, subject to their implementing of the mitigation measures. These mitigation measures will be followed up by the PMU during the course of implementation of the subprojects.

### **Action Plan for Pest and Pest Management**

For implementation of PMP, certain strategic actions and measures have been proposed. These are presented in terms of action items as under.

- Promotion of IPM among national actors and stakeholders;
- Awareness across the stakeholder in the value chain (farmers, retailers/wholesalers/PPQD staff/IPM extension staff about pesticide management, proper usage of pesticides, sensitizing on indiscriminate use of pesticides on environment and human health, banning use of pesticides forbidden by WHO, use of IPM for growing healthy crops;
- Capacity building of the plant protection and quarantine officials regarding the status of present pest scenario, minor pests and their management through IPM and IVM.
- Campaign on surveillance of insect vectors and their management with special attention towards the malaria-prone areas;
- Identification, Conservation and Utilization of potential biological control agents in IPM and IVM.

- Support for identification and management of storage pests.
- Enforce Pesticide Legislation in conformity with international legislation/rules/standards;
- Support to the pesticide residue laboratory for implementation of OMAID activities;
- Support to build up Institutional Human Resource capacity in Pest and Pesticide Management;
- Sensitizing concerned government department to effect strict border control on import of contraband pesticide;
- Support to develop a databank for Integrated Pest Management (IPM) through disease surveillance system in the project area on continuous basis;
- Support to the PPQD to protect invasive pest and diseases.
- Consequent on implementation of proposed Disease Surveillance system and build up real data from the project area and making the data set available to ARIA for further analytics and research;
- Conducting special studies in specific areas to overcome knowledge and information gaps in pesticide trade, assessing economic loss and related areas.

The above strategies actions are relevant for entire pest management spectrum for instituting a healthy culture for agricultural production and would involve all stakeholders in the value chain involving MAIL, OMAID, other Ministries and autonomous institutions and NGOs.

### **Monitoring & Evaluation**

The activities to be proposed under PMP will have to be monitored at regular interval as per the progress indicators identified for project monitoring. An ICT based project monitoring architecture has been proposed encompassing IPM indicators, pesticide usage pattern, farmers participation in IPM, crop coverage, plant disease occurrence phenomenon, milk quality parameters, milk contaminant parameters and grievance redress mechanism. The PMP will be evaluated mid-term and also at the end term by an external consultant of repute for highlighting important milestone achieved and assessing their impact in the society.

### **Manpower provision**

The PMP staff deployment has been proposed at the PMU level, agri- industrial park level and at the level of RTH/FCC. Separate set of staff have also been proposed for ensuring monitoring of milk quality assurance component of PMP. The staff will be trained both in –country and abroad so that their skill set and competency is enhanced and some of them can perform as TOT for dissemination of knowledge and awareness program.

### **Grievance redress and citizen engagement**

A framework on grievance redress mechanism has been suggested. Separate turnover time for different types of grievance redress and accountability has been fixed. This will help addressing grievances of the stakeholders on regular basis improving project functioning. The PMP will also involve citizen engagement in project monitoring, awareness building, and grievance redress so that any bottlenecks arising in course of project implementation can also be seen from an independent perspective facilitating achieving project outputs.

### **Training and capacity building**

As mentioned earlier, general awareness on IPM in Afghanistan is low across the board. The farmers' knowledge and awareness on this is no better. It is only when some NGOs and donor-funded specific projects are implemented with a focus on IPM, then the knowledge and awareness of those specific professionals are enhanced. But such programs are localized, and not broad-based. Additionally, it is also not propagated that IPM tools offer viable alternatives before the farmers to consider from economic, cultural and environmental points of view. These are indeed national issues.

Based on the situational analysis of the context of the study, some training modules are suggested which though not exhaustive yet they would be relevant. As the project is rolled out and practical experiences are gathered, there may be need for some additional skill-building which the PMU could decide subsequently.

The training and capacity building program will primarily involve PMP staff of OMAID and a few specialised personnel and scientist of PPQD on MAIL and academics drawn from the Agricultural Universities. The training program will largely be international training and exposure visits besides in – country training of the IPM extension staff/milk procurement supervisors to be recruited for OMAID.

### **Implementing IPM regime through pest and disease surveillance**

The proposed system will positively contribute towards implementation of IPM by transferring scientific knowledge and insights in tackling pest and disease issues instantly that emerge during different phases of plant growth, create a national archive on pest and disease incidence, crop-wise, season-wise, stage-wise for scientific analysis and building up of IPM model for further propagation and establish a benchmark. The potential of the model can also be expanded to accommodate other production enhancing sub-systems like agronomic characteristics so that it could become a diversified agricultural production system application for Afghanistan.

### **Proposed budget**

The estimated total cost of PMP activities is 5.20 million USD. This consists of Technical Assistance (National) - estimated at 2.50 million USD, Technical Assistance (International) - - estimated at 1.14 million USD and M & E activities- - estimated at 1.29 million USD. The remaining two components are capacity building, estimated at 0.15 million USD and Demonstration Plot at 0.075 million USD respectively.

### **Prelude to arriving at recommendation**

The OMAID project is proposed to maximize the arena of productions system to open a wide scope of business opportunity in agricultural sector where large majority of the employment is created and family incomes are supported. Since opportunities of alternative employment are limited in activities other than agriculture, there is an urgent need to initiate reforms in the agro-processing sector in a manner that vertical integration is carried out in agricultural production, procurement, processing and marketing with the objective of generating maximum returns to the farmers and private entrepreneurs. This process however entails many challenges that need to be overcome while safeguarding environment, public health and natural resources.

The PMP that is presented through the report is a component of environmental protection which necessitates the application of IPM tools for improving quality of agricultural production and production of healthy crops which should not only safeguard our environment but also fetch higher returns to the farming communities. Implicitly, it drives a reform agenda and attempts to take the production systems into a different paradigm.

The present report contains such information as activities that are to be promoted under IPM, Clean milk production, manpower positioning, training and capacity building of the manpower and direct stakeholders, extension activities, demonstrations for IPM, job functions of the proposed PMP staff and broad estimate on the cost (not complete though). In subsequent section, some broad recommendations are made, which may not be exhaustive as sub components under the project is yet to be known, and also many new activities would emerge once the project is rolled out. The present recommendations should therefore be considered on the basis of above caveat.

### **Recommendations**

In the context of PMP, a few lines of recommendations are indicated in the succeeding section, which needs to be followed either singularly, or in conjunction with others for adopting a comprehensive strategy for developing agro- horticulture production frontier.

#### **Creating enabling environment for IPM**

- Adopting best agricultural practices which have already been tested;
- Using the most acceptable cultural, mechanical management techniques in an improvised way;
- Exploring botanical pesticides as a prophylactic measure;
- Conserving, strengthening and using biological control agents especially for perennial orchards introducing potential parasitoids, predators and microbial pesticides;
- Suggesting use of need-based application with eco-friendly and safe pesticides.
- Production technology of the valuable cash crops like mushroom and saffron is to be improved;
- Apiculture and vermicomposting techniques are to be improvised adopting modern technologies;
- Screening and inclusion of best crop variety befitting agro-climatic zones.
- Protecting storage crops by the physical method through exposing to sun or by country cooling system as appropriate for the respective crops/grains;
- Minimizing use of pesticides which is only possible after adopting the above-mentioned steps;
- Controlling the use of hazardous toxic pesticides strictly by enforcing laws;
- Stringent action is required to stop use of toxic pesticides, especially to stop its contamination with natural resources in virgin areas;
- Adequate measures are to be taken by PPQD to stop the entry of invasive pests in the country;
- Adequate infrastructural facilities are to be developed in the quarantine department to check and stop entry of unwanted pests and diseases;
- Train 10 Lead farmers per district in each zone in Pest Management practices using IPM tools and methodology.
- Creating a state of art laboratory in Kabul and in the project Provinces on pesticides quality control and residue analysis;

- Capacity building of staff of IPM division of PPQD through specialized training, field exposure and empowering them so that they can contribute significantly towards fulfilling PMP objectives.
- Undertaking sustained public awareness program in IPM approaches as an alternative to indiscriminate use of pesticides through mass media, TV, Social media, leaflets, public transport, and videos. In addition, community engagement in the mobilization of public opinion will also be done.

The responsibilities to comply with above recommendations would fall on OMAID/PPQD.

In addition to the above recommendations, there are certain institutional vacuum, issues related to inter- ministerial accountability and support, intra departmental coordination that OMAID needs to address for implementing a healthy IPM regime. These are delineated through the succeeding section in broad terms.

### **Laboratory Infrastructure**

Pesticide laboratories are to be set up not only at the HQ but also they are to be placed at strategic locations for completion of laboratory compliances. One pesticide laboratory building has been constructed at *Badambagh*, Kabul under IAIDS project, which should be equipped with laboratory equipment and training of manpower needs to be organized. Border Quarantine Stations will need to be set up at some places while they should be equipped and operationalized to regulate and screen agricultural consignments entering into Afghanistan in respect of their potential spread of known and unknown pests within the country and also from Afghanistan to other countries.

Further, biological laboratories need to be set up in all 5 Provinces to prepare biocontrol agents which could then be supplied to the farmers to mitigate pests and disease attack. This would provide synergy to achieving the outcome of PMP intervention.

The responsibilities to comply with above recommendations would fall on MAIL/PPQD/OMAID.

### **Strengthening Institutional framework for PMP**

The present institutional strength, capacity and coordination among the actors among IPM implementation is missing. PPQD Department of MAIL will have to be strengthened with technical knowledge (laboratory and scientific knowledge), manpower, financial support to improve their capacities and such strengthening will need to be carried out across the provinces as well. It is therefore recommended that MAIL will have to be sensitized at the first instance so that adequate financial provision can be made by the Government. If financial provision from the Government becomes an issue, then OMAID will need to include this as part of sub-component to be funded under the project.

The responsibilities to comply with above recommendations would fall on MAIL & OMAID.

There are large numbers of FFS which are lying dormant. Under OMAID project, demonstration sites are to be created. Since FFS establishment is somehow in existence, it is recommended that all FFS will have to be revived so that producer members could use these FFSs as model demonstration units for IPM. These FFSs could also be used for carrying out new experiments on mitigating pest and disease attacks and also demonstrating the production of healthy crops. The justification of creating some islands of excellence for showcasing and demonstrating to the farmers cannot be ignored and it is suggested that this be considered as part of sub project activities under PMP. For each agro-climatic zone, such

islands will have to be established. These FFSs will be used to organize season-long Training of Trainer courses (TOT) in IPM technology for the country as a whole. The responsibilities to comply with above recommendations would fall on MAIL.

Unless the vigilance at the border point is strengthened against the illegal entry of contraband pesticides, unlabeled pesticides, the PMP plan under OMAID will render ineffective. It is therefore necessary that the entry of the contraband pesticides, unlabeled pesticides and harmful agrochemicals are screened at the entry point. The pesticide and drug inspector at the customs office will have to conduct due diligence so that such prohibited pesticides/unlabeled pesticides are denied entry. Therefore, custom regulations will have to be enforced rigorously so that the country is protected from spurious and harmful use of pesticides and agrochemicals. *The responsibilities to comply with above recommendations would fall on Ministry of Finance.*

### **Pesticide License**

The traders bring new pesticides without the approval of the concerned authority of the Government. The pesticides importer with their cross-country network and financial muscle power, circumvent local rules and regulations. The role of Ministry of Finance comes into being to prevent entry of illegal and undefined pesticides into the country. So, unless strong punitive actions against these traders/smugglers/bootleggers are initiated, the present practice shows an ominous trend, despite best efforts that will be made under OMAID project. However, if domestic environment is to be protected, illegal importation of new pesticides has to be controlled forthwith. The HEC of OMAID will have to pursue with the concerned Ministry to enforce this provision rigorously. *The responsibilities to comply with above recommendations would fall on OMAID/Ministry of Finance.*

### **Formulating IPM policy at the national level**

The GoIRA will need to formulate IPM policy at the national level as the time is now opportune for initiating activities in this regard. The need becomes apparent as the country envisages faster growth in income which needs to be driven by an exportable surplus of Agri horticultural products. This is to be backstopped by producing high quality produces for which adoption of IPM regime is critical. MAIL through their PPQD division needs to drive this policy to be implemented through provincial directorates of PPQD. The responsibilities to comply with above recommendations would fall on MAIL.

### **Strengthening University Faculty and IPM in Curriculum**

Given the necessity of producing high-quality agricultural outputs of international standards for export purpose, significant knowledge will need to be acquired by the teaching community and research personnel and the students. It is therefore necessary that some faculty is identified for advance training on application of IPM tools for managing pests and diseases while maintaining environmental balance and protecting public health from contamination. It is found that the IPM tools, as a means to improve agricultural productivity is not adequately reflected in teaching curriculum at the graduate level. This would call for a review of the existing curriculum, and inclusion of appropriate teaching and knowledge enhancing courses on IPM to generate proper appreciation of IPM tool for quality production. *The responsibilities to comply with above recommendations would fall on OMAID/Ministry of Higher Education.*

**Donor agencies in IPM implementation**

Specific agricultural development programs have been funded by donor agencies. Many donor agencies have provided for the application of IPM tools as a medium for environment safety and mitigating concerns for public health. Somehow, these experiments die out after the project tenure is completed. They are also not documented and disclosed in public domain. These discrete experiences are to be documented and lessons learned need to be shared across the concerned institutions/departments/stakeholders. Since, under OMAID project, considerable emphasis will be given on implementation of PMP it will be useful if these events are documented properly and a repository is made on these experiments and their results. A special study could be organized to be conducted through an outside consultant. *The responsibilities to comply with above recommendations would fall on OMAID.*

**Putting in place pest and disease surveillance system**

As part of IPM, a model pest and disease surveillance system has been proposed. This will generate wealth of information in the areas of identifying existing and new species, assessing pest population and damage at different stages of crop cultivation, observing changing pest pattern from minor to major and evaluating effect of new cropping system and varieties and related areas. Under the proposed system, feedback will be directly provided to the farmers on a real-time basis (within 24 hours of reporting) so that appropriate preventive measures will be communicated to the affected farmers, minimizing crop damage and protecting income loss. Somehow, this has been missing in the country. This will also enable agro-climatic zone wise pest and disease identification, which will be required for evolving appropriate policies for mitigation. Additionally, mammoth data that will be generated will become a national treasure on pest and disease incidence and their correlation with other variables in the environment, enabling building up complex pest and disease forecasting models. Once a consensus is arrived on the implementation of the proposed model, estimated cost and other requirements can be worked out by the PMU in consultation with IPM team. *The responsibilities to comply with above recommendations would fall on OMAID.*

**Putting in place ICT based milk testing mechanism**

Given the necessity to improve quality of milk production, collection and processing of milk into value-added milk products, maintaining quality standard in milk is essential. Besides, the milk producers will need to be paid according to the quality of milk that they would supply through the proposed milk collection system. Therefore, testing of fat & solid not fat and also milk contaminants are necessary. The ICT based milk collection system has therefore been proposed which will immensely benefit all stakeholders in the milk value chain and the milk producers will receive fair prices for their supplies. It is therefore recommended that milk collection system should be modernized with use of ICT based on line milk collection system so that the processors would be in a position to get procurement data on daily basis for their plant operations and allocation of raw material for different value-added products. *The responsibilities to comply with above recommendations would fall on OMAID.*

**Enforcing legal provisions of pesticide law**

The Pesticide Law of 2015 provides for a sound legal platform on which a healthy and judicious practice on pesticide use can be popularized in Afghanistan. The Law provides for an Empowered Committee on Pesticide with representation from concerned Ministries, academia, research institutions, technical experts to regulate orderly use of pesticide without causing environmental degradation and safeguarding public health. The pesticide inspectors are authorized to conduct spot checks on pesticide retailers' and wholesalers' premises to



ensure compliance of the protocol and guidelines laid out as per the Law, and report to the Pesticide Committee. A critical review of the provisions contained in the Law does not reveal any apparent gap, but the Law is dogged by weak enforcement. In fact, the governance of pesticide rule and regulations are rarely followed, thereby making the Law ineffective and unresponsive to safeguarding the interests of the country. This is an area where OMAID project has to drive reform by using good offices of HEC to make various provisions under the law enforceable in the country.

In Pesticide Law, there is no provision that the importers will have to import bio pesticides along with their normal consignment. It is felt that with such provision in the Law there will be induced demand for bio pesticides in the country. This may have to be explored through one of the functional agenda of the Pesticide Committee, as per the provisions of Pesticide Law. *The responsibilities to comply with above recommendations would fall on MAIL/OMAID.*

### **Harnessing synergic relationship between apiculture and horticulture production**

It is empirically established that technology of apiculture production and horticulture production are highly correlated. In other words, the two productions sub-systems are mutually beneficial to each other which give additional mileage to the farmers. From *a priori* knowledge, we suggest that apiculture needs to be promoted in Afghanistan simultaneously with horticultural crops. In the context of OMAID project, relationship between these 2 crop cultivations and their synergic relationship could become an area of applied research.

Though, in most cases, the horticulture crop growers use toxic pesticides to protect their crops from pest infestation, especially during flowering stage when there would be maximum influx of bee population. Therefore, growers are advised to consider safety of bee population since these bee populations are their friends which act as pollinator and enhance productivity. Therefore, considering the beneficial role of bee population, an alternative measure is to be taken by selecting eco-friendly pesticides like HMO, Lime Sulphur, etc. which would not be harmful for bee population. As bee is an important pollinator of horticulture crops, especially apple, pistachio, apricot, pomegranate, grape, almond, etc, presence of bee population helps in fruit setting for higher production- a symbiotic relationship which the OMAID project would like to capitalize. The bee growers and horticulture crop growers are to be sensitized on these two mutually beneficial existences of these organisms in the ecosystem. *The responsibilities to comply with above recommendations would fall on MAIL/OMAID.*

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## LIST OF ABBREVIATIONS AND ACRONYMS

<b>BP/OP</b>	World Bank Policy / Operational Policy
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>ESS</b>	World Bank Environmental and Social Standards
<b>FCC's</b>	Farmer Collection Centers
<b>FPICP</b>	Free, Prior, Informed Consultation and Participation
<b>IAFPs</b>	Integrated Agri-Food Parks
<b>MAIL</b>	Ministry of Agriculture, Irrigation and Livestock
<b>MOIC</b>	Ministry of Industry and Commerce
<b>MUDL</b>	Ministry of Urban Development and Land
<b>NGO</b>	Non-Government Organizations
<b>OMAID</b>	Opportunity for Maximizing Agribusiness Investments and Development Project
<b>PAP</b>	Project-Affected Person
<b>PMU</b>	Project Management Unit
<b>RAP</b>	Resettlement Action Plan
<b>RPF</b>	Resettlement Policy Framework
<b>RTHs</b>	Rural Transformation Hubs



## 1. INTRODUCTION

### 1.1 COUNTRY CONTEXT

According to Afghanistan Statistical Yearbook (2017-18), National Statistics and Information Authority, Islamic Republic of Afghanistan, the estimated per capita income including poppy was USD 719 in 2017-18 and without poppy, it was USD 681 respectively, one of the lowest in the World.

While in 2017-18, Afghanistan achieved a growth rate of 3.8% in the agricultural GDP (excluding poppy), the same had fallen into negative zone in 2015-16 (- 5.7%). Within the components of agricultural GDP, the growth rate in cereal production has consistently fallen in the negative zone over the years since 2015-16 (-14.2% in 2015-16, - 4.7% in 2016-17 and – 10.0 % in 2017-18), which is a matter of concern as depletion in cereal production, especially wheat, increases food insecurity and national vulnerability. In relation to cereal production, growth rate in fruit sub-sector have been noticeable (7.2% to 25.4% during 2015-16 and 2017-18).

While per capita GDP does not increase in Afghanistan, it is no surprise that poverty ratio declines over the years. The Afghanistan Living Conditions Survey (ALCS) of 2016-17 estimated that 54.5% of the total population were below the poverty line, while rural poverty was estimated at 58.6%. The increase in poverty estimate was also significant from 38.3% in 2011-12 to 54.6% in 2016-17. If the absolute population falling below the poverty line is of any indicator of increase in economic vulnerability, the ALCS survey estimated that 13.0 million people in the rural areas were below the poverty line indicator in 2016-17. The National Vulnerability and Risk Assessment Survey of 2007-08 and 2011-12 had found that 7.1 million and 8.8 million people were below the poverty line respectively.

### 1.2 AGRO ECOLOGICAL ZONES

For analysis, seven agro-climatic zones of Afghanistan have been provided. This classification of agro-climatic zones was published in the "Beekeeping Survey Report (2014)", Beekeeping and Animal Husbandry Development Project (BAHDP) and Beekeeping Development Project (BDP), MAIL. The zones are as follows: Central agro-climatic zone (CACZ), Eastern agro-climatic zone (EACZ), Northern agro-climatic zone (NACZ), North-East agro-climatic zone (NEACZ), Southern agro-climatic zone (SACZ), South-West agro-climatic zone (SWACZ), and Western agro-climatic zone (WACZ). In **Table 1. 1** , the distribution of provinces by their names and identification of Provinces where agro-park would be located have been provided.

It may be noted that though the name of the Province where the agro- park would be located have been identified against the concerned zone, it does not necessarily mean that only such Province would be the project beneficiary. On the contrary, the beneficiary Provinces for each agro-park would be influenced by the type of infrastructure proposed to be constructed and the catchment area that these parks could service. Therefore, the detailed physical features of these Provinces that have been provided in the following sections are only selective and not exhaustive of the entire agro-climatic zones.

The agro-climatic zones of Afghanistan are complex and heterogeneous. Under each agro-climatic zones, there are large variations in physical and climatic conditions, making broad generalization a difficult task. Moreover, physical characteristics of Afghanistan are analysed

by many scientists/researchers/administrators under different contexts. Admittedly, this is not the focus of the present study and therefore for the sake of general purpose and also as used under the context of a global Climate Change Study in Afghanistan<sup>1</sup>, the agro-climatic conditions are considered for our present study.

**Table 1. 1: Agro-climatic zones, provinces and the proposed location of the Agro Parks**

No	Name of the agro-climatic Zones	Provinces	Provinces to be located with Agro-Industrial Park
1	Central agro-climatic zone (CACZ)	Kabul, Kapisa, Parwan, Panjsher, Bamyar, Ghazni and Wardak	Kabul
2	Eastern agro-climatic zone (EACZ)	Kunar, Laghman, Nangarhar, Nuristan	Nangarhar
3	Northern agro-climatic zone (NACZ)	Balkh, Faryab, Jawzjan, Samangan and Sar-e-pul	Balkh (Mazar e – Sharif)
4	North-East agro-climatic zone (NEACZ)	Takhar, Baghlan, Badakhshan, Kunduz,	
5	Southern agro-climatic zone (SACZ)	Khost, Logar, Paktika and Paktia	
6	South-West agro-climatic zone (SWACZ)	Daykundi, Helmand, Kandahar, Urozgan and Zabul	Kandahar
7	Western agro-climatic zone (WACZ)	Nimroz, Badghis, Farah, Ghor and Herat	Herat
Total		34	

### 1.3 CONTEXT OF IPM

As specified in the PAD, a PMP is triggered as safeguard policy, conforming to Operational Guidelines of the World Bank OP 4.09. In sectorial projects funded by the World Bank, it is required to prepare a generic PMP at the appraisal stage and upgrade that document during the implementation phase. The plan should be designed to minimize potential adverse impacts on human health and the environment and to advance ecologically based Integrated Pest Management (IPM). The plan should be established based on ecological and specific on on-site evaluations of local conditions conducted by appropriate technical specialists with experience in participatory IPM.

#### 1.3.1 Objectives of PMP

1. To identify major pests and diseases affecting crops, typology of pests and diseases and pest management approaches adopted in the project area. Similarly, provide a status of sanitation and hygienic practices adopted in milk production and scope for improving quality milk production for domestic consumption and improving benchmark in quality production;

<sup>1</sup> Climate Change Scenarios of Agriculture in Afghanistan May 2017, Ministry of Agriculture, Irrigation and Livestock, The Islamic Republic of Afghanistan

2. To analyses legislative and regulatory framework available in the country for pesticide management;
3. To study different institutional framework available in the country for pesticide management, institutional responsibilities and their effectiveness in implementing environmentally desirable pest management policy taking into account present practices, trade, pesticide import regulation and control;
4. To examine if any IPM policy is presently in place, assess preparedness of the country in implementing IPM and provide guidelines towards adoption of IPM regime for growing healthy crops to improve incomes of the farmers;
5. To assess management capacity and capability to implement mitigation measures through the existing institutional structure and responsibility to implement PMP including grievance mechanism;
6. To identify monitoring indicators of potential impacts of pesticide management and implementation of IPM regime and providing a framework for pest management advisory services through implementing ICT based pest surveillance and monitoring system.
7. To recommend appropriate manpower structure for PMP implementation and quality milk production, capacity building through training and orientation and generating awareness among the stakeholders about adopting scientific pest management strategies leading to IPM regime in agriculture sector and quality milk production in dairy processing sector.
8. To suggest appropriate policy reforms defining roles and responsibilities of all institutions associated with implementation of PMP with specific recommendations for different institutions in pesticide management.

### **1.3.2 Scope of PMP**

The scope of the PMP study covers field crops (cereal, pulses and legumes), industrial crops and fruits, besides apiculture and non- conventional crop like mushroom and apiculture. The last two crops have the potential for commercial agriculture and therefore purposively considered for the present study. The study has also covered dairy processing value chain, beginning with milk production, intermediate bulking of milk and at the dairy plan level.

### **1.4 METHODOLOGY**

The methodology of the study was so designed to elicit information from all relevant stakeholders in an appropriate manner and also taking into account the requirement of studying different government rules, legislations, framework and policies and also conducting desk research in the context of Afghanistan and other associated countries. Following a blend of primary data, secondary data and also in consultation with stakeholders including concerned government officials and functionaries, the methodology of the study was enriched to cover all segments.

As mentioned in the TOR, a generic PMP was to be prepared for project appraisal and in consonance with this purpose, data collection protocol was focused towards collection and gathering of secondary data, ascertained from desk research, and visiting relevant Government offices and NGOs. Our preliminary search indicates that certain law/regulations/policy are in place in Afghanistan.

Before PMP was recommended, it was desirable that cropping pattern and associated agro-ecological information of these areas around these parks would have to be ascertained. This was completed following analysis of data as published in Afghanistan Statistical Yearbook 2017-18. The following information was gathered covering all important crops (Cereal crop, pulse Legume, Industrial crop [castor, oilseeds and cotton], Vegetable, Fruits and Nuts, Zafran).



















In the next step, after identifying important crops with potential for processing and value addition for the export market and internal market as well, it was necessary to appreciate the present Pest Management practices followed by the farmers/growers, which could form the Baseline information. This part of the exercise was completed through stakeholder meetings (group meeting of the farmers at all locations).

Appropriate questionnaire/checklist was prepared depending on the profile of the respondents and all interviews were conducted on the basis of checklist so prepared with an option for noting down open questions in informal and harmonious manner. All interviews were conducted by the local consultant of the PMP project.

It appeared that MAIL was responsible for implementing PMP as part of regular extension activities in the agriculture sector. It was therefore necessary to understand the organizational structure in place in MAIL. While doing so, an attempt was made to understand the organizational structure within PMP responsible for PMP, no of persons in each province, number of years of experience, job functions of these people, their perceptions of PMP implementation, technical knowledge of these persons, their capacity to help the stakeholders for improving PMP satisfactorily. A similar approach was adopted by contacting concerned officer and staff of General Directorate of Animal Husbandry within MAIL.

At the grass-root level, 2 provinces had been identified for collection of information from the progressive farmers/enlightened farmers, traders and other members of the value chain. About 10 such group discussions were conducted to represent stakeholders with crop segment and dairy segment **Table 1. 2.**

**Table 1. 2: Provinces covered for data collection and modules used**

Provinces covered	PPQD	Home Economics	Livestock	Farmers' GDs
MAIL				
Kabul				5 GD done
Nangarhar				
Mazar-e- Shariff				5 GD done
Kandahar				
Herat				5 GD done

Note: Under Home Economics module, Apiculture and Mushroom have been covered. GDs conducted in Baghbanha, Mir Daoud, Panj Gana, Pushkoh Mulla Yasine and Shakur Khani villages of Herat Province and Shoor Zamin, Mullag Quli, Naib Abad-1, Naib Abad-2 and Yakka Poze villages of Mazar-e-Sharif Province; and Chawk-i-Kohsafi, Dewana Qala Dag Area, Barik Aab, Dewan Qala Village, Dewana Qala Village South of AgriPark in Kabul Province.

GPS Coordinates of the venue of the meetings including latitude, longitude and altitude of the venue will have to be collected. In order to ensure the veracity of the Group Discussions,

name, social status and mobile number of the participant of such meetings were recorded. Data collection was completed by end July.

It is also to be mentioned that the methodology has also considered two IPM reports of contemporary period- - National Horticulture Project (NHP) and Improving Afghanistan Input Delivery System (IAIDS), both assisted by the World Bank, and housed under MAIL with commonalities in the approach. However, the present IPM takes into considerations the important lessons of 2 previous IPM studies and makes improvisations over them, adding value to the IPM sector in Afghanistan.

#### **1.4.2 Documents, legislation and regulations used in PMP**

- Pesticide Law 2015;
- Draft Plant Protection and Quarantine Law & Regulation, 2012;
- Draft Animal Health & Veterinary Public Health Act 2012.
- Food Safety Law 2012
- Afghanistan Environment Policies, Laws and Regulations

Attempts were made to procure the above documents from concerned Ministries/Directorates in Kabul, which were studied and salient features were noted. As some of these documents were in local languages and given tight time schedule, many documents could not be translated into English. However, local interpreter could extract salient features directly from these documents and reproduced in his report.

#### **1.4.3 Assumptions**

As all sub-components of the OMAID project is yet to be ascertained, for the purpose of appraisal of this project, a generic PMP was necessary, it was not possible to capture farmer level data from farm survey. The baseline scenario therefore was ascertained from collection of group data, which has been validated during discussions with government stakeholders. In addition, detail cropping pattern of all Provinces (34) within the Agro Climatic zones could not be completed due to lack of clarity about the total catchment area or influence zone of a park. Therefore, one Province from each agro-climatic zone has been identified for understanding the crop profile and potential for milk production. As these 5 Provinces are geographically spread out covering the entire country, it was felt that the data and analysis presented here are representative of the potential catchment area of the proposed agri park.

#### **1.4.4 Constraints**

The preparation of the report was constraints by the non- availability of any credible data or insights from the secondary sources. Moreover, the concept of IPM tool and its application in minimizing pest and disease attack and mitigating negative environmental impact and public health hazards is poorly appreciated in government parlance. Therefore, gathering credible field level demonstrable evidence and highlighting them for the present study could hardly be achieved for want of data and sample. There are some sporadic attempts made by the NGOs in specific projects, but were localized and no reference material or insights could be gathered as most of these experiments have been concluded. However, some discrete evidence could be obtained from FAO sponsored Farmers Field School (FFS) project, but they were in the realm of demonstration project, not inclined towards IPM.

Though there are references of the following Government reports/Surveys, but these reports could not be obtained from the Government source. These are:

- Survey of Insects & Diseases;

- Plant Protection & Quarantine Department Survey Report;
- Pesticide Market Survey.

In its present form, the PMP is only suggestive, as it is generic in nature. However, much detail activities (sub projects) will have to be performed when the proposed Agri Parks commence will commence their operations and commodity profile under each park will come to light through processor and farmers' linkages. So, more specific and focused PMP will have to be prepared after analysing commodity or activity profile. This was also perceived to be another constraint.

#### **1.4.5 Resolving constraints**

Constraints were however overcome, to the extent possible, by contacting the concerned officials and staff of those projects including PPQD personnel and intensive discussions were organised. These discussions threw sufficient qualitative data that have further been validated during field survey involving cross section of the stakeholders. Further, some anecdotal reference could also be gathered through internet survey and some material gathered through inter personal interactions with the concerned officials.

It is a fact that had those above referenced survey reports were available, it would have facilitated identification of pests and insects that were commonly found in Afghanistan, and also providing background information on pesticide trade. These deficiencies are however noted and provisions have been made to complete these surveys under OMAID project and accordingly, financial provisions have been suggested (refer Chapter 7).

As the present document provides a comprehensive outline of a generic PMP with operational guidelines, it was felt that preparation of specific PMP will be easier given the template available and data analysed and inferences contained. Therefore, the generic PMP will in fact provide synergy to the preparation of more specific PMP.

### **1.5 ORGANIZATION OF THE REPORT**

The report is organized through 11 chapters. Chapter 1 throws light on country context, objectives of PMP, methodology, constraints in data collection and process through with constraints were overcome. Chapter 2 brings in details about the OMAID Project, project description and project development objectives.

Chapter 3 provides information on crop pest, pest in horticulture and fruit crops and crop specific pest management strategy, and information on pest and disease issues in dairy cattle, management strategy and issues related to milk quality and milk contamination.

Chapter 4 is devoted towards studying the existing legislation and institutional framework to implement IPM, vector-borne disease, pest management approaches in vector disease control. In Chapter 5, concept of IPM, different tools and techniques that are practiced in IPM and constraints in IPM implementation have been discussed. Chapter 6 discusses about the pesticide management and associated risk. Chapter 7 covers understanding present practices of dealing with pests and diseases which also cover screening check list for assessment of proposed sub projects while Chapter 8 is devoted towards action plans, strategic guidelines, monitoring and evaluation plan and estimated budget. In Chapter 9, the issue of capacity building and training details are discussed and Chapter 10 contains pest and disease reporting mechanism while Chapter 11 covers summary and recommendations of the report.

## 2 THE OMAID PROJECT: DESCRIPTION AND PROJECT DEVELOPMENT OBJECTIVES

### 2.1 PROJECT BACKGROUND

The background concept note to the OMAID project has been articulated by the World Bank<sup>2</sup>. There is a compelling case for investing in agriculture/agribusiness in Afghanistan. The sector accounts for about 25 percent of national GDP and is the second-largest sector after services. This percentage becomes even higher if processing of agricultural products is included. More than 80 percent of the population and nearly 90 percent of the poor live in rural areas, and agriculture plays a key role in their livelihoods. About half of all households derive at least part of their income from agriculture, which employs about 40 percent of the national workforce.

Notwithstanding recent progress, the agriculture sector continues to suffer from the recurring and long-lasting political instability leading to structural constraints and low productivity. While significant results have been achieved in recent years regarding the development of selected value chains (i.e., horticulture crops), increases in productivity, and expansion of irrigation infrastructure, there is a long way to go to utilize the full potential of the agricultural sector - including: developing the necessary national capacity to carry out the structural reforms and other changes required by the sector's development strategy; revamping the rural institutions and infrastructure; improving access to modern production and post-harvest technology; and facilitating access to finance.

Creating market access to the rich agro produces of Afghanistan and linking the primary producers with the final consumers through a credible value chain has been recognized and proven to be one of the most desirable alternatives to ensure higher prices to the producers. Developing agro value chain and harnessing national and international markets through improved production, storage, processing and marketing cannot be overemphasized in the context of Afghanistan. This would however require a focused approach in developing agro sector under a well-coordinated plan and effective implementation resolving the obstacles that stand in the way of agro-industrial development. But this would call for creating sustainable institutions which could be controlled and managed by the producers as principal stakeholders to be managed by professionals and technical manpower and supported by producer friendly financial and fiscal policies and institutional support by the Government.

Agribusiness value chains are undeveloped with a low ratio of food processing to primary agriculture. The agro-processing sector in Afghanistan is poorly developed due to unpredictable policy environment, inadequate infrastructure (logistics, energy, storage, handling and packaging, etc.), lack of access to finance to make new, and competition from imported processed products that benefit from greater technological expertise and economies of scale. Furthermore, poor security, high land lease rates, and costs of operation have led to several businesses established in industrial parks (Herat, Mazar-i-Sharif, Bagram, etc.) to cease operations. Compared to neighbouring countries, costs of production in Afghanistan are high, and the costs and risks associated with export are equally high. While it is quite easy to start a business, the country ranks poorly in enforcing contracts, trading across borders, protecting minority investors, registering property, dealing with construction permits and providing electricity. The World Bank's annual Doing Business rankings for 2017 show that

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<sup>2</sup> The World Bank: Afghanistan Accelerated Agribusiness Development Project (AAADP); TOR for preparation of ESMF, PPM and RPF, September 2019. (mimeo).

Afghanistan continues to be one of the most challenging places in the world to do business; the country is ranked 183 among 190 economies in terms of Doing Business. At the same time, regulations and institutions that could facilitate agricultural production and trade, such as SPS enforcement, food safety standards and export certification, are lacking.

To reverse this trend, the Government of Afghanistan has developed a strategy for promoting agribusiness in the country; the Afghanistan evaluation (M&E) and establishing the governance structure for the coordination and implementation of the Afghanistan Agribusiness Charter.

## 2.2 PROJECT DESCRIPTION

The proposed Project will be structured as an Investment Project Financing (IPF), funded by an IDA grant in the amount of US\$25 million and a US\$150 million contribution from the Afghanistan Reconstruction Trust Fund (ARTF) over a five-year period<sup>3</sup>. It will focus primarily on the agro-processing segments of the horticulture and livestock value chains, including the critical linkages to upstream raw material. These were identified as priority value chains for development under the national development policies [National Priority program 5 (NPP) 2016-2021 and National Export Strategy 2018-2022 (NES)]; specifically: horticulture products (dried fruits and nuts, fresh fruits and vegetables - mostly for exports), and livestock products (poultry, eggs, and dairy for domestic markets, in competition with current imports).

Field operations will be implemented sequentially in the five selected areas of the country which have a comparative advantage to produce for these value chains (Mazar e-Sharif, Kandahar, Kabul, Herat, and Nangarhar). The project will adopt an integrated perspective to developing the selected chains from production to marketing on the domestic and regional markets, or for export to international markets. It will support access to finance for services and activities of entrepreneurs who are ready to engage in intensification of their production and/or develop value-added activities to primary production through diversification of processing activities. It will also support the logistics between agricultural production and the market (including processing, storage, and transport). This will require the close involvement with Partner Financial Institutions (PFIs), as well as partner companies with the framework approach of productive partnerships.

### 2.2.1 Constraints to be addressed through the project

The project will address the following constraints to agri-business development identified as part of the consultation process for the preparation of the Afghanistan Agribusiness Charter:

- a) *High cost of doing business in Afghanistan*: the country continues to be one of the most challenging places in the world for businesses to operate due in part to corruption and lack of transparency; lengthy and burdensome bureaucratic policies and procedures that cause substantial costs and contribute significantly to increased corruption and inefficiency. In addition, Afghanistan's tax regime is confusing, complicated and costly, particularly for the SMEs that play a key role in the agricultural sector;
- b) *Access to markets remains challenging for Afghan agri-food enterprises*: Afghanistan has made some improvements in facilitating imports and exports; however, with the WTO Trade Facilitation Agreement coming into force, major reforms are still needed

<sup>3</sup> Afghanistan Accelerated Agribusiness Development Project (AAADP): Terms of Reference (TOR) for Consulting Firm for preparation of ESMF, PMP, RFP, September 2018 ( unpublished); World Bank



(standards and certification regime particularly which is rudimentary and lacks the equipment and infrastructure required to test for key quality and food safety standards);

- c) *Access to industrial serviced land for agri-food enterprises and SMEs is limited*; available serviced land remains a severe constraint to upgrading the agricultural sector; agribusiness firms face challenges in trying to acquire productive plots due to patronage, poor management and rent-seeking behaviour;
- d) *Access to finance*: producers and processors lack access to finance because of ill-adapted financial products, weak capacity of financial institutions, lack of credit guarantees and overall poor financial outreach and education; and
- e) *Producer organizations are inefficient*: cost-savings, access to technology and markets can, in theory, be achieved through stronger producer organizations and cooperatives as part of productive partnerships with processors and traders; in reality, however, many cooperatives have been created mainly for the purpose of channelling aid to farmers; current cooperative and farmer organization laws therefore require revision.

### **2.3 Project Strategy**

The project strategy is built on the premise that Afghanistan requires a big push to industrialization for the economic development of large majority of the primary producers and the stakeholders in the value chain. By putting in place basic infrastructure required for agro-processing for value addition and market access, implementing systems and procedures for backward integration with the primary producers and improvising quality of produces and also putting in place an appropriate organizational structure backstopped by technical staff, the efforts would be self-sustaining. The process would lead to structural reform in the agro-industrial production sector, which holds much promise for development. It is also to be implicit in the strategy that given a successful implementation of the project model, demonstration effect would be generated paving way for increasing scope for further growth in agro-allied sectors. So, the design of the project implicitly would trigger multiplier effect in the macroeconomic structure of Afghanistan.

#### **2.3.1 Creating Afghan Charter**

In pursuance with the objectives of promoting agrarian growth and development, Afghanistan Agribusiness Charter has been prepared in 2018. It is designed to facilitate and improve policy, partnerships and private sector activity in agribusiness, improve effectiveness and transparency in state support for the development of agribusiness, and offer a platform for improved coordination. This is consistent with the emerging consensus in Afghanistan that if agriculture is to be the main sector to stimulate economic growth then public investments should go beyond improvements in on-farm productivity to cover agribusiness and agro-processing. Against this background, the vision of the Agribusiness Charter is of *“a competitive agribusiness sector generating sustained economic growth and diversifying employment opportunities, benefiting the Afghan population”*. This sector will be made up of highly productive and profitable value chains that: (i) effectively link small and medium-size agricultural producers to markets, inducing productivity gains and increasing prosperity through income diversification and value-addition processes; (ii) supply higher-valued and differentiated food, fibre and feed to consumers at local, regional and global markets; (iii) increase the incomes of producers; and (iv) act as an effective basis for industrialization, providing employment and entrepreneurial opportunities in both rural and urban areas.

### 2.3.2 *Project Development Objectives (PDOs)*

Component 1: Improving the enabling environment for agribusiness development (US\$ 22.5 million)

Subcomponent 1.1: Establishing the overall governance and implementation of the Agribusiness Charter (US\$ 5 million).

Subcomponent 1.2. Strengthening the capacities of the Ministry of Industry and Commerce (US\$ 7.5 million).

Subcomponent 1.3. Addressing food safety and sanitary and phytosanitary issues (US\$ 10 million).

Component 2: Support for the development of integrated agri-spatial solutions (US\$ 142.5 million)

Subcomponent 2.1: Investing in critical agri-industrial infrastructure in selected provinces (US 127.5 million).

Subcomponent 2.2: Supporting agribusiness investments in the IAFPs's broader catchment areas (US\$ 15.0 million).

component 3: Project Coordination, Monitoring, and Crisis Management (US\$10 million).

### 2.3.3 *Project activities to be promoted*

In as much as different types of economic and ancillary support activities identified for agri-food parks are concerned, a list is provided below. However, more activities could also emerge when the project is rolled out which could be finalized by the Project Implementing Agency (i.e. MOCI) in consultation with the World Bank.

- Agro-dealers and input supply stores;
- Extension services and training, by Government bodies, donors, and NGOs;
- Testing and certification laboratories;
- Warehousing, grain silos, and cold storage providers;
- Truck parking, container stacking, and rail yards;
- Agro-processing units, including for the packaging and/or processing of fresh fruit (juice, drying of fruits and nuts, bottling, etc.);
- Dairy processing;
- Commercial and auction centre/ wholesale market;
- Green area/ parks, vehicle parking, service buildings;
- Maintenance and repair facilities and shops.
- Any other, relevant to the project

### 2.4 CONSULTANT'S VISUALIZATION OF THE FCCs AND RTHs

Since the project is in preparatory stage, the structure and role of down the line rural infrastructural set up likely to be evolved through consultation with stakeholders, Government departments, World Bank Task Team members and others, it was necessary that a visualization of the proposed set up is broadly conceptualized with purpose of facilitating completion of the TORs of the present study (PMP). Specifically, manpower requirements, training and capacity building and manpower costs were to be estimated, which could be possible if an organizational framework is in place. Therefore, the Consultants have prepared a framework to fulfil those requirements of the TOR, as presented below.

### **2.4.1 A conceptual model depicting FCCs and RTHs**

#### **2.4.2 The essence of FCC and RTH**

One of the principal objectives of the OMAID project is to establish a direct linkage between the rural producers, many of them are located distantly from the market, with the intermediate processors via the Farmer Collection Centres (FCCs). While the FCCs will be the point for aggregation (collection) of agricultural produces, it would have facilities for weighing and testing equipment, drying yard, pre-cooling unit and milk collection set up. These are expected to be located nearer and within accessible distance from the producers' doorstep or within the negotiable distance, subject to economic feasibility and logistics.

The project has envisaged establishment of Rural Technology Hubs at the sub-Provincial level, and they will carry out primary processing (storage, grading, sorting and packaging). These Hubs will also be supplying agricultural inputs (fertilizers, seeds, pesticides, agricultural machinery, etc) to the producers. It is expected that supplies of the FCCs will be dispatched to the RTHs, which will be a second-tier rural infrastructure that OMAID proposes to create.

#### **2.4.3 Benefit to the farmers**

Farmers will be directly connected with the FCCs, eliminating the middlemen, who normally exploit the farmers, and the farmers tend to lose in the trade. Further, at the time of market failure, these middlemen discard the producers, and the producers fend for themselves without any mode to sell their products. So, selling to the middlemen cannot be a sustainable solution. Under the present model, this will be avoided as the producers will get better price for their produces through transparency in weighing, quality-based pricing and receiving payment based on quality output. All these steps will be modernized ensuring transparency in the transaction. On the whole, the rural collection system will be organized in a manner whereby distress sale will be avoided and the producers would get fair price round the year.

Producers will again gain from input supplies at pre-specified prices from the RTHs. Quality seed, fertilizer, agrochemicals, pesticides, agricultural machinery for custom hiring, etc will be made available to the farmers from the RTHs following fairness in weighing and competitive prices. These RTHs may be provided with banking facilities so that the farmers can receive payment directly into their bank account. In addition, RTHs will also provide farm advisory services on scientific method of farming following quality seed, proper application of manure and chemical fertilizer, pesticides and agrochemicals and other services. So, the RTHs will essentially provide single umbrella services to the farmers.

#### **2.4.4 Regional benefit**

The regional benefit need not be overemphasized. The regional economy will get a boost through increased flow of goods and services. Substantial employment will be generated in collection, transportation, services sectors benefitting direct and indirect stakeholders. In short, huge multiplier effect will be generated in the regional economy.

#### **2.4.5 Structure of the Project design**

The OMAID project is designed in a manner that a 3 tier infrastructure will be created through private initiatives- - FCCs at the first-tier (without value addition of produces), RTHs as the second tier, with minor value addition in terms of grading, sorting, packaging and processing, while the Agro-Industrial Parks as third tier for final processing, packaging in consumer packs, branding and marketing. They will also harness export market based on contracts and agreements with overseas buyers. The proposed Agribusiness Charter would assist these

entrepreneurs in establishing linkages with the manufacturers and provide market advice and other information.

#### **2.4.6 Public-private partnership**

The project will be built on the principle of Public-Private Partnership. Land for the Agri parks will be made available by the Islamic Republic of Government of Afghanistan, while basic infrastructure will be created under the project, while FCC and RTHs will be private entrepreneurs driven but the entrepreneurs of FCCs and RTHs will be entitled to receive project grant assistance subject to some upper limit to be specified under the project. This will ensure that private investors will retain considerable stakes in the project.

#### **2.4.7 Probable number of FCCs and RTHs under OMAID**

The sub-projects of FCC and RTH will follow the following guideline of the World Bank, indicated in PAD.

1. Technical assistance for the design of the sub-projects (FCC or RTH). This would include support for technical assistance for preparation of sound business plans, appropriate choice of technology, support for procurement, etc., and the corresponding preparation of loan applications;
2. Provision of a matching grant. The grant will consist of one-time financing in the amount of 70 percent of eligible sub-project costs, including: (i) technical assistance mentioned in point 1 above; (ii) new building facilities and equipment; (iii) rehabilitation or expansion of existing premises; (iv) upgrading of existing processing units outside the IAFPs; and (v) initial inventories and permanent fraction of required revolving funds.

Each IAIP is expected to be served by a network of FCCs and RTHs which provides market linkages to farmers. The Project foresees facilitating the creation of 25 FCCs (5 per province – each for a maximum investment of \$100.000) and 15 RTHs (3 per province – each for a maximum investment of \$200.000).

OMAID will not be involved in the construction of the sub-project (FCC or RTH). This will be the responsibility of the investor which could be a farmer group, a trader, a business person, etc. These actors will provide their own land for the sub-projects and will also contribute their part in terms of finance. The Government will not be involved in any land transfer for the FCCs and RTHs.

All FCCs and RTHs will be financed on clear business need and financial viability. They will be privately owned and managed.

### 3 PEST AND PEST MANAGEMENT APPROACHES IN AGRICULTURE AND PUBLIC HEALTH

#### 3.1 MAJOR PESTS AND DISEASES FOUND IN AGRICULTURE IN AFGHANISTAN

##### 3.1.1 Purpose

The objective of this section is to study the pest management of the crops with a view to increasing incomes of the stakeholders. The objective is also directed to ensure food security and to improve the livelihoods of the farmers and to address public and environmental health issues through implementation of the OMAID project. Specifically, these will be achieved with the use of appropriate inputs and priorities for agricultural investments and policies under the National Agricultural Development Framework.

It has been noted from the Group discussions and also reported through the desk research that the farmers of Afghanistan have less awareness and knowledge about the use of pesticides, the risk associated with it, environmental impact, influence on other non-target organisms and on public health. The pesticides used in Afghanistan do not have a label like red (with high risk) yellow (medium risk) blue (low risk) and green (safe). Usually, they get information from the pesticides vendors and from the staff of the Plant Protection and Quarantine Directorate of the MAIL. Both sources of information are often misinformed and unreliable. As a result, the farmers frequently receive incorrect diagnosis and therefore, in many cases, they make wrong recommendation that leads to improper use of pesticides. Many of the pesticides prescribed are inappropriate in formulations, beyond date of expiry, banned in other countries or may be classified by WHO as extremely hazardous (Ia) and highly hazardous (Ib) which lead to the misuse of pesticides.

##### 3.1.2 Overview of the major pest problems recorded

###### 3.1.2.1 Storage pests

According to Plant Protection and Quarantine Department (PPQD) of MAIL's survey report, substantial losses are caused due to attack of storage pests such as lesser grain borer, *Rhyzopertha dominica* (Fabricius)(Bostrichidae: Coleoptera); Khapra beetle, *Trogoderma granarium* Everts (Dermestidae: Coleoptera); Red flour beetle, *Tribolium castaneum* Herbst, (Tenebrionidae: Coleoptera), Saw-toothed grain beetle, *Oryzaephilus surinamensis* Linnaeus (Silvanidae: Coleoptera), and the Angoumois grain moth, *Sitotroga cerealella* Olivier, (Gelechiidae: Lepidoptera), *Almond moth*, *Ephestia cautella* Walker, (Pyrilidae: Lepidoptera) and Rice moth, *Corcyra cephalonica* Stainton, (Pyrilidae: Lepidoptera). Besides the above-mentioned pests, major damage is caused by Flour Beetle, *Cryeodon cerratus* (Seed Beetles) and Bean Beetles damage are estimated to be a maximum 30% on Rice, Flour, Beans and Oil Seeds in storage. Other associated problems include loss of seed viability and unsuitable for human consumption and export. The infestations can be higher at field level. The unfortunate part of the scenario is that damages are irreversible, and the entire product may be wasted if stored in an improper way. Home stored farm products are the most vulnerable in Afghanistan as the designs of the stores are inadequate for maintaining the quality of grains for long term storage.

### 3.1.2.2 Crop pests

#### 3.1.2.2.1 Field crops

The major crops cultivated in Afghanistan and their major pests and diseases are documented in a number of publications. The details of the major pests and diseases of major field crops, horticultural crops (vegetables and fruits) and industrial crops cotton, castor beans, and sugar beets are presented in the following sections. Alongside, their management practices are also indicated.

Besides, the storage pests listed above, the pests and diseases of major field crops are discussed along with their recommended management strategy in **Table 3. 1**.

