Technology Fact Sheet for Adaptation

D. Integrate Pest Management (IPM)[i]

Sector : Agriculture	
Subsector : all crops	
Technology characteristics	
Introduction	Integrated Pest Management (IPM) sometimes attributed as Ecological Pest Management is a mean to regulate pest infestation and keep it below thresholds causing economical damages through different strategies used into a holistic approach, while providing protection against hazards for plants, humans, animals and the environment. IPM aims at producing healthy crops, by protecting the plants from pest outbreaks through environmentally sound means, which has minimal disturbance to agriculture ecosystems.
Technology characteristics/highlights	IPM relies on different components, into which the use of chemical pesticides is the least important. The major alternative components are: - Crop management: i) introducing tolerant/resistant varieties and rootstocks to pest, ii) using diversified cropping pattern including intercropping, long crop rotations and agro-forestry, iii) pruning and burning damaged parts to reduce pest inoculums, - Soil management: i) improving soil fertility through green covers, including legumes in crop rotations, ii) increasing soil organic matter through the application of organic fertilizers, iii) improving soil structure through reducing compacting by minimal tillage… - Pest management: i) releasing beneficiary insects ii) providing habitats and managing field boundaries for the released insects, and to attract other predators such as birds and bats, iii) change planting strategies for better weed control, iv) adopted different techniques to control pests (i.e. a single pest on one crop, several pests on the crop, several crops of one exploitation, and several exploitations within a region)… (UNEP RISOE Center, 2011c).
Institutional and organizational requirements	Institutional arrangements are needed to reduce the administrative restrictions and conditions to import some features of IPM (insects, traps…). IPM success relies on collective action which involves farmers' groups, extension services and research institutes. Hence, organization of farmers and communication within the scientific community and establishing links between farmers, extension service and researchers is essential. Continuous capacity building and knowledge transfer are required. Moreover, knowledge of pests, their life cycle, damages, their predators or antagonists, the possibility of integrating different techniques for pest control, the feasibility of pest control are required. Technicians of the extension service should be subject to multi-disciplinary training.
Operation and maintenance	Since IPM is mostly a soft technology and relies on the organizational

	aspect, operation and maintenance consist mainly on monitoring. Monitoring comprises not only pest population and field conditions but also the quality of the end product (pesticide residues). Besides, other technologies, including early warning systems are required to conduct pest monitoring, and evaluate their risk. Linkage between responsible of weather stations and all the parties mentioned above is necessary.
Endorsement by experts	IPM is worldwide recognized and adopted in most countries. All agriculture experts, including local experts acknowledge this technology.
Adequacy for current climate	IPM has been used under current climate for the past three decades.
Scale/Size of beneficiaries group	Since IPM can be applied to all crops, all farmers are considered as beneficiaries.
Disadvantages	Since IPM requires quite a good organizational frame between different parties, it is not an easy technology to implement. The impact of IPM on a small scale (farm level) depends also from the available means for pest control. In many cases alternatives to chemicals are not developed yet, which obliges the farmer to return to pesticide spraying. Moreover, the adoption of IPM requires sometimes several years to develop a self-regulating control of pest populations, which could break the patience of farmers to pursue it.
Capital costs	
Cost to implement adaptation technology	The cost of adaptation varies according to the scale of implementation and on the crop. Most of the cost will be for training the extension service, capacity building for farmers and for the dissemination of the information through different means (seminars, pilot projects, booklets, media…).
Additional cost to implement adaptation technology, compared to "business as usual"	The additional cost will be the cost of the traps, pheromones, selective pesticides (compared to economic pesticides) and the cost of pest resistant/tolerant varieties compared to ordinary varieties. However, the cost of these items will be counterbalanced by a reduced number of spraying (including the cost of energy and labor).
Long term cost (i.e. 10, 30, or 50 years) without adaptation	n.a.
Long term cost (i.e. 10, 30, or 50 years) with adaptation	n.a.
Development impacts, direct and indirect benefits	
Direct benefits	Long term cost without adaptation will increase as farmers will face an increase in chemical and in cost of production. IPM fosters farmers to adopt alternative means of pest control, enhancing the self-regulating effect on pest populations, which will decrease the use of chemicals, energy and labor for spraying. IPM relies more on field observation rather on preventive spraying, which augment farmers' resilience and results into a decrease of the cost of production. IPM might sometimes induce a decrease in yield; nevertheless, it is counter balanced by a better quality of the product, and a more constant production along the years. Several experts assume that the cost of production can be reduced by IPM between 15 and 30% depending on the crop.