**Table 3. 1: Occurrence of major Pests and Diseases of field and horticultural crops in Afghanistan with their present and recommended management practices.**

Crops Cereals	Pest	Recommended management practices
Barley	1. Sun pest 2. Locust: Moroccan locust, Local locust Hoppers (wingless locust)	<ul style="list-style-type: none"> <li>• Use tolerant or resistant crop cultivars;</li> <li>• The proper time of sowing to desynchronize with a peak incidence of pests Use of botanicals at initial pest attack;</li> <li>• Use of microbial pesticides and if population exceeds ETL, then safe pesticides may be applied;</li> <li>• Encourage natural vertebrate predators like birds, amphibians, etc.</li> <li>• Install birds perching sites along the field margins;</li> <li>• Use neem-based pesticides Use the need-based application of safe pesticides;</li> <li>• Use of microbial pesticides and if the population exceeds ETL, then safe pesticides may be applied</li> </ul>
	3. Armyworm, (Noctuidae: Lepidoptera) Pseudaletia unipuncta	<ul style="list-style-type: none"> <li>• Ploughing after harvesting to destroy hibernating stage of insects.</li> <li>• Inundated release of egg and larval parasitoids.</li> <li>• Encourage natural vertebrate predators like birds, amphibians, etc.</li> <li>• Apply used mobile oil around infested plot to stop invasion to nearby plots</li> <li>• Install birds perching sites along the field margins</li> </ul>

Crops Cereals	Pest	Recommended management practices
		<ul style="list-style-type: none"> <li>• Use of microbial pesticides and if the population exceeds ETL, then safe pesticides may be applied</li> </ul>
	<p>Disease:</p> <p><b>1.Foliar diseases</b> Brown rust, Yellow rust</p> <p><b>2.Stem-based diseases</b> Stem rust</p> <p><b>3. Virus diseases</b> barley yellow dwarf virus, soil-borne mosaic viruses</p> <p><b>4. Fungal diseases</b> Loose Smut</p> <p><b>5. Bacterial Diseases</b> Blight (<i>Xanthomonas campestris</i> pv. <i>Translucens</i>)</p>	<p>To manage the diseases following steps to be considered, field sanitation, use of tolerant and resistant crop variety, cleaning the crop debris, destruction of alternative host plants, balance dose of manure and fertilizers, prevention of entry of unforeseen disease materials, use of safe chemical to suppress the fungal diseases, use of plastic mulch prior to sowing to reduce bacterial diseases.</p>
	<p><b>Weeds</b></p>	<ul style="list-style-type: none"> <li>• Hand weeding at critical stages ensure the crop growth and development;</li> <li>• Mulching with hay or cover crop may be explored;</li> <li>• Plastic mulching using blue or black plastic sheet may be useful;</li> <li>• Use of safe weedicides at need-based condition</li> </ul>

Crops Cereals	Pest	Recommended management practices
Maize	<p>Corn earworm (<i>Heliothis armigera</i>), Fall army worm (<i>Spodotera frugiperda</i>) Stem borers (<i>Chilo</i> spp.) Aphids (<i>Rhopalosiphum maidis</i>) are considered as major pests</p> <p>While the following are minor pests <b>Hoppers- Grasshoppers,</b> <b>Corn leafhopper</b> <b>Maggots-</b> Seed corn maggots <b>Mites-</b> Spider mites, <i>Oligonychus</i> spp. Brown wheat mite, <i>Petrobia latens</i> <b>And Thrips</b></p>	<ul style="list-style-type: none"> <li>• Ploughing after harvesting to destroy resting stage of insects; Inundated release of egg and larval parasiteoids;</li> <li>• Encourage natural vertebrate predators like birds, amphibians etc.;</li> <li>• Use of pheromone traps to attract males to disrupt mating;</li> <li>• Apply used mobile oil around infested plot to stop invasion to nearby plots; Install birds perching sites along the field margins;</li> <li>• Use of entomopathogenic fungi and if population exceeds ETL, then safe pesticides may be applied; Besides, following techniques reduce significant amount of pest pressure;</li> <li>• Optimum nutrient management;</li> <li>• Crop rotation with legume crops; Buried crop residue well below the soil at the corner of the plot;</li> <li>• Crop sanitation to keep free from pest remnants;</li> <li>• Use of resistant and tolerant crop cultivars for production of healthy plants;</li> <li>• Use of predatory mite species should encourage to control pest mite species and other small sucking insects.</li> </ul>
	<p><b>1. Fungal diseases</b> Smut (<i>Ustilago nuda</i>, <i>Tilletia</i> spp.).</p>	<ul style="list-style-type: none"> <li>• To manage the diseases;</li> <li>• Field sanitation by destroying disease inoculum;</li> <li>• Introducing tolerant and resistant crop variety;</li> <li>• Keep clean from the crop debris;</li> <li>• Destruction of alternative host plants;</li> <li>• Use of balance dose of manure and fertilizers;</li> <li>• Use of safe chemical to suppress the fungal diseases,</li> </ul>
	<p><b>Weeds</b></p>	<ul style="list-style-type: none"> <li>• Hand weeding at critical stages ensure the crop growth and</li> </ul>



Crops Cereals	Pest	Recommended management practices
		development; Intervene and destroy weeds at the flowering stage to stop the dissemination of the seeds; Mulching with hay or cover crop may be explored during the off-season; <ul style="list-style-type: none"> <li>● Plastic mulching using blue or black plastic sheet may be useful; Use of safe weedicides at the need-based condition.</li> </ul>
Millet	None of the major pests recorded in millet in Afghanistan	Methods will be followed for pest management as it has been recommended in maize and barley
	<b>Diseases:</b> 1 Downey mildew 2. Smut 3. Ergot 4. Village Weaver Birds	Methods will be followed as maize and barley
Rice	Grasshoppers and stem borers are major problems in rice in Afghanistan	<ul style="list-style-type: none"> <li>● Ploughing after harvesting to destroy resting stage of insects;</li> <li>● Inundated release of egg and larval parasitoids;</li> <li>● Encourage natural vertebrate predators like birds, amphibians etc.;</li> <li>● Use of pheromone traps to attract males to disrupt mating; Install birds perching sites along the field margins;</li> <li>● Use of entomopathogenic fungi and if population exceeds ETL, then safe pesticides may be applied;</li> <li>● Besides following techniques reduce significant amount of pest pressure:</li> <li>● Optimum nutrient management; Crop rotation with legume crops;</li> <li>● Buried crop residue well below the soil at the corner of the plot.</li> </ul>
	Diseases: Major diseases of rice is the Bacterial Leaf Blight and Rusts and Head drying.	Field sanitation by destroying crop debris, tolerant and resistant crop variety, cleaning the crop debris, destruction of alternative host plants, balance dose of manure and fertilizers.

Crops Cereals	Pest	Recommended management practices
	<b>Weeds:</b> Jungle rice ( <i>Echinochloa colona</i> (L.); bog bulrush ( <i>Schoenoplectus mucronatus</i> (L.); Bermuda grass ( <i>Cynodon dactylon</i> (L.)	<ul style="list-style-type: none"> <li>• Hand weeding; Buried the uprooted weeds well below the soil at the corner of the plot;</li> <li>• Crop rotation; selection of healthy weeds and disease-free seeds.</li> </ul>
Sorghum	Atherigona soccata, <i>Rhopalosiphum sp.</i>	Methods will be followed for pest management it has been recommended in maize and barley.
	1. Smut 2. <i>Claviceps sorghi</i> , 3. <i>Tolyposporium ehrenbergii</i>	Methods will be followed as maize and barley.
Wheat	The following pests have been observed as major pests of wheat in Afghanistan: 1. Sun pests 2. Locusts 3. Wingless locust 4. Aphids 5. Thrips 6. Wireworms 7. Grey beetle 8. Armyworm 9. Cereal Leaf beetle	<ul style="list-style-type: none"> <li>• Ploughing after harvesting to destroy resting stage of insects;</li> <li>• Inundated release of egg and larval parasitoids;</li> <li>• Encourage natural vertebrate predators like birds, amphibians etc.;</li> <li>• Use of pheromone traps to attract males to disrupt mating;</li> <li>• Install birds perching sites along the field margins;</li> <li>• Use of entomopathogenic fungi and if population exceeds ETL, then safe pesticides may be applied;</li> <li>• Besides following techniques reduce significant amount of pest pressure:</li> <li>• Optimum nutrient management;</li> <li>• Crop rotation with legume crops;</li> <li>• Buried crop residue well below the soil at the corner of the plot;</li> <li>• Crop sanitation to keep free from pest remnants;</li> <li>• Use of resistant and tolerant crop cultivars.</li> </ul>

Crops Cereals	Pest	Recommended management practices
	<p>Diseases:</p> <p><b>1. Rust diseases</b> Leaf rust (<i>Puccinia triticina</i>); Stem rust (<i>Puccinia graminis</i>); Stripe Rust (<i>Puccinia striiformis</i>)</p> <p><b>2. Leaf Spotting Diseases</b> Septoria leaf disease complex (<i>Septoria tritici</i>, <i>S. avenae</i>, <i>S. nodorum</i>); Spot blotch (<i>Helminthosporium sativum</i>)</p> <p><b>3. Smut Diseases</b> Loose Smut (<i>Ustilago tritici</i>); Covered smut and Common bunt (<i>Tilletia caries</i>, <i>T. foetida</i>)</p> <p><b>4. Root Diseases</b> Common Root Rot (<i>Cochliobolus sativus</i>/ <i>Bipolaris sativus</i>); Take-All (<i>Gaeumannomyces graminis</i> var. <i>tritici</i>)</p>	<ul style="list-style-type: none"> <li>• Field sanitation by destroying crop debris;</li> <li>• Introducing tolerant and resistant crop variety;</li> <li>• Keep clean from the crop debris;</li> <li>• Destruction of alternative host plants;</li> <li>• Use of balance dose of manure and fertilizers;</li> <li>• Prevention of entry of unforeseen disease materials;</li> <li>• Use of safe chemical pesticides to suppress the fungal diseases.</li> </ul>
<p><b>Legumes</b> Beans (soybean Mung bean, chick-pea, green bean, cowpea)</p>	<p>Insect and mite pests: <i>Ootheca mutabilis</i>, <i>Aphis craccivora</i>, <i>Heliocoverpa armigera</i>, <i>Coryna</i> spp. <i>Anoplognemis curvipes</i>, <i>Callosobruchus maculatus</i> White-flies (<i>Bemisia tabaci</i>), Red spider mite: <i>Tetranychus</i> spp. Broad mite: <i>Polyphagotarsonemus latus</i></p>	<ul style="list-style-type: none"> <li>• Ploughing after harvesting to destroy resting stage of insects;</li> <li>• Inundated release of egg and larval parasitoids;</li> <li>• Encourage natural vertebrate predators like birds, amphibians etc.;</li> <li>• Use of pheromone traps to attract males to disrupt mating;</li> <li>• Install birds perching sites along the field margins;</li> <li>• Use of entomopathogenic fungi, other microbial pesticides like Bt, or NPV may be encouraged;</li> <li>• Apply selective and safe pesticides if population exceeds ETL. Besides following techniques reduce a significant amount of pest pressure:</li> <li>• Optimum nutrient management; Buried crop residue well below the soil at the corner of the plot;</li> </ul>

Crops Cereals	Pest	Recommended management practices
		<ul style="list-style-type: none"> <li>• Crop sanitation to keep free from pest remnants;</li> <li>• Use of resistant and tolerant crop cultivars;</li> <li>• Use of predatory mite species should encourage to control pest mite species and other small sucking insects, thrips, whitefly, and mealy bugs.</li> </ul>
	Diseases: Pythium spp. Mosaic Virus, Rhizotonia solani, Fusarium oxysporium, and Fusarium solani, Pythium spp., Phuelus vulgaris	<ul style="list-style-type: none"> <li>• Field sanitation by destroying crop debris;</li> <li>• Introducing tolerant and resistant crop variety;</li> <li>• Keep clean from the crop debris; Destruction of alternative host plants;</li> <li>• Use of balance dose of manure and fertilizers;</li> <li>• Prevention of entry of unforeseen disease materials;</li> <li>• Use of safe chemical pesticides to suppress the fungal diseases.</li> </ul>
Groundnut	Insect and mite pests: Aphis craccivora, Millipede spp., Ootheca mutabilis, Epicauta spp. Odontotermes spp. Aphanus sordidus, Cryeadon serratus	<ul style="list-style-type: none"> <li>• Ploughing after harvesting to destroy resting stage of insects;</li> <li>• Inundated release of predatory coccinellids;</li> <li>• Encourage natural vertebrate predators like birds, amphibians etc.;</li> <li>• Use of pheromone traps to attract males to disrupt mating;</li> <li>• Install birds perching sites along the field margins;</li> <li>• Use of entomopathogenic fungi, other microbial pesticides like Bt, or NPV may be encouraged; Apply selective and safe pesticides if population exceeds ETL.</li> </ul>
Cotton	Insect and mite pests: <b>Aphids:</b> (Aphis craccivora, A. gossypii), <b>Cotton Strainers:</b> ( <i>Dysdercus spp.</i> ), <b>White flies:</b> (Bemisia tabaci), <b>Cotton worm:</b> ( <i>Spodoptera littoralis</i> ,	<ul style="list-style-type: none"> <li>• Buried waste plant material well below the soil. Inundated release of egg and larval parasitoids.</li> <li>• Encourage natural vertebrate predators like birds, amphibians, etc.</li> </ul>

Crops Cereals	Pest	Recommended management practices
	Heliiothis armigera, Diparopsis watersi, <b>Blossom thrips:</b> Frankliniella schultzei <b>Red spider mite:</b> <i>Tetranychus</i> spp. <b>Broad mite:</b> Polyphagotarsonemus latus	<ul style="list-style-type: none"> <li>• Use of pheromone traps to attract males to disrupt mating.</li> <li>• Install birds perching sites along the field margins</li> <li>• Use of entomopathogenic fungi, other microbial pesticides like Bt, or NPV;</li> <li>• Apply selective and safe pesticides if the population exceeds ETL. Besides following techniques reduce significant amount of pest pressure:</li> <li>• Crop sanitation to keep free from pest remnants</li> <li>• Use of resistant and tolerant crop cultivars</li> <li>• Use of predatory mite species should encourage to control pest mite species and other small sucking insects, thrips, whitefly and mealybugs</li> </ul>
	Diseases: Fusarium wilt, soil-borne fungi, Rhizoctonia solani and Pythium spp., Root-rot (Rhizoctonia, Phythium, Thielaviopsis spp), Verticillium wilt (Verticillium albo-atrum)	<ul style="list-style-type: none"> <li>• To manage the diseases suggested to introduce tolerant and resistant crop variety;</li> <li>• Keep clean from the crop debris;</li> <li>• Destruction of alternative host plants;</li> <li>• Use of balance dose of manure and fertilizers;</li> <li>• Use treated seed material;</li> <li>• Use of safe chemical pesticides to suppress the diseases.</li> </ul>
Olive	Facilia (producing white stuff around stem)	Clean cultivation practices and Mechanical destruction to suppress pests
Sesame	Insects: Defoliators- Haq moth, sucking insects	<ul style="list-style-type: none"> <li>• Use of birds perching site;</li> <li>• Mechanical destruction of larvae at the initial stage;</li> <li>• Use of safe pesticides.</li> </ul>

### 3.1.2.2.2 Crop Pests: Horticulture crops (vegetables)

Information on pest and plant disease is of horticulture (vegetables) have been presented through **Table 3. 1.**

**Table 3. 2 :Pests and disease of horticultural crops**

Crops	Pest	Diseases
Cabbage	Worms ( <i>Pieris rapae</i> , <i>Plutella xylostella</i> , <i>Hellula undalis</i> , <i>Crociodolomia binotalis</i> and <i>Spodoptera littoralis</i> ), Aphids ( <i>Aphis gossypii</i> ). Grasshopper ( <i>Zonocerus variegatus</i> ), Whitefly ( <i>Bemisia tabaci</i> ), Leaf cutworm ( <i>Barathra brassicae</i> ),	Root Knot Nematode ( <i>Meloidogyne spp.</i> ) Black mildews ( <i>Peronospora parasitica</i> ) Cabbage black rot caused by <i>Xanthomonas campestris</i> , blossom end rot, bacterial diseases
Eggplant	Red Spider Mites ( <i>Tetranychus spp.</i> ), Fruit and shoot borer ( <i>Leucinodes orbonalis</i> ) and Whitefly ( <i>Bemisia tabaci</i> ), Aphids ( <i>Aphis gossypii</i> ).	<i>Fusarium solani</i> , <i>Leveillula taurica</i> , <i>Rhizotonia solani</i> , blossom end rot
Lettuce	Aphids (green peach aphid, potato aphid, foxglove aphid, lettuce aphid, root aphid), Lettuce leaf-eating caterpillar and diamondback moth	Mosaic virus, powdery mildew, fusarium wilt, lettuce mosaic, verticillium wilt.
Onions/garlic	Thrips ( <i>Thrips tabaci</i> ).	Powdery mildew, Downy mildew, Bulb rot, <i>Fusarium oxysporium</i> ).
Pepper	Aphids, Thrips, Two-spotted spider mite, Broad mite and Whiteflies ( <i>Bemisia tabaci</i> ).	Alfalfa mosaic virus, bacterial spot, pepper potyvirus, mosaic, phytophthora root, powdery mildew, tomato spotted wilt virus, verticillium wilt,
Potato	Aphids ( <i>Aphis gossypii</i> ) <i>Oxycarinus spp.</i> ), nematods. Potato tuberworm ( <i>Phthorimaea operculella</i> ), and Flea beetles, Colorado potato beetles ( <i>Leptinotarsa decemlineata</i> ), Whiteflies( <i>Bemisia tabaci</i> )	<b>Early &amp; Late blight</b> ( <i>Phytophthora infestans</i> ), Bacterial ring rot ( <i>Clavibacter sepedonicus</i> ), cucumber mosaic, curly top, bacterial soft rot and blackleg ( <i>Erwinia carotovora</i> ), <b>Bacterial wilt</b> ( <i>Ralstonia solanacearum</i> ), Common scab ( <i>Streptomyces scabies</i> ).
Sweet & Hot Pepper	Whitefly ( <i>Bemisia tabaci</i> ), Aphids, <b>Blister beetles</b> , <u>cutworm caterpillar</u> ( <i>Agrotis ipsolon</i> ), <b>Tomato hornworms</b> ( <i>Manduca sexta</i> ), <b>Pepper weevils</b> ( <i>Anthonomus eugenii</i> ), <b>nematodes</b> , <b>Broad mite</b>	<b>Bacterial spot</b> ( <i>Xanthomonas vesicatoria</i> ), <b>Blossom-end rot</b> , <b>Bacterial wilt</b> , <b>Fungal wilt</b> ( <i>Sclerotium rolfsii</i> ), <b>Phytophthora blight</b> ( <i>Phytophthora capsici</i> ), <b>Bacterial soft rot</b> ( <i>Erwinia spp</i> )
Tomato	Red Spider Mites ( <i>Tetranychus spp.</i> ), Fruit borer ( <i>Heliothis armigera</i> ) and Whitefly ( <i>Bemisia tabaci</i> ), Beet Leafhopper, cutworms, Leaf miners ( <i>Liriomyza trifolii</i> ), Flea beetles, Root Knot Nematode ( <i>Meloidogyne spp.</i> ),	Tomato mosaic virus, Fusarium wilt, <i>Pythium spp.</i> Early blight ( <i>Alternaria solani</i> , <i>Stemphylium solani</i> ), Late blight ( <i>Phytophthora infestans</i> ), Tomato bacterial spot caused by <i>Xanthomonas vesicatoria</i> . <i>Verticillium Wilt</i> , Tobacco Mosaic Virus, Blossom end rot,

Crops	Pest	Diseases
		Take-all root rot ( <i>Gaeumannomyces graminis</i> var. <i>tritici</i> ), Powdery mildew ( <i>Oidium neolycopersici</i> ).
Water melon/ cucumber/ squash/ pumpkin	Leafminers ( <i>Liriomyza trifolii</i> ), Melon fly ( <i>Myiopardalis pardalina</i> ), fruit flies ( <i>Bactrocera cucurbitae</i> ), Melon aphids, twelve-spotted beetles, Darkling beetles, Cutworms ( <i>Agrotis</i> , <i>Amathes</i> , <i>Peridroma</i> , <i>Prodenia</i> spp.).	Powdery mildew ( <i>Leveillula taurica</i> ), Fusarium wilt, anthracnose, fusarium crown and foot rot.
White button Mushroom, Paddy straw mushroom	Mites, Flies	Fungi, Moulds, Bacteria

### 3.1.2.2.3 Crop Pests: Horticulture crops (Fruits)

Information on pest and plant disease of horticulture (fruit) crops have been described through **Table 3. 3.**

**Table 3. 3: Pests and diseases of horticultural fruit crops**

Fruit Trees	Pest	Diseases
Almond	Western tent caterpillar ( <i>Malacosoma indica</i> ), Aphids, Black veined white butterfly ( <i>Aporia crataegi</i> ) Brown tail moth ( <i>Eurproctis chrysorrhae</i> ); Scales Eggar/Lackey Moth ( <i>Eriogaster amygdale</i> ); Limb (Brown Peach) aphid ( <i>Pterochloroides persicae</i> ); Scale insects; Aphids, Mites; Longhorned Beetle ( <i>Aeolesthis sarta</i> )	Gummosis ( <i>Pseudomonas</i> sp); "Shot hole" disease ( <i>Stigmia carpophila</i> ); Leaf spot ( <i>Cercospora circumscissa</i> ); Wilt diseases; Anthracnose.
Apples	Apple aphid ( <i>Aphis pomi</i> ); San Jose scale ( <i>Quadraspidiotus perniciosus</i> ); Codling moth ( <i>Cydia pomonella</i> ); European red mite ( <i>Panonychus ulmi</i> ), Tent caterpillars, Stem borers-long horned beetle.	Powdery mildew ( <i>Podosphaera leucotricha</i> ), Bacterial cankers, Gummosis, Fire blight ( <i>Erwinia amylovora</i> ), Apple scab ( <i>Venturia inaequalis</i> ).
Apricot	Western Tent Caterpillar ( <i>Malacosoma indica</i> ), Browntail moth ( <i>Eurproctis chrysorrhae</i> ); Black veined white butterfly ( <i>Aporia crataegi</i> ); Eggar/Lackey Moth ( <i>Eriogaster amygdale</i> ); Bark Beetle "Shot hole"; Wood boring beetles; Aphids; White Grub (nurseries) ( <i>Polyphylla</i> sp).	Bacterial canker Gummosis ( <i>Pseudomonas syringae</i> ); "Shot hole" disease Stigmia blight ( <i>Stigmia carpophila</i> AKA; <i>Wilsonomyces carpophilus</i> ); Verticilium wilt ( <i>Verticillium dahliae</i> ); Brown rot blossom and twig blight, Ripe fruit rot.

Citrus	Aphids, Leaf worm and Leaf miner	Canker, Citrus dieback, and viral disease (Citrus Triesteza).
Grapes	Berry Moth ( <i>Endopiza viteana</i> ); Cicada; Leafroller ( <i>Archips subsidiaria</i> ); Mealybug ( <i>Pseudococcus</i> sp.); Fruit flies ( <i>Ceratitis capitata</i> , <i>Bractocera invadens</i> ); Termites; and Mites	Powdery mildew ( <i>Uncinula nector</i> ); Downy Mildew ( <i>Plasmopora viticola</i> ); Anthracnose ( <i>Elsinae ampelina</i> ); Crown Gall ( <i>Agrobacterium tumesfasens</i> ; <i>A. vitis</i> ); and viral diseases.
Peach	Aphids, Borers, Hard Scale and Soft Scale insects.	Leaf curl ( <i>Taphrina deformans</i> ), Fire blight ( <i>Erwinia amylovora</i> ), Anthracnose, Downy mildew
Pear	Tent caterpillars, Psylla, Aphids.	Fire blight, Powdery mildew
Plums	Tent caterpillars, Fruit flies, Aphids, Leaf rollers, cutworms, twig borer and peach tree borer.	Silver leaf, bacterial canker, blossom blast and brown rot, bacterial spot and plum leaf scab
Pomegranate	Scale insects, White Grub (nurseries) ( <i>Polyphylla</i> sp); Fruit borer "carop moth" ( <i>Ectomyelois ceratoniae</i> ); Aphids, Leaf edge rolling mite.	Leaf Spot ( <i>Alternaria</i> sp)

All the above-mentioned pests and diseases are variable in their occurrence in different regions and provinces. It has been reported to cause damage of different degree depending on specificity of the ecological situation and may appear severe form and their population outbreak cause havoc damage of the crop under congenial ecological condition. As there is no clear forewarning system adopted in the country therefore, their population outbreaks are not immediately communicated to the authority to do the needful to suppress the population. The other thing is that the pest species reported in the tables are not verified in the field condition because of the dearth of time to prepare the document for submission. Besides these there are good numbers of vertebrate pests like birds, rats and other animals which could damage the crops and need to be protected.

### 3.2 INVASIVE PESTS

In the context of infestation of various pest and disease of crops, it may be stated that some of the insect pests those are recently introduced and recorded in the neighboring countries like India, Pakistan, etc. as the invasive pests of crops could also invade or might have already been introduced in Afghanistan. These invasive pests are capable to multiply rapidly, with high adaptability, strong dispersal ability, survive on wide host range and are very aggressive in nature and those have sustained under various environmental condition. These pests are highly damaging to economic crops and they are very hard to manage as because in the new area they mostly remain free from any effective native natural enemies. Under the situation, those pests have become very serious and have caused devastating damage to the crops **Table 3.4.**



**Table 3.4: A list of invasive pests is given below for information and for records in Afghanistan.**

Sl.No	Common name	Scientific name	Country of origin	Year of introduction in India	References
1	Apple woolly aphid	Eriosoma lanigerum (Hausmann)	North America	1889	Mishra (1920)
2	San Jose scale	Quadraspidiotus perniciosus (Comstock)	China	1911	Singh (2004)
3	Lantana bug	Orthezia insignis (Browne)	Neotropical region	1915	Muniappan <i>et al.</i> (1986)
4	Cottony cushion scale	Icerya purchasi (Maskell)	Australia	1921	Singh (2004)
5	Potato tuber moth	Phthorimaea operculella (Zeller)	South or North America	1937	Singh (2004)
6	Diamond back moth	Plutella xylostella (Linn.)	Europe or East Asia	1941	Fletcher (1941)
7	Pine woolly aphid	Pineus pini (Macquart)	East Asia	1970	Singh (2004)
8	Subabul psyllid	Heteropsylla cubana (Crawford)	Central America	1988	Jalali & Singh (1989)
9	Serpentine leaf miner	Liriomyza trifolii (Burgess)	North America	1990	Singh (2004)
10	Coffee berry borer	Hypothenemus hampei (Ferrari)	North east Africa	1990	Vega <i>et al.</i> (1999)
11	Spiraling whitefly	Aleurodicus disperses (Russell)	Central America	1993	Palaniswami <i>et al.</i> (1995)
12	Coconut eriophid mite	Aceria gurreronis (Keifer)	Mexico	1998	Singh (2004)
13	Silver leaf white fly	Bemisia argentifolii (Gennadius)	North America	1999	Singh (2004)
14	Cotton mealy bug	Phenacoccus solenopsis (Tinsley)	USA	2005	Nagrare (2009)

Sl.No	Common name	Scientific name	Country of origin	Year of introduction in India	References
15	Erythrina gall wasp	Quadrastichus erythrinae (Kim)	Africa	2006	Faizal <i>et al.</i> (2006)
16	Papaya mealy bug	Paracoccus marginatus (Williams)	Mexico or Central America	2008	Jhala <i>et al.</i> (2008)
17	South American Tomato leaf miner	Tuta absoluta (Meyrick)	South America	2014	Sridhar <i>et al.</i> (2014)
18	Western flower thrips	Frankliniella occidentalis (Pergande)	Western North America	2015	Tyagi <i>et al.</i> (2015)
19	Brown peach aphid	Pterochloroides persicae (Cholodkovsky)		2015	Mahendhiran <i>et al.</i> (2018)
20	Rugose spiraling whitefly	Aleurodicus rugioperculatus (Martin)	Central America	2016	Selvaraj <i>et al.</i> (2016)
21	Fall army worm	Spodoptera frugiperda (J.E. Smith)	Tropical and sub-tropical regions of America	2018	Shylesha <i>et al.</i> (2018)
22	Bondar's nesting whitefly	Paralyrodes bondari (Peracchi)	Neo-tropical region of Central America	2018	Josephraj Kumar <i>et al.</i> , (2019)
23	Nesting whitefly	Paraleyrodes minei Iaccarino	Neo-tropical region of Central America	2018	CPCRI, 2019
24	Neotropical whitefly	Aleurotrachelus atratus Hempel	Neo-tropical region of Central America	2019	Selvaraj <i>et al.</i> (2019)

Note: Although Indian references are indicated, most of these pests are distributed across the continents.

### 3.3 CROP PLANT DISORDER DUE TO ABIOTIC PARAMETERS

Plant growth and productivity are hampered conspicuously due to abiotic factors that are listed below.

- Different types of malformation and ill effect of the crop growth and productivity may be observed due to deficiencies of major and minor elements viz., phosphorous deficiency-interveinal yellowing for magnesium, and young leaves chlorosis for iron, in some cases deficiencies results from actions by other elements or inadequate acidity. Corrections are by adding the required major and secondary elements. Adequate manuring can help prevent deficiencies.
- Phytotoxicity –is observed due to the application of overdoses of pesticides, chemical fertilizers, and pesticides or mineral oils showing symptoms of necrosis, epinasty, hyponasty, Leaf injury, wilting and vein clearing usually occurs.
- Soil acidity-it causes harmful effect to the crops as most of the crops prefer neutral soil. Acidity prevents the growth of many soil beneficial organisms help better crop growth. Some of the crop can withstand acidity than others (e.g. potatoes).
- Salinity –it causes crops to wilt because water and nutrient uptake are reduced with increasing salt concentration.
- Water supply – The optimum water supply ensuring crop growth and development by providing good aeration and filtration while excess water may cause wilting and root rotting.
- Wind, Sun and Heat- cause damage to plants. Tomato and Sweet Pepper fruits can be burnt (e.g. Blossom end rot of tomato).
- Drought- soil moisture restricts plant growth, both in terms of the total quantity of tissue produced and the time that the plant tissue is produced.

### 3.4 PEST MANAGEMENT APPROACHES IN AGRI-HORTICULTURAL CROPS IN AFGHANISTAN

It may be mentioned that under the IAIDS project, a nationwide survey on insect pests, diseases, weed pest have been initiated in 2017. According to a new report, this survey will be continued for 2 years, which would focus on all field crops, vegetables, fruit orchards, forest, veterinary firm and stored grains and all landscape i.e, agriculture, fallow land, grass and rocky land for detection of insect pests and diseases. A national database would be created for all this information and will establish a National Museum to preserve all the samples for future use and research studies<sup>15</sup>. It is expected that by the time OMAID project is rolled out, these databases will be available for working out a comprehensive PMP for Afghanistan.

In order to provide an outline of the pest scenario in Afghanistan, we have scanned available literature on the public domain, interacted with the stakeholders in the value chain selected closer to the proposed IP sites, and also discussed with the functionaries in the PPQD and NGOs and other relevant officials. These have been collated in a manner so as to provide information which can be interpreted for some definitive conclusions.

The correct taxonomic identification of most of these species is relevant as well as to determine their economic status. The laws of pesticides regulation and quality control for agrochemicals focusing on pesticides legislation in relation to import, distribution, use and application of pesticides to minimize risks for human, wildlife, and environment will be designed.

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15 “MAIL to conduct nationwide insect pests and plant disease survey”, News clipping appeared on August 11, 2017. Source: <http://aria.gov.af/?p=446>

### 3.5 IPM

Integrated pest management (IPM) is a multidisciplinary ecological approach where varieties of pest management techniques or strategies are combined together simultaneously or successively to bring down the population of pest species below economic threshold level without or with a minimum disturbance to the ecosystem. All the producers and stakeholders are requested to design the pest management strategy emphasizing IPM tools towards the management of pests and diseases of all type of crop ecosystems.

Studies have shown that over 95% of sprayed insecticides and herbicides reach a destination other than the target species diluting their effect and causing environmental contamination. IPM techniques can eliminate the need for these chemicals, preserving the environment and local community health.<sup>5</sup>

The commonly used IPM tools and techniques are as follows.

#### 3.6.1 Traditional or cultural management

It involves ploughing land after harvesting of crops to expose hibernating pupae of many lepidopteran and coleopteran pests. These are controlled by exposing them to sun or allow them for predating by the birds which will suppress the population pressure of pests in the following crops, crop debris is suggested to dump at corner of the field to prepare manure and to avoid burning to save environment from pollution, altering time of sowing to desynchronize with peak incidence of pest population, early planting and timely weeding to control weeds and other pest, handpicking and destruction of blister beetles adults, destruction of weeds before flowering, using series of pet bottles and glass ball to create noise devices to scare away the grain and fruit-eating birds.

#### 3.6.2 Agronomic practices

This includes various types of agricultural practices adopted by age-old farming practices and experiences by the farmers. These are - crop rotation with non-host crop of the pests for the following crop, fallowing, good seed and stock selection, seed treatment, recommended spacing and optimum plant population densities, application of recommended fertilizer dosage rates and manures, use of resistant crop cultivars, early harvesting to avoid pests and natural calamities, crop sanitation, tethering and timely harvesting.

#### 3.6.3 Mechanical methods

Various mechanical methods at the most vulnerable stages of the pests are very useful to manage the destructive pest population which is achieved by handpicking and destruction of egg masses, gregarious stages of immature population, digging of trenches to control hairy caterpillar and armyworms, hopper forms of locust and grasshoppers, ploughing to expose grasshopper's egg-pods and pupae of other insect pests.

#### 3.6.4 Physical methods

These methods are useful to control seed-borne pests and pathogens by sun-drying or exposing them to radiation. This method also very useful to control the pests of stored grains.

#### 3.6.5 Botanical pesticides

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<sup>5</sup> FAO Kabul, 2018: "15 years in Afghanistan: A Special Report:2003-18"

The pesticides that are extracted from plants are called botanical pesticides which are considered as one of the important components of IPM system as it does not impact any adverse effect on the environment. Many times these are used as prophylactic measures and some of them excellently work against the target pest species. Neem oil, Neem Seed Kernel extract, Seed Kernel Extract of *Pachyrhizus*, *Pongamia*, etc. is very promising and therefore, should be promoted for use in IPM system.

### 3.6.6 Biological control

Biological control is one of the most desirable components under IPM system where many of the biological organisms are exploited for suppression of pest species. There are many beneficial organisms that occur in nature, popularly known as natural enemies of pests which include parasites, parasitoids, predators, disease-causing organisms, etc. like (entomopathogenic fungi-, bacteria, virus, etc. belong to these categories) [Table 3.5].

**Table 3. 5: List of Biological Control Agents for use under modern days' IPM**

Sl. No.	Biological control agents /Natural enemies	Targeted pests
1.	<b>Predatory insect:</b> <i>Coccinella</i> spp; <i>Cryptoleamus montrouzieri</i> ; <i>Chrysoperlla</i> spp. Predatory thrips etc	Mealybugs, scale insects, aphids
2.	<b>Predatory mites:</b> <i>Phytoseiulus persimilis</i> , <i>Amblyseius swirski</i> ; <i>Neoseiulus barkeri</i> ; <i>N. longispinosus</i> etc.	Pests mite, thrips, whiteflies mealybugs, etc.
3.	<b>Parasitoids:</b> <i>Trichogramma</i> spp. <i>Bracon</i> spp.; <i>Apanteles</i> spp.; <i>Cotesia</i> spp. etc.	Egg and larval stage of Lepidopteran insects
4.	<b>EPN (Entomopathogenic Nematode)</b> <i>Steinernema</i> spp. <i>Heterorhabditis</i> spp.	Plant parasitic nematodes
5.	<b>Entomopathogenic fungi:</b> <i>Isaria fumosorosea</i> (Formerly called as <i>Paecilomyces fumosoroseus</i> ) <i>Metarhizium anisopliae</i> , <i>Beauveria bassiana</i> , <i>Nomuraea rileyi</i> , <i>Lecanicillium lecanii</i> <i>Hirsutella thompsonii</i>	European red spider mite, <i>Panonychus ulmi</i> , Whiteflies, Asian psyllid, white grub and many other insects belonging to the order Coleoptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, and Thysanoptera
6.	<i>Bacillus thuringiensis</i> (Bt)	Many of the pests of agricultural crops
7.	Nuclear Polyhedrosis Virus (NPV) HaNPV SNPV	For the management of lepidopteran insects
8.	<b>Antagonistic organisms</b> <i>Trichoderma</i> spp. <i>Bacillus</i> spp. VA Mycorrhiza	For the management of plant diseases

### 3.6.7 Chemical methods

Pest management using pesticides are the most common and easy way of controlling pests, diseases and weeds. It is the most hazardous, detrimental ingredient of the ecosystem. In agricultural sector, use of pesticides are inevitable because of its instant effect and easy availability. Considering it's both the advantages and disadvantages, use of pesticides is restricted by imposing regulations. Some of the pesticides have been developed which are eco-friendly and safe for the ecosystem are most useful in the IPM system for need-based application. The chemicals those are used to regulate insect behaviour (sex pheromones), some of the chemo-sterilant and growth regulators are useful in IPM system having no detrimental impact on the environment are suggested to promote in IPM system (**Table 3.6**).

**Table 3. 6: List of Chemical Pesticides for use under modern days' IPM**

Sl. No.	Name of the pesticides	Targeted pests
1.	<b>Insecticides:</b> Cypermethrin, $\alpha$ -cypermethrin, Bifenthrin, Imidacloprid, Thiamethoxam, Acetamiprid, Diafenthiuron, Pyridalyl, Fipronil, Chlorantraniliprole, Emamectin benzoate, Diflubenzuron.	Many insects belonging to the order Coleoptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, and Thysanoptera
2.	<b>Acaricides:</b> Spiromesifen, Diafenthiuron, Etoxazole, HMO, Wettable sulfur,	Broad mites, spider mites, false spider mites and eriophyoid mites
3.	<b>Nematicides:</b> Methyl Bromide, Nemathorin, Fenamiphos	Plant feeding nematodes
4.	<b>Fungicides:</b> Sulfur, copper sulfate, cuprous oxide, lime-sulfur, Mancozeb, Chlorothalonil, Carbendazim, Tebuconazole, Propiconazole, Dimethomorph, Cymoxanil	Various plant diseases, Late blight of potato, etc.
5.	<b>Weedicides:</b> <u>Glyphosate</u> (Roundup), Pendimethalin (Pre-emergent herbicide)	Grasses, broadleaf weeds, etc.
6.	<b>Botanical pesticides:</b> Neem oil, NSKE, <i>Pachirhizus</i> seed extract, <i>Pongamia</i> seed extract, Onion bulb extract, Garlic extract, mixture of garlic+pepper and Ginger Extract); Datura extracts, etc.	All type of pests

### 3.7 Dependence on chemical control and challenges to conventional methods

On the other hand, larger commercial crop growers use mostly conventional control methods that involve intensive use of pesticides to protect their crop against pest and disease to achieve instant results without considering the population of existing natural enemies which disappear from the ecosystem. This phenomenon (indiscriminate use of chemical pesticides) directly and indirectly, aggravate many odds like minor pests to become major pests, develop resistance, resurgence and residual problems and cause environmental hazards. All these lead to emerging pest problem in crops which become difficult to manage by conventional method.

### 3.6 PEST MANAGEMENT STRATEGY PROPOSED FOR HORTICULTURAL CROPS UNDER PROJECT

The pest management strategy will be considered after proper identification of pests and diseases. A successful management strategy depends on the followings points:

- i) To understand habit and habitat of the pests and diseases;
- ii) A continuous and thorough study on the population dynamics of the pests and disease;
- iii) To understand the seasonal incidence pattern of pests and diseases;
- iv) Emphasize on the pest species that are economically important and causing substantial damage;
- v) Train the extension workers through Farmer Field School.
- vi) All the pests and disease management is aiming following IPM system.
- vii) Recommend the safe and need-based application of newly developed eco-friendly pesticides eg. Diafenthiuron, Fipronil, Clorantraniliprole, Thiamethoxam, Acetamiprid, Imidacloprid, Spiromesifen, Etoazole, Pyridalyl, Emametin benzoet, etc. and as classified by WHO

### **3.6.1 Field crops**

#### **3.6.2 Wheat**

Wheat is the staple crop of the country and a national food as well. It is mainly winter-sown but spring wheat is grown in the coldest zones. The main pest problem in wheat in Afghanistan is Sun pest (*Eurygaster integriceps*), which feeds on the plant by injecting chemicals that cause the grain's gluten to break down. There are more than 16 different pest species which have been recognized causing damage to wheat and Barley especially in the southern and northern part of Afghanistan. However, 4 species are considered as major pests. Long term management of this pest is provided using integrated pest management (IPM) that calls for comprehensive biological control and behavioural knowledge of the Sun pest, its natural enemies, the farming practices, host plant resistance and the entomopathogenic fungi (*Beauveria bassiana*), as well as use of safe pesticides, if needed, to combat infestations and to reduce damage on the crop. By using this approach, in combination with improved and resistant wheat varieties, developed and/as recommended by Scientists from ICARDA/CABI, the introduction of tolerant or resistant crop cultivar or indigenously develop variety will provide satisfactory control. Besides insect pests, weeds also a great menace in wheat cultivation in Afghanistan which can be mitigated by improving cultivation practices like line sowing, use of rotary weed at the critical stages of crop growth period and use of selective weedicides to harvest satisfactory yield.

Currently, there is no pest management strategy to control the Sun pest on a national or global scale in Afghanistan. However, there are a number of methods that farmers can utilize to manage damaging pest populations. These are:

- Monitor and assess pest populations.
- Control initial pest population by spot application with effective pesticides to suppress the secondary damaging pest population at a later stage of the crop.
- Tolerant and early-maturing wheat varieties and harvest early; damage is less if wheat is harvested before Sun pest reach adulthood. Growing early-maturing varieties and establishing a regional uniform planting date minimizes damage. Early harvesting methods must be developed in relation to local production methods and weather conditions.
- Maintain shelter belts around wheat fields. Natural enemies, especially egg parasitoids, that play an important role in suppressing and reducing Sun pest populations and should be encouraged. Cereal crops should not be grown on marginal lands in the foothills. These areas should remain as uncultivated habitats for providing shelter and alternative food sources of the beneficial insects.

- Use of safe and need-based application of chemical insecticides.

Diseases are a major cause of yield loss in wheat besides insect pests. The major diseases of wheat in Afghanistan are rusts and smut/bunt that cause substantial damage to wheat crop and other diseases do not occur in such a destructive form and hence can be considered as of minor importance. Environmental conditions including elevation and rainfall in the wheat-growing agro-ecologies have major influence on the prevalence and incidence of specific wheat diseases. Tan spot, *Cephalosporium* stripe, *Fusarium* head blight, take-all (*take-all fungus*), and others are residue-borne diseases of wheat in no-till and reduced tillage system and all these can be managed through i) field sanitation ii) introducing tolerant and resistant crop variety, iii) keep clean from the crop debris, destruction of alternative host plants iv) use of balance dose of manure and fertilizers, use of safe chemical to suppress the fungal diseases. For the root diseases, the root, crown, and foot rots are common fungal diseases that affect overall plant health and lower yields. Common root rot and *Fusarium* foot rot are fungal diseases common in dryland wheat such as Afghanistan with continuous cropping systems. Cultural management with adapted cultivars as well as seed treatment fungicides provides an early window of protection against common root rot and seedling blights caused by *Fusarium* spp.

- Foliar diseases such as leaf rust, stripe rust, powdery mildew, tan spot, stem rust and glume blotch are primary foliar fungal diseases which result in serious economic losses in wheat. Monitoring rust epidemics in and scouting fields for powdery mildew and leaf spot will give an indication of the potential damage these diseases may cause in wheat production. A number of fungicides are currently registered to control **wheat** foliar diseases and ***Fusarium* head blight as well as stem rust**.
- **Management of powdery mildew of wheat** caused by the fungus *Blumeria graminis* f. sp. *Tritici*, is achieved through growing of mildew-resistant cultivars and a well-timed fungicide application to protect the flag leaf after assessment of the incidence and severity from tiller elongation through flowering.
- Diseases affecting the head, wheat grain and seed quality such as black point, ergot, common bunt, loose smut, and scab, reduce wheat yield, quality, or both. Fungal diseases affecting grain and seed quality in wheat such as loose smut and common bunt of wheat can be managed by planting resistant cultivars, and fungicide-treated seed can help to effectively control and manage both of these common fungal diseases.
- Proposed pest management strategy for wheat pests and diseases are the application of Wheat Intensification System(WIS) that is planting in rows and weeding three times with Rotary weed (start from 5 leaves till covering the ground).

### 3.6.3 Barley/Corn

Barley and corn are used as stock-feed, rarely for humans. Besides, aphids and grasshoppers, other insect pests are never of great importance in barley production. In contrast, barley diseases can affect the growth and survival of both tillers and spikelet which can affect initial plant count. Therefore, early disease management is vital, as initial plant count is important for successful yield and profit. Certifying seed is one way to reduce pests and diseases. Seed treatment with fungicides and clean cultivation are often the best way to limit barley crop diseases.

The control of corn diseases is achieved mostly through use of fungicide seed treatment of resistant hybrids during planting. It is recommended to plant when soil conditions are warmer



and drier and use proper planting depth. Corn disease is primarily a problem in seed production fields with certain highly susceptible inbred. Select hybrids with resistance (tolerance based on risk), using a two- year crop rotation scheme with non-grass crops, and cleanly plough under infected residue. Foliar fungicides may be useful in seed production fields.

Many insects may attack growing corn, but economic damage may not occur every year. In years of heavy infestations, any one of several insects may cause a loss in yield. To prevent loss, one must have knowledge of the insects and the most effective control method. When yield potential is low or other factors are involved, insecticide use may be impractical. In such cases, harvesting the crop as silage or fodder will be the best means of salvage. Several aphids transmit a plant virus which causes a disease known as maize dwarf mosaic. Insecticide control of the aphid is not an effective method of controlling the disease because the disease is transmitted prior to aphid death. The most effective means of virus management is the use of disease-tolerant varieties.

Early planting when the soil is warm reduces damage from most insects (aphids, seed maggots, cutworms, wireworms, white grubs) and early stalk destruction is a very good practice to reduce overwintering borers. For corn borers, stubble should be turned up and left through the winter. Ploughing or turning corn stubble in early spring will greatly reduce overwintering corn borer larvae. Because proper timing of insecticide application against borers is difficult, early planting and stalk destruction just after harvest are the best management corn borers.

#### **3.6.4 Rice and pulses**

As discussed in Chapter 1, poverty is a critical issue which affects growth and development of Afghanistan. In 2007, more than 42% of the population of the country was reported as being below the poverty line, but until 2014, 78.2% of households even in the urban areas were reported to be suffering from food vulnerability. The agriculture sector is the backbone of the country's economy and contributes as the key sector to the revival of the well-being of people in Afghanistan. Rice is the second staple crop after wheat and plays a key role in food security, nutrition, and caloric intake. However, Afghan farmers have suffered from the low quality of grains and yield which has resulted in the serious malnutrition. Insufficient breeding techniques for new rice cultivars with high yield and acceptable quality, mismanagement of agronomical practices, and traditional milling and processing thus can satisfy only 50% of the country's demand. Accordingly, Afghanistan has been compelled to import a huge annual amount of milled rice from Pakistan, India, and Iran. Although active efforts have been made by the government, research institutes, and international collaboration on rice research, production, and agricultural credit during the last 10 years, the deficit of milled rice in Afghanistan in 2018 is estimated to be 270,250 metric tons. Recently, the farmers have been applying the System of Rice Intensification (SRI) as a water-saving method in north- eastern Afghanistan. The average yield under SRI project had been recorded at 9.3 tons per ha, is remarkably higher than that obtained from traditional practices. Under this backdrop, it is possible to further increase rice production by protecting the crop from pests and disease attack both under storage and field condition following IPM techniques.

This approach, known as integrated pest management (IPM), discussed later in subsequent chapters, is referred as "multidisciplinary ecological approach where varieties of pest management techniques or strategies are combined together simultaneously or successively

to bring down the population of pest species below economic threshold level without or with a minimum disturbance to the ecosystem".

Cultural methods to control insects involve crop production practices that have a dual purpose of crop production and insect suppression. Primary cultural control practices are those done specifically to control insects such as draining a field to control the aquatic caseworm larva or planting a trap crop for stem borers. Secondary practices are those that are specifically done for crop husbandry, such as land preparation and weeding, which also happen to minimize pest build up. Due to pesticides cost, toxicity to man and the environment, the secondary pest problems caused such as the resurgence of the brown plant hopper and because of the development of insecticide-resistant populations, the recent trend in rice IPM has been toward the integration of insect resistant varieties with the conservation of natural control agents. Biological control through the action of indigenous predators, parasitoids and insect pathogens forms the cornerstone for modern IPM programs on rice. Research studies have shown that indigenous natural enemies have a strong impact on rice pest populations and their conservation is an essential part of rice IPM programs. Many species of predators, parasitoids, and pathogens have been observed to suppress rice pests.

### 3.7 HORTICULTURAL CROPS

#### 3.7.1 Vegetables

##### 3.7.2 Potatoes

The main disease problems faced by farmers in potato production are late blight, which is the most serious potato disease worldwide as well as in Afghanistan. It is caused by fungus, *Phytophthora infestans*, which initially occur on leaves with water-soaked lesion and formation of spores at the ventral surface of leaves that spread rapidly under congenial condition and destroys leaves, stems and tubers leaving behind nothing under field condition. The **Bacterial wilt** (*Ralstonia solanacearum*) is the other pathogen that affects the aerial part of the plant and leads to severe losses in potato fields in tropical, subtropical as well as in temperate regions. This pathogen is also present in Afghanistan and causes severe damage in potato farms. Also, the **Potato blackleg** (*Erwinia carotovora*) is a bacterial infection that affects and causes tubers to rot in the ground as well as in storage.

The major insect pest of potato is the **Colorado potato beetle** (*Leptinotarsa decemlineata*), a serious pest with strong resistance to insecticides, is present in Afghanistan and causes tremendous damage during the cropping season. The **Potato tuber moth**, most commonly known as *Phthorimaea operculella*, is the most damaging pest of planted and stored potatoes in warm, dry areas such as the one in Afghanistan to which farmers suffer substantial losses.

Combating pests and diseases in potato production with intensive use of insecticides and fungicides often does more harm than good. Luckily, an array of alternatives is available, including IPM. Increasing potato production while protecting producers, consumers and the environment requires a holistic crop protection approach encompassing a range of strategies - encouraging natural pest predators, breeding varieties with pest/disease resistance, planting certified seed potatoes, growing tubers in rotation with other crops, and organic composting to improve soil quality.

There is no effective chemical control, for example, against bacterial wilt. The most dangerous late blight disease of potato is managed most successfully following integrated management

where overdoses of fertigation are restricted and need-based application of fungicides with Acrobat and Moximate is suggested to stop further spreading of the disease. Planting healthy seed in clean soil, using tolerant varieties in rotation with non-susceptible crops, and other sanitation and cultivation practices can lead to significant reduction of the disease. Incidence of potato tuber moth can also be reduced by preventing soil cracking that allows moths to reach the tubers. Both the International Potato Centre (CIP) and FAO advocate Integrated Pest Management (IPM) as the preferred pest control strategy during production. IPM aims at maintaining pest populations (Colorado beetle) at acceptable levels and keeping pesticides and other interventions to levels that are economically justified and safe for human health and the environment.

### **3.7.3 Cucurbits (Watermelon/ Melon/ cucumber/ squash/ pumpkin)**

The main problem in cucurbits in Afghanistan is the Baluchistan Melon Fly, *Myiopardalis pardalina* (from 2001 onwards it spread all over melon producing areas in the north and north-east zones. Now it is present in all melon producing provinces). Other cucurbits pests are *Bactrocera* sp.; aphids, whiteflies, twelve-spotted beetle locally called "Kakana". Baluchistan Melon Fly, *Myiopardalis pardalina* is one of the most important pests with which vegetable growers have to fight throughout most of south-eastern Asia, from Nepal, Bangladesh, most of India, Pakistan and Afghanistan. The melon fly, sometimes called the melon fruit fly, is considered the most destructive pest of melons and related crops, and it has greatly curtailed the production of melons, cucumbers, and tomatoes. The extensive damage caused by this fly indicates that this species could rapidly become a very serious pest of cucurbits and possibly of some fruit crops also. Pumpkin and squash have been heavily attacked even before the fruit had well set, with eggs laid into unopened female flowers, and larvae successfully complete active stage in the developing fruits, taproots, stems and leaf stalks. Successful IPM has always followed an ecological approach. This approach encouraged the development of non-chemical methods that promote the growth of a healthy crop and at the same time protecting natural enemies, thus ensuring a low population of pest species. A participatory approach towards IPM demands that farmers need to be educated in ecology to better appreciate the advances in an ecological pest management approach. The management of this pest consists of a combination of bait spraying to attract and kill adults and male annihilation through mass trapping of males, and the use of sterile male insect technique. Concerting effort of the farmers for management fruit fly using methyle eugenol traps may provide satisfactory result. Biological control of this fly which consists of larval parasitoid *Psytalia fletcheri* and the egg parasitoid *Fopius arisanus* which are fruit fly parasitoids, is also one of the technical components in the management of this pest. Cultivation of trap crops (such as castor oil plant) in the vicinity is encouraged as well as crop hygiene (sanitation of the field) and a 3-4 years crop rotation.

## **3.8 FRUITS**

### **3.8.1 Grape**

The main problem in grapes is Powdery Mildew (*Uncinula necator*). A dormant spray of Lime Sulphur is made against Powdery mildew, which also reduces mealybug populations. New growth is protected against Powdery mildew with applications of sulphur dust or wettable sulphur beginning 2 weeks after bud burst and then to protect new growth at approximately 15-day intervals. A minimum of three applications is made. Spot sprays of copper fungicide in April are used to control Anthracnose. Mechanical control of insect pests (Cicadas for example) will be encouraged and methods developed accordingly.

### 3.8.2 *Pomegranate*

The main problem is the fruit borer: the larva of the Carob moth (*Ectomyelois ceratoniae*) which is believed to enter the young pomegranate via the calyx at flowering. This moth has been identified from pomegranates in Afghanistan, but the biology of the moth in the pomegranate is poorly understood. Orchard sanitation (pruning of overgrowth shoots, dead overwintering ranches, etc.) is used to reduce the number of infected fruit in the orchard and the population of the moth. Mechanical control can also be employed – a plug of mud placed in the calyx of the very young fruit acts as a physical barrier and prevents the larvae entering. The use of pheromones for mating disruption is being trailed by the IDEA-NEW project (funded by USAID) and is being supported by HLP in focus districts in the Northern provinces. The eriophyid mite causes the rolling of young leaf edges might be very damaging to the plant. It is prevented by pruning of infected branches followed by spraying with wettable sulphur.

### 3.8.3 *Almonds/ Apricots*

In Afghanistan, there is a high incidence of bacterial canker and gummosis in both almond and apricot trees. This is a chronic infection which can kill the tree and which is believed to be associated with the combination of cultivation of intercrops in the orchards and the overuse of water particularly the flood irrigation methods that are used. Copper has some impact in slowing the development of the disease. A dormant spray of Copper (Bordeaux mixture) is applied to the tree and Bordeaux paste is applied directly to lesions and pruning cuts. The copper spray also offers some protection against shot hole disease.

Horticultural Mineral Oil (HMO) is used to reduce populations of insects overwintering as sedentary stages or eggs, in particular aphids, scales and mites. The impact of recently developed HMO has been observed to be very effective against mealybugs, mites, scale and other small sucking insects. This practice also should be carried out for protecting the honey bees those will visit the crops for pollination.

Mechanical control is used to remove nests of tent caterpillars (defoliating Lepidoptera larvae) which can be burnt either in situ or after being pruned out of the tree. Mechanical control will be used to control local pest outbreaks during the crop season. Spot sprays of pesticides will be used to control local pest outbreaks, but only as a last resort.

### 3.8.4 *Mushroom Cultivation*

Mushroom is one of the most important nutritious edible crops that can be grown in Afghanistan under homestead condition engaging women power. There are different kinds of mushroom species cultivated but the white button mushroom, *Agaricus bisporus* is the most successful which have been commercially exploited. The others are oyster mushroom, *Pleurotus* spp. and straw mushroom *Volvariella volvacea* also popularly cultivated in many places. The main constraints of mushroom cultivations are the contamination of fungi, mould and bacteria which destroy mushroom cultivation significantly if proper sanitation measures by sterilizing growing media are not properly considered. Besides, mites and flies also destroy mushroom cultivation which again can be protected by disinfecting growing media and maintain hygiene.

### 3.8.5 *Apiculture*

Being the commercial producer of subtropical and temperate fruit crops especially for apple, peach, pear, almond, grapes, pomegranate, Afghanistan should explore apiculture industry not only for the production of honey and related items but also for ensuring and increasing

fruit productivity by pollination. There are many bee species reported from Afghanistan while the most successful and commercial viable species is *Apis mellifera*. There are many pests and diseases which cause the hindrances of apiculture industry. However, those can be mitigated by integrated pest management strategies to maintain the impacts of the numerous pest (*Varroa jacobsonii*, *V. destructor*, *Tropilaelaps* spp.- and pathogen-related problems below an acceptable threshold. Some of these control methods include selecting appropriate apiary locations, supplemental feeding, and trapping pests in colonies, replacing queens, preventative treatments, and chemical control.

### **3.8.6 Vermiculture- - an opportunity**

The culturing techniques of some suitable species of earthworms for producing organic debris to composting are called vermi culture. The product of vermiculture is vermi compost which is very important organic manure for producing many quality agricultural products and used for the enrichment of soil health. The vermiculture fulfils multiple objectives. It utilizes unwanted weeds, agricultural bi-product, and many other organic materials to good quality vermi compost. It keeps the surrounding environment free from ugly appearance. Obtain quality organic manure for production of delicate crops.

### **3.8.7 Scope and prospect of Saffron cultivation**

Saffron is one of the precious horticultural crops of Afghanistan which is exported and source of foreign exchange. As mention in chapter-1, more than 96% of the total acreage of saffron is grown in Herat province. Some of the pest viz., bulb mite, *Rhizoglyphus* sp., mole and rat cause damage saffron. Clean cultivation, selection of disease-free bulb is some of the ways to mitigate the problem

### **Economic loss**

As mentioned earlier, wheat is the principal food crop of Afghanistan. There are no statistical data on wheat losses exclusively by sun pest attack. The Swedish Committee for Afghanistan (SCA) conducted The Agricultural Survey in 1989 ([www.archive.org/details/azu\\_acku\\_s271\\_a47\\_v\\_8](http://www.archive.org/details/azu_acku_s271_a47_v_8)) revealed that sun pest had inflicted damage on wheat crops from late May to early June. Over 60% of the spring wheat field were either infested or exhibited signs of an early infestation. The grain development had been reduced as much as 75 to 100%. In wheat field planted earlier, grain development had reduced by 25 to 30 percent. The rough estimated had indicated that crop losses largely due to sun pests would have caused food deficits affecting approximately 350,000 people.

Like field crops, in case of horticulture and fruit crops, there is no comprehensive estimate on economic loss on account of pest and disease infestation. In one study by MANAGE, Hyderabad,<sup>6</sup> it was reported that disease in fruits (aphid, anthracnose, melon flies) and vegetables (Colorado beetle in potato and grasshopper) were reported in Kunduz and Baghlan. In the western region, aphid was spotted in vegetables and fruits in few areas. In Paktya province (southern region), apple crop had been adversely affected by powdery mildew causing yield potential to drop by 5 per cent. In south- western region (Urozgan province), almonds had been affected by soft scale and grapes had powdery mildew.

The point that emerges is that studies have so far analysed loss of production which is combination of factors like flood, erratic rain, excessive heat and pest and disease issues, but

<sup>6</sup> "Demand analysis Report- Islamic Republic of Afghanistan", Manage , Hyderabad ([www.manage.gov.in/ftf-itt/demand/Afghanistan.pdf](http://www.manage.gov.in/ftf-itt/demand/Afghanistan.pdf))

it cannot be conclusively argued if such losses have taken place due to pest and disease infestation separately. This is one area the OMAID project will have to address through sponsoring some special studies.

### **3.9 LIVESTOCK PEST**

#### **3.9.1 *Pest in Dairy Animal***

The situation related to animal disease and parasites have been articulated in a paper by Mr to Mustafa Zafar, National Livestock Production Field officer (FAO AFG). <sup>7</sup> The issues related to animal health are given under.

The lack of a diseases surveillance network, of laboratory services to carry out diseases diagnosis and investigation and of an Epidemiology Unit to manage livestock information in such a way that it can aid in providing necessary information for planning process;

The increasing incidence of diseases in milch cattle marked by the recent importation of exotic diseases (Food and Mouth disease and etc.) and an increasing incidence of endemic diseases (Anthrax, Blackleg, Haemorrhagic Septicaemia) and zoonotic diseases (Brucellosis) resulting in increased mortality and morbidity and insecurity for the population;

The lack of quality vaccines produced in Afghanistan because of the unavailability of the necessary equipment, in spite of adequate buildings and some well trained personnel;

The absence of animal movement control at the borders and within the country due to the lack of quarantine facilities and border control inspections for imported live animals and of facilities for inspection of trade animals in transit within the country;

Inadequate separation of trade and slaughter animals at markets places allowing for possible contamination of farm animals by trade animals;

Inadequate slaughter facilities and adequately trained meat inspectors to enforce needed sanitary measures for the protection of consumers;

The insufficient and outdated legal framework for the control of livestock diseases, the regulation of private animal health service providers, the importation of veterinary medicines, biological products and animal feed, standards and regulations governing meat inspection, the processing of livestock products including slaughter facilities and dairy processing plants;

The main issues being faced by the livestock sub-sector can be classified in three main categories as:

The lack of specific livestock policy and livestock development strategy;

The lack of co-ordination between Government, donors and NGOs activities;

The lack of adequately trained personnel in almost all areas of veterinary and animal husbandry services provision either to undertake public or private function:

The lack of reliable information on the livestock situation;

<sup>7</sup> Mutafa Zafar " Perspective of Animal Genetic Resources Development and Conservation in Islamic Republic of Afghanistan " <http://www.fao.org/tempref/docrep/fao/010/a1250e/annexes/CountryReports/Afghanistan.pdf>

The weak organization of the public services and inadequate distribution and motivating treatment of human resources. These might have been the main reason for the past apparent lack of long term commitment on the part of donors to invest in the reconstruction of the livestock sector.

### 3.9.2 Risk

Some animal pests and diseases can affect humans directly and may use animals as vectors that aid in their transmission. Areas with conflict or poor health controls pose a greater risk of human infection from animal disease. Larger production units and increased contact among animals also increases the impact of outbreaks.

**Table 1. 3 : Commonly observed pests in Dairy animals and their control measures**

Sr No	Disease	Manifestation	Control Measures
1	Foot and Mouth disease (FMD)- Affecting Ungulates (cloven footed animals)	<ul style="list-style-type: none"> <li>Highly contagious;</li> <li>Spread through contact, contaminated water, feed and air;</li> <li>Causes vesicle formation on mouth, palate, teat which burst and results in ulceration;</li> <li>Affects all cloven footed animals;</li> <li>Though mortality may be low, drastically reduces milk production and draft capacity;</li> <li>Leads to permanent impairment in milk production and fertility.</li> </ul> Usually fatal to calves.	<ul style="list-style-type: none"> <li>Vaccination of animals above 4 months every 6 months;</li> <li>Vaccinate at least a month before the expected onset;</li> <li>Animal movement control;</li> <li>Quarantine</li> </ul> Disinfection of infected premises.
2	Haemorrhagic Septicaemia (HS)- Affects bovines	<ul style="list-style-type: none"> <li>Usually occurs during monsoon;</li> <li>Buffaloes more susceptible;</li> <li>There is severe throat and brisket oedema;</li> <li>Mortality rates are ~80%;</li> </ul> Regular occurrence in endemic areas.	<ul style="list-style-type: none"> <li>Annual vaccination of animals above 6 months of age;</li> <li>Vaccinate at least a month before the expected onset.</li> </ul>
3	Black Quarter (BQ)- Affects bovines	<ul style="list-style-type: none"> <li>Characteristic hot and painful swelling on loin and buttocks or sometimes on neck, shoulders or chest;</li> </ul>	<ul style="list-style-type: none"> <li>Annual vaccination of animals above 6 months of age;</li> </ul>

		<ul style="list-style-type: none"> <li>Regular occurrence in endemic areas.</li> </ul>	<ul style="list-style-type: none"> <li>Vaccinate at least a month before the expected onset.</li> </ul>
4	Brucellosis- Affects bovines (also other species)	<ul style="list-style-type: none"> <li>Characterized by joint swelling, abortion, typically after 5th month of pregnancy, retention of placenta;</li> <li>Delivery may be normal usually after 4<sup>th</sup> calving but both the dam and calf remain infected;</li> <li>It is zoonotic.</li> </ul>	<ul style="list-style-type: none"> <li>Once in a life time vaccination of female calves between 4-8 months of age;</li> <li>Proper disposal of aborted material and placenta;</li> <li>Disinfection of infected premises.</li> </ul>
5	Anthrax	<ul style="list-style-type: none"> <li>Highly contagious &amp; infectious soil- borne disease caused by Bacillus Anthracis;</li> <li>Sudden mortality;</li> <li>High fever;</li> <li>Blood may be present around nose, mouth, anus of carcass.</li> </ul>	<ul style="list-style-type: none"> <li>Test carcass for Anthrax;</li> <li>Notify suspected death to concerned authority;</li> <li>Restrict movement of animals and animal products from the farms reporting suspected Anthrax;</li> </ul>

### 3.10 CLEANLINESS AND HYGIENE IN MILK PRODUCTION

Clean milk production is a major issue in quality of milk in Afghanistan. This is because of absence of organised milk collection by the milk processors. Without scientific milk testing equipment in place, contamination of milk, especially around the major demand centres becomes one of the major problems in ensuring milk quality. This gap needs to be filled up under OMAID so that Afghanistan could enter into a regime of quality milk production, improves benchmark in quality milk production and safeguard public health hazards.

Before cleanliness and hygiene issues are discussed, it is necessary that a perspective of cattle husbandry and prevalent farm level situations are considered, which will pave way for a fair understanding of the sector. It may be noted that different measures needed for clean milk production and testing of milk at the level of Bulk milk chiller/chilling centre and the dairy dock have been presented in Chapter 5.

#### 3.10.1 Baseline situation

Before we go into the discussion on the subject, we go into some basic understanding about the milk production activities of Afghanistan. This will help us appreciate the situation at ground zero level.



### **3.10.2 Structure of animal holding**

- Animal holding per family is about 2-4 animals, which includes drought animal as well;
- Cattle are retained mostly under crop-livestock sedentary farming system;
- Drought power, dung, manure and milk are the utilities derived out of cattle. Dung cake used extensively in winter for the heating purpose;
- Cattle are low yielders, usually Kunari, Kandahari, Watani and Sistani are the descriptive breeds, while HF crossbreeds are found when milk selling is an objective function in the family;
- Kunari and Kandahari are better cattle breeds with lactation yield 1000-2000 liters.

### **3.10.3 Management practices**

- Cattle are usually housed collectively along with cattle of neighbouring families;
- Feeding is traditional- - in winter cereal (wheat and rice straw), hay is fed under indoor condition, otherwise, cattle are grazed in rangelands;
- Due to severe cold during winter, animals are kept indoors. Scarcity of feed is high during winter. Some farmers do not milk their animals during winter;
- Landless farmers also keep animal by procuring straw from the village elites from prevalent barter system. So, marginal cost of rearing animal is almost zero;
- Low feeding costs;
- Milking is done twice a day manually;
- Introduction of new technology in milk production is constrained;
- Due to low level of production, scattered villages, transportation limitation, delivery of veterinary services are difficult and the cost is prohibitive;
- During winter and monsoon rain time, roads are not negotiable;
- Natural breeding is practiced - - long lactation length;
- Animals are managed as part of a household chore;
- No commercialization of milk production- - incidence of concentrate feeding among families is low, suggesting low input and low output production model.
- For intensive dairy farming, animals are brought from Pakistan, in limited cases. These animals are of superior germplasm, average price ranging between USD 900 to 1000 per cow. They are usually found in Nangarhar, Balkh and Laghman Provinces;
- No information on the proportion of crossbred cows available. But some observers say that "it would be less than 10%".

### **3.10.4 Gender engagement in dairying**

- Women do the majority of the activities such as feeding, milking, watering, tending young cattle, but animal health and grazing are looked after by males;
- More than 90% of cattle rearing tasks are managed by women;
- Women are not so literates and mostly indoor due to cultural practice;
- Milking is done by the women, but without following any basic hygiene;
- Udder of the animals are not cleaned before milking (hygiene issue);
- Fingers are dipped in milk for lubricating teats (hygiene issue);
- Plastic buckets are often used to retain milk (hygiene issue);

- Basic knowledge of Clean Milk production is lacking.

### **3.10.5 Milk use**

- Mostly for family use in the form of Yogurt, Maska (Ghee), Quroot (dry whey);
- Drinking milk as fresh milk is not so prevalent.

### **3.10.6 The practice of selling milk in villages**

- Opportunities for selling milk in the villages are limited;
- No milk producer association in milk collection;
- Prices received by the sellers from the village buyers are low;
- Individual producers cannot aggregate milk and cool due to absence of cooling infrastructure;
- Milk testing is done when it is sold to village milk collection centres set up under any Milk Scheme, but their outreach is extremely limited.

### **3.10.7 Organized sector in milk collection**

- Not there;
- Quality of loose milk in open bazar is not always up to the standard;
- Milk is adulterated when sold in loose form in bazar (some studies have shown).

### **3.10.8 Contagious diseases in cattle**

- Anthrax;
- Foot and Mouth;
- Hemorrhagic Septicemia;
- Brucellosis;
- Tuberculosis; and,
- Parasitic diseases.

### **3.10.9 Issues in hygiene and sanitation**

- No milk cooling infrastructure; Energy crisis is very severe in villages;
- Milking vessels are not properly cleaned; Hand washing before milking not done; and,
- Poor hygiene and poor quality of milk production.

### **3.10.10 Probable human health issue**

- Zoonotic disease (FMD).

### **3.10.11 Quality issue at the plant level**

- Microflora in milk found in dairies are coliforms, micrococci, lactic streptococci, spore-forming aerobes and corny bacteria;
- These are contaminants from milk vessels;
- High incidence of thermoduric bacteria.

## 4 LEGAL FRAMEWORK AND INSTITUTIONAL CAPACITIES

### 4.1 LEGISLATIVE AND REGULATORY FRAMEWORK OF PESTICIDE MANAGEMENT

The project emphasizes on the use of bio pesticides and other local safest materials which are not hazardous to human health and the environment. Use of pesticides will be ordered in emergency cases but should use only safest and with high care.

In order to safeguard human health and environment from any adverse or undesired impact of injudicious use of pesticides, legislative and regulatory frameworks are provided for in any country. These legislative and regulatory framework act as checks and balances in any society for ensuring safety and secured lifestyle through consumption of safe food. These legal measures so provided become necessary prerequisite in any civil society for ensuring a safe and secure living of their citizens. While in developed society, citizens become conscious of certain adverse impact of undesired use of pesticides in agricultural produces because of their knowledge and enhanced awareness, in underdeveloped society, the situation is not so, as general awareness of the population is generally low. This leads to vulnerability among common citizens causing health hazards and economic loss.

The World Bank in its policy guidelines, as part of Safeguard Mechanism against any adverse impact on environment, public health and society has formulated Operational Guidelines 4.09, titled as "Pest Management", which seeks to safeguard the interests of the society and protect them from any adverse impact upon implementation of any activity which is supported by the World Bank. In consonance with the World Bank guidelines, and given the nature of agro commodities that would be proposed to be promoted under OMAID, and as part of ESMF, pest management plan is triggered under the project. This is because pest management requires complete knowledge and awareness on pesticides lest it affects the environment and public health. As safeguard measures, harmful pesticides are to be completely banned, and permissible pesticides are to be used following SOPs. Further, under the project, alternatives to pest application, i, e, IPM tools are to be explored, which are environment-friendly, sustainable and which does not cause any adverse impact on the society, and therefore a PMP is triggered under the present project.

When a country is embarking upon planned growth and development of its agribusiness sector, with export market being the focus and ensuring standardization of quality production and processing, as per the requirements of the final clientele, it is all the more necessary that possible health hazards are mitigated through legal provisions, regulatory framework, and control. It is to be mentioned that this is necessary even for the country where production activities are organized for in-country consumption for ensuring safety of public health, environment and ensuring sustainable income of the producers, the legal framework becomes unavoidable.

Given the above background, we have attempted to review the legislative provisions, regulatory framework, different control and orders, if any, that are relevant for this sector. There are also international agreements, conventions, treaties that are ratified by the host country and therefore there are utilities to take a look at them in the context of IPM.

While writing this chapter, the consultants found that under IAIS project a similar exercise has been completed, which has been accepted by the World Bank. Therefore, to avoid duplication,

they have been reproduced verbatim, while any new addition or new insights have been added in the present text.

#### **4.1.1 International Conventions on Environment**

The legal framework, legislation, law, acts, regulatory orders, etc are the essential ingredients of governance structure of any activity requiring societal order or enforcing discipline. The legal framework that has direct and/or indirect relation with pest and pesticide management would also require several legislative and regulatory orders at the national level as well as complying with international agreements, treaties, and conventions as ratified by the countries. It is against this context that the Government of the Islamic Republic of Afghanistan (GoA) with a view to harmonizing and fulfilling its national, regional and international obligations has signed and/or ratified the following conventions:

- United Nations Convention to Combat Desertification (UNCCD) in those Countries Experiencing Serious Drought and/or Desertification
- Vienna Convention for the protection of ozone layers
- The Montreal Protocol on Ozone-Depleting Substance
- Basel Convention for Control of Trans-Boundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)
- International Treaty on Plant Genetic Resources for Food and Agriculture
- International Plant Protection Convention (IPPC)
- Convention on Biological Diversity (UNCBD)
- United Nations Convention on the Law of the Sea
- United Nations Framework Convention on Climate Change (UNFCCC)
- Male Declaration on Control and Prevention of Air Pollution and its Likely Trans-Boundary Effects for South Asia
- London Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter (London Convention)
- Convention on the Protection of World Cultural and Natural Heritage
- Convention on Fishing and Conservation of Living Resources of the High Seas
- Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)

According to PMP document of IAIDS report, the Islamic Republic of Afghanistan is not party or signatory to the following important international agreements, conventions and treaties:

- Rotterdam Convention on the International Code of Conduct on the Distribution and Use of Pesticides on Prior Informed Consent (PIC)
- Stockholm Convention on Persistent Organic Pollutants (POPs)
- Convention on the Conservation of Migratory Species of Wild Animals
- Kyoto Protocol Convention on Climate Change
- Agenda-21 Global Program of Action for Sustainable Development (Environmentally sound management of toxic chemicals and prevention of illegal international traffic in toxic and dangerous products)
- The Rio Declaration on Environment and Development- which addresses the sustainable use of natural resources and its development

#### 4.1.2 Policies, Legal and Regulatory Affairs on Environment Protection and Management

In the foreword to the report on Post- Conflict Environmental Assessment of Afghanistan 2003, UNEP, it is mentioned that “decades of conflict and violence coupled with drought and earthquakes have had devastating impacts not only on the people of Afghanistan, but also on its natural environment, once pristine and rich in biological diversity, but now suffering from years of overexploitation of natural resources and habitat loss”. These few lines sum up the environmental situation on the ground in Afghanistan.

The UNEP’s post-conflict environmental assessment illuminated state of affairs at the ground zero level involving almost all sectors and sub-sectors of the economy covering land degradation, poverty, migration, air quality, energy, urban environment, water, soil, forest, mine, agriculture, natural resources, irrigation, pest and many other sub-sectors. It also found that apart from conflict and internal strife, environmental degradation was one of the driving forces that led to out-migration from Afghanistan and also the internal displacement of people nearer to cities and towns in search of livelihoods. “The net result of the degradation is widespread desertification and erosion, and increased vulnerability to environmental disasters. Now is the time to take stock of the current conditions, develop systems for the sustainable use of resources and look for ways to rehabilitate degraded ecosystems.” (ibid, p- 7).

Following the release of UNEP report in 2003, the first time in the history of the country, an authority for environmental management was mandated in the structure of Interim Administration. The Ministry of Irrigation and Water Resources was allocated the additional responsibility for environmental management and renamed as the Ministry of Irrigation, Water Resources and Environment (MIWRE). The mandate of the new ministry covered watershed management, including the maintenance, design and construction of water intakes, irrigation canals, and reservoirs as well as the ecological condition of catchments. Responsibility for environmental management as well as environmental degradation was also added to its mandate. When MIWRE was established, the country’s environmental priorities had not been elaborated or prioritized, and the ministry operated largely without any policy guidance.

A Department of Environment was created but did not have dedicated staff to work specifically on environmental management issues. Rather, the staff consisted mainly of technical water and irrigation experts, consultants and engineers. Capacity building and technical assistance were being provided to the ministry by UNEP, as well as other UN agencies including UNESCO and UNICEF.

#### 4.1.3 Institutional responsibilities of Environmental management at the beginning of the present century

The environmental responsibilities also rested on many other Government bodies, and a description of such bodies and their broad roles, as provided through UNEP report is presented through **Table 4. 1**.

**Table 4. 1: Different other Ministries/Bodies entrusted with Environmental responsibilities**

Sr No	Ministry/Body	Broad Responsibilities
1	Afghan Assistance Coordination Authority (ACA)	Functioned as a temporary institution to review and approve all reconstruction projects conducted by international agencies and bilateral donors. It also

Sr No	Ministry/Body	Broad Responsibilities
		facilitates the management, coordination and financial tracking of reconstruction efforts, and is responsible for government-wide capacity-building strategies.
2	Ministry of Finance	Responsibility is to prepare and monitor, in cooperation with other ministries, the state budget.
3	Ministry of Reconstruction	Responsible for overall policy development on reconstruction priorities and for coordinating international assistance
4	Ministry of Planning	Responsible for planning coordination and ensuring harmony with national policies and reconstruction priorities.
5	Ministry of Agriculture and Animal Husbandry	<p>This ministry has traditionally held and continues to hold responsibility for the management of key environmental sectors including forests, wildlife, wetlands and fisheries. It is also responsible for agricultural and rangelands, including cultivation, grazing and chemicals management.</p> <p>This ministry is a critical partner to the Ministry of Irrigation, Water Resources and Environment in field-level implementation of environmental policy and enforcement of regulations. Capacity building and technical assistance to the Ministry is currently being provided by the FAO. Many offices of this Ministry are staffed but are not conducting management activities due to lack of capacity and equipment.</p>
6	Ministry of Public Health	<p>A Department of Environmental Health was first established in 1976. This department addressed health issues related to environmental pollution, such as air pollution-related diseases (respiratory infections, dust and smog), water pollution and sanitation-related diseases, cholera, diarrhoea) and liquid and solid waste-related diseases (infections, flies, rats, mosquitoes). The Department of Environmental Health has environmental monitoring responsibility. However, it is currently unable to perform this function since laboratory facilities have been largely destroyed. The ministry is also responsible for clean-up of environmental contamination, food safety of both imported and manufactured foods, and provision of environmental inspectors to cities. The WHO is assisting the Ministry of Public Health with a variety of health-related activities.</p>
7	Ministry of Urban Development & Land	Construction of housing, city planning, water supply and sewage systems and has established an environmental department. In principle, the Ministry works closely with the municipalities. UN-Habitat supports many of their programs, including those on urban waste, water, and sanitation.

Sr No	Ministry/Body	Broad Responsibilities
8	Ministry of Rural Rehabilitation & Development	Overall responsibility for rural livelihoods including a variety of activities like the provision of seeds and medicines, construction of clinics, schools and village roads, village water supplies. Due to the broad mandate of this Ministry, which clearly overlaps with many other Ministries, it works closely with a variety of UN agencies, in particular the UNDP Area Based Development Program.
9	Ministry of Water & Power	Management of national power supply, planning and reconstruction of hydropower dams, and management of surface water and reservoirs. Lacked capacity in issues related to environmental management and limited collaboration is conducted with other ministries with water management mandates.
10	Ministry of Mines & Industry	Management of mines and heavy industry including waste, but lacked in capacity to assess the environmental impact of mines and heavy industry.
11	Ministry of Information and Culture	Collection and dissemination of environment-related information through media. Maintenance of religious, cultural and heritage sites and museums for management.
12	Ministry of Foreign Affairs	Participation in international and regional environmental conventions.
13	Provincial and district government authorities	Community-based management of natural resources like irrigation ( <i>Karez</i> ), woodland and rangelands following local customs and traditions in rural areas. However, with the onset of conflicts, local institutional arrangements in community-based management systems collapsed, and local power brokers like commanders, warlords took control of natural resources and enforced their own rules. But with 80% of the population residing in rural areas, community-based resource management for environment gained importance in many places not inflicted by radical influence and in these areas, environmental rules, customs and traditions were aligned with the central government. In urban areas, own laws and standards were developed in the areas of waste management, water supply, transportation, and energy. However, due to lack of information, human capacity and financial resources greatly hindered management of the environment.

Source: Adapted from Afghanistan Post- Conflict Environmental Assessment, UNEP, 2003, p- 93 & 94

#### **4.1.4 A critical analysis of Environmental management issues during the beginning of the present century**

A perusal into the responsibilities of environmental management at the beginning of the present century indicate that there were different Ministries /institutions responsible for managing the environment in their functional areas, but in the absence of any well-coordinated law and enforcing mechanism, the responsibilities largely remained dormant. Moreover, knowledge and awareness about environmental issues could not catch the

required attention of the newly formed transitional Administration. It was also to be noted that capacity and the competency of different Ministries were severely constrained to work on environmental management. Some would also argue that at that point of time priorities of the national government was to ensure food security, shelter, peace and stability- - all of them were missing due to sustained war and internal conflict. Recurrent drought during the beginning of the century was another environmental stress that had pushed back some 4 million Afghans out of the country. So, environmental issues could not have preceded over other pressing issues from the priority of the then national government. A fair point, but what lessons we learn is that political, economic and governance issues are interconnected and they singularly or collectively impact environment. The proponents of environmental group would further argue that environment also induces economic wellbeing of any society. Therefore, it is to be understood that all these issues cannot be separated and they need to be analyzed in conjunction with associated reasons to have a better perspective on the subject of environmental management.

The environmental awareness and gravity of the issues were for the first time highlighted in Afghanistan following the publication of UNEP report. From this consideration, it needs to be acknowledged that public awareness and sensitization on this vexed issue started drawing the attention of the planners, scholars, public administrators, stakeholders and civil society which was a turning point on the contemporary thoughts on environmental policy and management.

#### **4.1.5 Creation of the National Environmental Protection Agency (NEPA)**

Subsequent to the realization of felt needs, due to increasing environmental problems (urban environment, surface and groundwater, forests and rangelands, soils, air, wildlife and biodiversity, and uncontrolled import and use of agrochemicals), the environmental issues were to be addressed by the Department of Environment, which was separated from MIWRE and given the function and the status of an independent National Environmental Protection Agency (NEPA). The National Environment Protection Agency (NEPA) was established as Afghanistan's environmental policy-making and regulatory institution to regulate, coordinate, monitor and enforce the implementation of Afghanistan's Environmental Laws, adopted in 2005 and amended in 2007.

The broad mandate of NEPA is focused on strengthening of environmental management capacity through (i) national environmental coordination; (ii) public administration reform and human resources skills development; (iii) environmental impact assessment; (iv) environmental legislation, regulations and standards; (v) sub-national environmental affairs and community-based natural resource management; (vi) environmental monitoring, information and analyses, audit and enforcement; (vii) environmental policy development and planning; (viii) environmental communications, outreach and education; and (ix) multilateral agreements and regional cooperation.

In addition, there was a dire need for capacity building in the implementation of the three global environmental conventions namely: Climate Change, Desertification and Biodiversity, using the 'bottom-up' approach and active participation of the communities in decision-making, in accordance with the institutional framework and decentralization approach (**ibid, p-24**)

While the National Environmental Protection Agency (NEPA) is the lead government authority, other national institutions also play an important role. They include Ministry of Agriculture,



Irrigation and Livestock, the Ministry of Water and Energy, the Ministry of Mines, the Ministry of Rural Rehabilitation and Development, the Ministry of Urban Development and Housing, the Ministry of Public Health, the Ministry of Transport, the Ministry of Education, the Ministry of Foreign Affairs, and the Ministry of Public Works. Other national institutions are also key partners, such as the universities and the Afghanistan Independent Human Rights Commission.

#### **4.1.6 Salient Provisions of Environmental Law, 2007**

The salient provisions of Environmental Law of Afghanistan 2007, has the following functions and responsibilities:

- Maintain environmental integrity and promote sustainable use of natural resources;
- Promote conservation and rehabilitation of the environment;
- Coordinate environmental affairs at the local, national and international levels;
- Develop and implement national environmental policies and strategies in order to integrate environmental issues and sustainable development approaches into the legal and regulatory frameworks;
- Provide environmental management services in the areas of environmental impact assessment, air, and water quality management, waste management, pollution control, and permitting of related activities;
- Establish communication and outreach for environmental information to ensure improved awareness of environmental issues;
- Implement bilateral or multilateral environmental agreements to which Afghanistan is a Party;
- Implement the Convention on the International Trade in Endangered Species of Fauna and Flora (CITES);
- Sign on behalf of the government agreements regarding the protection and rehabilitation of the environment;
- Promote and manage the Islamic Republic of Afghanistan's accession to and ratification of bilateral and multilateral environmental agreements;
- Coordinate the preparation and implementation of a national program for environmental monitoring and effectively utilize the data provided by that program;
- Prepare every two years in relation to urban areas and every five years in relation to rural areas a State of the Environment report for the Islamic Republic of Afghanistan for submission to the President's Office;
- Prepare an interim State of the Environment report on emerging issues relevant to the environment in Afghanistan not less than every two years;
- Within a period of three years of promulgation of this Act, develop a national environmental action plan, which assesses the urgency and importance of actions that should be taken in the short, medium and long-term in order to prevent, eliminate and reduce adverse effects as described in the most recent State of the Environment Report, and, in consultation with relevant ministries and institutions, determines a coordinated strategy and schedule for the implementation of those actions;
- Periodically compile and publish reports on significant environmental indicators;
- On an annual basis, compile and publish a report that details the authorizations granted and activities undertaken by the National Environmental Protection Agency;

- Assess the effectiveness of the implementation of the Act and any regulations made under it in improving the sustainability of the use and management of natural resources and conservation and rehabilitation of the environment;
- Develop and implement plans for environmental training, environmental education and environmental awareness-raising in cooperation with relevant ministries and public bodies;
- Actively coordinate and cooperate with ministries, Provincial Councils and District and Village Councils, public bodies and the private sector on all issues related to a sustainable use of natural resources and conservation and rehabilitation of the environment;
- Monitor the implementation of the objectives and provisions of this law;
- Fulfill any other functions assigned by the Council of Ministers.

#### **4.1.7 Status of Pesticide Law and Provisions made**

The IRGoA has approved the Pesticide Law, notified on official gazette on October 19, 2015.

**Table 4. 2: The Act contains 6 Chapters and 30 Articles. The Chapters are:**

Chapter	Article
Chapter 1: General Provisions	1-4
Chapter 2: Duties and Authorities	5-9
Chapter 3: Permit/ Licenses	10-15
Chapter 4: Registration of Pesticides	16-22
Chapter 5: Protective Measures	23-24
Chapter 6: Miscellaneous Provisions	25-30

The above Articles and their detail descriptions are provided through **Table 4. 3.**

**Table 4. 3: Articles and Provisions in Pesticide Law of Afghanistan 2015**

Chapter	Article	Description	Provisions made
1 General Provisions	Article 1	Legal Basis	This Act is enacted in pursuant to the Article (14) of the Constitution of the Islamic Republic of Afghanistan
	Article 2	Objectives	To control the production, import, transport, maintain, distribute and use of pesticides; 2. To prevent risks to human, animal, plant health, resulting from the use of pesticides; 3. To protect plants and environment from the adverse effects of pesticides; 4. To prevent the losses of agricultural products through the application of sound techniques.
	Article 3	Descriptions	<b>"Pests"</b> : All living factors such as insects, nematodes, disease (fungus, viruses and bacteria) weeds, that damage plants and agricultural products/fruit, qualitatively and quantitatively
			<b>"Pesticides"</b> : Chemical substance or a mixture of substances used for preventing, controlling or destroying pests, that include: <ul style="list-style-type: none"> <li>• Vectors of human and animal disease factors.</li> <li>• Undesirable species of plants and animals, listed in this Act.</li> <li>• Substances which may be administered to animals for the control of pests in or on their bodies.</li> <li>• Substances intended for use as a plant growth regulator, defoliant and desiccant.</li> <li>• Substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.</li> </ul>

Chapter	Article	Description	Provisions made
			<ul style="list-style-type: none"> <li>• Substances used to eradicate or pacify germs, repellants, pests and sterilizing agents.</li> </ul> <p><b>“Eradication”</b> refers to activities for, neutralizing, destroy of isolate wastes, used tools contaminated with agricultural pesticides.</p> <p><b>"Label"</b> refers to written, printed or graphic matter on or attached to the immediate package and on every other covering the package containing pesticides.</p> <p>. <b>“Package or Packaging”</b> means the container together with the protective wrapping used to carry pesticide products via wholesale or retail distribution to users.</p> <p><b>“Residue”</b> means any substances in or on food, agricultural commodities or animal feed resulting from the use of a pesticide, including:</p> <ul style="list-style-type: none"> <li>• any derivatives of a pesticide, such as conversion products, metabolites, reaction products and impurities considered to be of toxicological significance; and</li> <li>• Residues from unknown or unavoidable chemical source use.</li> </ul> <p><b>"Premises”</b> mean any land, shop, stall, place, vehicles or other physical location where any pesticide is, manufactured, stored, transported, sold or used.</p> <p><b>“Distribution”</b> means the process by which pesticides are supplied through trade channels to local or international markets.</p>

Chapter	Article	Description	Provisions made
			<p><b>“Manufacturer”</b> means any legal entity in the public or private sector engaged in the manufacture of a pesticide’s active ingredient or preparing its formulation or product, whether directly or through an agent or through an entity controlled by or under contract with it.</p> <p><b>“Risk”</b> means a function of the probability of adverse health or environmental effect, and the severity of that effect, following exposure to a pesticide.</p> <p><b>“Poison”</b> means a substance that can cause disturbance of structure or function, leading to injury or death when absorbed in relatively small amounts by human beings, plants or animals.</p> <p><b>“Formulation”</b> means the combination of various ingredients designed to make a product useful and effective for the purpose or purposes claimed.</p> <p><b>“Agricultural pesticide product”</b> means the pesticide active ingredients and other components, in the form in which it is packaged and sold.</p> <p><b>“Poisoning”</b> means the occurrence of damage or disturbance caused by a pesticide on living organism (human, animal, and plant).</p> <p><b>“Active ingredient”</b> means the chemically active part of the pesticide present in a formulation.</p>

Chapter	Article	Description	Provisions made
			<p><b>“Permit”</b> refers to a written document issued by the Ministry of Agriculture, Irrigation and Livestock to license the import, export, store, sale, and advertising of the pesticide, in accordance with this Act.</p> <p><b>“Registration Office”</b> refers to an office where a pesticide along with its qualitative and quantitative values is registered</p>
	Article 4	Implementing authority	The Ministry of Agriculture, Irrigation and Livestock is responsible for implementing the provisions of this law.
2 Duties and Authorities	Article 5	Duties and Authorities of the Department of Plant Protection and Quarantine	<p>The Department of Plant Protection and Quarantine shall have the following duties and authorities:</p> <ol style="list-style-type: none"> <li>1. Issue and register permits, listed in this Act;</li> <li>2. Develop and implement programs to control, monitor and inspection of pesticides.</li> <li>3. Develop and implement research programs on pesticides;</li> <li>4. Approve maximum concentration of pesticide residues in consultation with Pesticide Committee, in accordance with this Act.</li> <li>5. Establish relations with countries, national, regional and international organizations, in accordance with this Act.</li> <li>6. Organize and management of meetings of the Pesticide Committee.</li> <li>7. Accomplish other functions listed in this Act.</li> </ol>
	Article 6	The Pesticide Committee	<p>In order to better implementation of provisions of this Act, the Pesticide Committee shall consist of the following members:</p> <ol style="list-style-type: none"> <li>a) The Deputy Minister (Technical) of the Ministry of Agriculture, Irrigation and Livestock, who shall act as Chairman;</li> </ol>

Chapter	Article	Description	Provisions made
			<p>b) The Head of the Plant Protection and Quarantine Department of the Ministry of Agriculture, Irrigation and Livestock, as Deputy Chairman;</p> <p>c) An authoritative representative of the Ministry of Commerce and Industry, as a member;</p> <p>d) An authoritative representative of the Ministry of Public Health (MOPH), as a member;</p> <p>e) Head of Agricultural Research Institute, as a member;</p> <p>f) Director-General of Livestock and Animal Health, as member;</p> <p>g) An authoritative representative of the National Environment Protection Agency (NEPA), as a member;</p> <p>h) An authoritative representative of the Afghan National Standards Authority (ANSA), as a member;</p> <p>i) A professor from the Agriculture Faculty of Kabul University, as a member;</p> <p>j) A professor from the Veterinary Faculty of Kabul University, as a member;</p> <p>k) Head of Agricultural Chemistry Division of the Plant Protection Department, as secretary;</p> <p>l) A professor from the Environment Faculty of Kabul University as Member;</p> <p>(2) The Pesticide Committee may invite experts of relevant fields for consultations and technical information, if required, to its meetings</p>

Chapter	Article	Description	Provisions made
			<p>(3) The manner of convening the Committee meetings referred to in paragraph (1) of this Act, and its activities, shall be organized in accordance with the procedures, to be approved by the committee.</p>
	<p>Article 7</p>	<p>Functions and Authorities of the Committee</p>	<p>The Pesticide Committee shall have the following functions and authorities:</p> <ol style="list-style-type: none"> <li>1. Approve or reject applications for the registration, re-registration, suspension, substitution and removal of pesticides from the relevant registry office</li> <li>2. Prepare lists of allowed and prohibited pesticides</li> <li>3. Review, suspend substitute or removal of pesticides from the list in accordance with new scientific information, on the request of relevant agency or two committee members.</li> <li>4. Set forth necessary conditions, pursuant to provisions of this Act, for acquiring a permit.</li> <li>5. Provide advice and set forth criterions for the management and better use of pesticides.</li> <li>6. Provide advice, pursuant to provisions of this Act, in performing good agricultural practices, determination of fees to be collected for the services provided.</li> <li>7. Approve maximum limit of residue concentration of pesticides.</li> <li>8. Make sure the registration of pesticides</li> <li>9. Select location for store and use of pesticides.</li> <li>10. Organize the modality of transporting the pesticide and set forth special conditions.</li> <li>11. Organize the modality of eradicating unusable pesticide, empty containers and liquids from washing pesticide tools, in an environmentally sound manner.</li> </ol>



Chapter	Article	Description	Provisions made
	Article 8	Appointing Inspectors	<ol style="list-style-type: none"> <li>1. The Plant Protection and Quarantine Department, in order to implement the provisions of this Act, shall assign inspectors, whose interests are not opposed to the under inspection matter.</li> <li>2. The inspectors, referred to in paragraph (1) shall have the following duties and authorities:</li> <li>3. Control and inspect individuals, who produce, import, export, pack, label, sell, distribute, transport, use and advertise pesticides.</li> <li>4. Seek information and necessary technical assistance from individuals in order to better carry out functions set forth in this Act.</li> <li>5. Take samples of any substances to which this Act is applied, and send such samples for analysis to relevant laboratory.</li> <li>6. Probe violations/offenses against the provisions of this Act, and report to the Pesticide Committee.</li> <li>7. Stop all activities contrary to the provisions of this Act.</li> <li>8. Confiscate all documents and substances, insinuate violation and considered offense by the provisions of this Act.</li> <li>9. Inspectors, referred to in paragraph (1), are required to show the special card, during the inspection.</li> </ol>
	Article 9	Right of Appeal	<ol style="list-style-type: none"> <li>1. Any person, not satisfied with the decision of inspector or the laboratory section, may submit his written objection to the Pesticide Committee within a period of thirty (30) days from the date on which the decision is communicated to him.</li> <li>2. The Pesticide Committee, after receiving the appeal, referred to in paragraph (2) of this Article, within (30) days</li> </ol>

Chapter	Article	Description	Provisions made
			<p>of acceptance or rejection of the appeal, shall make its decision, and that decision shall be the final.</p>
3	Article 10	Issuance of Permits/Licenses	<ol style="list-style-type: none"> <li>1. Production, import, export, transportation, store, sale and distribution of pesticides, without a permit, shall be prohibited.</li> <li>2. A Legal entity, in order to obtain a permit, referred to in paragraph (1) of this Article, may submit a written application to the Plant Protection and Quarantine Department.</li> <li>3. The Plant Protection and Quarantine Department shall only issue an import permit to a legal entity registered in accordance with Afghanistan Law, for a period of one year, provided that the entity:               <ol style="list-style-type: none"> <li>a) holds a business/trade permit;</li> <li>b) imports pesticides from international firms of good standing;</li> <li>c) provides samples of pesticides to be imported for analysis, before importing;</li> <li>d) appoints professionals holding third-level science degree at pesticide sale stores;</li> <li>e) provides a list of retailers and sale agencies associated with the Plant Protection and Quarantine Department;</li> <li>f) registers pesticides upon import with the Registration Office of the Plant Protection and Quarantine Department.</li> </ol> </li> <li>4. Affairs related to producing, export, transportation, store, sale, distribution of pesticides and the royalty amounts, referred to in paragraph (2) of this Article, shall be regulated by a separate regulation;</li> <li>5. The permit, referred to in paragraph (1) of this Article, is not transferrable;</li> </ol>

Chapter	Article	Description	Provisions made
			<p>6. If the application, referred to in paragraph (2) of this Article, is rejected by the Plant Protection and Quarantine Department, the applicant may submit a written appeal to the Pesticide Committee. The committee decision on acceptance or rejection is then final.</p>
	Article 11	Purchase without obtaining Permit	<p>Agriculture Cooperatives may purchase necessary pesticides, without a license, proportionate to the land area, in accordance with the recommendations of the relevant technical personnel of MAIL and must undertake to store and use them safely.</p>
	Article 12	Obligations of the Permit/License Holder	<p>The permit/license holder may have the following duties/responsibilities:</p> <ol style="list-style-type: none"> <li>(1) Maintain documents related to production, import, export, store, purchase, sale, use, distribution, formulation and other documents related to pesticides, for at least (3) years.</li> <li>(2) Make available, upon request, documents referred to in paragraph (1) of this Article, to inspectors and public authorities.</li> <li>(3) Take necessary measures to protect, store and transport any pesticides.</li> <li>(4) Comply with environmental protection measures.</li> <li>(5) Import pesticides via ports, where equipment for analysis are available.</li> <li>(6) Comply with any and all conditions set forth in the permit/license.</li> </ol>
	Article 13	Renewal of Permit/License	<p>1. The holder of permit/license shall renew the relevant permit within a period of (30) days after the end of the date of expiry. A fine of AFG 500 shall be paid thereafter for each delayed day.</p>

Chapter	Article	Description	Provisions made
			2. The permit, after the end of the expiry date, may be renewed in accordance with relevant regulation, provided that the provisions of this Act is complied
	Article 14	Termination of Permit/License	The permit/license shall be terminated, if: 1. Provisions of this Act are not complied with; 2. Permit/license holder dies or his legal entity is dissolved. 3. There are safety reasons which justify limiting the trade or use of a pesticide, a premise or other element included in the license.
	Article 15	Returning the Permit/License	When the permit/license holder, is unable to perform his/her duties, he/she shall submit the permit/license along with a written report on the pesticide to the Plant Protection and Quarantine Department.
Chapter 4: Registration of Pesticides	Article 16	Application for Registration	1. Any person, desiring to register a pesticide product, shall, according to the provisions of this Act, submit an application for registration to the Plant Protection and Quarantine Department 2. The Plant Protection and Quarantine Department shall register the allowed pesticides in its relevant office. 3. Any pesticide, which existed prior to the enactment of this Act, and considered unusable according to the provisions of this Act, shall receive a special ruling by the Pesticide Committee to determine how such quantity and the time period will be allowed for the exceptional use of this same pesticide, otherwise, shall be immediately banned.
	Article 17	Import of Un-registered Pesticides	1. The manufacture, import, export, transport, storage, sale, distribution, application, use or advertisement of unregistered pesticides, are all prohibited.

Chapter	Article	Description	Provisions made
			<p>2. Pesticides, imported in emergency cases, in order to prevent a severe pest outbreak, are excluded from this provision, on authorization from MAIL.</p>
	Article 18	Temporary Research Permits/Licenses	<p>1. The Plant Protection and Quarantine Department after the approval of the Pesticide Committee, in accordance with the provisions of this Act, may grant a temporary permit to licensed individuals or entities authorizing them to import, formulate or use of pesticide for the purpose of scientific research.</p> <p>2. Individuals, referred to in the paragraph (1) of this Article, shall always submit the outcome of their research to the Plant Protection and Quarantine Department</p>
	Article 19	Use of Pesticides in Emergency Cases	<p>The Plant Protection and Quarantine Department, after the approval of the Pesticide Committee, may grant permits to licensed individuals for the use of the unregistered product in cases of emergency or a pest outbreak, provided that</p> <ol style="list-style-type: none"> <li>1. There is no product in the Registry available and affordable in sufficient quantities to manage the pest outbreak causing the emergency.</li> <li>2. The permit to use is for a specific time period only and specified by the Pesticide Committee.</li> <li>3. The permit holder and consignments are clearly identified.</li> </ol>
	Article 20	Revoking of a Pesticide from the Registry Office	<p>The Pesticide Committee may cancel the registration of a pesticide and remove it from the list when:</p> <ol style="list-style-type: none"> <li>1. It is no longer effective for its intended purpose.</li> <li>2. Based on new scientific information that the pesticide presents hazards to human, plant, or animal health or the natural environment.</li> <li>3. Other products or management measures become available that are more or equally effective, and less hazardous.</li> </ol>

Chapter	Article	Description	Provisions made
			<p>4. The pesticide becomes banned or restricted in a country with similar governance and ecological circumstances, or by an international agreement or convention that Afghanistan has acceded to.</p>
	Article: 21	Ban on Pesticides Usage	<p>If the Pesticide Committee has reasons to believe that the use of any registered pesticide may result in risk/injury to human beings, animals or the environment, it may:</p> <ol style="list-style-type: none"> <li>1. Temporarily prohibit the sale, distribution or use of the pesticide or a specified batch of pesticides.</li> <li>2. Specify the area and period of validity in its official notification to an individual or the registration office.</li> <li>3. Carry out an investigation of the matter.</li> </ol> <p>According to the results of the investigation, the Pesticide Committee shall order either the removal of the temporary prohibition, or the amendment, suspension, or cancellation of the registration.</p>
	Article 22	Investigation outcomes	<ol style="list-style-type: none"> <li>1. The Pesticide Committee shall carry out an investigation on a prohibited pesticide within the period of 3 months and shall, based on the findings of the investigation, decide on temporary prohibition or removal.</li> <li>2. In case a pesticide is permanently banned as a result of the investigation and decision of the committee, it shall make a decision on the eradication of any existing remaining stock.</li> </ol>
Chapter 5: Protective Measures	Article 23	Labeling	<p>All containers of pesticides shall be accompanied by a label in one of the official languages of the The Islamic Republic of Afghanistan that includes:</p> <ol style="list-style-type: none"> <li>1. Common and trade names, concentration formulation and ingredients of the pesticide.</li> </ol>

Chapter	Article	Description	Provisions made
			<ol style="list-style-type: none"> <li>2. The type of product (e.g. insecticide, fungicide, herbicide, rodenticide).</li> <li>3. The name of the pest which the pesticide is intended to eradicate and the recommended dosage.</li> <li>4. The use instructions, application methods, persistence and pre-harvest interval.</li> <li>5. Warnings and cautionary measures, including signs and symptoms of poisoning and information on safety, health and first aid measures, warning symbols and precautions for environmental protection.</li> <li>6. The date of manufacture, expiry, batch number and name of the manufacturing country.</li> <li>7. Other relative technical requirements</li> </ol>
	Article 24	Ban on Commercial Advertisement of the Pesticides	Advertisement of unregistered pesticides, or the use of pesticides restricted to trained operators and technical equipment, is prohibited.
Chapter 6: Miscellaneous Provisions	Article 25	Establishment of Laboratory	<ol style="list-style-type: none"> <li>1. The Ministry of Agriculture, Irrigation and Livestock may establish laboratories to carry out pesticide formulations and analysis of samples.</li> <li>2. The Plant Protection and Quarantine Department shall send the pesticides, collected by inspectors to laboratories, referred to in the paragraph (1) of this Article, for analyses, quality control and registration</li> </ol>
	Article 26	Functions of Laboratories	<p>The functions of the laboratories, referred to in Article (25) of this Act, shall include:</p> <ol style="list-style-type: none"> <li>1. Providing information to applicants on active ingredients of the pesticide and the amount of residue of the pesticide on agricultural products, for the purpose of registration.</li> </ol>

Chapter	Article	Description	Provisions made
			<ol style="list-style-type: none"> <li>2. Carry out studies on the presence and eradication of pesticides which are Persistent Organic Pollutants (POPS), harm the environment are banned or unregistered pesticides.</li> <li>3. Support the development of protocols for studies on pesticide residue.</li> <li>4. Coordination between pesticide residue and other pesticide-related studies, with the National Environmental Protection Agency (NEPA).</li> <li>5. The pesticide laboratory staff shall preserve the confidentiality of the formulae submitted for analysis or tests, along with its records.</li> </ol>
	Article 27	Punitive Measures	<ol style="list-style-type: none"> <li>1. If a person, without holding permit/license or package, serial number and particular label, engaged in importing and selling pesticides, the Plant Protection and Quarantine Department shall, apart from confiscating the pesticide, fine the offender 30% of the total cost of the imported pesticide.</li> <li>2. If a person, contrary to the list of the allowed pesticides, without a permit/license imports any pesticide, the Plant Protection and Quarantine Department shall, apart from confiscating the pesticide fine the offender 30% of the total cost of the imported pesticide.</li> <li>3. If a permit/license holder shows indifference in keeping the relevant documents or does not reveal upon request by inspectors, the Plant Protection and Quarantine Department shall close the storage facility of the offender until presentation of the documents. In case of failure to present the required documents within one month, the permit/license may be annulled.</li> </ol>



Chapter	Article	Description	Provisions made
			<p>4. If the permit/license holder does not submit a request for registration of pesticides to the relevant office, and without registration engages in import, store, advertise, sell, distribute, implement and use of pesticides, the Plant Protection and Quarantine Department, shall, considering the type of the offense, order this person to pay 20% of the total cost of the imported pesticides.</p> <p>5. If the outcomes of analysis prove contrary to the samples presented, the imported pesticides shall be confiscated and the offender may be fined to pay 20% of the total cost of the imported pesticide.</p> <p>6. The Plant Protection and Quarantine Department shall, within (10) days, deposit the collected amount in the government income account.</p>
	Article 28	Responsibilities of the Agencies	<p>1. Ministries of Finance and Trade and Industry, the Customs Department and other relevant agencies, shall cooperate with the Ministry of Agriculture, Irrigation and Livestock on the control, import and export of pesticide, and prevent the import of all pesticides prohibited by the provisions of this Act.</p> <p>2. Customs officials, required to allow/deny a permit/license holder to import pesticides</p>
	Article 29	Propose Regulation and Setting Procedures	The Ministry of Agriculture, Irrigation and Livestock, in order to better implement the provisions of this Act, may propose regulations and set procedures, not adverse to the provisions of this Act.
	Article 30	Enforcement	This Act shall, from the date of signature, be enacted and promulgated in the official gazette of the Government of the Islamic Republic of Afghanistan

Source: 1560317797\_zakon\_o\_pesticidakh\_eng (1).pdf

#### **4.1.8 A Critical Review of Pesticide Law**

The promulgation of Pesticide Law was a major step towards ensuring orderly use of pesticide, safeguarding the interests of the common men from adverse health and environmental issues as also bringing in control and discipline in the use of a pesticide for agricultural uses. A closer analysis of various provisions indicate that the law appears to have prepared after thorough deliberations wherein Pesticide Committee has been assigned with major responsibilities to resolve disputes, decide on registration, finalize list of approved or prohibited pesticides, decide on maximum limit of residue concentration in pesticide, select location for store and use of pesticide and ensure good management practices in agriculture.