Reduction of vulnerability to climate change, indirect	IPM is an environmental technology that integrates diversity of crops, conservation of soil fertility, protection of beneficiary insects and predators, and thus increases the resilience of the crops and farmers to climate change.
Economic benefits, indirect Growth & Investment	No specific increase or decrease is expected. Investment in diversified cropping, monitoring tools, production and release of beneficiary insects, and mostly investments in capacity building and extension.
Social benefits, indirect Income Education Health	Since the cost of production is expected to decrease by 15-30%, and pesticide residues alleviated from exported crops (i.e. apple, citrus, banana, potato, tomato…). The production will be more likely to be exportable and hence increasing income for farmers. Technicians and farmers will benefit from trainings to increase their knowledge in IPM and its benefits. Reduction of health hazards as chemical residues in crops are negligible and farmers are less exposed to spraying.
Environmental benefits, indirect	Reduction in GHG emissions in general, as IPM requires less fossil energy (decrease up to 30%, UNEP RISOE CENTER, 2011C). The environment is preserved as agro-biodiversity is fostered, beneficiary insects are maintained, soil fertility is enhanced and water pollution from pesticides is minimized.
Local context	
Opportunities and Barriers	IPM is most of all a market opportunity for farmers as it is either pesticide-free (organic) or with minimal traces, which makes the product easier to export into more restrictive international markets. It is also an opportunity to promote organic farming, reduce the imports of chemicals, and increase farmer's knowledge. IPM is an opportunity to link all stakeholders together, promote research and knowledge transfer. The major barrier for the deployment of IPM is not only the absence of funds but the lack of organization and coordination amongst different parties, including farmers themselves. Farmers lack trust in the current extension service within the Ministry of Agriculture and rely more on the service providers which in all cases are reluctant to IPM as it hinders their pesticides sales. There are no facilities for IPM in terms of policies (taxation of pesticides…) and subventions, while farmers tend to adopt the use of pesticides because of their readiness and short term quick effect. Besides, selective pesticides used in IPM have higher prices.
Market potential	Several lots of exported fruits have been lately rejected by the destination countries due to pesticide residues. Products resulting from farms adopting IPM are likely to be much more competitive on the market, because of their quality, especially for export.
Status	Lebanon has been promoting IPM through different projects involving the Ministry of Agriculture and Ministry of Environment and their partners including research institutions (AUB, LARI), NGOs (Arc-en-Ciel, Africa 70, AVSI, ICU, World Vision, Moawad Foundation, Georges Frem Foundation, Safadi Foundation, Jihad Al Binaa, YMCA…). Nevertheless,

	none of these initiatives was under a sustainable national action program.
Timeframe	Short to Medium Term
Acceptability to local stakeholders	Farmers cannot see the real advantage of IPM as it takes time to illustrate its benefits. Moreover, they believe that a sustainable production with higher yields is due to generous spraying of pesticides. Service providers are in many cases indisposed to collaborate due to the expected loss in pesticide sales and due to administrative constraints for the import of beneficiary insects, traps, pheromones or other items required for IPM. Nevertheless, exporters, big farmers (which are key farmers followed by others), the consumers and the Ministry of Agriculture are aware of the necessity of IPM.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Adaptation – Lebanon. You can access the complete report from the TNA project website http://tech-action.org/**