To keep an oversight on the use and management of pesticide, following the provisions of the Law, pesticide inspectors are given the responsibility to verify field level practices followed by the license holders and ensure if compliances are adhered to or not. Another novel provision is that importation of pesticide will have to be done through those ports where equipment for analysis is in place. Theoretically, it would ensure that spurious and hazardous pesticides do not make unhindered entry into the country. The Law therefore provides for a sound legal platform on which a healthy and judicious practice on pesticide use can be popularized in the country.

The apparent drawback in the Law is that it does not provide for representation from the private traders or wholesalers in the proposed Pesticide Committee. It may be taken into note that the pesticide trade is largely dominated by a handful of traders who are strong players and no representation of this segment in the Pesticide Committee might create a sense of marginalization in them. However, there is a provision of inviting experts in the committee, which could provide them entry so that the committee members could as well consider their views and suggestions.

Though not mentioned specifically about training and capacity building of the inspectors and technical staff of the concerned personnel in the department, it is presumed that Director PPQD is empowered to train and retrain its staff about new technology of testing methods, contemporary developments in the pesticide formulation, enhancing knowledge and awareness of the inspectors become a regular activity of the department.

#### **4.1.9 Draft Plant Protection and Quarantine Law of Afghanistan, 2012**

The Draft Plant Protection and Quarantine Law, 2012 has been promulgated to give effect to Article 11, 14 and 15 of the Constitution of Afghanistan to facilitate trade, provide for the implementation of effective programs for the development of agriculture and to protect the environment. Consequent on the promulgation of this Law, the Plant Quarantine Services Law, Official Gazette No. 647 of 1987, and the Plant Quarantine Services Regulation, Official Gazette No. 647 of 1987, and any later amendments have been repealed. The law notifies that the National Plant Protection Organization (NPPO) is to be designated by Government and notified to IPPC International Plant Protection Council (IPCC)

#### **4.1.10 Plant Protection Advisory Board**

- (1) A Plant Protection Advisory Board is hereby established, it consists of:
  - (a) Three staff members of the Ministry responsible for agriculture, including the head of the NPPO, who shall be the Chairperson;

- (b) At least one of the members of the National Seed Board listed under Article 4(a) of the Seed Law of [2008]; and,
- (c) One representative of each of the following –
- .1.1 The institution responsible for the conservation of the environment;
  - .1.2 The Ministry responsible for trade;
  - .1.3 The Customs Department;
  - .1.4 The Ministry of Interior;
  - .1.5 The Ministry responsible for Health
  - .1.6 The General Attorney’s office
  - .1.7 The Faculty of Agriculture of Kabul University;
  - .1.8 Importers;
  - .1.9 Exporters;
  - .1.10 Growers;
  - .1.11 xi) Nursery owners;
  - .1.12 Legal experts; and
  - .1.13 One additional member as may be necessary to carry out the functions of the Board.
- (2) Members of the Board shall be nominated by their respective Ministry or President/Chair, and appointed by the Ministry responsible for agriculture, who shall award a sitting allowance to the non-governmental representatives where eligible.
- (3) The Board shall invite experts to its meetings as it deems necessary to provide advice and technical inputs.
- (4) Members shall serve for a period of three years and shall be eligible for reappointment.
- (5) The quorum at a meeting of the Board shall be at least one half of the membership.
- (6) The Board shall meet at least three times per year
- (7) Except as provided in paragraphs (1) - (6) and Article 7, the Board shall regulate its own procedure.

**4.1.11 Legal and Regulatory affairs in Animal Health and Veterinary Public Health Act**

The IROGA has formulated Draft Animal Health and Veterinary Public Health Act, 2012 with the following objectives Error! Reference source not found..

1. the protection of animal health and public health;
2. the prevention and control of animal diseases, including zoonosis;
3. the regulation of veterinary diagnostic laboratory services;
4. the import and export of animals, animal products and biological materials;
5. the safety and quality of products of animal origin destined for human or animal consumption and commercial purposes; and,
6. Animal Welfare.

**Table 4. 4: Chapters and Articles (Animal Health & Veterinary Public Health)**

Chapter	Description	No of Articles
I	General Provisions	1-3
II	Authority, Power and Function	4-10

III	Conformity with Sanitary Measures with International Standard to facilitate trade	11-19
IV	Miscellaneous	20-25
V	Finances of the Veterinary Authority	26
VI	Enactment	27-29

*Source: Compiled from the Draft Animal Health and Veterinary Public Health Act 2012*

Under the ACT, The Minister is authorized to enforce the Regulations of this Act according to prescribed procedures, which shall be published by notice in the Gazette, subject to the provisions of Articles 11 – 19. The Minister will be supported by a Technical Standing Committee to advice on matters related to all technical issues.

Some of the significant provisions, having relevance for improving quality standards of animal husbandry and Dairy Industry are presented below:

- Procedures for the notification, detection and verification of the occurrence of, notifiable diseases;
- Procedures for the prevention and control of notifiable animal diseases, including the declaration of controlled animal diseases and animal disease control schemes;
- Procedures to be adopted following the declaration of a sanitary emergency;
- Conditions for the import of any animal, animal products, biological materials, commodities or other regulated articles;
- Designation of ports of entry or exit in Afghanistan appropriate for the import and export of animals, animal products, biological materials and other regulated articles;
- Circumstances under which sanitary requirements for import may be modified based on disease risk analysis;
- Procedures and guidelines for pre-clearance inspections;
- Manner in which permits, licenses and certificates shall be issued under this Act and their form, content and language;
- Manner in which animals, animal products, biological materials and other regulated articles must be housed, stored, transported, disposed of or destroyed in Afghanistan, as appropriate;
- Location, management and functioning of any animal quarantine stations or quarantine facilities established under this Act or Regulations;
- Requirements for the control and care of animals, animal products, biological materials or other regulated articles kept or maintained at animal quarantine stations;
- Procedures through which a compartment, zone or region may be declared disease-free or a zone or region of low disease prevalence;
- Requirements for the export of any animals, animal products, biological materials or other regulated articles;
- Requirements and procedures for the design and implementation of an animal identification system to achieve animal traceability;
- Procedures to ensure the safety and quality of products of animal origin, subject to veterinary oversight, destined for human or animal consumption or commercial purposes; and,

- Additional measures to be taken for the purpose of preventing the introduction or spread of animal diseases or the infectious organisms or substances that cause them.

The above provisions, among others, of the ACT, if implemented properly, will bring about significant improvements in the quality in animal health, animal movement, animal welfare, milk production, export and import of dairy products, and more importantly provide a safeguard against possible public health risk and will ensure a healthy standard within the sector which will be at par with international standards.

From the requirement of SPS Agreement and Codex Alimentarius for the regulation of import and export of animals and other commodities, the Act is well-drafted in terms of being harmonized with international standards, specifying that the Animal Health Authority (AHA) is obliged to respect the standards set by the OIE. There are also provisions in the Act to ensure that the principle of equivalence will be respected when an exporting country can demonstrate that an alternative sanitary measure will provide the same level of protection as the sanitary measures being imposed by the AHA.

#### **4.1.12 Draft Food Law 2012**

The IROGA has formulated Draft Food Law, 2012 with the following objectives. It contains 7 Chapters and 44 Articles (**Table 4.3**).

- Protect human health;
- Facilitate trade in food products;
- Promote the reconstruction and sustainable development of the national economy;
- Improve livelihoods and food security; and
- Establish regular inspection, evaluation, Microbiological and Chemical residue testing;
- Examination of food and food products;
- Chemical analysis of food;
- Application of hygienic procedure in food production, processing units, packaging, storage, transportation vehicles and marketing facilities;
- Safety and quality of imported, exported, and locally made foods;
- Promote training and capacity building of workers;
- Improving the health of workers involved in food production process, sanitation and,
- Environmental pollution.

**Table 4. 3: Chapters &Articles (Food Law), 2012**

Chapter	Description	No of Articles
I	General Provisions	1-4
II	Food Control Authority	5-11
III	Food and International Trade	12-22
IV	Inspection and Reviews	23-27
V	Import & Export	28-31
VI	Offenses and Penalties	32-38
VII	Miscellaneous	39-44

Under the Food Act, there is provision for establishing Food Control Authority with the purposes specified thereof. It is reported that food safety regulation drafted by the Ministry of Public Health is under process with the Ministry of Justice.

The Act also makes provision for creating Food Control Board which would have 14 members to be drawn from various stakeholders and scientific community and concerned representatives of other Ministries. The Board will constitute Committees on various Technical matters, who would advise Government on Business matters, traceability, labeling and International standards. The Act also makes provision for Inspection and Review, Guidelines for Import and Export, sampling and testing protocol. It is important that Act makes provision for designating a national laboratory for matters related product and sample testing and certification.

The Ministry of Public Health is responsible for ensuring Quality Assurance of any food products for human consumption. As per the report, 4 Food Testing Labs are set up in Kabul, Nangarhar, Balkh and Herat.

#### **4.2 INSTITUTIONAL FRAMEWORK FOR PESTICIDE MANAGEMENT IN AFGHANISTAN**

Afghanistan has had written regulations on pesticide use since 1989, but these are not enforced and are largely ignored due to lack of resources. Being a landlocked country, intercountry check posts are used by smugglers to import unregistered, internationally banned, substandard and obsolete pesticides. The major check posts are: Torkham border point on the east, Chaman border point on the west, Hairatan border pass with Uzbekistan, Sherkhan border pass with Tajikistan, Aqeena and Torghondi border pass with Turkmenistan, Islam Qala, Farah and Nimroz border pass with Iran is the likely routes through with contra banned pesticides and hazardous chemicals find easy passage into the country.

A pesticide regulation was produced and published in 2000, by the Ministry of Justice of the Islamic Republic of Afghanistan. However, this regulation was never implemented due to insecurity, lack of human capacity, logistics support. The Pesticides Law of 2015 has become a legally binding instrument to be enhanced by the National Environment Protection Agency (NEPA), which would establish the institutional framework required for the management of hazardous chemicals and pesticides and would protect human health and environment provided the provisions are enforced effectively and monitored properly.

##### **4.2.1 MINISTRY OF AGRICULTURE, IRRIGATION AND LIVESTOCK (MAIL)**

The MAIL is a national apex body responsible for overall policy formulation and implementation of all agricultural related activities in Afghanistan. There is 1 Minister and 2 Deputy Ministers within MAIL: Technical Affairs and Irrigation and Construction. The Deputy Minister for Technical Affairs is responsible for agricultural research, extension, plant protection and quarantine, food quality control, animal husbandry and health and natural resources. The Plant Protection and Quarantine Directorate (PPQD) is one of technical directorates of MAIL and directly responsible in matters related to plant protection, plant quarantine, IPM, agrochemicals and related matters.

The Ministry of Agriculture, Irrigation and Livestock (MAIL) is one of the overarching Ministries of the Islamic Republic of Afghanistan. The ministry is working on the development and modernization of agriculture, Irrigation and livestock which includes horticulture. MAIL's mandate relate to promoting agricultural development, through helping farmers and managing natural resources such as water, soil and forests; strengthening the agricultural economy through profitable new crops like saffron and better ways to grow traditional crops using new dry-land farming techniques; developing livestock sub-sector of agriculture to supplement farm incomes and promoting activities under livestock in a manner to upgrade

them into independent income-generating activity, and building cooperatives, Afghan agribusiness and exports, land-leasing and other state-of-the-art advances.

The MAIL has ten General Directorates among which the General Directorate for Research and Extension, under the Deputy Technical Minister, comprises of seven technical departments namely- - Research, Extension, Horticulture, Home Economy, Vegetables, Flower Growing, and Cereal and Industrial Crop Development, and a Directorate for each of the seven agricultural regions (corresponding to Agro-ecological zones). At the Provincial level, it has 34 Provincial Agriculture Directors.

The agriculture extension system aims to increase the knowledge and skills of farmers through the dissemination of improved agriculture technologies. It focuses mainly on crop improvement, human resource development and collaborative program with other government departments and Non-Governmental Organizations (NGO). Staffed with more than 3,000 extension workers in the 1970s, the extension services in Afghanistan today is a broken understaffed system, with two extension agents at most per accessible district, and even none in the remote areas.

Matters related to dairy development is the responsibility of General Directorate of Animal Husbandry and Veterinary, though nomenclature “dairy development per se” is yet to mentioned anywhere in its functional chart. It is possible that “dairy development” is subsumed under “Animal Husbandry.” This point appears since the proposed Agri Parks would consider dairy development one of their focus areas. The matters related to granting a license for creating dairy processing facilities are looked after by the Ministry of Commerce & Industry (MoCI).

Since 2003, USAID has been providing assistance to deliver new technologies and information to farmers and herders through its Rebuilding Agricultural Markets Program (RAMP), the Dairy Industry Revitalization Project implemented by Land O’Lakes, the Participating Agency Services Agreement (PASA) with USDA, and through grants to Central Asia Development Group (CADG). More recently, extension related work is being supported through the Alternative Livelihoods Program (ALP) at the provincial and district level. Although these activities have not directly targeted the capacity strengthening needs of MAIL, they have worked directly with farmers through privately contracted extension advisors, many of whom were previously employed by the MAIL.

Some of the important programs being implemented/completed by MAIL is provided through

**Table 4.4 Important programs of MAIL supported by donors**

No	Programs	Objectives/Outcome
1	<b>LIVESTOCK AND AGRICULTURE DEVELOPMENT PROJECT</b>	Providing animal-quality services, creating job opportunities for <i>Kuchi</i> (nomads) women, raising the economic level of nomadic farmers, improving the quality of <i>Kuchi</i> dairy products, creating dairy animal feeds that are available in different seasons of the year, raising the awareness of <i>Kuchi</i> livestock holders in various fields of animal breeding and livelihood in the <i>Kuchi</i> community.

No	Programs	Objectives/Outcome
2	<b>STRATEGIC GRAIN RESERVE PROJECT (SGRP)</b>	Prioritizing establishment of a grain reserve to respond to unforeseen shocks (drought, climate change, minimizing storage loss) mainly through purchase quantities of the locally grown wheat enhancing food security and hunger.
3	Support to Agriculture and Rural Development	The overall goal of the SARD project is to improve the living conditions of the rural communities through the implementation of a new strategy aimed at developing subsistence farming and small-scale agriculture production. The specific objectives are to improve agricultural production and productivity of smallholder farmers and small agro-producers in two Districts of Herat Province through the provision of agriculture services and inputs adopting an "Extension system" mechanism.
4	<b>ENHANCED AGRICULTURAL VALUE CHAINS FOR SUSTAINABLE LIVELIHOODS (EAVS)</b>	Prevention from onion and potato post-harvest losses with construction of cold storages. EAVS assisted its farmer beneficiaries to keep their produces in storages for almost six months and then supply it to the domestic markets with a better price particularly, during off-season, through the construction of zero energy storages for onions and potatoes. Training farmer beneficiaries in two sessions of training in the areas of best onion and potato production practices, IPM and post-harvest handling and management in Kabul, Parwan and Bamyán.
5	Community and Livestock Agriculture Project (CLAP)	Productive infrastructure; Dairy Industry Development Project; Backyard poultry projects; Improved Food, Fodder, and Vegetable Crops; Livestock Development among Kuchi Community
6	Agriculture Market Infrastructure Project (AMIP)	Establishment of modern slaughterhouses infrastructure; Establishment of small-Scale horticulture processing facilities.
7	Afghanistan Agriculture Input Project (AAIP)	<p>Improve the technical and economic efficiency of the value chain of certified wheat seed.</p> <p>Building on the legal and regulatory framework that the project helped building during the preparation phase, the project will develop the necessary accredited facilities for plant quarantine networks and quality control of agro-chemicals.</p> <p>Design and pilot test a demand-led action plan to improve and develop market-based input delivery systems for seeds and agrochemicals;</p> <p>Include ICT applications in agricultural extension and agro-chemicals quality control. The sustainability of these interventions will be supported by capacity building programs involving civil servants, farmers and traders.</p>



No	Programs	Objectives/Outcome
8	Panj Amu Basin River Sector Project	Rehabilitating secondary and tertiary canals of 21 main canals irrigation schemes. Implementation of 5 community contracts in the field of on farm water management (OFWM). Establishing and strengthening the capacity of approximately 106 irrigation associations (IAs) to operate and manage irrigation infrastructure in these secondary schemes. Improving on-farm water management and agronomic techniques (such as land levelling, bed and furrow irrigation, and intercropping). Preparing a community-based natural resources management technical manual and guidebook. Identifying approximately 21 watershed and/or rangeland sites for restoration and protection, Creating catchment management associations (CMAs) for these sites.
9	Support to National Priority Program 2	Institutional development and capacity building of community organizations, public extension services and relevant private sector entities in pilot provinces; and, Sustained increased incomes of small farmers and herders fostered by improvements in productivity and output, infrastructure and market linkages.
10	EU-MAIL Transmission Project	To ensure that the public functions, thus far implemented by these projects with external staff and external funding will be transitioned in a sustainable way as core activities managed and implemented by MAIL itself and the financial support by the EU for these activities moved from off-budget to on-budget.
11	ON- Farm Waste Management	The project mainly aims improving the efficiency of the water use, to increase agricultural production, building the capacity of local staff to implement similar projects in the country and educating farmers to improve irrigation systems and agricultural practices as well.
12	National Horticulture and Livestock Project (NHLP)	Improving the livelihoods of rural households through stimulating production and productivity of marketable perennial horticulture and livestock. Restructuring of NHLP finalized with increased portfolio in all components including introduction of extension approach along the principles of Farmers Field School (FFS).
13	Variety and Industry Seed Development Project (FAO)	Support a private sector seed and planting materials industry that produces and markets seeds and planting materials in Afghanistan to meet the needs of farmers for enhancing agricultural productivity and ensuring food security. The project will place systems within the government to regulate a private sector seed industry that meets international standards.

Source: Compiled from the website of MAIL. <https://mail.gov.af/en/programs?page=1>

A perusal of the above table indicates that many donors funded agricultural development projects would involve some components of IPM, though it might not have been indicated in the objectives /goals. However, in case of some projects, e.g. Afghanistan Agriculture Input Project (AAIP), National Horticulture and Livestock Project, Enhanced Agricultural Value Chain for Sustainable Livelihoods (EAVS), IPM is mentioned as part of project component/sub component while in many others, this component would be implicit with other subcomponents of the project. It would therefore be fair to assume that production of agricultural output and productivity enhancement and market access focus implicitly necessitates production through environmentally acceptable and public health wise desirable practices as against indiscriminate use of chemical pesticides. However, this would require validation from farm survey and anecdotal reference.

#### **4.2.2 Plant Protection and Quarantine Directorate (PPQD)**

The Directorate of plant protection and quarantine (PPQD) is one of the important and technical Directorates of the Ministry of Agriculture, irrigation and Livestock (MAIL) mandated with protecting agricultural resources of the country from dangerous plant pests and diseases. The Directorate is in charge of all substances related to plant health, including issuance of import and export Phytosanitary certificates for plant, plant products and regulated articles, as well as for plant pest prevention or eradication programs and IPM. The Directorate is also responsible for enforcing Law and regulations on registration and the use of pesticides and other agrochemicals.

**Vision:** Strengthening Afghanistan’s agricultural potential for the production of high-quality agricultural products free from plant pests and diseases to compete in international markets.

**Mission:** To protect Afghanistan agriculture resources against the risks associated with the invasions, entry, establishment, and spread of plant pests and diseases through using new scientific methods and techniques.

**Goals and Objectives:** The overall goal of plant protection and quarantine is to achieve an efficient system that safeguards damages caused to plants by biological, environmental and ecological factors and they are controlled in a sustainable manner.

#### **The main objectives of the Directorate are:**

- To minimize risks to agricultural production, natural resources, and human health and safety by effectively managing existing agricultural pests and diseases.
- To improve and implement programs to put integrated pest-management practices and strengthen the national IPM program.
- To diagnoses of the miscellaneous plant samples submitted by individual farmers, and others.
- To conduct pesticide management including pesticide registration and residue control.
- To prevent the entry, establishment and spread of exotic pests in Afghanistan as per the plant protection and quarantine Law at the national level.

#### **Organizational Structure**

PPQD is consist of six technical Divisions named:

1. Division of plant pest and diseases diagnostic laboratory,
2. Division of plant quarantine,

3. Division of Agrochemical,
4. Division of Integrated Pest Management (IPM),
5. Division of Emergency pest program, and
6. Two sections namely Planning and Program Coordination Section, and,
7. Administration Section.

The main roles and responsibilities of each divisions and sections are described as below:

**(i) Emergency Program Division:**

- Survey of the migratory pests in the country, and make urgent control measures against all emergency pests, and develop annual plan for control of plant pest and diseases under emergency program, and make coordination/cooperation with provincial plant protection directorate for better implementation of integrated pest management program.
- Conducting training courses, workshops, and seminars for provincial staffs.

**(ii) Plant Pest Diagnostic Division:**

- Diagnosis of miscellaneous plant samples submitted by provinces, districts, individual farmers, homeowners, governmental organizations and others.
- Assist personals in other agencies with problems related to insects, diseases, and other arthropods and invertebrates.
- Preparing herbarium and collection boxes of plant diseases and insects, and make isolation of fungal and bacterial diseases, and collection of insect pests, its preservation and identification.
- Develop an annual work plan of the division and monitor the implementation of activities.

**(iii) IPM Division**

- Develop planning and proposals for integrated pest management for all agriculture zones, coordination and cooperation with provincial plant protection directorate for better implementation of integrated pest management program, and development of a unique strategy and procedures for integrated pest management programme with the help and participating of stakeholders.
- Conducting of training courses, workshops, and seminars for provincial staffs.
- Develop an annual work plan of the division, and monitor the implementation of activities.

**(iv) Plant Quarantine Division**

- Implementation of plant protection and quarantine law, regulation, and procedures.
- Inspection of consignments of plants, plant products and other regulated articles, by plant quarantine officers to prevent the introduction and/or spread of pests into the country.
- Issuance of Phytosanitary certificates to provide facilities for import and export of plant, plant product and regulated articles through quarantine stations.
- Strengthen the relation of Plant Protection and Quarantine Directorate (PPQD) with the International Plant Protection Conventions (IPPC).
- Overcome Phytosanitary barriers to strengthen Afghanistan entrance to the international market in support of the agricultural production export.

- Provide for and carry out professional training of regional inspectors, increasing their level of professional skills in the respective field.
- Develop an annual work plan of the division, and monitor the implementation of activities.

**(v) Agrochemical Division**

- Implementation of pesticides law, regulations and procedures, and regular quality control of all industrial, importing, and exporting chemicals in the country.
- Prepare specification of pesticides based on need for PPQD.
- Assure that pesticides products available for use in Afghanistan are registered, as required by the government, and do not show an unacceptable risk.
- Develop a licensee for import, distribution, and sale of pesticides, and issuing permits for pesticides retailers.
- Conducting technical training, workshops and seminars, for capacity building of civil servants.
- Develop an annual work plan of the division, and monitor the implementation of activities.

**(vi) Quality Control of Chemical and Natural Fertilizers Division**

- Implementation of fertilizers quality control procedures, and regular quality control of all fertilizers in the country.
- Prepare specification of fertilizers based on need.
- Assure that Fertilizers available for use in Afghanistan are registered, as required by the government, and do not show an unacceptable risk.
- Develop a licensee for import, distribution, and sale of fertilizers, and issuing permits for fertilizers retailers.
- Conducting technical training, workshops and seminars, for capacity building of civil servants.
- Develop an annual work plan of the division, and monitor the implementation of activities.

**(vii) Planning Section and Program Coordination Section**

- Development of annual planning for the directorate as well as provinces based on their needs, collection and compiling of the performance reports regarding on pest and diseases control from all provinces, and liaison with all government, and non-government related agencies, and performing of the protocols, agreements, Law, regulations, and procedures
- Development of the proposals for funding, and preparation, and tracking of all documents for allotment, procurements, operational payments, and development budget disbursements.

**(viii) Administration Section**

- Preparation of all administration letters, suggestions, inquiries, Forms for orders, salaries, and overtimes, and filling.
- Preparation, and tracking of all documents for stationary, tolls, equipment, and chemicals, purchased and submitting it to all 34 provinces.
- Distribution of the job description for all staffs

**(ix) PPQD in Provinces**

Plant protection and quarantine Directorate has activities in 34 provinces of Afghanistan. There are 58 technical staff in the centre (PPQD) and 380 staff in 34 provinces. Each province has plant protection division under supervision of Directorate of Agriculture Irrigation and Livestock (DAIL) and PPQD in the centre (Kabul). All provincial plant protection activities and duties are done by themselves and monitoring by the DAIL and central PPQD.

Directorate of Plant Protection and Quarantine (PPQD) has working relationships with all departments of the MAIL, especially in technical issues with the Research General Directorate, Extension General Directorates and Seed Certification Directorate have close working relationships.

**4.2.3 Agriculture Research Institute of Afghanistan (ARIA)**

The Agricultural Research Institute of Afghanistan (ARIA), one of the main directorates of the MAIL, is mandated to plan, undertake, coordinate and promote research and technology development for sustainable agriculture. It has been created to strengthen the agriculture research to bring improvement in production, productivity, profitability in agriculture and livestock production for improved economic livelihood and food and nutritional security in Afghanistan.

The specific objectives of ARIA are as follows:

- To provide leadership role in the development and promotion of production technologies for sustainable agriculture production system;
- To establish and develop appropriate research programs to fulfil the national requirement and priorities;
- To develop new varieties of various field crops and introduce new-improved animal breeds to meet the needs of farming communities;
- To produce sufficient nucleus and breeder seed of popular varieties of different field crops;
- To improve soil condition and soil fertility;
- To develop and introduce new efficient production technologies of agriculture, livestock and forestry;
- To transfer the best production technologies to the farmer's and herder's through collaborative approaches; and,
- To establish and strengthen the Regional Research Stations for the development of regional production technologies ([http://aria.gov.af/?page\\_id=56](http://aria.gov.af/?page_id=56))

Our desk research indicates that ARIA has gone through significant changes in their functional activities over the years. Beginning with creating a backbone for building public research and extension outfits in the country in the 1950s and 1960s, the focus has broadened under National Agricultural Research System (NARS) approach of the 1980s, the Agricultural Knowledge and Information System (AKIS) approach in the 1990s, and the recently designated Agricultural Innovation System (AIS) approach, to the current established ARIA<sup>8</sup>.

Over 3 decades of civil war and internal conflict had demolished all physical infrastructures, scientific facilities created prior to commencement of the war in 1979. Alongside, talent pool

<sup>8</sup> Pest Management Plan (PMP) for the Improving Afghanistan Input Delivery System Project, MAIL, 2011 (mimeo).

in scientific research in agricultural areas has been greatly damaged. The plight of this institution was no way different compared to other public sector institutions whose capacities had been severely eroded due to prolonged uncertainty and violence.

ARIA’s research horizon is now dived into 3 Directorates- - Agriculture Adaptive Research Directorates, Animal Husbandry Research Directorate, Soil Science Directorate (**Table 4.5**). The scope of agricultural research includes biological, human and other sciences relevant to animal, plant and fish resources and production, and also the exploitation of natural resources (soils, water) on which such production is based. Over the recent past, the ARIA research areas have focused on improvements in cereals production, grain legumes and oilseeds improvement and development, horticulture production and postharvest management, cropping systems and resource management, agroforestry in production systems and agricultural engineering. It also carry out socioeconomic assessment, and study, supervise and control seed production in collaboration with the other International Research Institutes.

**Table 4.5: Functional Directorates of ARIA**

Sr No	Name of the Directorate	Activities Incorporated in their functional role
1	Agriculture Adaptive Research	Plant Protection, Cereal Crops, Vegetable Crops, Fruit Plant, Industrial and Legume Crops, Agronomy, Dry Land Plant, Irrigation, Agriculture Machinery, Forestry, Forage and Medicinal Plants and Germplasm.
2	Animal Husbandry	Livestock, Fishery & Poultry and Animal Husbandry and Beneficial Insects
3	Soil Science	Soil Lab Division, Soil Survey, Sampling and Classification, Reclamation and Soil Fertility Department.

Source: [http://aria.gov.af/?page\\_id=62](http://aria.gov.af/?page_id=62)

For policymakers, three points are of important concerned with agricultural research in Afghanistan: (i) Agriculture research is a fundamental building block for progress in agricultural production and food security; (ii) Rapid transmission to farmers of advances from research stations and experimental farms depends on the effective functioning of many actors along the “research impact pathway,” from researchers and policymakers to farmers and herders; and (iii) The farmer is the key to the whole system; in the end the decisions of hundreds of thousands of farmers in Afghanistan determine whether the new varieties and technologies are adopted, impacts registered and poverty reduced and livelihoods improved.

A few experiences under NARS, like the one the National Agricultural Experiment Stations Rehabilitation Project”, completed in 2011, report significant progress in introducing new technology of agricultural production through 20 national agricultural experiment stations and 3 central agricultural stations in Kabul and 2 facilities in the premises of the MAIL. Among other achievements, the evaluation datasheet indicates that “Some farmers in Balkh province have adopted the newly developed melon fly prevention techniques.<sup>9</sup>” “Significant research achievements include seven wheat varieties and three potato varieties that were newly developed and registered between 2007 and 2010” - a notable achievement under the project as noted through the end project evaluation sheet.

<sup>9</sup> [https://www.jica.go.jp/english/our\\_work/evaluation/tech\\_and\\_grant/project/term/asia/c8h0vm000001rr8t-att/afghanistan\\_2010\\_02.pdf](https://www.jica.go.jp/english/our_work/evaluation/tech_and_grant/project/term/asia/c8h0vm000001rr8t-att/afghanistan_2010_02.pdf)

#### **4.2.4 NGOs in IPM and related projects**

There is a plethora of NGOs, international agencies, singularly and jointly engaged in various major scientific experiments, borrowing broadly from innovations made in other countries and also engaged in country-specific research and innovations. These experiments yield favourable results for demonstration and adaptation, and MAIL has been the overarching Ministry to propagate such knowledge and insights for the common benefit of the farmers. Some of the collaborative relations are quite extensive, particularly with institutions through externally (USAID, USDA, World Bank, FAO, etc.) supported projects; International Agricultural Research Centres (IARCs) of the Consultative Group on International Agricultural Research (CGIAR), including ICARDA, ICRISAT, CIMMYT, IFPRI, JICA, etc.; Australian Centre for International Agricultural Research (ACIAR); specialized regional programs such as Asia-Pacific Association of Agricultural Research (APAARI), Regional Agricultural Research Station (RARS), etc. The multiplicity of donor agencies in the field of applied research in Afghanistan in diversified areas including IPM is a favourable input which would require further consolidation within MAIL and enhancing skill of the host Ministry to take the lessons down the line through stakeholder participation.

#### **4.3 OVERSIGHT OF THE PESTICIDE COMMITTEE FOR REGISTRATION AND RE-REGISTRATION OF PESTICIDE LICENSE**

Under the Pesticide law of 2015, the Pesticide Committee has the power to approve or reject applications for the registration, re-registration, suspension, substitution and removal of pesticides from the relevant registry office. The Committee would have to prepare a list of allowed and prohibited pesticides and review, suspend, substitute or removal of pesticides from the list in accordance with new scientific information, on the request of relevant agency or two committee members.

The inspectors of PPQD will control and inspect individuals, who produce, import, export, pack, label, sell, distribute, transport, use and advertise pesticides. They will take samples of any substances any get the sample tested in pesticide laboratory and prove violations against provisions are reported to the pesticide Committee. They also have the power to confiscate all documents and substances, insinuate violation.

Safeguard against violation of provisions as contained in Pesticide law seems to the overriding power that the Committee is empowered with, which would protect the interests of the society from public health hazards and from the possible adverse impact on environment. In addition, it is also to be noted that the law does not provide for any provision for approaching before the judicial system, in case the decision of the Pesticide Committee is to be challenged.

#### **4.4 INSTITUTIONAL AND HUMAN CAPACITY TO CONTROL PESTICIDE TRADE**

The Draft Pesticide Regulation, MAIL is a comprehensive documentation on registration, data requirement and efficiency trails (Chapter II), packaging and labelling (Chapter III), storage & transportation (Chapter IV), poisoning treatment and safety measures (Chapter VI), pesticide laboratories (Chapter VII), pesticide inspection (Chapter IX), etc are some of the provisions that provide guidelines, control and for orderly use and application of crop protection chemicals in Afghanistan. Our literature survey reveals that such provisions are in place in most countries. While there are registered pesticides listed with the approving authority, new plant protection chemicals are to be applied for registration following certain protocol which is deemed as safeguard measures and also technical and economic efficacy measures.

Phytosanitary measure refers to any measure in respect of any plant, plant product or land designed to protect plant health or plant life, human life or human health within Afghanistan from risks arising from diseases carried by plants or products or from the entry, establishment or spread of pests and includes all relevant laws, decrees, regulations, requirements and procedures applied.

Given the fact that Afghanistan has been a member country under WTO, and also considering broader macroeconomic and structural reform that OMAID project have been driving whereby domestic producers' market access would be enhanced through private sector investment in agro-processing sector to harness the export market and also developing the domestic market, phytosanitary compliances cannot be overemphasized. This would call setting up of state of art laboratories to gain international accreditation so that internal compliances and certification are accepted in exportable market. So, both production sector reform, as well as quality processing of agri- commodities, are to be undertaken. Specifically, export market would need to be organized in a manner that exportable commodities are free from pests, disease and pesticide residue, and all these are to be certified for acceptance in the export market. This might appear challenging, but OMAID project is willy-nilly driving this point.

While this draft is being written, some insights of pesticide trade were available from IAIDS report. It was reported that no quality control of pesticides nor any effective regulation was in place when the earlier report was drafted in 2011. As a result, the traders would bring all kinds of pesticide products into Afghanistan, some of these products are repackaged within the country, and spuriously marketed. "Farmers buy pesticides mostly based on the recommendations of the vendors"- an observation reported in numerous studies on IPM in the context of low-income countries. Even the vendors are not so much conversant with the products that they sell. The gullible farmers, in a country like Afghanistan with low literacy level and no accessible advisory and extension services easily fall prey to such unqualified traders. This is the prevalent practice and cannot be overlooked. Regulating pesticide trade and bringing in order from an unregulated regime to the path of reforming the pesticide trade channel should also become one of the implicit goals of OMAID project.

"A market survey of the Agrochemical trade was carried out in 2009 under the HLP project preparation phase. This survey was carried out in the 11 focal districts and main bazaars of the HLP implementation area and has determined the volume, types of products being sold and for what purpose and the types of vendors and distribution networks associated with this trade. The survey took place for three months starting mid-October 2009 and the results were made available in 2010". Though this was mentioned in IAIDS report, we could not get access to the report. However, should such report be available, it could through some additional dimensions into our understanding of the pesticide trade.

"The handling, storage, re-packaging, transport and application of pesticides pose a significant challenge to environmental management and health in Afghanistan. Given the porous nature of Afghanistan's borders, it is still possible (as was once common) for chemicals such as Methyl Parathion and *Methamidophos*, to sneak into Afghanistan which is subject to the Rotterdam Convention, to be freely imported from neighbouring countries. Such products are sold in Afghan bazaars by traders with little technical knowledge of pesticides. Such products are hazards to those who handle or use them, aggravate pest problems by destroying natural enemies and reducing the value of export products which may be contaminated by them.



Pesticide misuse may have consequences that directly impact on farmers and communities causing specific and non-specific health problems and eliminating natural enemies of pests thus creating further pest problems and often further dependence on the use of pesticides.

In addition, the medical staffs at the rural clinics are not properly trained to identify and diagnose pesticide poisoning from the farmers' complaints on health problems, and with the lack of appropriate infrastructures and equipment, there is no provision for antidotes at the rural clinics or such dispositions at the national level for reporting the statistics on pesticide poisoning in Afghanistan that could be related to international standards." These are some of the observations made in IPM report, and we are of the view that situations are unlikely to have improved since 2011, given the fact that regulatory institutions and their functioning are yet to attain quality standards. The quality of overall institutional governance in Afghanistan leaves much to be desired and it is no surprise that institutional governance in PPQD would be any different from other peer organizations.

#### **4.5 LIST OF BANNED COMPOUNDS AS PER INTERNATIONAL CONVENTION**

"The trade and transport of certain hazardous chemicals are subject to the Rotterdam Convention and its procedure of Prior Informed Consent (PIC). The objective of this procedure is to ensure that importing parties are aware of the hazards of certain chemicals before export/import takes place. If a party is exporting a product that is restricted or banned in his own country, he must inform with an export notification to the importing party. Afghanistan is not a signatory of the Rotterdam Convention and in the recent past many compounds on the list of banned or restricted compounds (**Annex 1**) were commonly available in Afghanistan. There is currently no legal way to prevent the dumping of such banned pesticides on the Afghan market. Afghanistan is not yet a member of the IPPC (International Plant Protection Council), the international body that monitors the regulation and use of pesticides in its member countries" [**observations of IAIDS report**].

## 5 CONSTRAINTS IN IPM IMPLEMENTATION

### 5.1 IPM ADVISORY

The World Bank, in its pest management guidebook, has provided certain advisories related IPM policy. These suggestions are applicable to all stakeholders which included policymakers, government, international donors, farmers, traders, academicians, and other users. They also cover areas of human safety, environment, legislation, control and order, punitive pricing for the pollutants, extension communication, etc. Detail description on this is provided through **Annex 2**, which could serve as guideline for the IPM professionals.

### 5.2 IPM EXPERIENCES IN AFGHANISTAN

The Plant Protection and Quarantine Department (PPQD) of the Ministry of Agriculture, Irrigation and Livestock (MAIL) is responsible for matters related to plant protection. The HQ and diagnostic laboratories of PPQD are located within Ministry compound in Kabul and it is represented in the Provinces by Provincial Directorates of Agriculture with one or two officers to look after pest management activities. IPM is generally understood by the Afghan farmers as “implementation of various agronomic practices to manage pest population below Economic Threshold Level (ETL)”. However, with the evolution of its method of implementation IPM has become much more than the above understanding. It is now a farmer’s lead exercise, a form of education towards the farming community. This particular image of IPM such as the practice of cultural and agronomic practices, mechanical practices, plant varieties, biological management and least use of pesticides are transferred through the extension worker under different projects towards the farming community. Thus, these extension workers play a supreme rule in implementation and adoption of IPM in Afghanistan.

### 5.3 PLANT PROTECTION AND IPM POLICIES

There is no policy relating to plant protection and IPM in Afghanistan. This is somehow surprising. Probably, priorities regarding agricultural development have been directed towards irrigation facilities and enhancing area coverage under food crops (wheat principally) to address stability in food production and reducing vulnerability. Unfortunately, that has also not materialized due to various externalities. As of now, plant protection measures have remained *ad hoc* and on fire- fighting mode, depending on the exigencies reported and communicated through the offices of Provincial Governors to the MAIL. This is also reported through political channel.

The plant protection department resorts to application of chemical measures for quick result. This serves 2 purposes. First, immediate relief is visible, and second, it enhances public image of the Government machinery in mitigating the woes of the farmers. Somehow, the practice seems to have been accepted in this manner without attempting to address them under the scope of any policy regime.

Some examples that are often cited in the context of Afghanistan in addressing plant protection diseases take us to Colorado Potato Beetle and Potato Blight, Baluchistan Melon Fry in cucurbits family, Moroccan , Italian (Desert) Locust and Sun pests in rust disease in wheat and worms (cutworms, armyworms, earworms) on corn and other vegetables (*ibid, p-45*). These issues are resolved through the centrally organized spray program by the staff of the plant protection department. However, from the point of view of drawing lessons for evolving appropriate strategies to deal with such incidence, it is important that investigation be carried out to diagnose causes of such occurrence and explore if they could be addressed

through alternative means following IPM protocol. If that could happen, these events become documentable evidence for further propagation and generation of awareness through extension and other media.

#### **5.4 CAPACITY TO IMPLEMENT IPM: SOME EMPIRICAL EVIDENCE**

As mentioned earlier, the capacity of Afghanistan to implement IPM, described in terms of access to information, skills and understanding of the concepts of IPM is low. Support for the PPQD through pro-active projects which could tackle pest problems and remove the need for reactive emergency interventions are considered to be non-existent. The building up of human capacity within the ministry staff would help facilitate moving away from the present practice prescribing of pesticides to a more sustainable approach of IPM.

Since 2002 various FAO emergency projects have been implemented for control of locusts and Sun pest and through these and other funding sources e.g. RAMP (Rehabilitation of Agricultural Marketing Program) laboratories at the Kabul Head Quarters of PPQD have been rehabilitated and re-equipped at a modest level. However, the technicians need training and mentoring to be at the appropriate professional standard to be able to offer accurate diagnostic and technical services to farmers. IAIDS project has been contributing significantly in creating hardware infrastructure of diagnostic and testing laboratories, honing the skill of the scientific and technical staff of the PPQD.

The System Rice Intensification (SRI) project of FAO/Norway (2012) promoted Integrated Pest Management (IPM) project and the provincial staff of the Directorates of Agriculture, Irrigation and Livestock (DAILs) conducted 38 Farmer Field Schools on SRI involving 950 farmers in Nangarhar, Baghlan, Takhar, Kunduz, Balkh, Kunar, Laghman and Herat provinces.

Under on-farm water management project (OFWMP) of the World Bank (2010), pest management as one of the action items considered and IMP was prepared under the project. In addition, Afghanistan value chain high-value crops Project (USAID), and Comprehensive Agriculture and Market Development (ARD France, FCOMAIL), Agha Khan Foundation sponsored Agricultural Productivity Enhancement Project had also included IPM as one of their extension activities. Likewise, there are many donor-funded agricultural projects which have implemented IPM as one of their sub action items.

The recent undertakings by FAO's IPM project and HLP in implementing the Farmers' Field School (FFS) in the wheat and fruit-producing zones were the first attempts to carry out IPM programs in the country, and was emphasized since the pilot farmers were to become trainers of trainers and this undertaking could induce snowball effect that could carry the message, leading to easy adoption of the IPM, reducing thus the heavy application of pesticides during the cropping season.

In this connection, the IAIDS report observes "a workshop for all provincial heads of plant protection held in Kabul in December 2005 revealed a wide range of technical ability, but many do not have expertise in the sector. Many provincial appointments were made by local authorities during the conflict period and the status of these is uncertain. Because of lack of capacity and a common strategic vision for plant protection to be pursued nationwide, the PPQD in September 2011, again has brought together in Kabul for a two day workshop all the stakeholders (including the FAO, JICA, HLP, PHPD, AECID, Root of Peace, IDEA-NEW, AKF, and Provincial Directorates of plant protection) involved in plant protection to share their different

experiences and design a five year national strategic plan for plant protection and quarantine Directorate. Nevertheless, the application of the recommendations outlined by the participants is still uncertain because the country is still in dire need for capacity building (institutional, human, and infrastructure) and the political will for the dream to be translated into concrete actions”.

Under integrated pest management for healthy crops and protecting environment in Balkh Province of Afghanistan, With support from the FAO and the Norwegian Government, more than 70 field-level plant protection and extension officers from the Ministry of Agriculture, Irrigation and Livestock from 14 north, north eastern and eastern provinces had participated in season-long Training of Trainers courses on IPM in rice, wheat, melon, potatoes and vegetables in *Dehdadi* research farm in Mazar-e Sharif, Balkh since June 2011.

“IPM is an ecosystem approach to crop production and protection. We combine different management practices to grow healthy crops and minimize the use of pesticides and other agricultural chemicals and maximize the outcomes to increase farmers' incomes,” FAO training consultant, *Wahyu Sutisna* explained. Physical control, mechanical control and also the use of bio pesticides are amongst the methods used in the management.

“Before, we used chemicals for pest control. Now we know that there are different techniques which have no negative impacts on the environment and also human health,” said Inayatullah, a participant from Laghman province. “We also learn how to self-produce bio pesticides using fermented chili, banana and other natural ingredients which are safe for the environment,” he added.

Since June 2011- June 2015, FAO has conducted 3 season-long training sessions and the 4th session was conducted involving 30 female participants of MAIL for vegetable crops in Badambagh Agricultural Research Farm, Kabul. During May 2012 to 30 June 2015, more than 700 FFSs have been conducted in 14 provinces including female FFS in north, east, western provinces of Afghanistan with 17500 farm households regularly participated in the FFS on weekly basis. Although insecurity remains the big challenge in the country, more FFS was to be conducted in 3 eastern provinces of Kunar, Laghman, and Nangarhar (<https://unama.unmissions.org/balkh-integrated-pest-management-healthy-crops-and-protecting-environment>).

Under IAIDS project, for the first time in Afghanistan, technical and scientific training has been organized professionally, as may be seen from **(Table 5.1)**.

**Table 5. 1: Technical Training organized under IAIDS project for PPQD staff in 2018**

Sr No	Name of the training	Duration (Months)	Remarks
1	International Pesticides Poisoning Management Specialist	3	Training of doctors, nurses and lab technicians in Management off Pesticide Specialist Poisoning Management
2	International Pesticides for Mutation Analysis cum Quality Control Specialist	3	NA

Sr No	Name of the training	Duration (Months)	Remarks
3	International Pesticides Analysis Technician	3	Training on Determination of Pesticides Formulation Analysis for Quality Control
4	International Pesticides Residues Chemist	3	Determination of Pesticides Residues in Agriculture Products of Afghanistan
5	International Pesticides Residues Analysis Technician	3	Determination of Pesticides Residues in Agriculture Products of Afghanistan
6	International Pesticides Plant Quarantine cum Training Specialist	2	Training of Quarantine staff in Rules and Regulation of WTO-SPS standards etc.
7	International Plant Nematologist	2	Training of Nematology Lab staff in isolation, identification, preservation and Management of Plant Parasitic Nematodes
8	International Plant Mycologist	2	Training on the Techniques using for isolation, purification and identification of plant diseases causing fungi
9	International Plant Bacteriologist		Training of Bacteriology lab staff in techniques using for isolation, purification and diagnosis of plant bacterial diseases
10	International Plant Virologist	2	Training on techniques use for isolation, purification and diagnosis of plant viruses
11	International Food Microbiologist	2	Training indetermination of food borne microorganisms in food items/agriculture products with its level
12	International Mycotoxin Specialist	2	
13	International Heavy Metal Analysis Specialist	2	Training in determination of heavy metals in Agriculture products, water, soils and its effect on human health and environment.
14	International Plant Bacteriology and Virology Lab Technician	3	Diagnosis of plant infected Bactria and viruses through traditional and molecular/serological techniques
15	International Food Microbiology Technician	3	Determination of Microbial contamination in food/agriculture items
16	International Fertilizer Formulation and Quality Control specialist	2	Training on Determination of fertilizer formulation analysis for Quality Control

Sr No	Name of the training	Duration (Months)	Remarks
17	International Fertilizer Formulation and Quality Control Technician	2	Training on Determination of fertilizer formulation analysis for Quality Control
18	International Plant Entomologist	2	Training in techniques using for identification of plant damaging insects

Source: [projects.worldbank.org/procurement/noticeoverview?2id=OP000494288&print=Y](https://projects.worldbank.org/procurement/noticeoverview?2id=OP000494288&print=Y)

### 5.5 CONSTRAINTS IN IPM IMPLEMENTATION

Any scientific experiment in Afghanistan is generally beset with many unanticipated local issues besides structural issues like insecurity, lack of awareness and knowledge, instability and vulnerability, market access, unorganized market and management of agricultural produces in collection, processing and marketing due to near collapse of village institutions. Moreover, governance parameters like legislation, enforcement, transparency in operation, citizen forum, collective movement, responsive democracy and so on are usually slow.

Inspectors who are supposed to provide a vital link between the IPM actors in the society with that of the PPQD and the proposed laboratories have become dormant due to prolonged absence from any effective role clarity, outdated outlook and aging. Similar is the situation regarding IPM extension staff, attached with the DAIL, who report to Director of Agricultural at the provinces. There is no direct reporting mechanism unless there is some urgency related to unanticipated pest attack. Further, the staff shortage and shortage of field functionaries is an inherent problem.

The legislative framework is now in place, a necessary condition of prevention of indiscriminate use of chemical pesticide, but what lacks is the shortage of extension staff. So, enforcement of legal provisions takes us nowhere as long as they are not enforced as per the provisions. The enforcement part of the legislation rests with the department, and there are issues concerning them. There is a need to make assessment about the manpower position, skill, job function and identifying missing links to make the department accountable and provide a balanced service to the society in safeguarding the public health concerns, environmental safeguard and providing extension service in IPM.

As mentioned before, IPM related legislations become infructuous unless enforced effectively. The farmers seem to have resorted to taking recourse to the chemical method of pest control, without making efforts to pre-empt certain occurrence of usual diseases and follow remedial measures.

There is a dearth of credible field information on the typology of pest attack across the crops and also across different agro-ecologies. Because of wide variations in the agro ecological parameters within the same zone, it is not easy to ascertain information on time. There is also no plant disease reporting mechanism. The cross country survey results of pests and diseases are yet to be available.

### 5.6 STRATEGY STRENGTHENING CAPACITY

Two important and much-awaited legislation have been passed (Pesticide Law, Draft Plant Protection and Quarantine law), providing sound legal platform based on which IPM policies,

programs, actions, regulatory measures, capacity building, creating of scientific and technical laboratories, testing protocol, licensing modalities, regulation of pesticide trade can be visualized. It would be fair to mention that Afghanistan has now been able to get the benefit of having necessary legal support, which forms one of necessary conditions of IPM governance from the supply side phenomenon which have to be further carried forward.

As in many countries, Afghanistan needs to align with the different international conventions that have enacted guidelines for bringing in systems and procedures controlling transportation, distribution, storing procedures and use of pesticides. Not only such alignment helps in improving the image in IPM ecosystem, but they are also beneficial from the point of view of potential acceptance in pushing Afghan brand in international markets.

Basic infrastructure in scientific laboratories, equipment and testing protocols will again need to be comparable with accredited labs elsewhere in the country. Here, not only investment is needed to set up these facilities, but capacities of the local staff, technicians and laboratory assistants including scientific community need to be enhanced to hone up their skill set. Capacity building program will need to be undertaken principally through overseas training or hiring some foreign consultants who could train the local staff so that technical expertise is enhanced. Resources from many international donor-funded projects working in different sub-sector of the agricultural ecosystem need to be harnessed for this project. As in IAIDS project, funds have been utilized in setting up of scientific facilities, there would many similar projects like NHP, on-farm development project and the like will need to be leveraged so that this sector is not solely dependent on budgetary support from the MAIL. What it would require are strategic thought and a drive-in fulfilling such mission.

As corollary to the above point, NGOs working in many sub sectoral segments could consider ensuring convergence in their operational area with that of the catchment area of OMAID project so that it becomes a win-win situation for the stakeholders, However, this could only be explored if scientific and political leadership could be taken on board, and cross-sectoral approach to development is considered to be one of the approaches in the development strategy of Afghanistan.

It would be desirable that under OMAID project some model demonstration spots are created for IPM which can be replicated through FCC or through proposed RTHs. Because some of these units would potentially be the growth centres to offer single umbrella service to the participating farmers, and it would be in the fitness of things that some of the more favourable units are deliberately developed as model centres as well.

Some “demonstration hotspots” on IPM practices need to be created for creating awareness and training among the farmers. Some NGOs and under donor-funded projects, IPM is being practiced, which should be identified and interface with other agencies needs to be established in the short run, while in the long-run public institutions need to create such facilities at different training centres of MAIL.

Adaptation on IPM regime in Afghanistan would have to be preceded with knowledge and information on the problematic areas relating to the incidence of pests and their typology, geography, frequency of occurrence, crops affected and intensity and estimated economic loss. These can only be completed through periodic studies and disseminating findings across the stakeholders in usable form. Pesticide trade is another area which requires studies, as it is

largely unorganized, and supply of chemicals and antidotes are highly controlled by the drug mafias.

The country is yet to formulate a policy on IPM so that *ad hoc* and emergency measures are slowly replaced by educating the farmers in adoption of IPM. There have been experiments carried out under different donor-supported IPM activities, demonstrating results and outcome and increasing localized knowledge of the target population. In the absence of regular follow up, these gains get out of practice, which is an issue in localized experiments. So, a well- designed strategy for IPM needs to be prepared and PPQD's IPM division needs to drive this initiative as part of extension activities.



## **6. PESTICIDE MANAGEMENT METHODS AND ASSOCIATED RISKS**

### **6.1 PESTICIDES MANAGEMENT METHODS AND USES**

This chapter discusses about regulatory measures on the pesticides and their handling including supply, transport, storage, proper use and disposal of pesticides related waste material, harmful to the environment and human health. These discussions will reveal the present practices followed by the stakeholders and will identify gaps and analyse scope for improvement in the management of pesticides. Pesticides being the sensitive product, utmost care will need to be taken to ensure proper management without causing harm to the society and environment. So, a necessity arises to study the present condition and related them with the desired level via identification of gaps.

### **6.2 PESTICIDE USE IN THE ISLAMIC REPUBLIC OF AFGHANISTAN**

The perusal of available literature reveals that the Government of Afghanistan does not have any registered pesticides for specific uses especially in the field of Agri-horticultural, veterinary and public health system. Therefore, it follows the list of acceptable products and the guidelines of FAO's list which is limited and not adapted specifically for Afghanistan's agriculture and human health systems. The MAIL is not the only importer and user of pesticides in the country. The pesticides also enter from other sources specifically during emergency requirement. A large number of pesticides used to protect the desert locusts, which mostly appear in the northern part of the country and it is a serious threat to agricultural crops. Most of the pesticides found in Afghanistan are imported, sold and distributed by the private sector businesses. These businesses are spread out across the country. Pesticides that are often banned for use in other countries or internationally and outdated are sold "free of any label." Moreover, validity of these pesticides have expired or are even dangerous and classified by WHO as extremely hazardous or highly hazardous (Ia and Ib), yet they are found in local trade. This is an ominous sign, requiring urgent attention from regulatory as well as enforcement machinery if Afghan is to move towards a healthy pesticide usage regime.

### **6.3 PESTICIDES USE IN AGRICULTURE SECTOR**

The stylized feature of the agro-climatic zones of the country is diversified. The climatic and environmental conditions widely vary across geography. Numerous insects, diseases and weed pest species occur synchronizing with this agro-ecological condition infesting major economic crops and they are liable to damage and cause substantial crop losses. Though there are sporadic efforts made to mitigate destructive pest population, other than pesticides, all have become futile and hence producers depend on chemical pesticides to control damaging pest population rapidly and effectively at the time of severe pest attack.

Many kinds of pesticides are being used in field crops, vegetables and in other horticultural crops, purchased from the local dealers/retailers in Kabul or local pesticides stores in different Provincial cities and districts without labels, mostly outdated and/or banned for sales in others countries. These are used without proper protection or safety measures and without considering hazards and toxic exposures to the farmers, manipulators, non-targets organisms especially natural enemies, wildlife, fish and other flora and fauna and thus negatively affecting the already pesticides contaminated environment. The producers also use the pesticides in their crops without knowing the phytotoxic effect, exact dosages of application and usually manage the pests and diseases by indiscriminate use.

It also happens that the farmers have purchased insecticide instead of pesticide from the retailers. Sometimes, the farmers have also bought fungicides instead of pesticides. These things happen as the retailers are also unaware of the appropriate agrochemicals to be given to the farmers on demand due to illiteracy and lack of knowledge.

The country also faces the attack of different types of migratory and invasive pests like locusts and caterpillar, usually controlled by pesticides. The horticultural fruit producers use more than one round of pesticides during the cropping season to ensure crop production. The complete dependence of the farmers on the pesticides towards production of fruit crops invokes many problems when the products are meant for export market. For OMAID project, this is likely to be an issue which needs to be managed through application of various tools, sensitization, awareness and knowledge enhancing methods. Acceptability of Afghan horticulture products would improve considerably provided pest issues are mitigated following standard protocols and credible means of verification is established for the satisfaction of international clientele.

Those consignments are sent without residue analysis. Till date, there is no organized residue laboratory developed in the country. Although a complex laboratory including pesticides analytical laboratory, constructed next to the Plant Protection and Quarantine under the AAIP Project funded by the World Bank but it is not yet equipped. Due to this limitation, many times, consignments are refused by the importing countries, forcing heavy losses to the traders.

Through the FAO's IPM project and the Horticulture and Livestock Project (HLP), IPM strategy has been attempted in some provinces of the Central and Northern regions. However, the fact of the matter is that the farmers do not follow IPM approaches and relies on pesticides as they think it is a part of production input like fertilizers. The actual IPM practices are not followed in a larger part of the universe.

#### **6.4 PESTICIDES USE IN PUBLIC HEALTH SECTORS**

The major problems of pesticide management in Afghanistan include: (i) very fragile legislation and regulation of public health pesticides; (ii) inadequate mechanisms and capacity for procurement and quality control of pesticides; (iii) challenges in implementation of integrated vector management (IPM) and application of pesticides; (iv) no management and prevention techniques nor any adequate capacity to mitigate pesticide resistance (v) general lack of capacity for monitoring pesticide exposure and poisoning; (vi) alarmingly low capacity for disposal of pesticides and pesticide-related waste; and (vii) low capacity of managers of vector control programs for integrated vector management and sound management of pesticides.

In addition, though new Pesticide Law is in place, its enforcement leaves much to be desired.

#### **6.5 PESTICIDES LABEL AND USAGE PATTERN**

The farmers do not have proper knowledge on the toxicity level of pesticide, risk, impact on other beneficial and non- target organisms. It is therefore difficult for the farmers to decide on which, when, how and what type of pesticides is to be applied to address the critical problem of hazards of pesticides and at the same time, deriving benefit of eco-friendly pesticides which is an integral part of application of IPM module with a minimum disturbance to the ecosystem.

There are no quick and easy answers regarding pesticide use. But when it is judiciously used according to the label, risks, toxicity and impact on the environment then pesticide hazards

are minimized. Pesticides vary greatly according to their level of toxicity, so during training in integrated pest management, which is an ecological approach of pest management, one should emphasize the importance of using a product that is effective, but as nontoxic as far possible or rather safe to the non-target organisms.

An intelligent and sensitive farmer will select a suitable plant variety that is tolerant or resistant to pest attack while yielding good output. He can minimize the pest attack of his crop after periodical monitoring and introducing various options of integrating pest management tools as much as possible to integrate simultaneously and successively to minimize the pest population for optimizing yield, protecting human health and environment. Whatever be the situation, it is always important to first (i) identify the problem, (ii) monitor the severity and spread, and (iii) be aware at what time or stage control is necessary.

Farmers in Afghanistan do not use pesticides in the context of IPM. They use it as and when required to manage the pest problems without considering the impact on other non-target organisms, environment and health. A paradigm shift for change in behavior and attitudes of the farmers towards dependence on pesticides is required.

There are some cases where the IPM/Farmer Field School (FFS) concept have been taking place in fruits production and production of other crops through various NGO funded projects. These need to be adopted and extended to field crops and horticultural crop production to change producers' attitudes and behaviour in the country. The FAO/FFS initiative, implemented in the wheat-producing zones, should be given more emphasis since the pilot farmers/extension agents would become trainers of trainers and they will in effect carry the message of IPM uses. This could lead to reduction in excessive application of pesticides during the cropping season.

Through the FFS the farmers need to be trained to the adoption procedure. The project will encourage farmers to use cultural methods, mechanical, botanical and biological methods to conserve populations of natural enemies prior to the use of spot sprays. The project will train extension personnel to guide the farmers to identify pest and disease problems and accordingly plan for preparation, application and timing of an appropriate pesticide. The farmers are to be advised not to use those Pesticides classified by WHO as extremely hazardous or highly hazardous (Ia and Ib) and only selective and safe pesticides will be used to avoid any possible negative impact on populations of natural enemies, pollinating insects and other beneficial organisms.

#### **6.6 TYPES OF PESTICIDES MAY BE CONSIDERED FOR THE PROJECT**

The main objective of the OMAID project is to promote all-round development of the farming community through improving farming techniques for production of quality and healthy product suitable for export market and also improving the quality standards in the domestic market. To fulfil these objectives, farmers are to be trained and inspired for adoption of IPM techniques for pest management strategy which can achieve the goal. All pest management tools, other than pesticides, are to be integrated at the early stage of crop production to keep the destructive pest population away. Farmers should be promoted to grow healthy crops because healthy crops are rarely attacked by pests or have the ability to compensate losses. Farmer should be trained through FFS how to grow healthy crops and what are factors for growing healthy crops.

However, the safe and need-based application of pesticides may be recommended considering the hazards and risk associated with pesticides, following the criteria laid down OP 4.09 to control the targeted pest, promoting and encouraging natural enemies, bio-pesticides, as listed in Table 3. 5 & Table 3.6. The use of highly persistent and highly toxic chemicals must be avoided to the maximum possible extent and the choice of pesticides must be based on factors as per the *World Bank Guidelines on Pesticide Handling and Application* where it has been stated that these criteria should be assessed based on: (i) biodegradability; (ii) toxicity to mammals and fish; (iii) occupational health and safety risks; and (iv) costs associated.

## 6.7 PESTICIDE MANAGEMENT METHODS

A guideline for management methods of pesticides and its recommendation actions is summarized in **Table 6. 1**.

**Table 6. 1: Guidelines for management methods of pesticides and its recommendation for extension workers and farmers**

Management Practices	Recommended Actions
Procurement/ purchase	Complying with the registration process of NEPA and the Pesticides Law to be enforced. The WHO and FAO guidelines for pesticides and vector control should be followed.
Testing the Quality of the Product	Testing Product Quality is essential for the quality and efficacy of the treatments to be conducted. Pesticides Analysis Laboratory and Residue analysis laboratory is extremely essential, especially for export. The laboratory should be equipped, staff should be in place and they are to be trained for use of analytical procedures. Under OMAID, this should be followed on immediate basis and therefore functioning of the laboratory will have to be considered as one of the principal subcomponents under the OMAID project.
Labeling	Ensure that the Pesticides are properly packaged and labeled according to WHO Standards, and written in English and in Dari/Pashto languages and should indicate the content, safety instruction warning and action to be taken in case of an accident. The pesticide should remain in its original container and with its label. The label may be in red, yellow, blue and green triangle to represent high, medium, low risk and safe pesticides respectively.
Storage and Transportation	Appropriate precautionary measures should be taken and protective gears are worn for protection. Compliance to the National Legislation is a must. Pesticides should be stored properly under lock and key and out of reach children; the store must be well ventilated and located away from residences. The store must have fire extinguisher and detergents. Precautionary measures are to be taken during transport to remote places. Farmers are also to be trained and made aware that they should not store or they should not keep the unused pesticide near food grain/food articles to avoid contamination and causing health hazards.

Management Practices	Recommended Actions
Use	The operator must follow the instructions written on the label. Protective gears must be worn and recommended guidelines are to be followed. They also have to consider the time of application and weather conditions. They must apply pesticides against target pests. It is farmer habitual if observe pests on a tree or part of a tree or in one or two spots in the field, spray all field and trees.
Disposal	All the empty containers of pesticides must be gathered and stored at PPQD's specific location. The Government of the Islamic Republic of Afghanistan faces a big challenge in this regard as the farmers habitually tend to ignore disposal of empty pesticide container carefully.
Monitoring Applicators Pesticide Exposure Levels	Monitoring of exposure levels of pesticide applicators is recommended before the season, and regularly during the season, to determine the levels of exposure to applicators to ensure their health and safety. Be care full of skin diseases, blurred vision, headache, irritation, etc. It would be advisable if the pesticide applicator should consult a physician on regular interval for usual health check-up.
Training of all actors involved in the implementation of the pesticide application programs	Training of all Actors and Collaborators in Pesticide Management (traders, handlers, applicators)

## 6.8 PESTICIDE USE AND RISKS ASSOCIATED WITH THEIR USES

The use of all pesticides poses a serious risk to public health. The best way is to reduce this risk is by choosing the safe and eco-friendly pesticides that are considered less hazardous and also by taking precautionary measures to avoid health hazards. In general, the farmers of the developing countries, as well as the farmers of Afghan, are reluctant to use protective clothing. Under the present project, it is important that implementation of different components of PMP will have to include use of protective gears (apron, gloves, goggles, masks, etc).

### 6.8.1 Negative Impacts of Uncontrolled use of Pesticides

When a pesticide applicator system/body is exposed to a pesticide, the manifestation of the pesticide toxicity occurs. Toxic products produce effects on the body from the moment they are absorbed, mainly on the skin, the digestive system and on the lungs. This may cause blurred vision, skin irritation, headache and convulsion.

Foreseeable risks are related to the following steps: product storage; handling; transportation; dosage during treatments particularly contamination of field agents (applicators) who could be exposed to pesticide effects if instructions related to product utilization standards are not sufficiently adhered. The grazing areas need to be protected immediately after application of pesticides, lest it might cause the death of livestock. In **Table 6. 2**, natural resources (soil, water, air, etc) that are usually affected by the traditional use of pesticides is provided.

**Table 6. 2: Major risks in the areas of traditional use of pesticides**

Environment	Nature of impact
Soil	<ul style="list-style-type: none"> <li>• Modification of the microbial flora</li> <li>• Pesticide residue content in soil causes pollution</li> </ul>
Surface water	<ul style="list-style-type: none"> <li>• Pollutions</li> <li>• Altered Ph</li> </ul>
Well water	<ul style="list-style-type: none"> <li>• Pollutions:</li> <li>• Altered pH</li> </ul>
Water-tables	
Air	<ul style="list-style-type: none"> <li>• Air pollution</li> </ul>
Biodiversity	<ul style="list-style-type: none"> <li>• Pest chemo-resistance</li> <li>• Fauna poisoning</li> <li>• Poisoning and mortality</li> <li>• Manpower reduction and/or biomass</li> <li>• Extinction/Proliferation of species or group of species</li> <li>• Breakdown of the food chain</li> <li>• Loss of biodiversity</li> </ul>
Human health	<ul style="list-style-type: none"> <li>• Intoxication: Alteration:                             <ul style="list-style-type: none"> <li>○ of the embryonic development</li> <li>○ of population growth</li> <li>○ of reproduction</li> </ul> </li> <li>• Poisoning</li> <li>• Death</li> <li>• Drop-in cholinesterase level</li> </ul>

Source: Adapted from PMP (Main report) for the IAIDS Project, Table 7, Project p-52

The intrinsic dangers for each pesticide can be based on five toxicity measures representing various risk factors:

- Acute oral toxicity for the rat; general poisoning risk for human;
- Acute skin toxicity for the rat: an occupational hazard for pesticide operators (professional applicators, farmers, formulating plants workers);
- Acute toxicity for fish: risk for fish and fishing;
- Oral toxicity for the bird; risk for birds;
- Acute toxicity through contact for the bee: risk for bees, pollination of crops and honey production.

### 6.8.2 The Population at Risk

Risks occur during:

- Pesticides application (for land applicators, pilots, drivers and machine manipulators);
- Transportation (contamination of containers, tank bursting or spillage);
- Monitoring during treatment activities or prospection.

Risks affect:

- Field agents:

These are people (researchers, supervisors, field workers) involved in treatment activities and who are more exposed but, it is important to point out that all other agents can be in danger.

- Populations:

During treatment activities and after treatment, empty pesticide containers are used in domestic settings in fetching water, storing foodstuff, etc.

**6.8.3 Adverse Effects on the Environment.**

The use of pesticides has certain disadvantages and cause environmental pollution and induces risks of intoxication- - all these often justifying the need of abandoning pesticide uses and resorting to other natural protection measures. Pesticides pollute water and air, destroy the fauna and destroy the typical balance in the ecosystem.

Adverse effects exist on the soil (destruction of soil macro and micro-fauna and flora), in the air and on waters in terms of: (i) mortality on non-targeted species fulfilling important ecological functions: bees and other pollination agents, natural enemies of certain pests (parasites, predators, pathogens) ; (ii) pollution during space treatment of parks and natural reserves, fishing and livestock production zones with the contamination of fauna and flora; (iii) water pollution either directly or through surface water : (iv) resistance among insect populations.

**6.8.4 Risks Associated with Handling of Packaged Products**

In general, the public health risk will need to be assessed (as low and/or high) regarding the handling of selected packaged chemicals and pesticides. Training and sensitization of extension workers regarding disposal of pesticide containers and other packaging are necessary. There is a noticeable tendency among the farmers to discard plastic containers (bottles) without taking any safety precautions. This practice is detrimental to environment and to public at large. The objective of the training during the FSS sessions will need to cover such aspects as risks to the environment and the public.

**6.8.5 Actions to Reduce the Risks Associated with Specific Products**

Dust pesticides need to be kept in dry stores and should be applied with a dusting machine under the cool condition when there is no wind and the crop is dry; their application in the heat of the day in the middle of the summer will lead to burning of the crop. Hand throwing of dust pesticide risks burning of skin and should be avoided. Protective clothing, gloves and masks should be worn to avoid skin contact since pesticides burn if in contact with the skin, and avoid inhalation of pesticide fumes.

**6.8.6 Pesticides-related Accidents**

Large quantities of obsolete pesticides stocks constitute major risks to human and animal health, and the environment. Storage conditions of this toxic and hazardous waste are most often precarious.

**6.8.7 Summary of Impacts and Risks of Pesticides Management Methods (Table 6. 3).**

**Table 6. 3: The impacts and risks associated with pesticide management methods**

Steps	Influencing factor	Risks		
		Public health	Environment	Personnel
Transportation	<ul style="list-style-type: none"> <li>- Lack of training</li> <li>- Inadequacy of transport and emergency prepared</li> </ul>	Health hazard if mixed with foodstuff or water and other beverages	<ul style="list-style-type: none"> <li>- Accidental discharge, water-table pollution through leaching</li> </ul>	<ul style="list-style-type: none"> <li>- Product inhalation: vapor, dust, risk of skin contact</li> <li>- Skin and eye contact</li> </ul>

Steps	Influencing factor	Risks		
		Public health	Environment	Personnel
	<ul style="list-style-type: none"> <li>- Business planning</li> <li>- Safeguard for emergency</li> </ul>			
Storage	<ul style="list-style-type: none"> <li>- Lack of means</li> <li>- The deficit in pesticide management training</li> <li>- Inadequacy of facilities</li> <li>- Provision for proper ventilation</li> </ul>	<ul style="list-style-type: none"> <li>- Accidental contamination</li> <li>- Inconvenience of populations living in the vicinity</li> </ul>	<ul style="list-style-type: none"> <li>- Soil contamination</li> <li>- Toxic to soil microorganisms</li> <li>- discharge in nearby streams, and rivers</li> <li>- contamination of ground by leaching</li> </ul>	<ul style="list-style-type: none"> <li>- Skin contact through accidental spillage caused by the narrowness of the premises</li> <li>- Skin and eye contact</li> </ul>
Handling Manipulation	<ul style="list-style-type: none"> <li>- The deficit in training and sensitization</li> <li>- Inappropriate clothing of pesticide handlers</li> <li>- Lack of right equipment and tools</li> <li>- Selection of isolated place</li> </ul>	<ul style="list-style-type: none"> <li>- Contamination of water sources through washing of containers</li> <li>- Accidental leaks</li> </ul>	<ul style="list-style-type: none"> <li>- Soil contamination through accidental spillage or intentional discharge, water-table pollution</li> </ul>	<ul style="list-style-type: none"> <li>- Vapor Inhalation, skin contact through splashing during preparation or product transfer</li> <li>- Skin and eye contact</li> </ul>
Packaging disposal	<ul style="list-style-type: none"> <li>- Deficit in training, education and</li> </ul>	<ul style="list-style-type: none"> <li>- Product ingestion by re-using</li> </ul>	Contaminated containers may release toxic residues and	<ul style="list-style-type: none"> <li>- Skin contact and</li> </ul>



Steps	Influencing factor	Risks		
		Public health	Environment	Personnel
	sensitization - Non availability of disposal facilities	containers - Inhalation - Skin contact	fume in the atmosphere	respiratory tract - Skin and eye contact
Washing of containers	- The deficit in training, education and sensitization	- Skin contact, contamination of wells, stream and rivers	- Acute intoxication of fish and other crustacean, pollution of wells, ponds, water-tables	- Skin contact - Skin and eye contact - Ingestion of contaminated water and foodstuff

Source: Adapted from PMP (Main report) for the IAIDS Project, Table 8, Project p-55

## 6.9 PESTS RELATED TO PUBLIC HEALTH

### 6.9.1 Overview of Vector-Borne Diseases

According to WHO the vector-borne diseases of major public health problem in Eastern Mediterranean Region are Malaria, Leishmaniasis, Lymphatic filariasis, Onchocerciasis, Trypanosomiasis and a number of Arbov Go Al infections—Rift Valley fever, Dengue fever, Yellow fever, West Nile fever, Crimean–Congo hemorrhagic fever and Japanese encephalitis. These are the potential diseases and could spread due to global climate changes in different geographical areas. According to the Vector Control Department of the Ministry of Public Health, the major vector-borne diseases in Afghanistan are as follows:

- Mosquitoes caused diseases such as Malaria, Dengue fever and Yellow fever
- River Blindness caused by black flies
- Sand Flies causes Leishmaniasis
- Bed bugs, Fleas, Lice, Ticks, Mites and House flies.
- Malaria is a significant public health concern in Afghanistan.

During the warmer months of May to November, the climate and ecological habitat support large populations of arthropod vectors, including mosquitoes, ticks, and sand flies. Significant disease transmission is sustained countrywide, including in urban areas. Malaria is the major vector-borne risk in Afghanistan. In present situation 50-60% population of the country live in malaria-endemic areas. There is public health infrastructure in Afghanistan but they do not function. The maximum area of Afghanistan is arid or semi- arid where agricultural crop production is not possible without irrigation. The vectors of malaria viz. *Anophelesstephensi*, *Anophelesculicifacies*, *Anophelespulcherrimus* and *Anophelessuperpictus* mainly multiply in

irrigated water, river pools and river edges. Intensified rice cultivation near the populated town is also one of the important reasons of causing malaria. On the other hand, during rainy season the rain water also provides additional space for multiplication and thus malaria transmission.

The goal of the WHO Eastern Mediterranean Regional Office (EMRO) regional malaria program is to reduce the malaria burden to a level at which it is no longer a major cause of morbidity and mortality and a barrier to social and economic development. Specifically, the program aimed to reduce malaria morbidity by 60% and malaria mortality by 90% by the year 2013.

Crimean-Congo hemorrhagic fever is a tick-borne disease primarily in the rural areas of the country where the disease risk remains throughout the year but peak in warmer months. Cutaneous-mucosal Leishmaniasis is another disease caused by sand fly during April to October which is also the peak active period of sand fly multiplication. The risk due to this disease is limited to focal areas in rural and peri-urban areas in the northern plains of Baghlan, Balkh, Faryab, Jowzjan, Konduz, Samangan, and Takhar Provinces and in the southwestern lowlands. Sanitation is extremely poor throughout the country where local food and water sources are heavily contaminated with pathogenic bacteria, parasites and viruses. Risk is year-round and countrywide, including in major urban areas. The insects like houseflies remain active throughout the year and play important role in transmitting the disease vectors of diarrhoea, Cholera, etc.

### **6.9.2 Pest management approaches in Vector Borne Disease Control**

Insecticide-treated bed nets (ITN) have been distributed and well accepted by the people through extensive public awareness campaigns and mobile, subsidized sales in all disease-prone areas is urgently required. As insecticide residual spraying (IRS) is difficult to implement, broadening the ITN use is a viable approach for reducing malaria and Cutaneous-mucosal Leishmaniasis infection. Like other infectious diseases, malaria is grouped with other health and disease programs into a basic package of health services (BPHS). The other approaches that could be followed are:

1. Indoor spraying with insecticide like cypermethrin to kill the mosquito larvae in mosquito breeding sites and post-treatment observation.
2. Sanitation is the most important thing to reduce the risk of vector-borne diseases. Keeping clean of the homestead areas prevent the multiplication of insects (disease vector) and often reduce the application of chemical or microbiological ovicides, larvicides, and pesticides in areas where endemic mosquito-borne diseases occur.
3. Utilization of biocontrol agents - Natural enemies feeding on mosquito larvae and pupae in aquatic environments can play an important role in reducing the mosquito population. Mosquito young instars are preyed upon by a large number of aquatic organisms including fish, amphibians, copepods, odonate young instars, water bugs, etc.
4. Promoting Integrated Vector Management, using combinations of methods like monitoring, sanitation, natural biological control and application of pesticides to reduce the vector of the diseases.
5. Regular surveillance and to control the vectors is necessary to apply pesticides around major cities.
6. Research on new techniques to combat the vectors.
7. Proper utilization of quarantine to prevent the introduction and spread of new infectious diseases like Bird Flu, Mad Cow, etc.

### **6.9.3 Recommendations**

- A close watch on vector breeding site in rural and urban areas required and preventive application with a selective pesticide like cypermethrin is very useful to protect the vector.
- Awareness and expansion of utilization of Insecticide Treated Nets (ITNs).
- Application of botanical pesticides and the utilization of natural biocontrol agents.
- Release of local larvae eating fish (Guppy) in mosquito breeding site is useful to control the vector.
- Support in terms of conducting training to make skill personnel for surveillance and control operation.

### **6.10 SELECTION OF ALTERNATIVES TO THE CHOSEN PESTICIDES**

The substitution of selected hazardous products with less hazardous ones would clearly be one of the key objectives under PMP component of OMAID. Impediments to the sustainability of this strategy are the availability of bio-pesticides and botanicals in Afghanistan, the sustainability of their supply and the generally high cost of these products. This should not however prevent substitution trials taking place or alternative control strategies being designed and experimented with. In the IPM demonstration plots, this needs to be practiced as experiment and the results need to be documented besides preparing visual documentation for propagation.

### **6.11 PROPOSED STRATEGY TO STRENGTHEN CAPACITY**

In order to protect itself from becoming a dumping ground for banned pesticides, it is necessary to become a member of the international organizations and signatory to the conventions controlling the distribution and use of pesticides. The new Pesticide Legislation is in place, and so is PPQD legislation. These, in conjunction with other laws, regulations, acts, etc have created an enabling canvas for implementing pesticide governance mechanism in Afghanistan which need to be made enforced.

### **6.12 ASSESSMENT OF KNOWLEDGE AND PRACTICES IN PESTICIDE MANAGEMENT**

The circumstance of pesticide uses and the competence required to handle pesticides are largely due to lack of awareness on pesticides risks and hazards caused to human health and the environment. There are also issues of complacency, misuse and abuse, lack of knowledge on pests and disease management, lack of knowledge on product dosage rates. Awareness on the spraying methods and technique of spraying, application of equipment and calibration techniques, use of protective gears, safety precautions, and protection of non- target species and the impact of pesticides to human health and environment are low.

For control of general pest, the case is different, some producers buy their own protective gears which is very expensive and they cannot afford it. Those who cannot afford it, spray without protection, as a result, they are exposed and contaminated.

### **6.13 SUMMING UP**

The Afghan agricultural products including horticulture products quality improvement is critical for ensuring sustainable incomes of the producers. The OMAID project brings in an opportunity for undertaking reform in the application of IPM tool in a manner that product quality improves, verification of such improvement is recognized both internally as well as internationally and public health hazard in the use of pesticides are minimized. Since the baseline in pesticide management in Afghanistan is very weak and low awareness among the

farmers, coupled with uncontrolled import of pesticides and their applications are the limitations, the OMAID project will have to make efforts to remedy them and take the agricultural production system into a different level which will have to market-driven and quality rich. The coordination among the public institutions, farmers, OMAISD project, NDOs, donors, citizen forum including the actors in pesticide trade will have to contribute in this endeavour to improve pest management across the value chain.

## **7. UNDERSTANDING PRESENT PRACTICES OF DEALING WITH PESTS AND DISEASES**

### **7.1 INTRODUCTION**

As mentioned in the TOR, the present exercise needs to highlight current status of PMP preparation and mechanism that exists within the Government framework for PMP. It is necessary that such status is also highlighted after ascertaining evidence from the field. In this direction, as indicated in the methodology section of Chapter 2 that as part of preparing this document, a wide-ranging consultation, data collection and gathering of insights have been completed by visiting 5 Provinces and also seeking opinions and suggestions of the stakeholders at the Headquarters. It is with this intention this chapter is developed to highlight the opinion expressed and impressions gathered from them which would reveal situations that are prevalent at ground zero.

There is yet another utility to get familiarity with the on-field conditions prevalent in Afghanistan. By the time the OMAID project is rolled out, and PMP staff is on board, it would be useful for them to be aware of farmers' opinion and knowledge so that they can organize their activities commensurate with the requirements.

### **7.2 OPINION OF THE PROVINCIAL PPQD ON PMP**

Our interviews with the concerned PPQD staff reveal that they are aware of the different types of pest attack that usually happen in their area of operation. They also could identify crop-wise typology of pests (e. g, root feeder, borer pests, defoliator, sucking, etc). In addition, they claim that biological, pheromone trap, yellow traps, cultural and mechanical tools are integrated into the IPM, and they feel that some of these tools could be available with the farmers. However, on a direct question on which are the tools that are practiced, they mentioned that it was only "pesticides". Therefore, their claim that farmers could have access to alternative tools does not appear to hold ground, when validated by the farmers.

In as much as risk perceptions of the different types of pesticides are used, they are unanimous that it is not known to the farmers. This is perhaps valid across the country. According to them, farmers use pesticides indiscriminately, which is partly induced due to their ignorance and also belief that extra doses of pesticide application could probably protect their valuable crops. In a country which is perennially food deficit, and farmers suffer from prolonged drought and climatic uncertainties, the urgency of the farmers is probably understandable, but in the process, the damage is being done to the ecology and environment which becomes difficult to recoup. So, this is a difficult choice for the farmers and for the IPM fraternity to recoup the damage however, silver line is that this can be redeemed through IPM tools. They also narrate that lack of technical persons and security situation are not conducive for making IPM knowledge and insights to the farmers.

### **7.3 OPINION OF THE FARMERS**

The perception of the farmers differs across the crops that they grow. Specifically, they could describe the type of pests that they faced in wheat, maize and rice and also for fruit crops. Somehow, their knowledge and awareness regarding different alternative tools possible under IPM is virtually non-existent and their mindset is only towards using chemical pesticides. Moreover, the pesticides are not labelled, no risk perception mentioned, and no SOPs indicated. This is a universal observation. On the question relating to indication of safety warning label on the pesticide, the responses are unclear. While in some GDs, it was observed

that some progressive farmers could say that there are some labels, while in some other GDs, the responses were not so indicative, implying poor knowledge on this matter. The gullible farmers are completely at the disposal of the pesticide traders and these traders impose certain pesticides which are available in the market. The user (farmer) behaviour in pesticides usage pattern is determined as per the supplies.

#### **7.4 PEST ATTACK DURING GRAIN STORAGE**

In many GDs, the farmers have identified pests only for wheat and maize crops. However, according to them, only the large farmers and traders/hoarders face such issue, and the small farmers cannot relate any such issue as their marketable surplus is limited. Beetle and Rats are the two pests that they have mentioned. They use disinfectant (phostoxin tablets) and Baits mixed with Zinc Phosphide for rodent control. No other method is followed by these 2 segments.

#### **7.5 OPINION OF MAIL PPQD**

The PPQD staff of MAIL are of the view that for industrial crops, farmers partially follow IPM approaches, but they are not scientific. It is perhaps their claim. The fact of the matter is that pesticides are used. They also say that some progressive farmers use mechanical hand collection of weeds from cereal crops, but they are very specific, and as a matter of general practice, pesticides are used. But the quality of the pesticides is not necessarily of "standard quality", even labels are tampered. Also, there are no controls on import of pesticides and their efficacy.

Regarding field application of pesticide on crops, they point out that the farmers do not follow the standard protocol propagated by the MAIL Directorate. According to them, there is some bio pesticide available in the market, but its usage is not properly known to them. As expected, they also highlighted that imported pesticides are not necessarily of any standard quality and more importantly, the risk perceptions of the imported pesticides are not indicated on the label. Many fake pesticides are sold in the market.

Regarding storage practices of the farmers, they are of the view that the farmers adopt localized storage practices of limited crops like potato, onion and grain, etc. For grain, grain weevil, rice weevil, beetle and mites are reported, and they are addressed through (i) cleaning of storage space, (ii) sun drying and (iii) disinfection. They use aluminium phosphate tablet and aluminium bromide as disinfectant.

Potatoes/Onions are stored by the farmers at underground storage by digging wells, while the traders use cold storages. Onions are stored at low temperature and sometimes concrete structure are used to store onion. The IPM method used is sun drying, cleaning of storages, and ensuring aeration facility.

Dry fruits are kept by the farmers at their house premises in cartoons, while the traders use bags and cartoons with aeration facility. Different species of moths and Beetles are the usual pests that become an issue during storage. Apart from sun drying, cleaning the storage space, fumigation is also done.

#### **7.6 CHECKLIST FOR SCREENING OF SUBPROJECT PROPOSAL**

As the project is rolled out, sub project proposals will be prepared. These projects will be location-specific, project-specific and activity-centric with differential impact on social, economic, environment and related parameters. Depending on the nature of the project and

scale at which the project will be implemented, environmental impact will vary. Therefore, a screening mechanism will need to be developed which will act as a guiding tool. In this regard, a checklist has been prepared and annexed at **Annexure-VII**. The environmental and social team within PMU, in consultation with PMP, will need to fill up such checklist and assess the impact on environment. This will therefore be used as a decision-making tool on the basis of the likely impact on the environment, following World Bank guidelines. Projects with significant impact on environment will be discarded, while projects with moderate or low impacts will be considered for appraisal, subject to their implementing of the mitigation measures. These mitigation measures will be followed up by the PMU during the course of implementation of the subprojects.

It is necessary that before the subproject proposals are submitted to PMU for appraisal, the end implementing agencies carry out a baseline survey on important environmental and social parameters for reference purpose, which is compared later during the course of project implementation.

### **Summing up**

If we are to sum up the experiences that we gained from our interactions with the direct stakeholders during the field survey, we found that IPM as a tool to address unwanted pests and diseases is not known to them. During storage, the occurrence of storage pests is common which is addressed through pesticide application. Many ecologically healthy IPM tools are not practiced by the farmers. While sustained extension efforts are necessary, they alone cannot bring about major changes unless continuous education, training, experimentation and practical demonstration results are communicated to them. Use of pesticides to tackle pest and disease issues are however common, but what is concerning is the indiscriminate application, and more concerning is near-collapse of enforcement of pesticide rules and regulations as safeguard mechanism in the ecosystem. The OMAID project will need to focus on enforcement of the pesticide use regulatory framework provided through the national act and regulations.

## 8. ACTION PLAN FOR PEST AND PEST MANAGEMENT

### 8.1 INTRODUCTION

This chapter covers action plan on pest and pest management, national priorities on pests, monitoring indicators, possible results framework of PMP, M & E activities, training and capacity building of the M & E personnel for PMP, job responsibilities at different levels, and outline of special studies to be done and estimated budget for organizing such activities. The chapter also covers the need for regular monitoring of the indicators, feedback to be given and highlighting the learning from the project initiatives for dissemination and integrating the inputs for formulation of future projects. Grievance redressal and citizen engagement in improving outcome of the project have also been covered under this chapter.

### 8.2 MAIL (PPQD) AND MOCI (PMU/DIRECTORATE OF INDUSTRIAL PARK)

- Support for proper identification and management of pests and diseases;
- Support towards the pest monitoring, survey, pest and disease surveillance and forecasting;
- Enforcing provisions contained under pesticides law and pesticide regulation, application of quarantine law, both internal & external quarantine;
- Support to the application of new molecules for pest management and preparation of pesticide data bank;
- Support for biological pest management and application of bio pesticides;
- Support towards the insecticide resistance and resurgence management;
- Periodic monitoring and evaluation of PMP and support to the preparation of IPM database.

### 8.3 PRIORITIZATION TO IDENTIFY ISSUES AT THE COUNTRY LEVEL

- Promotion and adoption of IPM practices;
- Awareness to the farming community for proper identification and management of pests and diseases;
- Training to the plant protection and quarantine officials regarding the status of present pest scenario of the country;
- Training towards the laboratory technicians for diagnosis of pests and diseases;
- Arresting indiscriminate use of pesticides and their ill effect on the environment;
- Utilization of biological control agents;
- Participation of major stakeholders for research, adoption and development of IPM;
- Ensuring the convergence of activities of different stakeholders engaged in IPM;
- Establishment of National IPM Policy and strategy;
- Support to the legal and quarantine issues.

### 8.4 STRATEGIC ACTIONS AND MEASURES UNDER OMAID PROJECT

- Promotion of IPM among national actors and stakeholders;
- Support for monitoring insect pests and diseases of agriculture, horticulture and public health importance;
- Awareness through training to the farming community for proper identification and management of pests and diseases;
- Awareness among the pesticide retailers/wholesalers about advising the farmers on proper usage of pesticides, and banning the use of pesticides forbidden by the WHO;



- Awareness among PPQD IPM division, both at HO and at the provinces about application of IPM tool to produce healthy crops which are ecologically and environmentally sustainable;
- Capacity building of the plant protection and quarantine officials regarding the status of present pest scenario, minor pests and their management through IPM and IVM.
- Campaign on surveillance of insect vectors and their management with special attention towards the malaria-prone areas;
- Awareness on indiscriminate use of pesticides and their ill effect on the environment and human health;
- Identification, Conservation and Utilization of potential biological control agents in IPM and IVM;
- Support for identification and management of storage pests;
- Enforce Pesticide Legislation in conformity with international legislation/rules/standards;
- Support to the pesticide residue laboratory for implementation of OMAID activities.
- Support to develop an app for proper identification of insect pests;
- Support to build up Institutional Human Resource capacity in Pest and Pesticide Management;
- Sensitizing concerned government department to effect strict border control on import of contraband pesticide;
- Campaign on proper handling of pesticides and equipment;
- Support to develop a database for Integrated Pest Management (IPM) through disease surveillance system in the project area;
- Support to the PPQD to protect invasive pest and diseases;
- Consequent on implementation of proposed Disease Surveillance system (refer to Chapter 9 for details) and build up real data from the project area and making the data set available to ARIA for further analytics and research.

#### **8.4.1 Activities and Results**

In **Table 8.1** and **Table 8.2**, a tentative framework of activities and their expected results and performance indicators have been attempted. The enlisted activities in the Table have been prepared on the basis of some broad postulates under PMP and their likely impact in narrative form. A few points need to be underscored.

**Table 8. 1: Envisaged Goal of OMAID Project proposed to be achieved through application of IPM tools**

Sequence of events outline	Expected results	Performance indicators	Assumptions/risks
<p><b>Goal:</b> To increase the national economy by increasing crop productivity and good quality of food crops through an eco-friendly pest management program.</p> <p>Reason</p> <p>i) To mitigate the crop loss due to pests and diseases and to increase productivity in Agriculture sector of Afghanistan.</p> <p>ii) To minimize use of outdated pesticides, their adverse effect in environment</p> <p>iii) To promote organic agricultural production</p>	<ul style="list-style-type: none"> <li>• Increase productivity, enhancement of food and nutritional security, increase the income of farmers, Improvement of quality foods free from pesticides to compete in the international market;</li> </ul> <p>Medium-term results/outcomes</p> <ul style="list-style-type: none"> <li>• Producer members will easily identify the major pest problems of the concerned crop, select the most appropriate IPM practices, select the pesticides safe to environment and health, and disseminate the knowledge of ill effect of indiscriminate use of pesticides.</li> <li>• Promoting the use of local materials for pest management and enhancing knowledge of pesticides hazards in human health and environment</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of food in the project area (provinces), level nutrition of local flocks, level of poverty, Improvement in marketable surplus of agro products including milk; Availability of year-round markets of agricultural products and better price realization through FCC and RTHs; Accessibility to farm equipment/machinery/ fertilizer through FCCs and RTHs, Improved or unchanged status of environmental components like soil, water and aquatic fauna.</li> <li>• Availability of sufficient nutritious food.</li> <li>• Enhanced market access round the year;</li> <li>• Higher price realization of the producer;</li> <li>• Awareness of IPM technologies for sustainable pest management</li> <li>• Level of pesticides use and impact on the environment</li> <li>• Awareness of botanical pesticides, bio pesticides for pest management program</li> <li>• Level of conformity with World Bank policy</li> </ul>	<ul style="list-style-type: none"> <li>• National food security will remain stable</li> <li>• Government policies continue to support the food security program</li> <li>• Environmental</li> </ul>

Note: Structure of the table taken from PMP (Main report) for the IAIDS Project, Table 9, p-61

**Table 8. 2: Module of activities and expected results of the PMP under OMAID project**

Narrative outline	Expected results	Target	Performance indicators	Assumptions/risks
<p>i) Correct diagnosis of pests and their natural enemies in field level.</p> <p>ii) Implementation of most suitable IPM tools for respective pest management.</p> <p>iii) Develop a historical profile of pest and pest management strategies.</p> <p>iv) Historical profile of pesticides used in Afghan Agriculture and awareness of new group of pesticides.</p> <p>v) Prepare a catalogue of allowed pesticides in Afghanistan</p> <p>vi) Record stakeholders' impression on pests and their management.</p> <p>vii) Joint venture at local, national and international level for implementation of PMP.</p>	<p><b>Result 1:</b> Producer members of the project areas (provinces), PMP extension supervisors, and stakeholder groups will work under single umbrella for correct identification of the pests and sustainable pest management.</p>	<ul style="list-style-type: none"> <li>• Identification of pests associated with the crop and categorized into the key, major and minor group of importance;</li> <li>• Design suitable IPM practices to minimize the pest problem;</li> <li>• Possibilities to improve existing pest management system through IPM;</li> <li>• Possible constraints of producer members for implementing IPM tools;</li> <li>• Preparation of Pest lists of quarantine pests and alien invasive species;</li> <li>• Disease Surveillance mechanism for monitoring of pest and diseases for feedback on mitigation, warning on alien invasive species and migratory pests</li> <li>• Action plan for location-specific IPM activities developed.</li> </ul>	<ul style="list-style-type: none"> <li>• Standard information on the status of pests and their natural enemies in Afghan agriculture.</li> <li>• Crop wise, season-wise availability of real-time data for corrective measure and creation of huge data bank for research and analytics;</li> <li>• Identification of alien invasive species and quarantine pests of Afghanistan;</li> <li>• Availability of natural enemies used in biological control</li> <li>• Availability of microbial pesticides and botanical pesticides to replace chemical pesticides</li> </ul>	<p>Social, economic, ecology, political and security issues will remain stable.</p>

Narrative outline	Expected results	Target	Performance indicators	Assumptions/risks
		<ul style="list-style-type: none"> <li>• Identification of gaps and areas for improvement of IPM</li> </ul>	<ul style="list-style-type: none"> <li>• Type and nature of participatory methods for problem analysis</li> </ul>	

**Table 8. 3: (Cont'd): Module of Activities and Expected results of the PMP under OMAID**

Narrative outline	Expected results	Targets	Performance indicators	Assumptions/risks
<p>i) Need assessment of the producer members about the type of training required through participatory learning module.</p> <p>ii) IPM supervisors to be attached with FCCs/RTHs will organize workshops to elicit information about the producers' perception of IPM tools and gaps in their understanding;</p> <p>iii) The training will be conducted by expert personnel in this field.</p> <p>iv) Organize national or international tour on IPM skills for the farmers and extension functionaries.</p> <p>v) Strengthen research activities on farmers need;</p>	<p><b>Result 2:</b> Development of human resource in IPM delivery and execution.</p> <p>OMAID will make a partnership with PPQD, FAO, MoPH. The partnership will help with the promotion of IPM activities nationally through Agriculture and Horticulture projects. It could also make partnerships with international projects like ICARDA or other NGO funded projects for promotion of IPM for convergence of activities in the project areas of</p>	<ul style="list-style-type: none"> <li>• At least one orientation workshop per ecological park will be organized.</li> <li>• Identification of major crops where IPM will be implemented.</li> <li>• All IPM supervisors will be trained on various aspects of IPM.</li> <li>• Producer members of Producer Organisations will be trained through the experiential learning process.</li> <li>• Farmers will accurately identify the pests by its damage symptoms, natural enemies and could also choose the best IPM tools for pest management.</li> </ul>	<ul style="list-style-type: none"> <li>• Number of male and female producer members trained in IPM tool;</li> <li>• A number of producer members adopted new strategies under IPM.</li> <li>• Number of IPM supervisors trained and capacities enhanced;</li> <li>• Number of producer members following the guidelines of IPM</li> <li>• Type of IPM skills covered in study visits/tours;</li> <li>• Number of crops covered, season-wise and agro-climatic zone wise under Disease Surveillance System;</li> </ul>	<p>Village level Producer organisation set up and members enrolled.</p> <p>Adoption of new pest management strategies by the producer members;</p> <p>OMAID project beneficiaries and extension functionaries will obey the rules and regulation of international pesticides handling and use.</p>

Narrative outline	Expected results	Targets	Performance indicators	Assumptions/risks
<p>vi) Build up the IPM decision-support information resources for IPM supervisors, producer members, policymakers, and the public;</p> <p>vii) Strengthen farmers in IPM skills.</p>	OMAID for sustainable pest management.	<ul style="list-style-type: none"> <li>• A significant proportion of producer members would adapt to new IPM options in targeted crop production and horticulture crops;</li> <li>• All producer members reporting pest and disease attack information through Disease Surveillance System will receive on time advisories from IPM specialist of OMAID project,</li> <li>• International study tours of technical personnel of IPM team in OMAID, PPQD and other concerned officials.</li> </ul>	<ul style="list-style-type: none"> <li>• Mass Media campaign on dealing with pest and disease in the project area;</li> <li>• Identification of natural; enemies and their use in IPM.</li> <li>• Dissemination of knowledge for correct identification, the benefit of natural enemies in agri-horticulture through on-time feedback through Disease Surveillance System.</li> </ul>	

**Table 8. 4: (Cont'd): Module of Activities and Expected results of the PMP under OMAID**

Narrative outline	Expected results	Targets	Performance indicators	Assumptions/risks
<p>(i) Identification of existing and new species;</p> <p>(ii) Assess pest population damage at different stages of crops;</p>	<p><b>Result 3:</b> Safe the environment and biodiversity by using eco-friendly pest management practices. In partnership with the:</p>	<ul style="list-style-type: none"> <li>• At least few internationally acceptable botanical pesticide widely used in place of chemical pesticides.</li> <li>• At least a few microbial pesticides registered and</li> </ul>	<ul style="list-style-type: none"> <li>• A number of commercial enterprises engaged in production and selling of botanical and microbial pesticides.</li> </ul>	Government of Afghanistan and development partners remain committed to international conventions and

Narrative outline	Expected results	Targets	Performance indicators	Assumptions/risks
<p>(iii) Observe changing pest pattern from minor to major;                      (IV) Assess natural enemies and their influence on pests;                      (V) Promotion of insect growth regulators as an alternative to synthetic pesticides.                      (VI) Promotion of microbial pesticides as an alternative to synthetic pesticides.                      (VII) Update the national IPM policy including pesticides manufacture, importation, distribution and use and their possible effects on the environment;                      (VIII) Formation of national advisory and oversight committee to guide national, provincial, district and local compliance with World Bank safe guard Policies and other international conventions concerning pesticide handling and use.</p>	<p>1. CABI-IPM for sustainable access to microbial pesticides.                      2. FAO National Crop Protection Office, HLP's IPM department &amp; PPQD's IPM unit, IPM team of OMAID for assistance to develop a national IPM policy document and establish a national IPM advisory and oversight committee.                      3. The identification and selection of IPM module will be done by the Agricultural Research Institute of Afghanistan's Taxonomy unit and ICARDA biodiversity centre.</p>	<p>internationally widely used in place of chemical pesticides</p> <ul style="list-style-type: none"> <li>• Encourage the local distributors to market botanicals and microbial pesticides and make awareness on the benefit of using these kinds of pesticides.</li> <li>• A surveillance system to enforce the Pesticide Law to protect Afghan agriculture from banned/harmful pesticide regimes is fully operational;</li> <li>• Exert control and governance on private trade dealing with pesticides;</li> <li>• Sensitizing, training and capacity enhancement of the pesticide trade personnel about pesticide, fungicide and on harmful effects of the banned pesticides.</li> <li>• A multi-stakeholder National IPM advisory and</li> </ul>	<ul style="list-style-type: none"> <li>• The volume of sale of botanical and microbial pesticides.</li> <li>• The volume of sale of synthetic chemical pesticides.</li> <li>• Level of reduction in chemical pesticide use; type and number of pesticides replaced by botanical or microbial pesticides.</li> <li>• Level of compliance with World Bank safeguard policies by Afghan farmers and pesticide dealer/service providers</li> <li>• The usefulness of public awareness campaign on ill effect of using synthetic chemical pesticides and use of botanical and microbial pesticides as alternative.</li> </ul>	<p>guidelines on safe Pesticide handling and use towards saving biodiversity.</p>

Narrative outline	Expected results	Targets	Performance indicators	Assumptions/risks
		<p>oversight committee established to guide compliance with international conventions and guidelines on pesticide handling and use and promote the IPM development</p> <ul style="list-style-type: none"> <li>• Conduct Radio, TV, social media, mobile and other public campaigns on impact of pesticides on agriculture, environment and health through group discussion, talk show, drama, field days, hoardings, etc.</li> </ul>		

Note: Structure of the Table taken from PMP (Main report) for the IAIDS Project, Table 10, pp-62-64

## **8.5 STRATEGY OF INTERVENTION AND PESTICIDE MANAGEMENT ACTION PLAN**

As per our interactions with several actors directly or indirectly responsible for IPM activity, some deficiencies are identified as i) lack of knowledge for implementation of IPM and pesticide application. ii) Knowledge deficiencies regarding insecticide-resistant and resurgence management. iii) Coordination gap between research and extension workers. iv) lack of awareness on new molecular pesticides and their impact in agri-horticulture, (v) lack of enforcement of provisions of Pesticide laws, (vi) Weak institutional governance of pesticide trade and lack of enforcement of regulatory mechanism across the border, contributing to free importation of banned pesticide, and (vii) Lack of knowledge about the pesticide traders etc.

### **8.5.1 *Recommending agro-ecological zone wise IPM practices***

The country is having rich diversity in Agro-Ecology. Production of agricultural crops, as well as horticultural crops, differ according to ecological conditions of the zone. These crops and horticulture products are already profiled in Chapter 1. In addition, in Chapter 3, crop-wise pest issues are discussed. Therefore, agro-climatic zone wise IPM measures boil down to adopting crop-wise mitigating major pest issues specifically and overcoming institutional bottlenecks that presently exist in the public institutions. A combination of these 2 issues ultimately boils down to emergence of agro-climatic zone wise IPM practices.

## **8.6 MONITORING AND EVALUATION PLAN**

Since different sub-components of the OMAID project is yet to be defined, a detailed monitoring and evaluation framework will have to be done on the basis broad visualization keeping in mind the project goals and objectives. In other words, this framework will have to be re-worked once further details of the sub-components and their organizational structure is evolved. Nonetheless, monitoring and evaluation have been attempted on the basis of some broad assumptions that the consultants have envisaged. In Error! Reference source not found., frequency of monitoring indicators and means of verification has been presented.

### **8.6.1 *Assumptions***

Producers organizations/Farmers Group in villages will be organized involving farmer members who will be willing to transact with the proposed FCCs/RTHs network. The POs/FGs will be engaged in organizing the producers into village association/producer group for collection of village produces and dispatching to FCCs. They may set up collection centers either temporary or permanent to aggregate the farmers' produce at the village level.

POs/FGs will be technically assisted by IPM supervisors and these supervisors will impart training to farmer members on IPM tools and benefits to be accrued in PMP.

POs/FGs will aggregate data relating to crop sowing at the beginning of the sowing season and aggregate them for assessing likely quantity of products to be available for collection which can be shared with the FCCs/RTHs.

### **8.6.2 *Monitoring and Evaluation Plan***

The Monitoring & Evaluation function will be an integral component of OMAID project's planned activities. Monitoring will be supported by data collection at regular intervals, compilation, analysis and reporting in order to check whether the implementation of activities is being carried out as per the plan and identification of areas needing attention for improving the progress of the activities. Providing feedback, sharing progress report among the



stakeholders and removing the bottleneck that comes in the way of effective implementation of the project activities are the usual purposes served through the project monitoring activities. The frequency of the monitoring will depend on the type of activity being monitored and feedback needed to resolve any immediate issue that could affect overall project targets. Therefore, monitoring function continues throughout the implementation of the action plans under any project.

The Monitoring and Evaluation (M&E) unit within OMAID project will be responsible for overseeing overall project impacts on the implementation of project components and sub-components which would also encompass impacts on cross-cutting issues such as gender participation, environment, quality standard in Agri-horticulture produces and public health.

The OMAID could also associate other stakeholders in the monitoring of activities by associating institutions that are directly or indirectly associated or could synergize implementation of the project components. A multi-organizational monitoring and coordination committee involving PPQD, NEPA, MoPH, ARIA, Extension Department, Ministry of Rural Rehabilitation and Development, Farmer Organizations, Pesticide Traders' Association, Civil Society Group, concerned NGOs may be constituted for consultation and undertaking comprehensive monitoring.

The M & E plan includes a mid-term evaluation to be conducted by a Consultant. To determine the correct development of the PMP as well as ascertaining mid-term results, the World Bank, FCCs, RTHs, Producer organizations and the member producers will participate in midterm evaluation. The PMP components will also be evaluated on mid-term bases like other components and sub-components of the OMAID project.

The M & E plan also includes External evaluation which will measure the effectiveness of the project as well as its performance and to identify lessons learned. Here also PMP components and sub-components will be included as part of the overall implementation of the project. This evaluation results will be necessary for highlighting the benefits occurred among the target population not only from activities point of view but also from the point of view of macro benefit accrued to the society.

**8.6.3 Indicators for monitoring and evaluation Producer level: Crop related**

<p>(a) Capacity building of the farmer groups</p> <p>No of FOs have nominated farmers for training</p> <p>No of farmers receiving IPM training</p> <p>No of women farmers trained</p> <p>No of farmers included under pest and disease surveillance component</p> <p>Assessing understanding of the contents of the training for sustainable development</p> <p>(b) Adoption of IPM practices</p> <p>No of farmers adopting IPM practices as crop protection strategy as a proportion of total farmers</p> <p>Number of crops covered under IPM in relation to major crops grown</p> <p>(c) Assessing benefits through IPM</p>
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Economic benefits realized upon adoption of IPM practices (to be compared with pre-adoption stage- - baseline survey)

(d) Improving the Health Status of the farmers

Disease occurrence among family members

(e) No of IPM unit operational and type of activities undertaken

(f) IPM successfully operated against the pest species

% of pest species regulated

(g) The extent to which pesticides are used for crop production (% of crops consuming pesticides)

(h) Efficiency in pesticide use

Number of farmers aware of toxic label pesticides

Using pesticides with a proper label (blue and green)

Using pesticides with high risk (red and yellow)

No of pesticide poisoning reported in the area

No of environmental contamination reported (Pesticide quality analysis laboratory and residue analysis laboratory)

(i) Gaining knowledge on the management of handling empty bottles/containers to safeguard human health

No of farmers disposing of toxic bottles/container in a designated place away from public human habitat

Producer level: Storage related

(j) Improving the incidence of pest attack during storage of grain

No of farmers reporting pest attack in grain storing;

No of farmers practicing pest prevention measures at the household level (like Sun drying, improving container to store grain, improving the floor of the house, providing aeration facility; etc).

Producer level: Milk

(k) Milk Farmer maintain quality of milk (Fat% and Solid Not Fat %) as per prescribed standard of the country (%);

No of farmers using Stainless Steel Milk Can;

No of farmers aware of personal hygiene for milking;

No of farmers keeping cow shed clean

**Table 8. 5: Monitoring Frequency and Means of Verification**

<b>Indicators</b>	<b>Frequency</b>	<b>Means of Verification</b>	<b>Remarks</b>
Capacity building of the farmer groups	Bi- annual	Official record; Internal MIS data.	Involvement of the farmers
Pest and disease occurrence, crop-wise, stage wise Identify existing and new species; Observe changing pest from minor to major	Continuous/Weekly	Disease surveillance database;	To develop National database towards pest profile
Assessing benefits through IPM	Annual	Conducting Survey on assessing benefits through IPM	Specialist in IPM required to conduct this survey.
Improving the Health status of the farmers	Annual	Conduction Survey on Economic benefits	Specialist in public health to do this survey.
No of IPM unit operational and type of activities undertaken	Annual	IT Enabled the application to be developed for PMP monitoring	Determine the implementation of IPM in crop protection
IPM successfully implemented against the pest species	Seasonal	Disease Surveillance database IPM Supervisor to do on-field checking;	Knowledge on pest population dynamics acquired over the time
Extent to pesticides are used for crop production (% of crops dependent on pesticides)	Seasonal/Biannually	IT Enabled application to be developed for PMP monitoring	The national database will be developed on consumption of pesticide used
Efficiency in pesticide use	Seasonal/Biannually	IPM Supervisor to do on-field checking; IT Enabled application to be developed for PMP monitoring	National database will be developed on efficiency of pesticide used
Gaining knowledge on management of handling empty pesticide bottles/containers to safeguard human health	Annual	IPM Supervisor to do on-field checking	Data on % farmers acquired knowledge on handling pesticides is a good indicator

Indicators	Frequency	Means of Verification	Remarks
Improving the incidence of pest attack during storage of grain	Bi-annual	IT Enabled application to be developed for PMP monitoring	Difference between baseline value with the present will indicate change
Milk Farmer maintain quality of milk (Fat% and Solid Not Fat %) as per prescribed standard of the country (%)	Monthly	IT Enabled application to be developed for Quality of milk monitoring	Progress will indicate standard quality of product.

#### 8.6.4 Preparing a generic result framework

At this point, a broad result framework appears feasible, as different components of the OMAID project is yet to be finalized. However, one of the sub-components are firm up, the resulting framework would need to be further articulated taking into account all sub-components where PMP would have relevance. In **Table 8.4**, a generic monitoring framework has been presented.

**Table 8. 6: Outline of a generic result framework of OMAID project**

Narrative Summary	Expected Results	Performance Indicators	Assumptions
<p>Goal of PMP</p> <p>Improve agricultural incomes of the producers through adoption of improved pest management practices for sustainable development</p>	<p>Food security-enhanced;</p> <p>Environmental quality improves;</p> <p>Governance in pest management improves;</p> <p>Employment in general and women engagement, in particular, rises through greater market access of quality agricultural produces</p>	<p>Per capita food availability;</p> <p>Per capita agricultural income (crop and dairy);</p> <p>Environmental parameters improve</p>	<p>Internal security remains stable;</p> <p>Government regularity measures are in place;</p> <p>Behaviour of climate and rainfall remaining normal</p>
Midterm result and outcome	<p>Purpose</p> <p>Farmers in the provinces and districts prioritize their pest problems and identify</p>	Availability of sufficient food.	

Narrative Summary	Expected Results	Performance Indicators	Assumptions
<p>In mid-term, arrest incidence of pest occurrence to significant extent and safeguard producers from income loss. In longer-term, enhance capacity and awareness of the producers across value chain to reduce environmental risk associated with pest management practices in Afghanistan</p>	<p>IPM opportunities to mitigate negative environmental and social impacts associated with pesticides.</p> <p>Farmers in the provinces and districts adopt ecologically sound options to reduce crop losses with minimal personal and environmental health risks.</p> <p>Milk producers in Afghanistan appreciate the need for producing quality milk under clean environment</p> <p>Farmers in the provinces and districts prioritize their pest problems and identify IPM opportunities to mitigate negative environmental and social impacts associated with pesticides.</p> <p>Afghanistan decision-makers provided with clearer guidelines enabling them to promote IPM approaches and options in the Afghan agriculture</p>	<p>Perception of Government institutions regarding the value of IPM in Afghan agriculture.</p> <p>Level of compliance with World Bank policy, etc.</p> <p>Level of chemical control practices</p> <p>Types and level of use of alternatives to synthetic pesticides</p>	<p>Internal security remains stable;</p> <p>Behaviour of climate and rainfall remaining normal</p>

## **8.7 PUTTING IN PLACE AN EFFECTIVE MONITORING MECHANISM**

The OMAID project needs to be backed up by a strong MIS system of ICT enabled application. This will also be used to provide extension services to the farmers. With an ICT enabled back up and supported by trained operators (in our case say, IPM supervisors), the monitoring system can generate timely data and information and also communicate necessary technical information and other advisories to the farmers.

### **8.7.1 Challenges and need for ICT-based monitoring and extension efforts**

- The geography is difficult to navigate, making remote communications a more reasonable option.
- OMAID is a multi-locational and multi-stakeholder engagement project to be monitored by PMU to be housed within MoIC.
- The World Bank task team would require project progress to be monitored periodically;
- The HEC of MoIC would require consolidated as well as disaggregated data at a different level of proposed institutional hierarchy - - project level, Agri-park specific, province-specific, FCC/RTH specific, for feedback and management decision;
- Through ICT application it would be possible to monitor large dataset to be generated from field operations and analyzed for quick decision making and feedback.
- Communication channel in Directorate of PPQD with their counterpart in DAIL provincial office and also down the line with district-level extension officers are not so well organized.
- ICT could allow extension service provider and farmers to share their knowledge and new technologies with the wider community.
- Prolonged war has generated a generational knowledge gap among farmers, extension agents do not have access to updated information, and even material taught by universities may be more than 30 years old. ICT would enable access to updated information.
- ICT is typically well-received by youth, who compose a significant majority of the Afghan population (65% are under 25 years).
- Before the project is rolled out, separate consultancy inputs are required to prepare the architecture of the proposed ICT application which would also include IPM as a separate module.

### **8.7.2 Training of PMP personnel on M & E**

The PMP personnel at all levels will need to undergo M & E training of PMP. As is known, M & E is a specialized component of project monitoring and also given the fact that expertise on such training is not available within the country, it is recommended that key IMP personnel will have to undergo overseas training, generally organized by the World Bank or any other donor agencies. This training is suggested for M & E specialist of PMU, and IPM coordinators at the Agri park level. On completion of training of these key personnel, they can also be imparting training locally to the IPM extension staff. Alternatively, one consultant from outside can be hired for capacity and skill-building of the local IPM supervisors to be associated at FCC/RTH levels.

### 8.7.3 Estimated Cost: M & E Training

#### a) International training

Seven person which consist of Two PMP specialists and Five PMP coordinators will be trained for 10 days. Cost estimated on the basis of 1000 USD as training fees plus 1000 USD for living cost and 500 USD passage money per person (1000 USD + 1000 USD + 500 USD=2500 x7 Persons=17,500 USD).

#### b) IPM Supervisor training on M & E:

Seven (7) persons will be trained for 10 days. Cost estimated on the basis of 150 USD for training fees and living cost per person for 7 persons (150 x 7 Persons= 1,050 USD).

### 8.7.4 Estimated Cost: M & E Studies

Several scientific studies need to be conducted as part of project necessities as information base in pest and pesticide use is limited in Afghanistan. Moreover, these studies will cover technical and scientific areas and to be conducted largely by international consultants. A budget is provided in this regard in **Table 8.5**. These are provisional, which can be modified as per the local conditions and local norm.

**Table 8. 7: Estimated budget for M & E Studies on Pest and Pesticide usage Patten including pesticide trade.**

Study Type	Estimated Cost (USD)	Remarks
Baseline Study on IPM	35,000	At the Project level
Midterm Evaluation study	35,000	At the Project level
End Project Evaluation study	35,000	At the Project level
Special Study on Public Health Impact	30,000	At the Project level
Special Study on Environment due to Pesticide use	30,000	At the Project Level
Pest Market Study	30,000	At the national level
Assessment of Economic Benefit of IPM	30,000	At the Project level
Total	225,000	

Note: Study name can be tweaked depending on the requirement to be proposed by IPM Specialist and approved by HEC.

### 8.7.5 Estimated cost of ICT Enabled application for monitoring quality of milk standard

ICT enabled application of milk quality standard is required for automatic milk collection, milk analyzer, electronic weighing scale, display unit and also milk adulteration testing unit. These are proposed to be installed at FCC and RTH level, agro-park and at HQ. The proposed budget estimate also includes cost towards application development, application testing, training and implementation. Details are given in Error! Reference source not found..

**Table 8. 8: Estimated ICT enabled milk collection and milk adulterant testing, application development and training cost**

Item	Unit cost (USD)	No of units	Total Cost (USD)	Remarks
Automatic Milk Collection Unit ( Comprising 1 PC, 1 Milk Analyzer, 1 Ultrasonic Vibrator, 1 Electronic Weighing Scale , 1 Digital Display Monitor and 1 Printer )	9000	5+3+1= 9*5=45+1=46, Say 50	450,000	Consultant cost to be added
Milk Adulteration Testing Equipment	9000	46, Say 50	450,000	
Internet Connectivity:	800	1	800	
Web-Based Application Development (On Cloud) with SRS, specifying functional requirements and describing system architecture	70,000	1	70,000	Application Development Cost
User-Based on SAAS Model (Software as a Service) e.g., as per subscription model per user would be to the tune about USD 4500 per user per annum with provision for accessing dashboards on Android Mobile platform.	4500	1	4,500	
Mobile-based application on Android Platform for accessing field level information on Pest, disease, milk procurement dashboard.	500	1	500	
Training & Implementation Cost per Location for 30 days ;Lump sum	43000	1	43,000	
Total			1,018,800, say 1,000,000	

Note: Automatic Milk Collection Units and Milk Adulterant Testing Units are proposed at the FCC, RTH, Agri Park levels with some scope for accommodating some private entrepreneurs also. The above estimates are provisional and can be reworked depending on the requirements of OMAID.



## 8.8 FUNCTIONAL RESPONSIBILITIES OF THE PMP STAFF

The functional responsibilities of PMP staff at all levels are indicated below.

### 1) Responsibilities of PMP Specialist (International)

1. Overall responsibility for implementing PMP;
2. Design of PMP Plan;
3. Implement the plan;
4. Monitoring and feedback on PMP and Pest and Disease Surveillance system;
5. Responsible for reporting progress to HEC;
6. Technical guidance to the IPM Team;
7. Staff Training and capacity building;
8. Maintaining contacts with other functional divisions of PMP,
9. Making an emergency plan on pest outbreak under intimation to HEC;
10. Coordination with other government Directorates, NGOs, Civil Society,
11. Coordinating special studies on the baseline, midterm and end-term and assessing economic benefit;
12. Grooming successor.

### 2) Milk Procurement Specialist (at PMU level)

1. Be responsible for planning and implementation of milk procurement plan;
2. Monitoring and feedback on PMP components;
3. Responsible for reporting progress to IPM Specialist;
4. Technical guidance to the Procurement Team;
5. Staff Training and capacity building;
6. Coordination with other government Directorates, NGOs, Civil Society,
7. Scan secondary data on the milk sector;
8. Grooming successor.

### 3) PMP Specialist- Local (at PMU level)

1. Involve in training and capacity building of PMP staff
2. Keeping PMP specialist updated about pest monitoring, identification and management
3. Implement PMP plans;
4. Preparing a work plan for PMP staff down the line;
5. Supervise and provide direction to IPM staff down the hierarchy.

### 4) PMP Coordinator at the Agri- park level

1. Monitor PMP activities within the Province;
2. Prepare Monitoring report at the designated interval (Daily, weekly, monthly and annually);
3. Providing technical guidance to the staff down the line;
4. Undertaking field visits for PMP matters;
5. Maintain contact with PPQD directorates of DAIL, PPQD, pesticide traders and suppliers;
6. Escalating issues at a higher level for emergency solution;
7. Involvement in conducting r studies;
8. Initiating new experiment;

9. Arranging for field demonstration on PMP impact.

**5) Milk procurement Officer (at Agri park level)**

1. Monitor milk procurement activities within the Province;
2. Prepare Monitoring report at a designated interval (Monthly and annually);
3. Providing technical guidance to the staff down the line;
4. Undertaking field visits for Procurement matters;
5. Maintain contact with General Directorates of AH&V;
6. Involvement in conducting r studies;
7. Arranging for dairy plant visits.

**6) Milk procurement coordinator (at Agri park level)**

1. Monitor milk procurement activities within the Province;
2. Be responsible for preparing Monitoring report at a designated interval (Monthly and annually);
3. Providing technical guidance to the staff down the line;
4. Undertaking field visits for milk procurement matters;
5. Maintain contact with Provincial Directorates of Animal Husbandry and Veterinary and traders and suppliers;
6. Involvement in conducting r studies;
7. Initiating new initiatives.

**7) PMP Extension Officer**

1. Collect farmer level data on crops grown, cultivation practices;
2. Collecting data on pest and disease population, assess intensity and reporting;
3. Be responsible to organize data collection for Pest and Disease Surveillance system
4. Providing extension services to the farmers;
5. Imparting to training to the farmers;
6. Organizing farmers' day, arranging for their visit to demonstration plots.

**8) Milk Procurement supervisors**

1. Visit milk collection centers for regular monitoring;
2. Providing training to milk producers and FPO in charge;
3. Implement plan as per the advice of Milk Procurement Officer;
4. Report data as per project requirement;
5. Provide technical guidance to milk producers on clean milk production.

**8.9 M & E REPORTS**

The template for generation of M & E reports will have to be prepared by the M & E specialist of OMAID keeping in view the requirements for project monitoring by the HEC and also for reporting to the World Bank. The frequency of reporting M & E reports can be daily (in some case, like milk or say for pest attack scenario), monthly, quarterly and annually. However, it would be necessary that a few workshops are organized involving all stakeholders within PMU,

Agri Parks, and General Directorate of AH & V of the government to understand their information needs and accordingly, the on-line application will have to be developed.

The second reporting format could be in the nature of periodic monitoring for which no immediate actions are required. While any occurrence of pests, the disease will have to be immediately notified by the extension supervisors for immediate actions/suggestion, as part of surveillance and escalating to authorities, target-oriented information could be compiled on monthly/quarterly and annual basis. A proposed plan for disease surveillance system to be put in place is covered under Chapter 9, which the M & E team will have to integrate into their report. The application software to be developed should also have options of generating some special reports, as and when needed.

**8.10 SHARING OF LEARNINGS**

M & E function is an integral part of monitoring and feedback of any project which provides progress of the project, feedback and identifies the deficiencies while the project is rolled out in a manner that the project implementing authorities could take corrective decisions as far as practicable. The resulting framework of M & E identifies the changes that have taken place from the baseline situation and the extent to which such changes could be attributable to the project. In other words, the project is evaluated on the basis of such result framework.

It is therefore necessary that overall M & E activities of OMAID are prepared in a manner that the PMP component is also reflected which is possible if the core PMP team is also exposed to M & E training and capacity building program. The key indicators that require regular monitoring and feedback should be identified once the baseline survey is completed and it is possible to identify major crop-wise, season-wise pest and disease issue that require application of IPM tools for mitigation following operational guidelines of the World Bank safeguard measures.

During the end of the project, as part of M & E task, lessons learned under the project and experiences gained will have to be documented, recorded and disseminated. Success stories will require escalation for appreciation of wider community, lessons learned are to be highlighted in a manner that they become inputs for subsequent program development.

**Table 8. 9: Estimated Budget of M & E**

No.	Training Type	Cost (USD)
1	International Training	17500
2	In-country Training	1050
3	ICT Infrastructure & Application Development	1,000,000
4	Special Studies	225,000
Total		1,243,550

**8.11 CITIZEN ENGAGEMENT IN PMP**

**8.11.1 Introduction**

Citizen Engagement, as per World Bank, is about empowering people to take control of their own lives, to continue to find solutions to these challenges, and to provide feedback on the quality of services received. It is about giving a voice to people so that they are not left out of the development process. In an increasingly interconnected world CE is critical for improving

development outcomes. It is found that when citizens are engaged when they participate, they can improve policymaking and service delivery. Many social, economic and environmental challenges of the World are tackled taking into account knowledge, experiences, views and values of the people directly facing these challenges.

The World Bank Group's brief on Citizen Engagement indicates the following:

- Citizens play a critical role in advocating and helping to make public institutions more transparent, accountable and effective, and contributing innovative solutions to complex development challenges.
- The goal of the 2014 World Bank Strategic Framework for Mainstreaming Citizen Engagement in Operations is to improve development results. We want to better understand what we are already doing and identify what types of engagement contribute most to results, so we can develop a coherent approach to citizen engagement, for the Bank and for our clients.

(Source: <https://www.worldbank.org/en/about/what-we-do/brief/citizen-engagement>).

### **8.11.2 Strategic Framework for Mainstreaming Citizen Engagement**

The Strategic Framework for Mainstreaming Citizen Engagement in *World Bank Group Operations* were developed to more systematically mainstream citizen engagement through including beneficiary feedback in WBG-supported operations. The Strategic Framework defines citizen engagement as the two-way interaction between citizens and governments or the private sector within the scope of WBG interventions. This approach gives citizens a stake in decision-making in order to improve the intermediate and final development outcomes.

The approach to mainstreaming citizen engagement in WBG supported operations are guided by **five principles**: 1) it is results-focused, 2) it involves engaging throughout the operational cycle, 3) it seeks to strengthen country systems, 4) it is context-specific, and 5) it is gradual.

The Strategic Framework builds on the WBG's experience in multi-stakeholder engagement, citizen participation, and open and inclusive governance, as well as experiences from citizen engagement efforts around the world. The framework assesses lessons learned and outlines methods and entry points to provide a more systematic and results-focused approach for the WBG.

In practical terms, President of the World Bank, Jim Yong Kim's commitment means that all Investment Project Financing (IPF) operations financed with IBRD loans or IDA credits must meet **three requirements**:

- **Project design must be citizen-oriented**, i.e., having at least one mechanism to engage with beneficiaries in the specific context of the project;
- Projects' results frameworks must include a beneficiary feedback indicator to monitor citizen engagement throughout project implementation; and
- Projects must report on the beneficiary feedback indicator by the third year of implementation.

### **8.11.3 Potential for CE in the context of PMP**

The activities considered under PMP will involve primary producers of agricultural commodities as beneficiaries; their attitude and practices towards uses of pesticides will need to be influenced through training and capacity building and through a live demonstration of benefits of applying IPM tools.

One of the major issues in the indiscriminate use of pesticides in Afghanistan is unprotected application of pesticides which is even banned as per WHO, un-label or even without any risk perception (i.e, red, yellow marks). Weak governance on import control at the inter-state border, corruption, high handed manipulation of the influential importers collectively responsible for this state of affairs. So, supply-side control and peer oversight through CE has potentially significant role to play in exerting pressure on government machinery, mobilizing public opinion, monitoring and follow up measures through using good offices of HEC or even as independent oversight body would make much difference in realizing the major goals under the present project.

It is necessary that to exert pressure on regulatory bodies of the government to control illegal and even outdated pesticides into the country which are pilfered through the interstate border points would require formation of Ethical Committee for use of pesticides in the country. However, the issue in the country is that there is no baseline information in this regard, which could reflect a status quo situation prevailing in the country and based on which control process and achievement could be monitored through CE.

Under PMP, sustained awareness and educational campaign and advocacy will have to be undertaken, if the present conditions are to be improved. These campaigns will have to be accompanied by technical and environmental concerns about improper and haphazard use of pesticides and how the beneficial biological agents are destroyed and adverse impact on the environment and society. Another issue that has significant potential for CE in campaign is Clean Milk Production. If CE is engaged in such campaign, it would make significant impact in the minds of the target audience (farmers and other stakeholders). The CE could identify and persuade important social personalities - - spiritual leaders (like Mullahs etc), sports personalities, cultural personalities, social achievers to join the campaign of using IPM tools for resolving plant pest and disease issues.

Under World Bank-funded projects, CE has been found to be effective in grievance redress mechanism (GRM), across many contexts. Taking a clue from this empirical revelation, it is felt that CE would also be contextual in GRM. In fact, early resolution of the grievances is an important indicator of project monitoring framework, and it is envisaged that CE will also be integrated as part of monitoring, oversight and improving the effectiveness of the different sub-components that will be initiated under the present project.

CE has the potential to be part of the external monitoring of the PMP. It would be engaged in progress review, compared to baseline, identify critical areas requiring the intervention of the citizens, mentor the project team and lend inputs for achieving the project targets.

On the type of institutional structure envisaged under OMAID, CE has an even bigger role to play. At the village level, producer institutions or producer groups will be established to organize collection and aggregation of agro produces. These institutions will be village-level collective organizations, and they will supply produces to the private entrepreneurs at FCC or RTH level. Now, there is likely that there could be conflict of interests- - in the sense that producers, habitually, would demand higher prices for their produces, which the private entrepreneurs might not be willing to accede. Institutionally, while POs are social organizations, formed out of social mobilization of interest groups, FCCs/RTHs are to be managed by private investors, with generating profit as overriding consideration. So, there could potentially be some dissatisfaction, which probably needs to be addressed through an

oversight body like CE. A broad framework of CE and process to be followed by the CE is presented through Error! Reference source not found..

#### **8.11.4 CE Constituency**

The CE group could be constituted from among the representatives of the following category of people to broad base constitution of the group. Number of members in the CE Group may be decided in consultation with the HEC of OMAID. As cross-section of interest group will need to be represented, it will be useful if the size of CE group is enlarged to say, 8-10 members. The HEC will have to identify suitable personalities, solicit their consent, prepare working responsibilities, frequency of meeting, project disclosure, sharing information/ data of the project, and seek guidance. The group may consist of members drawn from 5 Provinces of the project command area.

Cross sectional representatives of Spiritual leaders/cultural personality/sports personality/Citizen forum/Civil liberty organization/Traders body/ Chamber of Commerce & Industry/Environmental activist/ Subject matter specialist/ Academia/ NGO/ other interest groups.
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The CE group members may nominate one person among them to function as Chairman and one person as Secretary to constitute office bearer of CE. They may also designate some other positions from among them. They will have one office space within PMU for meeting and consultation, providing direction and oversight, as and when required.

**Table 8. 10: Broad Architecture of CE in PMP**

Potential Activity for Engagement	Citizen Engagement to stock-take	Strategy	Implementation disclosure	Frequency of meeting of CE	Result scorecard	Remarks
Improving Attitudes and Practices of Pesticide uses	Highlighting the baseline situation	Media campaign, Use of social media campaign (cartoon, visuals, etc); Training and awareness building; Organizing demonstration site visits;	Contents prepared; Media identified; Campaign released; Target audience identified;	Quarterly	To be analyzed after say 1 year of campaign	PMU will suggest appropriate tools for assessment
Improving institutional governance in pesticide import	Gathering information from secondary/primary sources; Gathering information from Key Informants.	Ethical use of pesticide group formed; Pesticide Inspector are instructed to report and observe the incidence of use of red and yellow mark pesticides, un label pesticides, expired pesticide; Organizing meetings with Ministry of	Pesticide ethical group functioning; Reporting template prepared; Pesticides Inspector report shared; Government authorities at border point sensitized;	Bi-annually	Type of issues discussed and resolved; No of retailers agreed not to sell banned pesticides voluntarily;	Quantitative & Qualitative report prepared;

Potential Activity for Engagement	Citizen Engagement to stock-take	Strategy	Implementation disclosure	Frequency of meeting of CE	Result scorecard	Remarks
		Finance, Ministry of Interior and impressing upon them for vigilance and regulation.	CE undertaking retailer/wholesaler site visits;		Instructions issued by the concerned Ministry for enforcement of legal provisions;	
Subscribing to the necessity of Clean Milk Production at the Producer level to improve quality milk production	Ascertain present practices followed by milk producers at the village level in respect of personal hygiene, sanitation through key informants,	<p>Milk procurement supervisors organize village level workshops involving milk producers;</p> <p>Advising milk procurement supervisors to identify some enlightened producers who observe hygiene and sanitary practices for milch animal husbandry;</p> <p>Arranging field visits of the lay milk producers into the premises of enlightened milk</p>	<p>CE verifying monitoring data available through the system;</p> <p>CE's oversight on no of enlighten/progressive farmers identified, Province wise and discussions completed with them;</p>	Quarterly	<p>Internal MIS data on no of training and awareness camps organized; No of milk producers participated;</p> <p>No of women milk producers attending training;</p> <p>Internal MIS data on no of progressive farmers' sites visited;</p>	



Potential Activity for Engagement	Citizen Engagement to stock-take	Strategy	Implementation disclosure	Frequency of meeting of CE	Result scorecard	Remarks
		producers who adopt to hygiene and sanitary practices as demonstration sites;	CE's oversight on no of field visits completed/arrangement made for field visits;		Internal MIS data on no of training and awareness camps organized	
Keeping oversight on Grievance Redress Mechanism	<p>Ensure that GRM is in place</p> <p>Information on typology of Grievance received during the reference period;</p> <p>Identify Accountability;</p> <p>Decide on turn-over time for grievance redress.</p>	<p>GRM meetings organized within PMU.</p> <p>Procedures to redress grievance at every level of the hierarchy;</p> <p>Identifying accountability and time frame for addressing grievance;</p>	<p>Disclosing information through internal MIS that Grievance Redressing is being done at different levels of hierarchy;</p> <p>Disclosing information about turn over time to redress grievances;</p> <p>Disclosing information on no of cases reported, no of cases addressed and no of cases pending.</p>	Quarterly	<p>% cases resolved within stipulated time;</p> <p>% cases where grievance redressing is pending;</p> <p>Feedback on farmers' satisfaction level;</p>	PMU to prepare a comprehensive report as per the agreed frequency and circulate.

**8.11.5 Indicators to be monitored**

Indicators that could be monitored by the CE could vary depending on the activities considered for monitoring. However, it is felt that 2 indicators (i) % farmers have been made aware of IPM tool to address the issue of pest and disease attack and grow healthy crops, (ii) % pest-related grievances redressed within the stipulated time - - could be considered for monitoring.

**8.11.6 Project documentation about CE**

It is suggested that during midterm and end project evaluation of the project, to be done by the third party, one of the components of the TOR could be the activities performed by CE, experiences gained and learnings.

**8.11.7 Provision of budget for CE**

At this juncture, it was not possible to make an estimate of the budget. However, it is felt once the project implementation plans are worked out, budget provisions need to be made on this account.

**8.12 GRIEVANCE REDRESS MECHANISM (GRM)**

For any agricultural improvement project associated with improving attitude and practices and application of scientific tools, grievances could be numerous. While some grievances could be internal to PMP activities, some could be external, and not related to the PMP program, but having relevance to the fulfilment of project targets. These grievances are to be resolved at a cross functional level or even maybe external to OMAID. So, the primary task will be to categorize grievances which are within the PMP system, or say, internal to PMP, while those grievances that are external to PMP, but fall within the purview of OMAID.

A hierarchical GRM has been proposed for activities that are to be initiated under PMP. The grievances at the grass-root level are expected to be originated and submitted to the leader/promoter of the PO, who, on examination, can evaluate as to how many can be resolved at his level. While he does that, the remaining are escalated to the PMP supervisor attached to the FCC/RTH level. A similar process is followed at second step, while in third step (Agri-park level), IPM coordinator will review remaining complaints and will provide instructions down the line for redress. It is expected that only limited grievances will be referred to the PMU level (Step 4).

**8.12.1 Categorization of grievances**

As mentioned earlier, grievances are to be categorized in the first instance. This is because some grievance could be pest related for standing crops, which would require immediate attention. Further, pest attack could be minor or major, also requiring immediate attention in case of major attack. Some grievances could be operational (business/transaction-related), which needs to be resolved within the specified time, though it may not require emergency attention. The grievances related to, say, policy matters, would require longer time as it would be external to the project. A working guideline on grievance categorization could be as under **(Table 8. 11).**

**Table 8. 11: Categorization of grievances and turn over time**

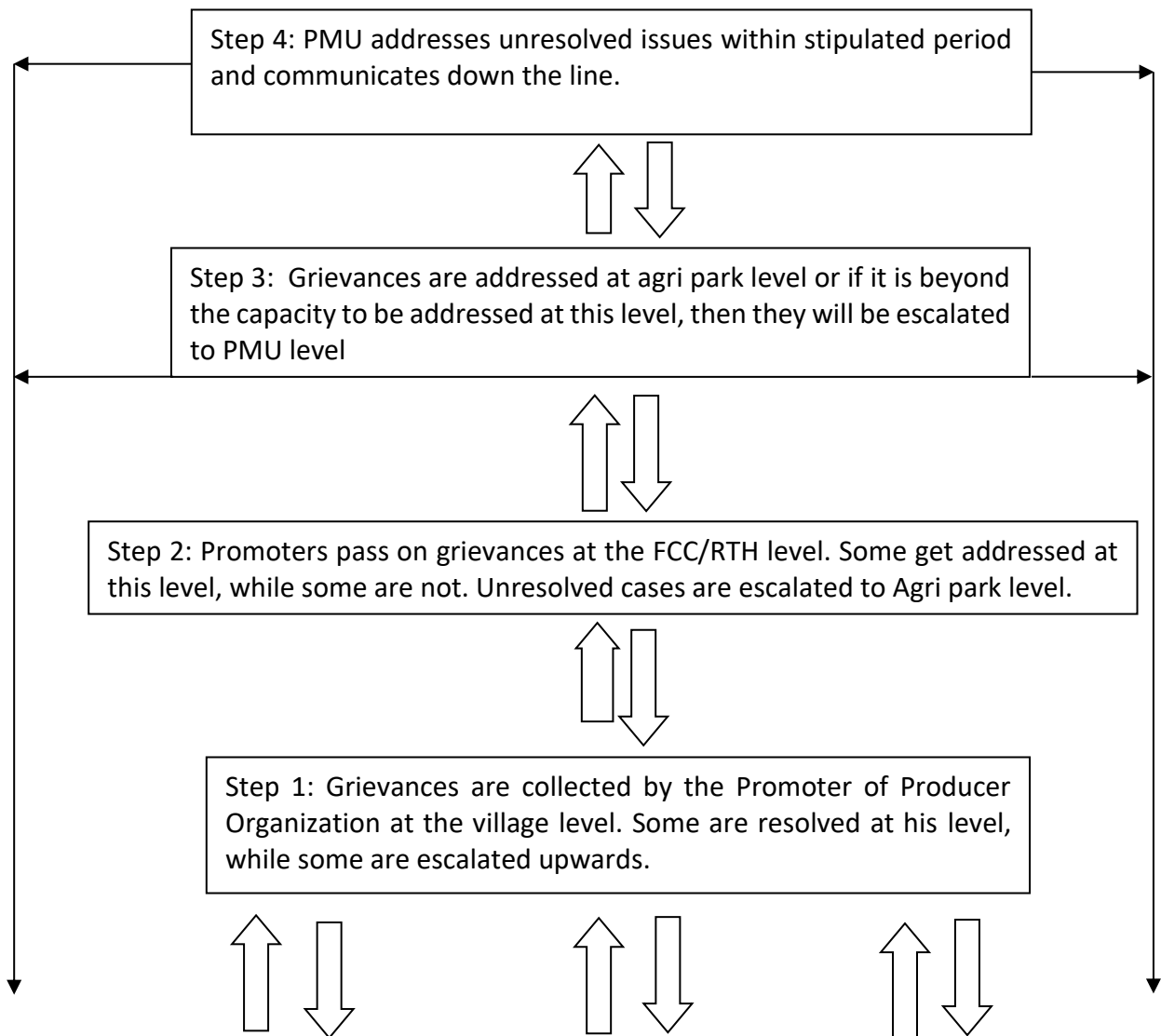
Type of Grievance	Turnaround time	Accountability
<b>A. Pest related:</b>		
Major pest attack	Immediate (1 day)	PMP Specialist/ PMP Coordinator/ PMP supervisor
Minor Pest attack	7 days	PMP Coordinator/PMP supervisor
<b>B. Input related:</b>		
Arranging Certified Seed	15 days	PMP coordinator
Arranging fertilizer	15 days	PMP coordinator
Arranging pesticide	7 days	PMP coordinator
Arranging farm equipment	15 days	PMP coordinator
Others (undefined)	15 days	PMP coordinator
<b>C. Operational:</b>		
Price related (Agr)	7 days	PMP supervisor
Measurement related	7 days	PMP supervisor
Milk Fat & SNF related	7 days	Milk Supervisor
Price related (Milk)	7 days	Milk supervisor
<b>D. Policy related:</b>		
Internal to OMAID	3 months	PMP Specialist
External to OMAID		

Note: Above grievances are illustrative. This may be modified depending on activities to be promoted when sub-project proposals are expected to be known.

### **8.12.2 Training on GRM**

The staff of the PMP and other functional areas including representatives of the grass-root producer organization will have to be trained under GRM since it is a special activity and it is unlikely to be assumed that the employees will be aware of GRM procedures. Therefore, this activity may be considered at the time of rolling out of the OMAID project.

**Chart 1: A PROPOSED DESIGN AND IMPLEMENTATION OF GRIEVANCE REDRESS MECHANISM**



Grievances could arise on the following issues (an illustration)

- i. Lack of supply of certified seeds of wheat and other major crops
- ii. Irrigation facilities are poorly developed, needing intervention for development
- iii. Supply of Bio-controlling agents are meagre for implementing in IPM system
- iv. Lack of availability authentic and certified fertilizers, pesticides and farm machineries
- v. Markets are flooded with spurious fertilizers and pesticides
- vi. Market access of farm produces and milk are very poor
- vii. Use of highly toxic chemicals in farming system polluting environment
- viii. No warning systems on pest outbreak and therefore no instant mitigation available
- ix. Non- existence of advisory systems for farming community to address their problems

### **8.13 SUMMING UP**

Effective implementation of the activities to be proposed under PMP will require identification of indicators in a manner that the indicators are measurable, captured through the monitoring mechanism and feedback is shared across the functionaries. All stakeholders have some role to play, which the chapter delineates, besides outlining the resulting framework which lists probable activities and how they would assist in fulfilling different outcomes of the intervention under the project. Monitoring and evaluation is a special function that needs to be sensitized among the functionaries which will have to be integrated with the mainframe M & E task under OMAID.

## 9. TRAINING AND CAPACITY BUILDING FOR PMP PROFESSIONALS

### 9.1 ASSESSMENT OF TRAINING NEEDS

This chapter is devoted to training and capacity building activities to be organized under the proposed PMP. As we have mentioned in previous chapters, general awareness on IPM is low across the board in PPQD, MAIL. The farmers' knowledge and awareness on this is no better. It is only when some NGOs and donor-funded specific projects are implemented with a focus on IPM, then the knowledge and awareness of those specific professionals are enhanced. But such programs are localized, and not broad-based. Therefore, the specialized knowledge does not percolate down the line, and also there is no mechanism within MAIL or NEPA to propagate ill effects of indiscriminate pesticide use on the crops. Additionally, it is also not propagated that IPM tools offer viable alternatives before the farmers to consider from economic, social and environmental points of view. These are indeed national issues.

The OMAID project now gives us an opportunity to overcome knowledge and capacity gaps on this issue and the geographic dimension of this project is fairly sub-national (5 Provinces), and they are well dispersed over the country. Besides, the trade and quality implications of the proposed outputs of this project are significant.

Given this favorable background, we are of the view that a targeted approach towards enhancing capacity of the PMP professionals, key stakeholders be considered and the farmers are made aware of different alternative pest management practices through IPM tools so that they are sensitized and they also evaluate conditions on their farms for their journey on IPM path.

### 9.2 IDENTIFICATION OF THE CONTEMPORARY TRAINING MODULES

Based on the situational analysis of the context of the study and on the basis of visualization of the consultant, some training modules are suggested which though not exhaustive, yet they would be relevant. As the project is rolled out and practical experiences are gathered, there may be need for some additional skill-building which the PMU could decide subsequently.

The recommended training modules are:

- Morphology and molecular basis of pest and disease identification techniques
- Instrumentation in Entomological/Plant Pathological research
- Advanced training on pest management using IPM tools
- Mass production techniques of microbial pesticides
- Mass production techniques of potential biological control agents for commercial use in plant protection;
- Advanced training on Apiculture/ Mushroom/Vermiculture;
- Training on IPM;
- Training of the scout for their capacity building.

In **Table 9. 1:** Estimated cost on capacity building of the PMP professional has been provided.

**Table 9. 1: Capacity building of the PMP professional**

No	Training Module	Eligibility	Duration	Category National or International	No. of Trainee	Estimated cost (USD)
Technical	Morphology and molecular basis of pest and disease identification techniques/ Instrumentation in Entomological research/ Advance training on pest management using IPM tools/Mass production techniques of microbial pesticides/Mass production techniques of potential biological control agents for commercial use in plant protection.	<ul style="list-style-type: none"> <li>University Academician</li> </ul>	3 Weeks	International	3	5000x3=15000
		<ul style="list-style-type: none"> <li>PPQD Official (with at least M.Sc. in Entomology/Plant Pathology/Zoology)</li> </ul>	3 Weeks	International	3	5000x3=15000
		<ul style="list-style-type: none"> <li>OMAID Official (with at least M.Sc. in Entomology/Plant Pathology/Zoology)</li> </ul>	3 Weeks	International	3	5000x3=15000
						Sub-Total= 45,000 USD
Technical	Advanced Training on Apiculture/Mushroom/Vermiculture	<ul style="list-style-type: none"> <li>OMAID Official (B. Sc./ M.Sc. degree)</li> </ul>	2 Weeks	International	10	4000x10 = 40,000 USD
Technical	Training on PMP	OMAID Staff (B. Sc./ M.Sc. degree)	1 Week	National	50	100x50 =5,000 USD
Technical	Training of the scout for their capacity building	For proposed surveillance project under OMAID (10 <sup>th</sup> /12 <sup>th</sup> standard)	1 month	National	50	50x30x40 =6,000 USD
Total Cost=			96,000 USD			

**International Technical Training on scientific knowledge**

This training will be imparted to University faculty, PPQD and OMAID official from the concerned disciplines. From each institution, three persons will be trained with a view to enhancing scientific knowledge and capacity building of the key scientist/technical personnel of Afghanistan who would be associated with the implementation of PMP activities, directly or indirectly. The academician is University Professors and they are expected to disseminate their up-to-date acquired knowledge from International Training among the graduate/masters students who will join the local talent pool at a later date.

International training cost estimated on the basis of 2000 USD as registration (Training fees) + 2500 USD as living cost+500 USD as passage money= 5000 USD per person x 9= Sub-Total 45,000 USD.

**International Technical Training on Apiculture/Mushroom/Vermicompost**

Per province 2 persons will be trained for International training. Cost estimated on the basis of 2000 USD as registration (Training fees) +1500 USD as living cost + 500 USD as passage money= 4000 USD Per person= sub-total 40,000 USD. These trainers will assume the role of master's trainers at a later date.

**National Technical Training on PMP**

Per province 5 persons will be trained for national training. Cost estimated on the basis of 100 USD as Training fees cum living per person for 1 week x50= Sub-total 5000 USD. These trainers will assume the role of master's trainers at a later date.

**National Technical Training of the scout for their capacity building**

Per province, 10 scouts will be trained for capacity building and imparting knowledge on pest and disease diagnosis and scouting. Cost estimated as Training fees cum living cost per person for 1 month 1200 USD for 50 persons= Sub-total 6000 USD. They will acquire month-long training on pest and disease diagnosis and data capture techniques for implementing IPM in the project area.

**9.3 ENHANCING AWARENESS OF PMP PERSONNEL ON THE ENVIRONMENT AND PUBLIC HEALTH**

The scope of training and sensitization programme under PMP will further be expanded to cover environmental, social, behavioural and operating aspects of managing pesticides. Most of these issues are to be covered through awareness enhancement programme for public health, beneficial organisms and environment. A list of such issues to be covered under the awareness-building programme is provided below:

- Information on risks as well as health and safety advice
- Rules governing the storage and the conservation of pesticides by farmers
- Basic knowledge about risk handling and management procedures
- Carrying of protective and safety equipment
- Risks associated with pesticide transportation
- Handling, loading and offloading procedures
- Vehicle equipment
- Protective equipment
- Outline of treatment and operation procedures



- Health and safety in connection with the operations
- Emergency and relief procedures
- Technical procedures
- Maintenance of equipment
- Emission control
- Process and residue monitoring
- Biological monitoring of pesticide exposure
- Preparation of water based spray solution, dust and wettable powder formulations.
- Safety disposal of empty container

#### 9.4 IDENTIFICATION OF CONTEMPORARY TRAINING MODULE FOR DAIRY PROFESSIONAL

For milk production, management of Bulk Milk Cooler and Chilling Centres, a few training modules suggested. The recommended training modules are:

- Operation and Maintenance of chilling centres:
- Quality Assurance Program for the chilling plants:
- Clean milk production:
- Dairy animal management:
- Member awareness program:
- Capacity building for Dairy Professionals

In Error! Reference source not found., estimated cost on capacity building of the dairy professional has been provided.

**Table 9. 2: Capacity building for dairy professionals**

Type of training	Training Module	Eligibility	Duration	Category National or International	No. of Trainee	Estimated cost (USD)
Technical	Quality assurance program for chilling plants/	<ul style="list-style-type: none"> <li>• Milk procurement officers/Executive of chilling Centre</li> </ul>	1 Week	International	15	19,500 USD
Technical	Operation and maintenance of chilling plants.	<ul style="list-style-type: none"> <li>• Milk procurement officers/Executive of chilling Centre</li> </ul>	1 Week	International	15	19,500 USD

General	Clean milk production	<ul style="list-style-type: none"> <li>Milk procurement supervisors</li> </ul>	1 Week	National	46	100x46=4600 USD
General	Dairy animal management	<ul style="list-style-type: none"> <li>Milk procurement supervisors</li> </ul>	1 Week	National	46	100x46=4600 USD
General	Member awareness program	<ul style="list-style-type: none"> <li>Farmer members</li> </ul>	2 days	Local	250	30x250=7500 USD
Total Cost =						51,100 USD

### International Technical Training on Quality assurance program for chilling plants

This one-week training will be imparted to milk procurement officers/Executive of chilling Centre of concerned disciplines. From each centre, three persons will be trained hence, altogether there will be 15 persons. They will ensure quality standard of milk during procurement. International training cost estimated on the basis of 1500 USD as training fees+10,500 USD as living cost+7,500 USD as passage money= 19,500 USD for 15 person

International Technical Training on milk procurement for officers/Executive of chilling Centre  
This training will be imparted to milk procurement officers/Executive of chilling Centre of concerned disciplines. From each centre, three persons will be trained hence; altogether there will be 15 persons. They will take care of operation and maintenance of chilling plants. International training cost estimated on the basis of 1500 USD as training fees+10,500 USD as living cost+7,500 USD as passage money= 19,500 USD for 15 person

### Training on clean milk production

This training will be imparted to milk procurement supervisors. This one-week national-level training will be given to 46 persons. Cost estimated on the basis of 100 USD as Training fees cum living cost per person per day for 46 persons= 4,600 USD. They will ensure milk quality standard.

### Training on dairy animal herd management

This training will be imparted to the persons engaged in animal herd management. This one-week training will be given to 46 persons. Cost estimated on the basis of 100 USD as Training fees cum living per person per day for 46 persons= 4,600 USD. They will ensure better management of the dairy herd.

### Member awareness program

This training will be organized for the milk producers who would be members of the producing organization. This is for the general awareness programme. Cost estimated on the basis of 15 USD as Training fees cum living cost per person for 2days 250 Farmers= 7,500 USD.

## 9.5 ESTABLISHING SYNERGY BETWEEN APPLICATION OF APICULTURE TECHNOLOGY AND HORTICULTURE PRODUCTION.

By improving the quality of honey production, it would be possible to increase the incomes of the honey growers along with other by products (like royal jelly, nectar, bee wax). Further,

improved apiculture production would lead to agricultural productivity in general and horticulture in particular. A high correlation between these two productions sub-systems has been proved to be beneficial for the farmers. Although we have not come across evidence showing the complementarities between these 2 economic agents in Afghanistan, there is numerous evidence elsewhere in the World in this regard. From this *a priori* knowledge, we suggest that apiculture needs to be promoted in Afghanistan simultaneously with horticultural crops. In the context of OMAID project, relationship between these 2 crop cultivations and their synergic relationship could become an area of research.

Though, in most cases, the horticulture crop growers use toxic pesticides to protect their crops from a pest infestation, especially during flowering stage when there would be maximum influx of bee population. Therefore, growers are advised to consider safety of bee population since these bee populations are their friends which act as pollinator and enhance productivity. Therefore, considering the beneficial role of bee population, an alternative measure is to be taken by selecting eco-friendly pesticides like HMO, Lime Sulphur, etc. which would not be harmful for bee population.

The usual practice in the country is to resort to using pesticide as a tool for plant protection. This adversely affects the bee population. As bee is an important pollinator of horticulture crops, especially apple, pistachio, apricot, pomegranate, grape, almond, etc, presence of bee population helps in fruit setting for higher production- a symbiotic relationship which the OMAID project would like to capitalize.

The bee growers and horticulture crop growers are to be sensitized on these two mutually beneficial existence of these organisms in the ecosystem. However, there are some contrarian perceptions among the growers, which also need to be considered (refer box).

It is empirically found that some mustard growers have developed some ill notion that when there are significant bee population mounted on flowering mustard twig, it would be harmful for the plant.

This is a fallacy. This is because bee helps in pollination, although the twigs could be bending due to load of bee population. On the other hand, such event would contribute to higher grain formation, which will lead to higher production of mustard.

This proven result is also valid for horticulture crops and therefore we are of the view that apiculture needs to be promoted alongside horticulture crops.

## 9.6 CREATING A POOL OF TOT IN AFGHANISTAN

Through the training and capacity building program, there will be a talent pool which will be leveraged for undertaking training elsewhere in the country. So, under the project, some master trainers will be developed for imparting training and capacitating professionals, which will be an added advantage through investments in training and capacity building under the program.

## 9.7 ESTIMATED TOTAL TRAINING COST

The estimated total cost for training and capacity building will be 147,100 USD (96,000 USD for PMP plus 51,100 for dairy).

### 9.8 PROMOTE DEMONSTRATION SITES

As part of field training, there is a need to organize demonstration sites where IPM tools and SOPs will be internalized and result of which will have to be demonstrated to the farmers. Presently, MAIL promotes Farmers Field Schools (FFS) for extension and demonstration services where farmers attend classroom as well as on-field demonstration. However, it is reported that many such establishments have been destroyed during the prolonged war. It is therefore necessary that in these 5 Provinces, the FFS need to be revived, which could then be considered for setting up of demonstration units for application of IPM tools and displaying the results for the satisfaction of the participant stakeholders. So, a convergence of approach between MAIL Extension wing and OMAID will have to be ensured so that these FFSs become model units for propagating IPM utilities among the farmers. Therefore, some provisions have been made for this purpose which will be treated as “Capacity building cost.” With such convergence in activities, this will become a win-win situation for both the institutions and will reduce cost as OMAID will leverage the infrastructural support of MAIL.

### 9.9 ESTIMATED TOTAL BUDGET

In Error! Reference source not found. **the** estimated cost of PMP has been presented. The cost parameters and justification are indicated at the end of the Table. It may be noted that the estimated costs are provisional as there would be requirements for many other cost components which needs to be accommodated subject to approval of HEC. The estimated budget is therefore needed to be considered subject to the above caveat.

The estimated total cost of PMP activities is 5.20 million USD. This consists of Technical Assistance (National) - estimated at 2.50 million USD, Technical Assistance (International) - - estimated at 1.14 million USD and M & E activities- - estimated at 1.29 million USD. The remaining two components are capacity building is estimated at 0.15 million USD and Demonstration Plot at 0.075 million USD respectively.

**Table 9. 3: Estimated cost of PMP activities under OMAID (USD)**

Functional area	Year 1	Year 2	Year 3	Year 4	Year 5	Total
A.Technical Assistance (International)						
IPM Specialist	150,000	150,000	150,000	150,000	-	600,000
Pathology Diagnosis Consultant	45,000	45,000	45,000	45,000	-	180,000
Pest Diagnosis Consultant	45,000	45,000	45,000	45,000	-	180,000
Milk Procurement Specialist	45,000	45,000	45,000	45,000	-	180,000
Sub- Total						11,40,000
B.Technical Assistance (National)						
Plant Protection Specialist				24,000	24,000	48,000
IPM Coordinators-6	108,000	108,000	108,000	108,000	108,000	540,000
Milk Procurement Officer- 6	108,000	108,000	108,000	108,000	108,000	540,000

Functional area	Year 1	Year 2	Year 3	Year 4	Year 5	Total
IPM Extension Staff (46)	138,000	138,000	138,000	138,000	138,000	690,000
Milk Procurement Supervisor (46)	138,000	138,000	138,000	138,000	138,000	690,000
Sub- Total						25,08,000
C. Capacity Building						
PMP- International	30,000	30,000	25,000	-	-	85,000
PMP- National	3,800	3,800	3,400	-	-	11,000
Dairy- International	14,000	14,000	11,000	-	-	39,000
Dairy- National	5,800	5,800	5,100	-	-	16,700
Sub- Total						1,51,700
D. Establishment of Demonstration plots for IPM and on field training through FFS	15,000	15,000	15,000	15,000	15,000	75,000
E. Monitoring & Evaluation (M & E)	625,300	501,500	70,000	60,000	35,000	1291,800
Total						5,165,700 Say, 5.20 Million USD

**Note:** Data considered and assumptions made for estimating budget

1. IPM Expert: to be recruited for 4 years for National Coordination of the program at 150,000 USD per year (for 4 years aggregating to 600,000 USD).
2. Pathology Diagnosis Consultant: to be hired for 3 months each year for 4 years to oversee the plant disease diagnosis by local officers during the growing season at 500 USD per day for 90 days (500 USD/day x 90 days = 45,000 USD), for a total amount of 180,000 USD.
3. Plant Pest Diagnosis Consultant: to be hired for 3 months each year for 4 years to oversee the plant pest diagnosis by local officers during the growing season at 500 USD per day for 90 days (500 USD/day x 90 days = 45,000 USD/year), for a total amount of 180,000 USD.
4. Plant protection Specialist: to be recruited for 2 years to assist the International IPM during the fourth year of the project implementation in order to take over the national coordination of the program in the fifth year, at 24,000 USD per year (for 2 years aggregating to 48,000 USD).
5. IPM Coordinators at agri- park level: Six (6) will be hired to coordinate program in 5 agri parks/ 5 agro-ecological zones, to report to the National IPM Coordinator (International Expert), at 18,000 USD per year each for 5 years for a total of 5 x 6 x 18,000 USD = 540,000 USD.
6. Milk Procurement Officer: 6 to be recruited (5 for agri-parks and 1 for PMU= 6) for 5 years at 18,000 per year \*5 years \* 6 persons aggregating to 540,000 USD
7. IPM Extension Staff: About 46 will be recruited (8 IPM Extension staff per Province \* 5 Provinces = 40 + 5 agri Park and 1 in PMU= 46) at 3000 USD per Extension staff per year\*5 Years\* 46 = 690,000 USD.

8. Milk Procurement Supervisor: About 46 will be recruited (8 IPM Extension staff per Province \* 5 Provinces = 40 + 5 agri Park and 1 in PMU= 46) at 3000 USD per Extension staff per year\*5 Years\* 46 = 690,000 USD.
9. Demonstration plots
10. It is presumed that at least 5 FFSs are to be identified in 5 Provinces for promoting demonstration units and a provision of USD 15,000 has been considered per Province for this purpose.
11. M & E budget
12. During the first year, major expenditure will have to be incurred for system development and purchase of milk testing and milk adulteration testing equipment.

#### **9.10 SUMMING UP**

The suggested programme for training and capacity building proposed under OMAID will benefit not only the target population within the project area but also it will benefit the entire country. These investments in human capital to hone up their skill and capacities will be an endowment in human capital for the society besides delivering effective PMP services to the farmer members and stakeholders of OMAID.

## 10. A SUGGESTED MODEL FOR PEST AND DISEASE SURVEILLANCE AND MITIGATION

### 10.1 PRESENT PRACTICES

At present, DAIL reports information on pests and diseases to MAIL on a quarterly and annual basis as per their standard official reporting mechanism through email or through official letterhead. This information is compiled at MAIL and placed before the Hon'ble Minister for reporting and any action deemed fit.

In addition, the PPQD at HQ organize a workshop at the end of the year and invite all Provincial Plant Protection Directors to present major activities undertaken during the year regarding plant pests and diseases and invite suggestions for pest management and improvement in this regard. If any immediate actions are required, then the matter is placed before the Hon'ble Minister for necessary advice and actions. Presently, there is no online disease reporting mechanism within the network of MAIL, DAIL and further down the line. It is reported that FAO has introduced online locust reporting system, however a clear appreciation of such system could not be ascertained.

In case of emergency pest and disease attacks, the matter is reported to Provincial Governors who in turn report such cases to MAIL directly, but it also requires political intervention. The pests and disease reporting system therefore appears archaic and outdated.

### 10.2 EFFECTIVENESS OF THE PRESENT REPORTING SYSTEM

Effectiveness of the present disease reporting system leaves much to be desired. It is neither effective nor it serves any useful purpose for the farmers. According to some officials, at least monthly reporting could reveal a better picture, while some have also suggested that the pests and disease reporting system should be made on-line. This reporting system should be introduced through survey and surveillance mechanism where fluctuation of pest and diseases can be captured at a regular interval to highlight the pest scenario of the region. These survey and surveillance are the modern practices under PMP which include with the following practices.

### 10.3 PROPOSAL FOR STRENGTHENING PEST AND DISEASE MONITORING SYSTEM

The objectives of putting in place a pest surveillance system in the project areas are:

- To identify existing and new species;
- To estimate crop losses;
- To assess pest population and damage at different growth stages of crops;
- To study the influence of agro-climatic parameters on pests;
- To observe changing pest status from minor to major;
- To monitor the development of type, resistance, resurgence;
- To assess natural enemies and their influence on pests;
- To evaluate the effect on new cropping system and varieties.
- To study the upcoming of exotic pests in the area

### 10.4 BASIC COMPONENTS OF PEST SURVEILLANCE

- Identification of pest species;
- Determination of pest population;
- Understand the functioning of life system of pest species;

- Loss caused by the incidence based on ETL and EIL;
- Economic benefit through the control measures;
- Distribution prevalence;
- Level of incidence;

The outcome of the above would contribute towards generating advance knowledge and insights into probable pest infestation and will help evolving appropriate cropping pattern as also deriving maximum advantage out of pest control measures.

### 10.5 A SUGGESTED MODEL FOR PEST MONITORING SYSTEM UNDER OMAID

Given the situation prevalent in Afghanistan, under OMAID project, an attempt will be made to put in place a model pest and disease surveillance system in a modest way so that the planners and decision-makers of the agricultural production system could visualize a better regime of agricultural production through PMP, with emphasis on IPM. It is also to be recognized that if a system of the present kind could be made operational, it would bring about significant changes in the internal production system in Afghanistan. It can also be deemed as “undertaking reform in the inherent agricultural production system”.

#### 10.5.1 Inputs for the model

To begin with, we have illustrated the model with some basic inputs (**Table 10. 1 & Table 10. 2**). A framework on the hierarchical flow of information from farmers to PMU and feedback has been provided through a flow chart (**Chart 2**).

**Table 10. 1: Illustrative inputs considered for collection of data for the generalized model**

Province	Selection of villages	Farmer Member per villages	Season	Name of the crops to represent crop diversity	Stage of the crop	Name of the pests	Data on pest population per unit
1	10	3	1 or 2 Seasons	Wheat, Rice, Grape, Pomegranate, etc	Seedling, Tillering, Booting, Flowering, Ripening	Stem Borer, Leaf Folder, etc.	% tiller infested or number/plant etc.

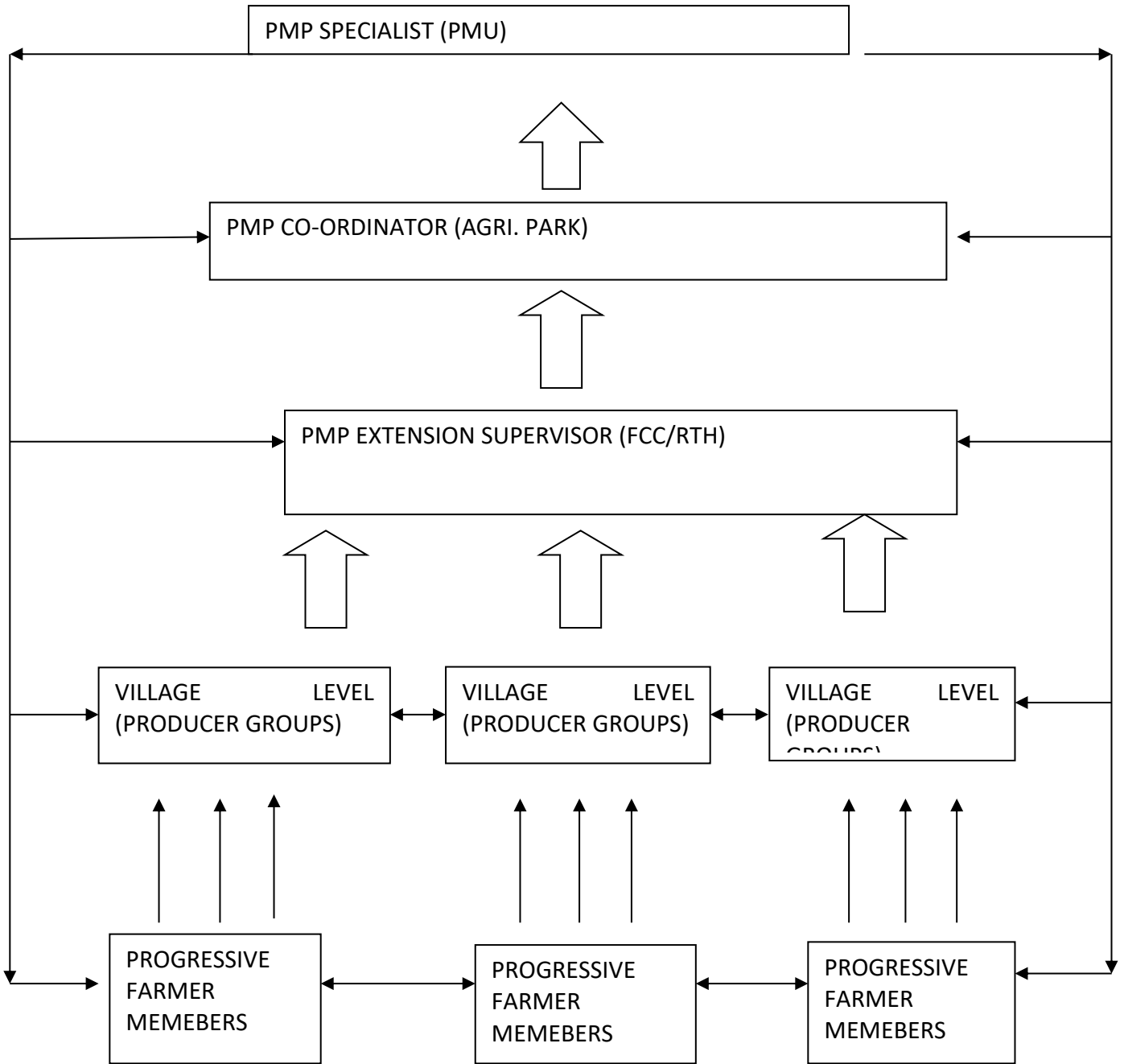
Note: Same row and column parameters will be considered for other four provinces. This will have to be done crop-wise and date wise.

**Table 10. 2: Rationale behind the design of the input**

Item	Guidelines
Province	The scope will be limited to 5 Provinces considered under OMAID
Villages	Project villages attached with FCCs/RTHs
Farmer Member	Sample farmer will be chosen from the members of the Producer Organization with a progressive outlook
Season	Cropping season, usually 1 or 2 in Afghanistan
Crops	Major crops will be considered
Stage	As pest scenario varies across stages of plant growth, the sample will get expanded accordingly.



**Chart 2: A MODEL OF PEST AND DISEASE SURVEILLANCE LEADING TO PEST MANAGEMENT**



## 10.6 STEPS INVOLVED IN IMPLEMENTATION

- The consensus within PMP and OMAID to implement this system;
- Developing tools for data capturing (tentative guideline is provided in Table 9.1);
- Developing monitoring and forecasting system (through report/trigger for decision support);
- Hiring consultant to work on the architecture of the model;
- Model testing and feedback;
- Training and capacity building;
- Roll out for implementation;
- Monitoring and feedback

## 10.7 DATA CAPTURING MECHANISM AND RESPONSIBILITIES

The primary data from the selected farmer will be collected by the trained scouts to be recruited exclusively for this project who would then transfer the data to the PMP supervisor. The supervisor will verify the data and forward to PMP coordinator at Agri Park level, who will consolidate the data for the Province, analyses and generate report and transfer the consolidated report to PMP specialist at HO. The PMP specialist at HO will have to take immediate decision and communicate down the line up to the level of farmer for corrective actions. It is suggested that the response time for mitigation measure should be available within 24 hours of data capturing.

The financial implication of the implementation of this model can be estimated by engaging a suitable consultant<sup>10</sup>. However, the PMU, with the concurrence of the World Bank, will then have to make financial provisions for this activity.

## 10.8 MACRO BENEFIT FROM THE SUGGESTED MODEL

Immediate remedial action against the pest and disease attack is possible; A national archive on pest and disease incidence, crop-wise, season-wise, stage-wise would be possible, which can be further analyzed for scientific studies;

This will also be one of the most comprehensive national databases on pest and disease, on a time series basis, for technical analysis, which can become a benchmark for Afghanistan.

The potential of the model is even bigger. If it can be successfully demonstrated under OMAID, the scope can further be expanded to accommodate other production enhancing sub-systems like agronomic characteristics so that it could become a diversified agricultural production system application for Afghanistan.

The pest and disease occurrence, season-wise and stage-wise data can be juxtaposed with environmental data, agronomic data to build a national predictive model crop-wise, agro-climatic zone wise for diseases forecast which will enable the government machinery (IPM division of PPQD) to take pre-emptive actions. With the involvement of local university faculties, ARIA, MAIL, PPQD, NEPA and other technical bodies, nationally and internationally<sup>11</sup>,

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<sup>10</sup>Caveat: No budget estimate at the moment is done. Once the consensus is built, World Bank should support this sub- project for funding and implementation.

<sup>11</sup> International Consultant may be hired for exploring this task.

such complex models will have to be tried out first at the project level which can be expanded at the national level provided required data is available.

## **11. SUMMARY & RECOMMENDATIONS**

### **11.1 THE COUNTRY CONTEXT**

The National Statistics and Information Authority, Islamic Republic of Afghanistan, the estimated per capita income including poppy was USD 719 in 2017-18 and without poppy, it was USD 681 respectively, one of the lowest the World. The agricultural growth has been erratic and barely noticeable despite being attempting to put the war devastated economy into a sustainable growth path for the past two decades. While in 2017-18, Afghanistan achieved a growth rate of 3.8% in the agricultural GDP (excluding poppy), the same had fallen into negative zone in 2015-16 (- 5.7%). The sector accounts for about 25 percent of national GDP and is the second largest sector after services. This percentage becomes even higher if processing of agricultural products is included. More than 80 percent of the population and nearly 90 percent of the poor live in rural areas, and agriculture plays a key role in their livelihoods. About half of all households derive at least part of their income from agriculture, which employs about 40 percent of the national workforce.

### **11.2 STAGNATING AGRICULTURE**

Notwithstanding recent progress, the agriculture sector continues to suffer from the recurring and long-lasting political instability leading to structural constraints and low productivity. Though significant results have been achieved in recent years regarding the development of selected value chains (i.e., horticulture crops), there is a long way to go to utilize the full potential of the agricultural sector - including: developing the necessary national capacity to carry out the structural reforms and other changes required by the sector's development strategy; revamping the rural institutions and infrastructure; improving access to modern production and post-harvest technology; and facilitating access to finance. Therefore, there is a compelling case for investing in agriculture/agribusiness in Afghanistan.

### **11.3 CREATING MARKET ACCESS THROUGH LINKAGES WITH THE PRODUCERS**

Creating market access to the rich agro produces of Afghanistan and linking the primary producers with the final consumers through a credible value chain has been recognized and proven to be one of the most desirable alternatives to ensure higher prices to the producers. Developing agro value chain and harnessing national and international markets through improved production, storage, processing and marketing cannot be overemphasized in the context of Afghanistan. This would however require a focused approach in developing agro sector under a well-coordinated plan and effective implementation resolving the obstacles that stand in the way of agro industrial development.

### **11.4 STATUS OF AGRIBUSINESS VALUE CHAIN**

Agribusiness value chains are undeveloped with a low ratio of food processing to primary agriculture. The agro-processing sector in Afghanistan is poorly developed due unpredictable policy environment, inadequate infrastructure (logistics, energy, storage, handling and packaging, etc.), lack of access to finance to make new, and competition from imported processed products that benefit from greater technological expertise and economies of scale. Furthermore, poor security, high land lease rates, and costs of operation have led to several businesses established in industrial parks (Herat, Mazar-i-Sharif, Bagram, etc.) to cease operations. Compared to neighbouring countries, costs of production in Afghanistan are high, and the costs and risks associated with export are equally high. While it is quite easy to start a business, the country ranks poorly in enforcing contracts, trading across borders, protecting minority investors, registering property, dealing with construction permits and providing

electricity. The World Bank's annual Doing Business rankings for 2017 show that Afghanistan continues to be one of the most challenging places in the world to do business; the country is ranked 183 among 190 economies in terms of Doing Business. At the same time, regulations and institutions that could facilitate agricultural production and trade, such as SPS enforcement, food safety standards and export certification, are lacking.

### 11.5 THE OMAID PROJECT

The OMAID Project is structured as an Investment Project Financing (IPF), proposed to be funded by an IDA grant in the amount of US\$25 million and a US\$150 million contribution from the Afghanistan Reconstruction Trust Fund (ARTF) over a five-year period. It will focus primarily on the agro-processing segments of the horticulture and livestock value chains, including the critical linkages to upstream raw material. These were identified as priority value chains for development under the national development policies [National Priority program 5 (NPP) 2016-2021 and National Export Strategy 2018-2022 (NES)]; specifically: horticulture products (dried fruits and nuts, fresh fruits and vegetables - mostly for exports), and livestock products (poultry, eggs, and dairy for domestic markets, in competition with current imports). Field operations will be implemented sequentially in the five selected areas of the country which have a comparative advantage to produce for these value chains (Mazar e-Sharif, Kandahar, Kabul, Herat, and Nangarhar). The project will adopt an integrated perspective to developing the selected chains from production to marketing on the domestic and regional markets, or for export to international markets. It will support access to finance for services and activities of entrepreneurs who are ready to engage in intensification of their production and/or develop value-added activities to primary production through diversification of processing activities. It will also support the logistics between agricultural production and the market (including processing, storage, and transport). This will require the close involvement with Partner Financial Institutions (PFIs), as well as partner companies with the framework approach of productive partnerships.

### 11.6 CONSTRAINTS TO BE ADDRESSED

The project will address the following constraints to agri-business development identified as part of the consultation process for the preparation of the Afghanistan Agribusiness Charter:

- a) High cost of doing business in Afghanistan;
- b) Access to markets remains challenging for Afghan agri-food enterprises;
- c) Access to industrial serviced land for agri-food enterprises and SMEs is limited;
- d) Access to finance; and,
- e) Pproducer organizations are inefficient.

### 11.7 PROJECT DEVELOPMENT OBJECTIVES (PDOs)

**Component 1:** Improving the enabling environment for agribusiness development (US\$ 22.5 million)

**Subcomponent 1.1:** Establishing the overall governance and implementation of the Agribusiness Charter (US\$ 5 million).

**Subcomponent 1.2.** Strengthening the capacities of the Ministry of Industry and Commerce (US\$ 7.5 million).

**Subcomponent 1.3.** Addressing food safety and sanitary and phytosanitary issues (US\$ 10 million).

**Component 2:** Support for the development of integrated agri-spatial solutions (US\$ 142.5 million)

**Subcomponent 2.1:** Investing in critical agri-industrial infrastructure in selected provinces (US 127.5 million).

**Subcomponent 2.2:** Supporting agribusiness investments in the IAFPs's broader catchment areas (US\$ 15.0 million).

**Component 3:** Project Coordination, Monitoring, and Crisis Management (US\$10 million)

Project activities to be promoted

In as much as different types of economic and ancillary support activities identified for agri food parks are concerned, a list is provided below. However, more activities could also emerge when the project is rolled out.

- Agro-dealers and input supply stores;
- Extension services and training, by Government bodies, donors, and NGOs;
- Testing and certification laboratories;
- Warehousing, grain silos, and cold storage providers;
- Truck parking, container stacking, and rail yards;
- Agro-processing units, including for the packaging and/or processing of fresh fruit (juice, drying of fruits and nuts, bottling, etc.);
- Dairy processing;
- Commercial and auction center/ wholesale market;
- Green area/ parks, vehicle parking, service buildings;
- Maintenance and repair facilities and shops.
- Any other, relevant to the project

### 11.8 STRUCTURE OF THE PROJECT DESIGN

The OMAID project is designed in a manner that a 3 tier infrastructure will be created through private initiatives- - FCCs at the first tier (without value addition of produces), RTHs as the second tier, with minor value addition in terms of grading, sorting, packaging and processing, while the Agro Industrial Parks as third tier for final processing, packaging in consumer packs, branding and marketing. They will also harness export market based on contracts and agreements with overseas buyers.

### 11.9 PUBLIC- PRIVATE PARTNERSHIP

The project will be built on the principle of Public- Private Partnership. Land for the agri parks will be made available by the Islamic Republic of Government of Afghanistan, while basic infrastructure will be created under the project, and at the same time FCC and RTHs will be private entrepreneurs driven. The entrepreneurs of FCCs and RTHs will be entitled to receive project grant assistance subject to some upper limit to be specified under the project. This will ensure that the private investors will retain considerable stakes in their project.

### 11.10 CONTEXT OF INTEGRATED PEST MANAGEMENT (IPM)

As specified in the PAD, a PMP is triggered as safeguard policy, conforming to Operational Guidelines of the World Bank OP 4.09. In sectorial projects funded by the World Bank, it is required to prepare a generic PMP at the appraisal stage and upgrade that document during implementation phase. The plan should be designed to minimize potential adverse impacts on human health and the environment and to advance ecologically based IPM. The plan should be established based on ecological and specific on on-site evaluations of local conditions conducted by appropriate technical specialists with experience in participatory IPM.

**11.11 OBJECTIVES OF PMP**

To identify major pests and diseases affecting crops, typology of pests and diseases and present pest management approaches adopted in the project area. Similarly, provide a status of sanitation and hygienic practices adopted in milk production and quality milk production adopted in the project areas;

To analyse legislative and regulatory and institutional framework available in the country for pesticide management, capacities of these institutions and their roles relating to pesticide uses, pesticide trade and regulation towards pesticide management;

To examine if any IPM policy is presently in place, assess preparedness of the country in implementing IPM and provide guidelines towards adoption of IPM regime for growing healthy crops to improve incomes of the farmers;

To assess management capacity and capability to implement mitigation measures through the existing institutional structure and responsibility to implement PMP including grievance mechanism;

To identify monitoring indicators of potential impacts of pesticide management and implementation of IPM regime and providing a framework for pest management advisory services through implementing ICT based pest surveillance and monitoring system.

To recommend appropriate manpower structure for PMP implementation and quality milk production, capacity building through training and orientation and generating awareness among the stakeholders about adopting scientific pest management strategies leading to IPM regime in agriculture sector and quality milk production in dairy processing sector.

To suggest appropriate policy reforms defining roles and responsibilities of all institutions associated with implementation of PMP with specific recommendations for different institutions in pesticide management.

**11.12 SCOPE OF PMP**

The scope of the IPM covers field crops (cereal, pulses and legumes) and horticulture crops including fruit crops. The study has also covered dairy processing value chain, beginning with milk procurement, bulking, and milk processing.

**11.13 METHODOLOGY**

As a generic PMP was to be prepared for project appraisal and in consonance with this purpose, the methodology of the study involved collection of primary and secondary data and consultations with stakeholders including concerned government officials, NGOs, officials of other donor funded projects with IPM as one of the components. Our preliminary search indicated that certain law/regulations/policy are in place in Afghanistan, which have been referred. These documents are:

- Pesticide Law 2015
- Plant Protection and Quarantine Law & Regulation, 2012;
- Animal Health & Veterinary Public Health Act 2012
- Draft Food Law 2012
- Afghanistan Environment Policies, Laws and Regulations

Secondary data was screened to identify important crops in the select 5 provinces with potential for processing and value addition for export market and internal market as well, it was necessary to appreciate the present Pest Management practices adopted by the farmers/growers, which could form the baseline information. This part of the exercise was completed through stakeholder meetings (group meeting of the farmers at all locations).

Appropriate questionnaire/checklist was prepared depending on the profile of the respondents and all interviews were conducted on the basis of checklist so prepared with option for noting down open questions in informal and harmonious manner. All interviews were conducted by the local consultant of the PMP project.

About 15 group discussions were conducted to represent stakeholders with crop segment, dairy segment and home economics segment. It is also to be mentioned that the methodology has also considered two IPM reports of contemporary period- - National Horticulture Project (NHP) and Improving Afghanistan Input Delivery System (IAIDS), both assisted by the World Bank, and housed under MAIL with commonalities in the approach. However, the present IPM takes into considerations the important lessons of 2 previous IPM studies and makes improvisations over them, adding value to the IPM sector in Afghanistan. While the main report is organized through 11 chapters, the present summary is a synthesis of important observations contained through these chapters.

#### **11.14 SPATIAL SPREAD OF AGRI PARKS UNDER AGRO CLIMATIC ZONES**

The agro- climatic zones of Afghanistan are complex and heterogeneous. Under each agro- climatic zones, there are large variations in physical and climatic conditions, making broad generalization difficult. The provinces of Kandahar, Herat and Balkh are spread over vast land space, while Nangarhar and Kabul are relatively small in size. While Kabul is located at a high elevation from the sea level (1800-2275 meters), Nangarhar and Balkh provinces have relatively low elevation, while Kandahar and Herat are at moderately high elevation.

#### **11.15 CROPPING PATTERN IN THE SELECT AGRO ECOLOGICAL ZONES**

The crop profile of Afghanistan is highly focused towards cereal crops. They account for more than 95% of the cropped area, and around 2.5% area each are under vegetable and oil seed crops. The country had an area of 336 thousand ha under total fruit crop area in 2016-17, with almond crop making up for 19 thousand ha (5.8% of total fruit area), while walnut and olive crops taking up about 2-4 thousand ha each respectively, and the remaining area is used for miscellaneous fruit crops.

The commercial crops of the select agro climatic zones are cotton and saffron. Among 5 agro ecological zones, cotton is grown in Bulk and Herat provinces, representing northern agro climatic zones and western agro climatic zones respectively, saffron is the most precious commercial crop extensively grown in Herat province which shares more than 96% of total acreage under this crop. The profile of horticulture crops grown in the select agro climatic zones is diversified. In most of these 5 agro climatic zones, 4-5 horticulture crops are grown.

#### **11.16 MILK PRODUCTION**

The livestock sub-sector is another key component in Afghanistan's agricultural economy. The total milk production in Afghanistan is not enough to meet the demands for dairy products. As per latest information ([www.faostat.org](http://www.faostat.org)), Afghanistan produces about 2.11 million tons of milk per year in 2017 and the estimated per capita availability of milk works out to about 57 kilograms per capita. About 40% of the country's requirement is sourced through import,



principally from Pakistan, in the form of milk powder and UHT milk. Afghanistan has so far not undertaken any clean milk production drive at the producer level, and therefore hygiene and sanitation have remained an issue in improving quality milk production.

#### **11.17 MILK COLLECTION AND PROCESSING**

There is no estimate at the national level about the marketable surplus of milk. However, as per NRVA 2011-12, about 125 million liters per annum is sold. This is about 10% of national production. A low proportion of marketable surplus is attributed to lack of market access, dispersed production, topographic limitation and cultural practices.

#### **11.18 MILK COLLECTION SCHEMES**

A host of donors and development organizations have attempted to develop milk schemes in the country on cooperative basis. Our desk research indicates that milk processing facilities had been organized in Kandahar (1998), followed by Kabul (2000), Mazar-I-Shariff (2002) and Kunduz (2005). Milk schemes were also created in Jalalabad under IFAD in 2012. In Pul-e - Khumri in Northern Afghanistan, where a Swiss project existed before the war, the Dutch Committee for Afghanistan (DCA) had established a small dairy plant for the production of Gouda cheese. The plant used to collect about 1,000-1,500 kg milk/day, while the installed capacity allowed for a gradual increase of production.

The first large scale dairy plant is the Mountain Pastures Dairy (MPD), an American-Kazakh joint venture established with USAID financial support. There were milk schemes in Mazar-I-Shariff and in Kunduz, with limited operations. The Kabul Dairy Union (KDU), Kabul and Khatiz Dairy Union (KhDU), Jalalabad, have set up dairy plants, under FAO/IFAD assistance, produces limited range of products, and enjoy good reputation in localized markets. However, none of the milk schemes could emerge as sub- regional or national brand and continued to operate at a limited scale (< 5000 liters a day). Milk testing facilities were created under the milk schemes, but their operations were so limited that it could hardly make any impact in improving milk quality standards in the society.

#### **11.19 MAJOR PEST FOUND IN AGRICULTURE**

##### **11.19.1 Crop pest**

As per the primary evidence gathered, major pest issue in wheat crop is Sun pest which feeds on plant by injecting chemicals that cause grain's gluten to break down. The major disease of wheat in Afghanistan are rusts and smut/bunt that cause substantial damage to wheat crop.

The main disease problems in potato production is late blight caused by fungus which initially occurs on leaves with water-soaked lesion destroying leaves, stems and tubers leaving behind nothing under field condition. The other issues are bacterial wilt, a pathogen that affects aerial part of the plant and leads to severe losses in potato output. The major insect pest of potato is Colorado potato beetle with strong resistance to insecticides besides potato tuber moth, most damaging pest of planted and stored potato in warm and dry areas of Afghanistan.

Cucurbit group of crops (watermelon/melon/cucumber/squash/pumpkin) have Baluchistan Melon as major pest problem. The melon fly is considered as the most destructive pest of melon and related crops. In case of grapes, the main problem is Powdery Mildew while for pomegranate, the main problem is fruit borer, the larva of Carob moth which is believed to enter into the young pomegranate via the Calyx at the time of flowering. Though this moth has been identified to affect pomegranate, but the biology of the moth is poorly understood.

There is a high incidence of bacterial Canker and gummosis in both almond and apricot trees. This is a chronic infection which could destroy the tree and is believed to be associated with the combination of cultivation of intercrops in orchards and over use of water particularly the flood irrigation.

Saffron, being one of the most precious horticulture crops of Afghanistan for export earning, suffers from bulb mite and mole and rat damage.

Apiculture occupies special position in Afghanistan. Beside producing honey and related items, it positively influences higher productivity of fruit crops like apple, pear, almond, peach, grapes and pomegranates through pollination. The most successful bee specie is *Apis mellifera*, which is also subjected to many pests and disease attack which can be mitigated through IPM strategies to maintain numerous pests and pathogen related problems below an acceptable threshold.

Mushroom is one of the most important nutritious edible crops that could be grown in Afghanistan under homestead condition engaging women power. There are different kinds of mushroom species cultivated but the white button mushroom is the most successful which have been commercially exploited. The main constraints of mushroom cultivations are the contamination of fungi, mould and bacteria which destroy mushroom cultivation significantly if proper sanitation measures by sterilizing growing media are not done. Besides, mites and flies also destroy mushroom cultivation which again could be protected by disinfecting growing media and maintain hygiene.

#### **11.19.2 Pest in horticulture crops**

The main problem in grapes is Powdery Mildew. A dormant spray of Lime Sulphur is made against Powdery mildew, which also reduces mealybug populations. New growth is protected against Powdery mildew with applications of Sulphur dust or wettable Sulphur beginning 2 weeks after bud burst and then to protect new growth at approximately 15-day intervals. A minimum of three applications is made.

The main problem in Pomegranate is the fruit borer- - the larva of the Carob moth which affects young pomegranate via the calyx at flowering. Orchard sanitation (pruning of overgrowth shoots, dead overwintering ranches, etc.) is used to reduce the number of infected fruit in the orchard and the population of the moth. Mechanical control can also be employed – a plug of mud placed in the calyx of the very young fruit which acts as a physical barrier and prevents the larvae entering. The use of pheromones for mating disruption is being trailed by the IDEA-NEW project (funded by USAID) and supported by HLP in focus districts in the Northern provinces. The eriophyid mite causes the rolling of young leaf edges might be very damaging to the plant. It is prevented by pruning of infected branches followed by spraying with wettable Sulphur.

In Afghanistan, there is a high incidence of bacterial canker and gummosis in both almond and apricot trees. This is a chronic infection which can kill the tree, and which is believed to be associated with the combination of cultivation of intercrops in the orchards and the overuse of water particularly the flood irrigation methods that are used. Copper has some impact in slowing the development of the disease. A dormant spray of Copper (Bordeaux mixture) is applied to the tree and Bordeaux paste is applied directly to lesions and pruning cuts. The copper spray also offers some protection against shot hole disease.

Horticultural Mineral Oil (HMO) is used to reduce populations of insects overwintering as sedentary stages or eggs, in particular aphids, scales and mites. The impact of recently developed HMO has been observed to be very effective against mealybugs, mites, scale and other small sucking insects. This practice also should be carried out for protecting the honey bees those will visit the crops for pollination.

Mechanical control is used to remove nests of tent caterpillars (defoliating Lepidoptera larvae) which can be burnt either in situ or after being pruned out of the tree. Mechanical control will be used to control local pest outbreaks during the crop season. Spot sprays of pesticides will be used to control local pest outbreaks, but only as a last resort.

### **11.19.3 Economic loss**

As mentioned earlier, wheat is the principal food crop of Afghanistan. There are no statistical data on wheat losses exclusively by sun pest attack. The Swedish Committee for Afghanistan (SCA) conducted The Agricultural Survey in 1989 ([www.archive.org/details/azu\\_acku\\_s271\\_a47\\_v\\_8](http://www.archive.org/details/azu_acku_s271_a47_v_8)) revealed that sun pest had inflicted damage on wheat crops from late May to early June. Over 60% of the spring wheat field were either infested or exhibited signs of an early infestation. The grain development had been reduced as much as 75 to 100%. In wheat field planted earlier, grain development had reduced by 25 to 30 percent. The rough estimated had indicated that crop losses largely due to sun pests would have caused food deficits affecting approximately 350,000 people.

For fruit and horticulture crops, there is no comprehensive estimate on economic loss on account of pest and disease infestation. In one study by MANAGE, Hyderabad, it was reported that disease in fruits (aphid, anthracnose, melon flies) and vegetables (Colorado beetle in potato and grasshopper) were reported in Kunduz and Baghlan. In the western region, aphid was spotted in vegetables and fruits in few areas. In Paktia province (southern region), apple crop had been adversely affected by powdery mildew causing yield potential to drop by 5 per cent. In south- western region (Urozgan province), almonds had been affected by soft scale and grapes had powdery mildew.

## **11.20 MILK HYGIENE AND QUALITY**

### **11.20.1 Hygiene and sanitation in milk production**

The milk production scenario in Afghanistan is traditional with 1-2 local breed of animal producing small quantity of milk, mainly for family consumption, and management practices followed are inherited from family tradition. The sanitary and hygienic practices followed leave much to be desired. As milk is produced for family uses, volume of marketable surplus is also limited. However, there are some milk schemes which are working at a limited scale, but have put in place milk testing mechanism. As the scale of operation is limited, these schemes have not made any significant impact in quality milk production and quality milk processing. The major disease observed among cattle are Foot & Mouth, Brucellosis, Hemorrhagic Septicemia and parasitic diseases.

## **11.21 LEGAL FRAMEWORK AND INSTITUTIONAL CAPACITIES**

The legislative and regulatory framework act as checks and balances in any society for ensuring safety and secured lifestyle through consumption of safe food. In this direction, Pesticide Law of 2015 has been passed to control production, import, transport, maintain, distribute and use of pesticides in the country. This has been done to prevent risks to human, animal, plant health, resulting from the use of pesticides, and to protect plants and

environment from the adverse effects of pesticides and to prevent the losses of agricultural products through the application of sound techniques.

Under the draft Plant Protection and Quarantine Law of Afghanistan, 2012 it is notified that the National Plant Protection Organization (NPPO) is the designated government agency to implement plant protection and quarantine law of Afghanistan.

Two above laws provide sound legal platform based on which IPM policies, programs, actions, regulatory measures, capacity building, creating of scientific and technical laboratories, testing protocol, licensing modalities, regulation of trade can be visualized. Thus, it would be fair to state that Afghanistan has now been able to get the benefit of having necessary legal support, which forms one of necessary conditions of IPM governance from the supply side phenomenon which have to be further carried forward.

#### **11.21.1 Pesticide management in Afghanistan**

The Government of Afghanistan does not have any registered pesticides for specific uses especially in the field of agri-horticultural, veterinary and public health system. It follows the list of acceptable products and guidelines of FAO which is limited and not adapted to Afghanistan's agriculture and human health systems. Most pesticides found in Afghanistan are imported, sold and distributed by the private sector. Pesticides that are often banned for use in other countries or internationally and outdated are sold "free of any label." Moreover, validity of these pesticides have expired or are even dangerous and classified by WHO as extremely hazardous or highly hazardous (Ia and Ib), yet they are found in local trade. This is an ominous sign, requiring urgent attention from regulatory as well as enforcement machinery.

#### **11.21.2 Pesticides use in agri-horticultural sector**

Though there are sporadic efforts made to mitigate destructive pest population, other than pesticides, all have become futile and hence producers depend on chemical pesticides to control damaging pest population rapidly and effectively at the time of severe pest attack. Many kinds of pesticides are used in field crops, vegetables and in other horticultural crops without proper protection or safety measures and without considering hazards and toxic exposures to the farmers, manipulators, non-targets organisms especially natural enemies, wildlife, fish and other flora and fauna. The producers also use the pesticides in their crops without knowing the phytotoxic effect, exact dosages of application and usually manage the pests and diseases by indiscriminate use.

The country also faces the attack of different types of migratory and invasive pests like locusts and caterpillar which are controlled by pesticides. The horticultural fruit producers use more than one round of pesticides during the cropping season to ensure crop production. The complete dependence of the farmers on the pesticides towards production of fruit crops invokes many problems when the products are meant for export market.

#### **11.21.3 Pesticides Label and Usage Pattern**

The farmers do not have proper knowledge on the toxicity level of pesticide, risk, impact on other beneficial and non-target organisms. When used as per the directions indicated on the label, risks, toxicity and impact on the environment then pesticide hazards are minimized. Pesticides vary greatly according to their level of toxicity, so during training in IPM, which is an ecological approach of pest management, one should emphasize the importance of using

a product that is effective, but as nontoxic as far possible or rather safe to the non-target organisms.

An intelligent and sensitive farmer would select a suitable plant variety that is tolerant or resistant to pest attack while yielding good output. The farmers could minimize pest attack on their crops after periodical monitoring and introducing various options of integrating pest management tools as much as possible to integrate simultaneously and successively to minimize the pest population for optimizing yield, protecting human health and environment. It is necessary to first (i) identify problem, (ii) monitor severity and spread, and (iii) be aware at what time or stage control is necessary.

Presently, the farmers of Afghanistan do not use pesticides in the context of IPM. They use it as and when required to manage the pest problems without considering the impact on other non-target organisms, environment and health. Under IPM, the farmers will be encouraged to use cultural methods, mechanical, botanical and biological methods to conserve populations of natural enemies prior to the use of spot sprays. The farmers are to be advised not to use those pesticides classified by WHO as extremely hazardous or highly hazardous (Ia and Ib) and only selective and safe pesticides will have to be used to avoid any possible negative impact on populations of natural enemies, pollinating insects and other beneficial organisms.

#### **11.21.4 Pest management methods**

The guidelines for pest management are governed by country laws, regulations and in some cases, by the international conventions, agreements and treaties (i.e., Rotterdam conventions on international code of conduct on the distribution and use of pesticides, Stockholm convention of Persistent Organic Pollutants, Kyoto Protocol Convention on Climate Change, Agenda 21 Global Program of Action for Sustainable Development etc.) as applicable in case of Afghanistan. Accordingly, guidelines are prepared for procurement of pesticides, product quality testing, labeling, storage, use, disposal, applicators exposure level and training) by the PPQD.

#### **11.21.5 Risk associated with pesticide uses**

Traditional uses of pesticides are one of the major sources of environmental pollution. The traditional applicators of pesticide are also susceptible to health hazards, if protective measures are ignored. The environmental damages involve soil, surface water, ground water, air, biodiversity, fauna, pasture land, etc and human health affect skin, lung and digestive system. The pesticide usage could also cause damage to ecological agents like species fulfilling important ecological functions, bees and other pollination agents, natural enemies of certain pests (parasites, predators and pathogens). If instructions related to product usage, and product handling during storage, transportation, dosage are not followed, then these processes could also affect human health and natural resources.

Risks also originate from improper handling of packaged chemicals and pesticides. More often than not the farmers discard used plastic containers/bottles arbitrarily without taking and safety precautions, which is detrimental to environment and public health. Storage conditions of the pesticides often are not proper leading to toxic waste which is detrimental to human health and environment. Similarly, dry pesticides are to be stored at a secluded place so that dust particles do not come into contact with human food and animal feed, and these pesticides are to be used through sprayers using mask and protective aprons.

The management of pesticide include transportation, storage, handling, packaging disposal, washing of containers- - all these activities are associated with risks that affect environment, public health and human beings, and therefore these activities will need to be carried out following standard operating procedures.

## **11.22 IPM ECOSYSTEM IN AFGHANISTAN**

### **11.22.1 IPM**

Integrated pest management (IPM) is a multidisciplinary ecological approach where varieties of pest management techniques or strategies are combined together simultaneously or successively to bring down the population of pest species below economic threshold level without or with a minimum disturbance to the ecosystem.

Studies have shown that over 95% of sprayed insecticides and herbicides reach a destination other than the target species diluting their effect and causing environmental contamination. IPM techniques can eliminate the need for these chemicals, preserving the environment and local community health.

The commonly used IPM tools and techniques are as follows.

### **11.22.2 Traditional or cultural management**

It involves ploughing land after harvesting of crops to expose hibernating pupae of many lepidopteran and coleopteran pests. These are controlled by exposing them to sun or allow them for predating by the birds which will suppress the population pressure of pests in the following crops. Crop debris is dumped at the corner of the field to prepare manure and to avoid burning to save environment from pollution, altering time of sowing to desynchronize with peak incidence of pest population, early planting and timely weeding to control weeds and other pest. In addition, handpicking and destruction of blister beetles adults, destruction of weeds before flowering, using series of pet bottles and glass ball to create noise devices to scare away the grain and fruit-eating birds are also done under traditional management.

#### **Agronomic practices**

This includes various types of agricultural practices adopted by age-old farming practices and experiences by the farmers. These are - crop rotation with non-host crop of the pests for the following crop, fallowing, good seed and stock selection, seed treatment, recommended spacing and optimum plant population densities, application of recommended fertilizer dosage rates and manures, use of resistant crop cultivars, early harvesting to avoid pests and natural calamities, crop sanitation, tethering and timely harvesting.

### **11.22.3 Mechanical methods**

Various mechanical methods at the most vulnerable stages of the pests are very useful to manage the destructive pest population which is achieved by handpicking and destruction of egg masses, gregarious stages of immature population, digging of trenches to control hairy caterpillar and armyworms, hopper forms of locust and grasshoppers, ploughing to expose grasshopper's egg-pods and pupae of other insect pests.

### **11.22.4 Physical methods**

These methods are useful to control seed-borne pests and pathogens by sun-drying or exposing them to radiation. This method also very useful to control the pests of stored grains.

### **11.22.5 Botanical pesticides**

The pesticides that are extracted from plants are called botanical pesticides which are considered as one of the important components of IPM system as it does not impact any adverse effect on the environment. They are also used as prophylactic measures and some of them are very effective against the target pest species. Neem oil, Neem Seed Kernel extract, Seed Kernel Extract etc. are very promising and therefore, should be promoted for use in IPM system.

### **11.22.6 Biological control**

Biological control is one of the most desirable components under IPM system where many of the biological organisms are exploited for suppression of pest species. There are many beneficial organisms that are found in nature, popularly known as natural enemies of pests which include parasites, parasitoids, predators, disease-causing organisms, etc. like (entomopathogenic fungi-, bacteria, virus, etc. belong to these categories).

### **11.23 IPM EXPERIENCES IN AFGHANISTAN**

The Plant Protection and Quarantine Department (PPQD) of the Ministry of Agriculture, Irrigation and Livestock (MAIL) is responsible for matters related to plant protection. The HQ and diagnostic laboratories of PPQD are located within Ministry compound in Kabul and it is represented in the Provinces by Provincial Directorates of Agriculture with one or two officers to look after pest management activities.

### **11.24 PLANT PROTECTION AND IPM POLICIES**

There is no policy relating to plant protection and IPM in Afghanistan. This is somehow surprising. As of now, plant protection measures have remained *ad hoc* and on fire-fighting mode, depending on the exigencies reported and communicated through the offices of Provincial Governors to the MAIL.

The plant protection department resorts to application of chemical measures for quick result. This serves 2 purposes. First, immediate relief is visible, and second, it enhances public image of the Government machinery in mitigating the woes of the farmers. Somehow, the practice seems to have been accepted in this manner without attempting to address them under the scope of any policy regime.

### **11.25 CAPACITY TO IMPLEMENT IPM; SOME EMPIRICAL EVIDENCE**

As mentioned earlier, the capacity of Afghanistan to implement IPM, described in terms of access to information, skills and understanding of the concepts of IPM is low. Support for the PPQD through pro-active projects which could tackle pest problems and remove the need for reactive emergency interventions are considered to be non-existent. The building up of human capacity within the ministry staff would help facilitate moving away from the present practice prescribing of pesticides to a more sustainable approach of IPM.

Since 2002 various FAO emergency projects have been implemented for control of locusts and Sun pest and through these and other funding sources e.g. RAMP (Rehabilitation of Agricultural Marketing Program) laboratories at the Kabul Head Quarters of PPQD have been rehabilitated and re-equipped at a modest level. However, the technicians need training and mentoring to be at the appropriate professional standard to be able to offer accurate diagnostic and technical service to farmers.

The System Rice Intensification (SRI) project of FAO/Norway (2012) promoted Integrated Pest Management (IPM) and the provincial staff of the Directorates of Agriculture, Irrigation and

Livestock (DAILs) conducted 38 Farmer Field Schools on SRI involving 950 farmers in Nangarhar, Baghlan, Takhar, Kunduz, Balkh, Kunar, Laghman and Herat provinces.

Under on-farm water management project (OFWMP) of the World Bank (2010), pest management as one of the action items considered and a PMP prepared under the project. Afghanistan value chain high-value crops Project (USAID), and Comprehensive Agriculture and Market Development (ARD France, FCOMAIL), Agha Khan Foundation sponsored agricultural productivity enhancement project had included IPM as one of the extension activities. Likewise, there are many donor-funded agricultural projects which have implemented IPM as one of their sub action items.

Under integrated pest management for healthy crops and protecting environment in Balkh Province of Afghanistan, MORE than 70 field-level plant protection and extension officers OF the Ministry of Agriculture, Irrigation and Livestock from 14 north, north eastern and eastern provinces haD participatED in season-long Training of Trainers courses on IPM in rice, wheat, melon, potatoes and vegetables in *Dehdadi* research farm in Mazar-e Sharif, Balkh since June 2011.

#### **11.26 CONSTRAINTS IN IPM IMPLEMENTATION**

Any scientific experiment in Afghanistan is generally beset with many unanticipated local issues besides structural issues like insecurity, lack of awareness and knowledge, instability and vulnerability, market access, unorganized market and management of agricultural produces in collection, processing and marketing due to near collapse of village institutions.

The inspectors who are supposed to provide a vital link between the IPM actors in the society with that of the PPQD and the proposed laboratories have become dormant due to prolonged absence from any effective role clarity, outdated outlook and aging. Similar is the situation regarding IPM extension staff, attached with the DAIL, who report to Director of Agricultural at the provinces. There is no direct reporting mechanism to PPQD by the DAIL staff. Further, the staff shortage and shortage of field functionaries is an inherent problem.

The legislative framework is now in place providing for necessary condition to prevent indiscriminate use of chemical pesticide, but what lacks is the shortage of extension staff. So, enforcement of legal provisions takes us nowhere as long as they are not enforced as per the provisions. The enforcement part of the legislation rests with the department, and there are issues concerning them. There is a need to make assessment about the manpower position, skill, job function and identifying missing links to make the department accountable and provide a balanced service to the society in safeguarding the public health concerns, environmental safeguard and providing extension service in IPM.

#### **11.27 STRATEGY STRENGTHENING CAPACITY**

Two important and much-awaited legislation have been passed (Pesticide Law, Draft Plant Protection and Quarantine law), providing sound legal platform based on which IPM policies, programs, actions, regulatory measures, capacity building, creating of scientific and technical laboratories, testing protocol, licensing modalities, regulation of IPD trade can be visualized. It would be fair to state that Afghanistan has now been able to get the benefit of having necessary legal support, which forms one of necessary conditions of IPM governance from the supply side phenomenon which have to be further carried forward.



As in many countries, Afghanistan needs to align with the different international conventions that have enacted guidelines for bringing in systems and procedures controlling transportation, distribution, storing procedures and use of pesticides. Not only such alignment helps in improving the image in IPM ecosystem, but they are also beneficial from the point of view of potential acceptance in pushing Afghan brand in international markets.

The country is yet to formulate a policy on IPM so that *ad hoc* and emergency measures are slowly replaced by educating the farmers in adoption of IPM, which is culturally and ecologically more desirable and sustainable. There have been experiments carried out under different donor supported IPM activities, demonstrating results and outcome and increasing localized knowledge of the target population. In the absence of regular follow up, these gains get out of practice, which is an issue in localized experiments. So, a well- designed strategy for IPM needs to be prepared and PPQD's IPM division needs to drive this initiative as part of extension activities.

### **11.28 PRESENT PRACTICES IN DEALING WITH PEST AND DISEASES**

The analysis of data collected during stakeholder consultations revealed that IPM as a tool to address unwanted pests and diseases is unknown to them. During storage, the occurrence of storage pests is common which is addressed through pesticides. Many ecologically healthy IPM tools are not practiced by the farmers. Use of pesticides to tackle pest and disease issues are however common, but what is concerning is its indiscriminate application, and more concerning is near collapse of enforcement of pesticide rules and regulations as safeguard mechanism in the ecosystem. The OMAID project will need to focus on enforcement of the pesticide use regulatory framework provided through the national act and regulations.

The farmers adopt localized storage practices of limited crops like potato, onion and grain, etc. For grain, grain weevil, rice weevil, beetle and mites are reported, and they are addressed through (i) cleaning of storage space, (ii) sun drying and (iii) disinfection. They use aluminum phosphate tablet and aluminum bromide as disinfectant. Potatoes/Onions are stored by the farmers at underground storage by digging wells, while the traders use cold storages. Onions are stored at low temperature and sometimes concrete structure are used to store onion. The IPM method used is sun drying, cleaning of storages, and ensuring aeration facility. Dry fruits are kept by the farmers at their house premises in cartoons, while the traders use bags and cartoons with aeration facility. Different species of moths and beetles are the usual pests that become an issue during storage. Apart from sun drying, cleaning the storage space, fumigation is also done.

### **11.29 SCREENING OF SUB- PROJECTS**

As the project is rolled out, sub project proposals will be prepared. These sub- projects will be location-specific, project-specific with differential impact on social, economic, environment and related parameters. Depending on the nature of the project and scale at which the project will be implemented, environmental impact will vary. Therefore, for screening of the project a check list has been suggested which will act as a guiding tool. The environmental and social team within PMU, in consultation with PMP, will need to fill up such checklist and assess the impact on environment. This will therefore be used as a decision-making tool on the basis of the likely impact on the environment, following World Bank guidelines. Projects with significant impact on environment will be discarded, while projects with moderate or low impacts will be considered for appraisal, subject to their implementing of the mitigation measures. These mitigation measures will be followed up by the PMU during the course of implementation of the subprojects.

### 11.30 ACTION PLAN FOR PEST AND PEST MANAGEMENT

For implementation of PMP, certain strategic actions and measures have been proposed. These are presented in terms of action items as under.

- Promotion of IPM among national actors and stakeholders;
- Support for monitoring insect pests and diseases of agriculture, horticulture and public health importance;
- Awareness through training to the farming community for proper identification and management of pests and diseases;
- Awareness among the pesticide retailers/wholesalers about advising the farmers on proper usage of pesticides, and banning the use of pesticides forbidden by the WHO;
- Awareness among PPQD IPM division, both at HO and at the provinces about application of IPM tool to produce healthy crops which are ecologically and environmentally sustainable;
- Capacity building of the plant protection and quarantine officials regarding the status of present pest scenario, minor pests and their management through IPM and IVM.
- Campaign on surveillance of insect vectors and their management with special attention towards the malaria-prone areas;
- Awareness on indiscriminate use of pesticides and their ill effect on the environment and human health;
- Identification, Conservation and Utilization of potential biological control agents in IPM and IVM.
- Support for identification and management of storage pests.
- Enforce Pesticide Legislation in conformity with international legislation/rules/standards;
- Support to the pesticide residue laboratory for implementation of OMAID activities.
- Support to develop an app for proper identification of insect pests.
- Support to build up Institutional Human Resource capacity in Pest and Pesticide Management.
- Sensitizing concerned government department to effect strict border control on import of contraband pesticide;
- Campaign on proper handling of pesticides and equipment.
- Support to develop a database for Integrated Pest Management (IPM) through disease surveillance system in the project area.
- Support to the PPQD to protect invasive pest and diseases.
- Consequent on implementation of proposed Disease Surveillance system and build up real data from the project area and making the data set available to ARIA for further analytics and research;

The above strategies actions are relevant for entire pest management spectrum for instituting a healthy culture for agricultural production and would involve all stakeholders in the value chain involving MAIL, OMAID, other Ministries and autonomous institutions and NGOs.

**11.31 MONITORING AND EVALUATION**

The activities to be proposed under PMP will have to be monitored at regular interval as per the progress indicators identified for project monitoring. An ICT based project monitoring architecture has been proposed encompassing IPM indicators, pesticide usage pattern, farmers participation in IPM, crop coverage, plant disease occurrence phenomenon, milk quality parameters, milk contaminant parameters and grievance redress mechanism. The PMP will be evaluated mid-term and also at the end term by an external consultant of repute for highlighting important milestone achieved and assessing their impact in the society.

**11.32 MANPOWER PROVISION**

The PMP staff deployment has been proposed at the PMU level, agri- industrial park level and at the level of RTH/FCC. Separate set of staff have also been proposed for ensuring monitoring of milk quality assurance component of PMP. The staff will be trained both in –country and abroad so that their skill set, and competency is enhanced and some of them can perform as TOT for dissemination of knowledge and awareness program.

**11.33 GRIEVANCE REDRESS AND CITIZEN ENGAGEMENT**

A framework on grievance redress mechanism has been suggested. Separate turn over time for different types of grievance redress and accountability has been fixed. This will help addressing grievances of the stakeholders on regular basis improving project functioning. The PMP will also involve citizen engagement in project monitoring, awareness building, and grievance redress so that any bottlenecks arising in course of project implementation can also be seen from an independent perspective facilitating achieving project outputs.

### **11.34 TRAINING AND CAPACITY BUILDING**

As mentioned earlier, general awareness on IPM in Afghanistan is low across the board. The farmers' knowledge and awareness on this is no better. It is only when some NGOs and donor-funded specific projects are implemented with a focus on IPM, then the knowledge and awareness of those specific professionals are enhanced. But such programs are localized, and not broad-based. Additionally, it is also not propagated that IPM tools offer viable alternatives before the farmers to consider from economic, cultural and environmental points of view. These are indeed national issues.

The OMAID project now provides an opportunity to overcome knowledge and capacity gaps on this issue and the geographic dimension of this project is fairly sub-national (5 Provinces), and they are well dispersed over the country. Besides, the trade and quality implications of the proposed outputs of this project are significant.

Based on the situational analysis of the context of the study, some training modules are suggested which though not exhaustive, yet they would be relevant. As the project is rolled out and practical experiences are gathered, there may be need for some additional skill-building which the PMU could decide subsequently.

The training and capacity building program will primarily involve PMP staff of OMAID and a few specialised personnel and scientist of PPQD on MAIL and academics drawn from the Agricultural Universities. The training program will largely be international training and exposure visits besides in – country training of the IPM extension staff/milk procurement supervisors to be recruited for OMAID.

### **11.35 IMPLEMENTING ONLINE PEST AND DISEASE SURVEILLANCE AND MITIGATION SYSTEM**

Presently, there is no online disease reporting mechanism within the network of MAIL. In the context of IPM, an on-line disease reporting system has been proposed through survey and surveillance where fluctuation of pest and diseases can be captured at a regular interval and suggest remedial measures.

Given the situation prevalent in Afghanistan, a pest and disease surveillance system has been proposed so that the planners and decision-makers could visualize a better regime of agricultural production through IPM. It is also to be recognized that if a system could be made operational, it would bring about significant changes in the internal production system in Afghanistan. It can also be deemed as “undertaking reform in the inherent agricultural production system”.

**The objectives of putting in place a pest surveillance system in the project areas are:**

- To identify existing and new species;
- To estimate crop losses;
- To assess pest population and damage at different growth stages of crops;
- To study the influence of agro-climatic parameters on pests;
- To observe changing pest status from minor to major;
- To monitor the development of type, resistance, resurgence;
- To assess natural enemies and their influence on pests;
- To evaluate the effect on new cropping system and varieties.
- To study the upcoming of exotic pests in the area

**The pest and disease surveillance system will contribute to following outcomes:**

- Identification of pest species;
- Determination of pest population;
- Understand the functioning of life system of pest species;
- Loss caused by the incidence based on ETL and EIL;
- Economic benefit through the control measures;
- Distribution prevalence;
- Level of incidence;

### **11.36 IMPLEMENTING IPM REGIME THROUGH PEST AND DISEASE SURVEILLANCE**

The proposed system will positively contribute towards implementation of IPM by transferring scientific knowledge and insights in tackling pest and disease issues instantly that emerge during different phases of plant growth, create a national archive on pest and disease incidence, crop-wise, season-wise, stage-wise for scientific analysis and building up of IPM model for further propagation and establish a benchmark. The potential of the model can also be expanded to accommodate other production enhancing sub-systems like agronomic characteristics so that it could become a diversified agricultural production system application for Afghanistan.

### **11.37 PROPOSED BUDGET**

The estimated total cost of PMP activities is 5.20 million USD. This consists of Technical Assistance (National) - estimated at 2.50 million USD, Technical Assistance (International) - - estimated at 1.14 million USD and M & E activities- - estimated at 1.29 million USD. The remaining two components are capacity building, estimated at 0.15 million USD and Demonstration Plot at 0.075 million USD respectively.

### **11.38 PRELUDE TO ARRIVING AT RECOMMENDATION**

The OMAID project is proposed to maximize the arena of productions system to open a wide scope of business opportunity in agricultural sector where large majority of the employment is created and family incomes are supported. Since opportunities of alternative employment are limited in activities other than agriculture, there is an urgent need to initiate reforms in the agro-processing sector in a manner that vertical integration is carried out in agricultural production, procurement, processing and marketing with the objective of generating maximum returns to the farmers and private entrepreneurs. This process however entails many challenges that need to be overcome while safeguarding environment, public health and natural resources.

The PMP that is presented through the report is a component of environmental protection which necessitates the application of IPM tools for improving quality of agricultural production and production of healthy crops which should not only safeguard our environment but also fetch higher returns to the farming communities. Implicitly, it drives a reform agenda and attempts to take the production systems into a different paradigm.

The present report contains such information as activities that are to be promoted under IPM, Clean milk production, manpower positioning, training and capacity building of the manpower and direct stakeholders, extension activities, demonstrations for IPM, job functions of the proposed PMP staff and broad estimate on the cost (not complete though). In subsequent section, some broad recommendations are made, which may not be exhaustive as sub components under the project is yet to be known, and also many new activities would emerge once the project is rolled out. The present recommendations should therefore be considered on the basis of above caveat.

### **11.39 RECOMMENDATIONS**

A lot of agricultural crops are produced in the country, but not adequate to meet domestic demand. Hence, production needs to be augmented many folds keeping in mind that production technology of agricultural produces should produce quality products which are economically profitable and environmentally sustainable. Even the quality of production of the existing crops can be improved through application of superior production technology wherein application of IPM tools come into being. This improves return of the farmers through higher price realization thanks to the OMAID project which intends to link the primary producers with the terminal market through procurement, sorting, grading, processing, packaging and finally reaching out to the consumers of national and international markets. These will be achieved through creation of different institutions right from the village level to intermediate level and provincial level (Agri-parks). It is therefore realized that strategically superior quality produces are to be encouraged beginning with application of IPM tools, which essentially integrates multi-pronged approach to agricultural production following scientific production frontier which is environmentally safe and sustainable. However, this requires sustained efforts in capacity building across the value chain, enhancing knowledge and awareness and above all institutional governance in a manner that producers' interests are unharmed. The OMAID project, being an open-ended approach towards creating market access, brings in this option before the Afghan farmers, and therefore it will be befitting if such option is explored with care and cooperation of all government departments and non-government institutions.

Economic benefits, to be accrued to the farmers, of such integration with the market is a tested and proven phenomenon elsewhere in the World, and it is probably an opportune moment for the Afghan farmers to be aligned with this concept. In the context of PMP, a few lines of recommendations are indicated in the succeeding section, which needs to be followed either singularly, or in conjunction with others for adopting a comprehensive strategy for developing agro- horticulture production frontier.

#### 11.40 CREATING ENABLING ENVIRONMENT FOR IPM

- Adopting best agricultural practices which have already been tested;
- Using the most acceptable cultural, mechanical management techniques in an improvised way;
- Exploring botanical pesticides as a prophylactic measure;
- Conserving, strengthening and using biological control agents especially for perennial orchards introducing potential parasitoids (viz, *Trichogramma*, *Bracon*, *Apantalis*, *Cotesia*, *Platygaster*, *Encarsia*, etc.), predators ( viz., *Chrysoperlla*, *Cryptolaemus*, predatory mites, etc.), microbial pesticides (viz., entomopathogenic fungi, Bt, NPV, etc.);
- Suggesting use of need-based application with eco-friendly and safe pesticides.
- Production technology of the valuable cash crops like mushroom and saffron is to be improved;
- Apiculture and vermicomposting techniques are to be improvised adopting modern technologies;
- Screening and inclusion of best crop variety befitting agro-climatic zones.
- Protecting storage crops by the physical method through exposing to sun or by country cooling system as appropriate for the respective crops/grains;
- Minimizing use of pesticides which is only possible after adopting the above-mentioned steps;
- Controlling the use of hazardous toxic pesticides strictly by enforcing laws;
- Stringent action is required to stop use of toxic pesticides, especially to stop its contamination with natural resources in virgin areas;
- Adequate measures are to be taken by PPQD to stop the entry of invasive pests in the country;
- Adequate infrastructural facilities are to be developed in the quarantine department to check and stop entry of unwanted pests and diseases;
- Train 10 Lead farmers per district in each zone in Pest Management practices using IPM tools and methodology.
- Creating a state of art laboratory in Kabul and in the project Provinces on pesticides quality control and residue analysis;
- Capacity building of staff of IPM division of PPQD through specialized training, field exposure and empowering them so that they can contribute significantly towards fulfilling PMP objectives.
- Undertaking sustained public awareness program in IPM approaches as an alternative to indiscriminate use of pesticides through mass media, TV, Social media, leaflets, public transport, and videos. In addition, community engagement in the mobilization of public opinion will also be done.

The responsibilities to comply with above recommendations would fall on OMAID/PPQD.

### 11.41 LABORATORY INFRASTRUCTURE

Access to scientific laboratory on pesticide quality and measurement of efficacy is grossly underdeveloped in Afghanistan. The gullible pesticide importers exploit this deficiency to their advantage. Testing of new pesticides that enter into the country often bypass the necessary clearance from pesticide regulator, a major problem in the country. Therefore, pesticide laboratories are to be set up not only at the HQ but also, they are to be placed at strategic locations for completion of laboratory compliances. One pesticide laboratory building has been constructed at *Badambagh*, Kabul under IAIDS project, which should be equipped with laboratory equipment and training of manpower needs to be organized. These laboratories would function as pests and diseases laboratories for introduction, augmentation, conservation and mass production of biological control agents Under OMAID, such options need to be provided so that they can be considered as subproject proposal. If any private investment is forthcoming in this segment, it would be desirable to explore that opportunity as well under OMAID project.

Border Quarantine Stations will need to be set up at some places while they should be equipped and operationalized to regulate and screen agricultural consignments entering into Afghanistan in respect of their potential spread of known and unknown pests within the country and also from Afghanistan to other countries.

In addition, biological laboratories need to be set up in all 5 Provinces to prepare biocontrol agents which could then be supplied to the farmers to mitigate pests and disease attack. This would provide synergy to achieving the outcome of PMP intervention.

Although no budget provisions have been made under the present PMP, it is felt that as part of PMP activities, OMAD could consider providing grants under sub-project investment plan to set up and equip range of laboratories in the country.

The responsibilities to comply with above recommendations would fall on MAIL/PPQD/OMAID.

### 11.42 STRENGTHENING INSTITUTIONAL FRAMEWORK FOR PMP IMPLEMENTATION

As we have seen, the present institutional strength, capacity and coordination among the actors among IPM implementation is missing. PPQD Department of MAIL will have to be strengthened with technical knowledge (laboratory and scientific knowledge), manpower, financial support to improve their capacities and such strengthening will need to be carried out across the provinces as well. It is therefore recommended that MAIL will have to be sensitized at the first instance so that adequate financial provision can be made by the Government. If financial provision from the Government becomes an issue, then OMAID will need to include this as part of sub-component to be funded under the project.

The responsibilities to comply with above recommendations would fall on MAIL & OMAID.

There are large numbers of FFS which are lying dormant. Under OMAID project, demonstration sites are to be created. Since FFS establishment is somehow in existence, it is recommended that all FFS will have to be revived so that producer members could use these FFSs as model demonstration units for IPM. These FFSs could also be used for carrying out new experiments on mitigating pest and disease attacks and also demonstrating the production of healthy crops. The justification of creating some islands of excellence for showcasing and demonstrating to the farmers cannot be ignored and it is suggested that this



be considered as part of sub project activities under PMP. For each agro-climatic zone, such islands will have to be established. These FFSs will be used to organize season-long Training of Trainer courses (TOT) in IPM technology for the country as a whole.

The responsibilities to comply with above recommendations would fall on MAIL.

Unless the vigilance at the border point is strengthened against the illegal entry of contraband pesticides, unlabeled pesticides without any risk marking, the PMP plan under OMAID will render ineffective. Apparently, this practice is pervasive across all stakeholders. It is therefore necessary that the entry of the contraband pesticides, unlabeled pesticides and harmful agrochemicals are screened at the entry point. The pesticide and drug inspector at the customs office will have to conduct due diligence so that such prohibited pesticides/ unlabeled pesticides are denied entry. It is also to be mentioned that pesticide policy of GoIRA provides for ban of prohibited pesticides/un-labelled pesticides and pesticides whose expiration dates are tampered. Therefore, custom regulations will have to be enforced rigorously so that the country is protected from spurious and harmful use of pesticides and agrochemicals. *The responsibilities to comply with above recommendations would fall on Ministry of Finance.*

#### **11.43 PESTICIDE LICENSE**

The traders bring new pesticides without the approval of the concerned authority of the Government. This has been shared unequivocally by almost everybody in this business. The pesticides importer with their cross-country network and financial muscle power, circumvent local rules and regulation. The pesticide licensing division of NEPA is not capable to handle this menace. At the same time, any adverse effect of a new pesticide on environment and public health is not known. The role of Ministry of Finance comes in significantly to prevent entry of illegal and undefined pesticides into the country. So, unless strong punitive actions against these traders/smugglers/bootleggers are initiated, the present practice shows an ominous trend, despite best efforts that will be made under OMAID project. However, if domestic environment is to be protected, illegal importation of new pesticides has to be controlled forthwith. The HEC of OMAID will have to pursue with the concerned Ministry to enforce this provision rigorously. *The responsibilities to comply with above recommendations would fall on OMAID/Ministry of Finance.*

#### **11.44 FORMULATING IPM POLICY AT THE NATIONAL LEVEL**

The GoIRA will need to formulate IPM policy at the national level as the time is now opportune for initiating activities in this regard. The need becomes apparent as the country envisages faster growth in income which needs to be driven by an exportable surplus of Agri horticultural products. This is to be backstopped by producing high quality produces for which adoption of IPM regime is critical. MAIL through their PPQD division needs to drive this policy to be implemented through provincial directorates of PPQD. With policy support on IPM at the national level, lot of other support services will also need to be organized especially in regard to training, capacity building, field demonstration, advisory services in package of practices and finally, realizing better prices for the Agri horticultural produces. *The responsibilities to comply with above recommendations would fall on MAIL.*

#### **11.45 STRENGTHENING UNIVERSITY FACULTY AND IPM CURRICULUM**

Given the necessity of producing high-quality agricultural outputs of international standards for export purpose, significant knowledge will need to be acquired by the teaching community and research personnel and the students. It is therefore necessary that some faculty is identified for advance training on application of IPM tools for managing pests and diseases while maintaining environmental balance and protecting public health from contamination. It

is reported that the IPM tools, as a means to improve agricultural productivity is not adequately reflected in teaching curriculum at the graduate level. This would call for a review of the existing curriculum, and inclusion of appropriate teaching and knowledge enhancing courses on IPM to generate proper appreciation of IPM tool for quality production. *The responsibilities to comply with above recommendations would fall on OMAID/Ministry of Higher Education.*

#### **11.46 DONOR AGENCIES IN IPM IMPLEMENTATION**

Specific agricultural development programs have been funded by donor agencies. Many donor agencies have provided for the application of IPM tools as a medium for environment safety and mitigating concerns for public health. Somehow, these experiments die out after the project tenure is completed. They are also not documented, disclosed in public domain. These discrete experiences are to be documented and lessons learned need to be shared across the concerned institutions/departments/stakeholders. Since, under OMAID project, considerable emphasis will be given on implementation of PMP it will be useful if these events are documented properly and a repository is made on these experiments and their results. A special study could be organized to be conducted through an outside consultant. *The responsibilities to comply with above recommendations would fall on OMAID.*

#### **11.47 PUTTING IN PLACE PEST & DISEASE SURVEILLANCE SYSTEM**

As part of IPM implementation, a model pest and disease surveillance system has been proposed to generate wealth of information in the areas of identifying existing and new species, assessing pest population and damage at different stages of crop cultivation, observing changing pest pattern from minor to major and evaluating effect of new cropping system and varieties and related areas. Under the proposed system, feedback will be directly provided to the farmers on a real-time basis (within 24 hours of reporting) so that scientific preventive measure will be communicated to the affected farmers, minimizing crop damage and protecting income loss. Somehow, this has been missing in the country. This will enable agro-climatic zone wise occurrence of pest and disease identification, which will be required for evolving appropriate policies for mitigation. Additionally, mammoth data that will be generated will become a national treasure on pest and disease incidence and their correlation with other variables in the environment, enabling building up complex pest and disease forecasting models. Once a consensus is arrived on the implementation of the proposed model, estimated cost and other requirements can be worked out by the PMU in consultation with IPM team. *The responsibilities to comply with above recommendations would fall on OMAID.*

#### **11.48 PUTTING IN PLACE ICT BASED MILK TESTING MECHANISM**

Given the necessity to improve quality of milk production, collection and processing of milk into value-added milk products, maintaining quality standard in milk is essential. Besides, the milk producers will need to be paid according to the quality of milk that they would supply through the proposed milk collection system. Therefore, testing of fat & solid not fat and also milk contaminants are necessary. The ICT based milk collection system has therefore been proposed which will immensely benefit all stakeholders in the milk value chain and the milk producers will receive fair prices for their supplies. It is therefore recommended that milk collection system should be modernized with use of ICT based on line milk collection system so that the processors would be in a position to get procurement data on daily basis for their plant operations and allocation of raw material for different value-added products. *The responsibilities to comply with above recommendations would fall on OMAID.*

### 11.49 ENFORCING LEGAL PROVISIONS OF PESTICIDE LAW

The Pesticide Law of 2015 provides for a sound legal platform on which a healthy and judicious practice on pesticide use can be popularized in Afghanistan. The Law provides for an Empowered Committee on Pesticide with representation from concerned Ministries, academia, research institutions, technical experts to regulate orderly use of pesticide without causing environmental degradation and safeguarding public health. The pesticide inspectors are authorized to conduct spot checks on pesticide retailers' and wholesalers' premises to ensure compliance of the protocol and guidelines laid out as per the Law, and report to the Pesticide Committee. A critical review of the provisions contained in the Law does not reveal any apparent gap, but the reality is that the Law is dogged by weak enforcement. In fact, the governance of pesticide rule and regulations are rarely followed, thereby making the Law ineffective and unresponsive to safeguarding the interests of the country. This is an area where OMAID project has to drive reform by using good offices of HEC to make various provisions under the law enforceable in the country.

In Pesticide Law, there is no provision that the importers will have to import bio pesticides along with their normal consignment. It is felt that with such provision in the Law there will be induced demand for bio pesticides in the country. This may have to be explored through one of the functional agenda of the Pesticide Committee, as per the provisions of Pesticide Law. *The responsibilities to comply with above recommendations would fall on MAIL/OMAID.*

#### Harnessing synergic relationship between apiculture and horticulture production

It is empirically established that technology of apiculture production and horticulture production are highly correlated. In other words, the two productions sub-systems are mutually beneficial to each other which gives additional mileage to the farmers. Although we have not come across evidence showing the complementarities between these 2 economic agents in Afghanistan, there is numerous evidences elsewhere in the World in this regard. From this *a priori* knowledge, we suggest that apiculture needs to be promoted in Afghanistan simultaneously with horticultural crops. In the context of OMAID project, relationship between these 2 crop cultivations and their synergic relationship could become an area of applied research.

Though, in most cases, the horticulture crop growers use toxic pesticides to protect their crops from pest infestation, especially during flowering stage when there would be maximum influx of bee population. Therefore, growers are advised to consider safety of bee population since these bee populations are their friends which act as pollinator and enhance productivity. Therefore, considering the beneficial role of bee population, an alternative measure is to be taken by selecting eco-friendly pesticides like HMO, Lime Sulphur, etc. which would not be harmful for bee population. As bee is an important pollinator of horticulture crops, especially apple, pistachio, apricot, pomegranate, grape, almond, etc, presence of bee population helps in fruit setting for higher production- a symbiotic relationship which the OMAID project would like to capitalize. The bee growers and horticulture crop growers are to be sensitized on these two mutually beneficial existence of these organisms in the ecosystem. *The responsibilities to comply with above recommendations would fall on MAIL/OMAID.*

## ANNEX I

### List of Pesticides and Other Chemicals Banned or Severely Restricted in Use

It is illegal in The Islamic Republic of Afghanistan to Import, Manufacture, Formulate, Offer, hold on Stock, Sell, Use or Advertise the following Banned Chemicals, but unfortunately, it is not enforced:

Pesticide/ Chemical Compound Banned	
1. 2,4,5-T (2,4,5 Trichlorophenoxyacetic acid)	26. PARATHION-METHYL (Toxic Oregano-Phosphorus Pesticide present in "Spiridon")
2. ALDRIN	27. HCH
3. ALDICARB	28. HEPTACHLOR
4. BENOMYL+CARBOFURAN+THIRAM Formulation	29. HEZACHLOROBENZENE
5. BENZENE HEXACHLORIDE	30. LINDANE (Present in Thiodal form Senegal)
6. BINAPACRYL	31. MALEIC HYDRAZIDE
7. CALCIUM CYANIDE	32. MENAZONE
8. CAPTAFOL (80% Powder)	33. MERCURY COMPOUNDS
9. CABOFURON (50% SP)	34. METHAMIDOPHOS FORM
10. CHLOROBENILATE	35. METHOMYL 12.5% L
11. CHLOROBROMOPROPANE	36. METHOMYL 24% L
12. CHLORODANE	37. METHYL BROMIDE
13. CHLORODIMEFORM	38. METHYL PARATHION
14. COPPER ACETOARSENITE	39. MONOCROTOPHOS and its Formulations
15. DDT (Persistent Organo-Phosphate, found in Cock Brand Coil from PRC)	40. NICOTIN SULFATE
16. DIELDRIN	41. NITROFEN
17. DINOSEB	42. PARAQUAT DIMETHYL SULFATE
18. DINOSERBY SALTS (DNOC and its salts)	43. PARATHION
19. ENDRIN	44. PENTACHLORO-NITROBENZENE
20. ETHYL MERCURY CHLORIDE	45. PENTACHLOROPHENOL
21. ETHYL PARATHION	46. PHENYL MERCURY ACETATE
22. EHTYLENE DIBORMIDE (EDB)	47. PHOSPHAMIDON
23. ETHYLENE DICHLORIDE	48. SODIUM METHANE ARSENATE
24. ETHYLENE OXIDE	49. TAA (Trichloro Acetic Acid)
25. FLUOROACETAMIDE	50. TETRADIFON
	51. TOXAPHENE

Source: Plant Protection and Quarantine Department of the Ministry of Agriculture, Irrigation and Livestock, Islamic Republic of Afghanistan

(Source: Plant Protection and Quarantine Department; HLP's Agrochemical survey 2009, and ASAP-PERSUAP).

## ANNEX II

The “DO” and “DO NOT DO”

DO NOT DO – Examples of elements that may contribute to a policy environment that encourages reliance on pesticides

- Pesticide use is directly or indirectly subsidized
- Inadequate pesticide legislation or weak enforcement of legislation to control import, distribution, handling and use of pesticides
- Requesting/accepting donor support in the form of pesticide donations, (i) without adequate assessment of actual requirements, (ii) without paying adequate attention to non-chemical alternatives, (iii) without appropriate pricing of these pesticides to avoid unnecessary use induced by availability at below-cost prices
- Government agricultural programs and associated budget allocations emphasize input supply more than farmer training in IPM
- Absence of IPM extension, as a result of which farmers have little or no access to information about alternative approaches that reduce reliance on chemical control
- Extension schemes/programs/messages are oriented towards chemical control
- Agricultural advisory services for extension staff and/or farmers have a financial interest in selling pesticides (e.g.: extension advice is provided by private sector entities that sell pesticides; extension staff receives commissions on pesticide sales)

DO - Examples of policy elements that reduce biases towards chemical control

- Social and environmental costs internalized in prices through polluter pay tax
- Enforcement of pesticide legislation
- Enforcement of food safety legislation regarding pesticide residues (quality control)
- Enforcement of environmental protection legislation
- Emphasis on development of agroecosystem management skills and knowledge
- Establishment of formal policies on IPM covering inter-agency coordination and common agendas’ incentive systems, regulatory and information systems for sustainable agriculture, generation and dissemination of appropriate approaches and technologies
- Encouraging research on the economics and the environmental and health impact of different plant protection approaches and make this information available
- Development of an effective regulatory framework to enhance food safety and to reduce risks related to the distribution, handling and use of pesticides
- Orienting agricultural research, in general, to be more demand-driven and with greater beneficiary participation.

(Source ‘Pest Management Guidebook’ <http://web.worldbank.org>)

**ANNEX III**

Allowed pesticides found during the survey of Market by AAIP and PPQD of MAIL, during a survey conducted during the year 2017-2019

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
1	acetamiprid	Acetamiprid	Insecticide	III	China	Aphids, bed bugs, Thrips, Whiteflies
2	Bestox	Alpha cypermethrin	Insecticide	II	Pakistan	Thrips, leaf miner etc.
3	Beta khushkyar	Beta cypermethrin + Propoxur	Insecticide		China	Bettle, grasshopper, rootboror, stemboror, etc.
4	Bifenthrin	Bifenthrin	Insecticide	II	China	aphids, worms, ants, moths, beetles, earwigs, grasshoppers, mites
5	Siven	Carbaryl	Insecticide	II,III	China	Apple aphid, Mealybugs, Leafhopper, Thrips Grasshopper, Armyworms, Corn earworm
6	Zubin	Cyfluthrin	Insecticide		Iran	flies, corn earworms, tobacco budworm, codling moth, European corn borer
7	Advantage	Carbosulfan	Insecticide	II	Pakistan	Aphids, scales, whiteflies, leafhoppers, mealy bugs, Leaf miners
8	Cypermethrin	Cypermethrin	Insecticide	II	Pakistan	Thrips, leaf miner, cutworm, bettle, midges, mosquitoes, Fruit flies, Codling moth, American Bollworm

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
9	Padan	Cartap Hydrochloride	Insecticide	II	China	rice-leaf beetle, Stem Borer and Leaf Folder, Diamond Back Moth, Leaf Miner, Mealy Bugs, Armyworm, Green leafhopper
10	Chlorpyrifos	Chlorpyrifos	Insecticide	II	China	Mealybug, grasshoppers, leafhoppers, armyworms, cutworms, San Jose scale,
11	Diafenthiuron	Diafenthiuron	Insecticide	II	China	whiteflies, aphids, thrips, and Jassids
12	Dinadim	Dimethoat	Insecticide	II	China	Locust, sun pest
13	Nagos super	Dichlorvos	Insecticide	I	Pakistan	Thrips, whitefly, scale, aphids, mites, mealy bugs, ticks, crickets, fleas, flies.
14	Deltamethrin	Deltamethrin	Insecticide	II	China	aphids, mealy bugs, Codling mot, whitefly. American bollworm, grasshopper,
15	We –DDVP	DDVP	Insecticide	I	China	Grasshopper, thrips
16	Ethion	Ethion	Insecticide	II	China	leaf-feeding insects, mites, aphids, scales, thrips, leafhoppers, maggots and foliar feeding larvae
17	Emamectin	Emamectin benzoate	Insecticide	II	Pakistan	Aphid, Conifer Mites, Japanese

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
						Beetle, Gypsy Moth
18	Esfenvalerate	Esfenvalerate	Insecticide	II	China	moths, flies, aphids, Asian lady beetles, bedbugs, beetles, etc
19	Fenvalerate	Fenvalerate	Insecticide	II	China	control of chewing, sucking, and boring insects (particularly Lepidoptera, Diptera, Orthoptera, Hemiptera, and Coleoptera)
20	Antracol	Fipronil	Insecticide	II	China	ants, beetles, cockroaches, fleas, ticks, termites, mole crickets, thrips, rootworms, weevils, etc
21	Belal pearl	Imidacloprid	Insecticide	II	China	Sun pest, locust, aphid, termite, thrips, weevil, Colorado beetle,
22	Lambda cyhalothrin	Lambda Cyhalothrin	Insecticide	II	China	butterfly larvae, Aphids, Whiteflies & Hopper, mosquitoes, ticks, and flies, Rice Stalk Borer,
23	Lufenuron	Lufenuron	Insecticide	III	China	control of Lepidoptera and Coleoptera larvae on cotton, maize and vegetables; and citrus whitefly and rust mites on citrus fruit,



S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
24	Lannate	Methomyl	Insecticide	I & III	China	Whitefly, Blotch Leaf miner, Aphids, Weevil Larvae, Loppers, White Cutworm, etc
25	Malathion	Malathion	Insecticide	II	Iran	thrips, leafhopper, codling moth, beetle, cabbage loppers, mits, aphid
26	Tiadan	Monosultap	Insecticide	II	China	Cabbage butterfly, amonblack moth, etc
27	Supercide	Methadithion	Insecticide	II	China	San José Scale apple, Orange Fruit Borer, Mealybug and Black Citrus Aphid.
28	Summer oil	mineral oil	Insecticide /oil		Iran	Rust Mite, Greenhouse Thrips, Young Mealybugs, Citrus Red Mite, Scale Insect
29	Propetamp hos	Propetamphos	Insecticide		China	
30	G-Phos	Profenophos	Insecticide	II	Iran	Black bug; Early shoot and stalk borer; Whitefly; Root grub; Grey Weevil. Shoot and fruit borer
31	Permethrin	Permethrin	Insecticide	II	Iran	kill ticks, mosquitoes, chiggers, mites
33	Winter oil	Paraffinic Petroleum Oil	Insecticide /oil		Iran	aphids, mites, whiteflies, Scale Insect, San Jose Scale and soft-body insect etc
34	Dimet	Phorate	Insecticide	Ia	China	Worms,

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
35	Superiority	Pyriproxyfen	Insecticide		Pakistan	
36	Noor green	Sex pheromon	Insecticide		China	
37	Trymethoate	Trymethoate	Insecticide	none	Germany	
38	Thiodicorb	Thiodicorb	Insecticide / Ovicide/ Molluscicide	II	Iran	Bollworm, budworm, corn ear-worm, black cutworm, slug
39	Capital plus	Triazophos38.5Betacyfluthrin2	Insecticide	II	Pakistan	Cotton pink boll worm Whiteflies, nematodes, Shoot & Fruit Borer, Jassids, Aphid, etc.
40	Dipterex	Trichlorfon	Insecticide	II	China	Cutworm, Leaf miner, Fruit fly, Armyworm,
41	Dazzle	Thiomectoxan	Insecticide		China	
42	Varunastra	Verticillium lecanil	Insecticide	Bio-pesti	Turkey	aphids, Jassids, thrips, whitefly, mites, wooly aphid.
43	Nanok	Azoxystrobin	Fungicide	U	Pakistan	rice blast, rusts, downy mildew, powdery mildew, late blight, apple scab, and Septoria
44	Super bandazim	Carbendazim	Fungicide	U	China	powdery mildew, leaf spot, blight, early blight of tomato, anthracnose, gray mold
45	Bordou mixture	Copper Sulphate	Fungicide	U	Iran	Fire blights, Leaf curl, Peacock spot, snails & Slugs, downy mildew,

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
						powdery mildew
46	Copper oxychloride	Copper oxychloride	Fungicide	III	Pak	Bacterial blight, Angular leaf spot, Bacterial wilt, Downy mildew, Early and Late blight, Bacterial canker, Brown rot, Peach leaf curl, Powdery mildew fire blight
47	Captan	Captan	Fungicide	U	China	Downy mildew, Late blight, Early blight, Scab, shoot hole, rots
48	Moltovin	Cymoxanil	Fungicide	III	Pakistan	grape downy mildew and late blight of potato and tomato
49	Cuproavit blue	Cuproavit blue	Fungicide	II	China	brown rot blossom blight of peach caused by Monilinia fruticola
50	Boostan	Diconazole 2.5% +mancozeb 30%	Fungicide		China	Powdery mildew, downy mildew, Leaf spot, etc.
51	Haxaconazole	Haxaconazole	Fungicide	III	China	Powdery mildew, Blaster blight, Blast, Sheath blight, Leaf spot, Rust, Scab and wilt
52	Kersoxim methyl	Kersoxim methyl	Fungicide	III	Iran	Powdery mildew
53	Mancozeb	Mancozeb	Fungicide	U	China	Powdery mildew, downy mildew, Sheath blight, Leaf spot,
54	Metalaxyl	Metalaxyl	Fungicide	III	China	Potato & tomato late blight, Root

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
						rot of Soybean, and Blue mold of tobacco.
55	Polyrom	Metiran	Fungicide	U	Pakistan	Control of fungal diseases such as scab, rusts, rots, Downy mildew, shoot hole, early blight
56	Hetazeb	Metazeb	Fungicide	III	China	Late blight, Downy mildew
57	Penconazole	Penconazole	Fungicide	II	China	powdery mildew, pome fruit scab and other pathogenic Ascomycetes, Basidiomycetes and Deuteromycetes on vines, pome fruit, stone fruit.
58	Stalco	Pyrimethelin	Fungicide	U	China	
59	Sulphur	Sulfux	Fungicide	U		Fungus Protective
60	Vitavax Thiram	Thiram	Fungicide	III	China	Seeds treatment
61	Tebuconazole	Tebuconazole	Fungicide	III	Iran	Smuts
62	Topsin-M	Thiophanate –methyl	Fungicide	III	China	powdery mildew, blight or gray mold and apple scab
63	Mask	Tricyclazole	Fungicide		China	
64	Agromeltan	Wettbl sulfur	Fungicide	U	Germany	powdery mildew, scab, rusts, Brown rot etc
65	Zineb	Zineb	Fungicide	U	China	Powdery mildew
66	Kumulus DF	گندھک	Fungicide		Germany	powdery mildew
67	Acetochlor	Acetochlor	Herbicide	III	Iran	Broadleaf weeds
68	Gengwei	Atrazine	Herbicide	III	Pakistan	control most annual

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
						Broadleaf and Grass weeds
69	Butachlor	Butachlor	Herbicide	III	Iran	annual grass weeds and some broadleaf weeds in direct seeding or transplanting paddy fields.
70	Bentazone	Bentazone	Herbicide	III	Iran	Broad leaf weeds
71	Loxoril	Bromoxynil	Herbicide	II	China	annual broadleaf weeds
72	Super puma	Clodinafop-propargyl	Herbicide	II	China	oats, rough meadow-grass, Italian rye-grass, etc.
73	Illograss	Diclofop – methyl	Herbicide	III	China	Wild Oat, Common Barb grass, Annual Ryegrass, etc.
74	Swift	Fenoxaprop –p-ethyl	Herbicide	III	Pakistan	Narrow-leaf weeds: yellow foxtail, Volunteer corn, barnyard grass, wild oat, lesser canary grass
75	RoundupC T XTRA	Glyphosate	Herbicide	III	China	Water soluble herbicide for non-selective control of many annual and perennial weeds (Barley grass, Wild oat, Annual ryegrass)
76	Super Haloxy	Haloxypop –r- methyl	Herbicide		China	Avenafatua (Common wild oats), Triticumaestivum (Volunteer wheat)
77	Ko- koril	Koril	Herbicide		China	Broadleaf weeds
78	Loxynil	Loxynil	Herbicide	II	China	Creeping bentgrass,

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
						bromussterilis, onion couch, annual meadow grass, etc
79	Super killer	Metsufuron	Herbicide	III	China	Broadleaf weeds
80	Oxyfen	Oxyfluofen	Herbicide	II & III	China	annual grasses and broadleaf weeds
81	Oxidiazon	Oxidiazon	Herbicide	U	Iran	Annual Grasses, Annual Broadleaf Weed
82	Parquat	Parquat	Herbicide	II	China	Annual grass, broadleaf weed control, Columbus Grass, Milkweed (2-3 leaf),
83	Paindor	Pendimethalin	Herbicide	III	China	control annual grasses and certain broadleaf weeds
84	Scotts	Quizalafop –p-Ethyl	Herbicide	III	Pakistan	Annual Ryegrass, Volunteer Barley, Volunteer Wheat, wild oats( Avenasp),
85	Dual gold	S-metlachlor	Herbicide	U	Pakistan	Controls certain annual grasses and broadleaf weeds in certain crops
86	Sethoxydim	Sethoxydim	Herbicide	III	Iran	Broadleaf weeds
87	Image	Sulfosulfuron	Herbicide		China	
88	Trifluralin raja	Trifluralin	Herbicide	III	Iran	Broadleaf weeds
89	Tribenuron methyl	Tribenuron	Herbicide	III	China	Broadleaf weeds
90	Topas prowaite	Tetradifon	Herbicide		Iran	
91	Teinenuron	Teinenuron- methyl	Herbicide		China	
92	2,4-D	2,4-D	Herbicide	II	China	Xanthium strumarium,

S.no	Active ingredient	Trade name of the pesticide	Category	Class Who	country	Target pest
						Broad-leaved purple vetch, Blue weed, etc.
93	Abamectin	Abamectin	acaricide	II	China	Mite, leaf miner, Red spider
94	Dicofol	Dicofol	acaricide	III	Pakistan	mite, Spider, Tomato mite, red spider mite
95	Fenproprathrin	Fenproprathrin	acaricide	II	Iran	Asian Lady Beetles in Grapes, mites
96	pyradabin	Pyradabin	Acaricide	II	China	Phytophagous mites,
97	Propargite	Propargite	Acaricide	III	Pakistan	Mites, spider mite etc.
98	Fenpyroximate	Fenpyroximate	Acaricide		Iran	Mites
99	Weather blok XT	Brodifocoum	Rodenticide	II, III	America	Rate, House Mice, Roof Rats, etc
100	Commando	Zinc phosphate	Rodenticide	Ia	India	Rate, House Mice etc.
101	Potassium carbonate	Potassium china	N/A		China	
102	Termite killer	Chloropyrifos	Termiticide	II	Pakistan	termites
103	Tenekil plus	Poly chlorinated hydrocarbon (chloropyrifos)	Termiticide	II	Pakistan	termites
104	Metadehyde	Metadehyde	Molluscicide		Iran	slug and snail

The above list is updated and approved and released by PPQD, MAIL in 2019

Ia = Extremely Hazardous, Ib = Highly Hazardous, II = Moderately Hazardous, III = Slightly Hazardous, U = Unlike Hazardous

## ANNEX IV

### Principles of Integrated Pest Management (IPM)

Sustainable agriculture requires that today's production needs are met while *improving* the production resource base for future generations. IPM, as a cornerstone of sustainable agriculture, seeks to improve farmer practices in order to create higher profits while not only protecting but *improving* environment quality and community health. In order to do this IPM implementation is based on four practical principles:

- Grow a healthy crop
- Conserve natural enemies
- Observe fields regularly
- Farmers become experts

These principles describe the main actions of IPM implementation. Each principle is described below.

**Grow a Healthy Crop:** healthy crops rarely attacked by pests. When crop is healthy, allows plants to recover better from environmental or pest injury, avoids nutrient deficiencies related with pest attack (insects and disease), and promotes natural defenses to many insects and diseases inherent in plants. Proper crop and plant management methods include using proper fertilizers (chemical and organic), irrigation, use of sanitation practices (removal of crop debris) and soil management which are critical for healthy plants. A healthy crop can *resist* diseases and *compensate* for damage caused by pests so that plant injury does not always lead to yield-losses. A robust healthy crop is the first step in IPM methods and foundation for an optimal yield.

**Conserve Natural Enemies.** In all agricultural ecosystems, there are predators, parasites and diseases which attack eggs, larvae, nymphs, pupae, and adult stages of insect pests. There may also be micro-organisms that work against disease-causing pathogens. These "natural enemies" often occur naturally in fields and they are the "friends of farmers" because they may biologically control plant pests. Learning to recognize and manage these natural enemies is one major focus of IPM training so that they are not destroyed by unnecessary applications of pesticides but are allowed to work for the farmer's benefit.

**Observe Fields Regularly:** field observation is necessary to assess crop development, pest (including insects, diseases and weeds) and natural enemy populations, and weather or climatic conditions. Observations should determine how the crop is growing and if there are pests causing yield-loss; remembering that not all crop injury causes yield-loss. Proper assessments must be made to effectively and profitably manage the use of inputs such as labor, quality seed, resistant/tolerant varieties, fertilizers, drainage or irrigation systems, community organizing and pesticides in order to ensure profitable production. Inputs used are based on an ecological and economic assessment. Observation skills and decision-making skills are key elements to becoming an expert IPM farmer and require field level practice for most farmers and extension staff.

**Farmers become Experts** it is crucial for modern agriculture in which farmers are responsible for farm-level management. Future gains in yields, profits, and sustainability will be the result of farmers making better use of available and new technologies and (limited) resources. More emphasis in all agriculture programs must be placed on the ability of farmers to make better



decisions, increase their own efficiency, and become better managers. Expertise implies a basic understanding of the agro-ecological system, and decision making processes. The future of food production and food security will depend on how well farmers can innovate and manage systems. IPM is implemented by farmers and thus requires an emphasis on farmers' skills and knowledge.

These are some of the basic concepts and assumptions in IPM implementation such as:

- IPM is not a "packaged technology" that is "adopted" by farmers. IPM is a process of decision making and farming which is gradually improved with greater ecological knowledge and observation skills.
- IPM skills and concepts are best learned, practiced, and debated in the field. The field is the best teacher. Stay away from energy-intensive multi-media lecture halls!
- Season-long training courses allow all plant pest development processes and management to be observed and validated over time. IPM training must be carried out in overall crop stages.
- Farmers must be allowed to actively participate and share their experiences during training to achieve maximum interest and effectiveness. Local or indigenous knowledge of the environment, varieties, pests, etc. must play a major role during decision making.
- Facilitators must not lecture but should facilitate a process of learning. Facilitators do not convince farmers, but rather provide structured experiences so farmers can test IPM methods and convince themselves about which are useful and which are not.
- Young facilitators must have a method of working in a respectful manner in groups that often include person older and more experienced than themselves.

Reference: Facilitators' FFS Manual, Regional Integrated Pest Management Program in the Near East/GTFS/REM/070/ITA.

## **ANNEX V**

### Best Agriculture Practices:

- a. Select healthy -good quality seeds/ saplings
- b. Prepare land according to the requirement of the crop/orchard
- c. Maintain proper plant to plant and row to row spacing
- d. Adopt Good fertilizers a/ micro-nutrients management
- e. Add organic matters to the soil
- f. Go for good irrigation/water management
- g. Initial information about the pest-types of pests / proper identification
- h. Monitoring pests /damages.
- i. Visit the field /orchards regularly / at least once a week
- j. Keep proper record of the pest and treatment
- k. Clean culture/ maintain good hygiene in the orchard/field
- l. Adopt a good drainage system
- m. Maintain a good crop rotation system

## ANNEX VI

Some IPM Tools in the Toolbox are:

1. Cultural Practices
  - Destruction of plant residue
  - Destruction of weeds
  - Improvement in storage/cleaning
  - Tillage
  - Crop rotation
  - Change in sowing time
  - Nutrient management
  - Water management
  - Trap and mixed cropping
  - Training and pruning
  - Harvesting time
  - Use of healthy seed/seedling
  - Seed rate
  - Sanitation
2. Mechanical methods
  - Manual destruction
  - By shaking of plants
  - By trench making
  - Use of traps
  - Flooding
  - Bagging
  - Use of barriers
  - Netting around the trees
  - Mulching
  - Use of sweeping nets
3. Physical method
  - Heat, Cold, Humidity, water wash
  - Energy and sound creating
  - Use of light traps
  - Use of different colors
  - Sieving soil and seeds to separate larvae or eggs of insects
4. Biological control methods
  - Parasites/Parasitoids(Arthropods)
  - Predators
  - Microbes
5. Resistant cultivars
6. Regulatory methods
  - Plant and animal quarantine
  - Eradication and suppression program
7. Botanical pesticides (Neem, Pyrethrum, Datura, Ponogram, Castor apple, Tobacco extract Rotenone, etc)
8. Use of biotechnology
  - Transgenic crops (genetically modified crops)
  - Bt toxin

- Genetically modified organisms
9. Chemical control
- Attractants
  - Repellents
  - Insecticides
  - Fungicides
  - Bactericides
  - Sterilants
  - Growth inhibitor

## ANNEX VII

### Pest Management Check List: An Illustrative Template

<p><b>A. Location Details</b></p> <p>Country: _____</p> <p>Province: _____</p> <p>District: _____</p> <p>Village: _____</p> <p>Agri Park: _____</p> <p>Farmer Collection Centre (FCC): _____</p> <p>Rural Transformation Hub (RTH): _____</p> <p>None: _____</p> <p>Attached with Farmer Producer Organisation (FPO): Yes No</p> <p>Name of FPO: _____</p> <p>Name of Extension Officer: -----</p> <p>Date: _____</p>	<p><b>B Farmer Details</b></p> <p>Name: _____</p> <p>Village: _____</p> <p>District: _____</p> <p>Mobile No: _____</p> <p>Landholder/Lease holder/Sharecropper: _____</p> <p>Irrigation Source: _____</p>	<p><b>C. Crop Details</b></p> <p>Name of Crop: _____</p> <p>Area Cultivated (Jerib): _____</p> <p>Variety: Improved/Local</p> <p>Sowing Month: _____</p> <p>Harvest Month: _____</p> <p>Quantity Sold (Kgs): _____</p> <p><b>D. Fruit Crops</b></p> <p>Name of Fruit: _____</p> <p>Area Cultivated (Jerib): _____</p> <p>Type of fruits: _____</p> <p>Harvesting Month: _____</p>	
<b>PMP Components</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
Previous History of Pest Known			
Pest Noticed during the crop season			
Pest Identified			
Natural enemy noticed			
Natural Enemy Identified			
Conservation of natural enemy followed			
Any IPM tool used			
Group of Pesticide Applied			
SOPs of pesticide use followed			

PPE used			
Apron used			
Hand Gloves used			
Head, nose, and ear covered			
Any New unfamiliar Agrochemicals used			
Is the new agrochemicals approved by NEPA/MAIL?			
Does the agrochemical contain Toxic label (Red, Yellow, Green, etc.)			
Adversely affect microorganism of soil			
Adversely affect groundwater			
Adversely affect surface water			
Adversely affect consumers' crops (residues in vegetables & fruits)			
Provide benefits to men & women			
Environmental Sensitivity of the Area			
The sensitivity of the area identified and discussed with the producer (Forests, Pasture, Rivers, Wetlands, etc.)			
Soil Quality tested after application of Pesticide			
Surface Water Quality tested after application of pesticide			
Ground Water Quality tested post-application of pest			
Adverse Effect on Beneficial organism tested			
Local regulation of Pest Control known (DAIL/MAIL or Community Development Councils)			
Local regulation, control followed (MAIL or Village Development Council control)			
Farm Workers or Pest Applicators oy Bystanders are adequately protected			
Risk of exposure of non-target species, both on and off-site, has been assessed and reduced.			
Habitants in the area protected			
RE- entry period set up and practiced			
PMP during storage of Grain			
Grains are stored			
Any pest infestation observed			
Mitigation of pest done			

Knowledge of pest prevention during storing of grain		
Natural process adopted		
Pesticides Used		
Disinfection done		
Milk quality-related checklist		
Manual milking done		
Milk vessels cleaned before milking		
Stainless steel vessel used		
Hand washing of the milker done?		
Vessels covered after milking		
Teats of cows washed before milking		
Machine milking used		
Milk testing done		
Test results are within prescribed limits		
Milk Collection Centre present		
Boiling done to kill microbes		

**Note:**

- (1) The above checklist has been prepared on the basis of consultant's assumptions which need to be fine-tuned once the profile of the subprojects to be prepared would be completed.
- (2) The above checklist will have to signed by a Pest Management Specialist with date
- (3) Frequency of certification can be decided after the subproject components are rolled out for implementation (annual or bi-annual or quarterly)
- (4) This certification may be linked with Payment. However, details of such an arrangement will need to be worked out considering practices that are followed under similar project conditions of the World Bank.
- (5) This will have to be modified by the Project PMP Specialist once the project is rolled out.

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