Food and Agriculture Organization of the United Nations

# CONSULTATIVE MEETING ON FALL ARMYWORM IN ASIA

## BANGKOK, MARCH 20-22, 2019

*Meeting Report*

# CONTENTS

## SUMMARY

RAP and AGP organized a consultative meeting on FAW in Asia, from March 20-22 in Bangkok Thailand. The meeting included participants from governments of 20 Asian countries, FAO country staff and resource persons, representing different organizations, from Africa, Latin America and FAO staff from HQ and RAP.

FAO HQ staff provided an overview of FAW work to date, including experiences gained in Africa since first occurrence in 2016, and relevance for the spread of FAW in the Asian region. Asian countries with infestation by FAW provided updates on the current FAW situation, and measures put in place to raise awareness, strengthen monitoring systems and developing and fine-tuning IPM strategies for long-term FAW management. Resource persons shared experiences from the African region. Chairs of 7 technical working groups on FAW (created to best respond when FAW emerged in Africa) provided short presentations on the different technical themes, before engaging in intense discussions with the participants in rotating working groups to deepen the topic and to identify best options for strategies to manage FAW in Asia.

The meeting also included a session on public private interaction and partnerships for FAW. Awareness raising on FAW and its spread in the region, monitoring and surveillance of FAW and developing sustainable IPM programmes are key priorities for immediate response and for long term management. The role of biological control for sustainable FAW management was identified as one of the priority areas of IPM.

The participants developed action plans for the Asian region, reflecting different situations – no presence of FAW yet, high risk of FAW infestation in the short term, recent FAW infestation and FAW established and spreading. FAO will remain active in sharing information in the region, and in providing support as needed, including development of TCP and other projects at national and regional level.


## BACKGROUND

FAO's Regional Office for Asia and the Pacific (RAP) and the Agriculture Plant Production and Protection Division (AGP) organized a consultative meeting on Fall Armyworm (FAW) in Asia, from March 20-22, 2019, in Bangkok. The FAW is an invasive insect pest, originating in the Americas where it is part of a pest complex managed by farmers there. FAW prefers maize but can feed on over 80 host plants. In 2016 FAW was first found in West Africa. By the end of 2018 it had spread to most sub-Saharan African countries. FAO has been actively engaging with governments and other partner organizations in Africa to provide support for sustainable management of this new pest.

In July 2018 FAW was first found in Asia, in Karnataka state, India. Since then the FAW has continued to spread to other countries in the Asian region. Adults can fly over 100 km a night. The FAW has continued to spread in India to more states and by the end of 2018 FAW was confirmed in Sri Lanka, Bangladesh and Myanmar, and in January 2019 in Thailand and China. Vietnam reported during this meeting that specimen of suspected FAW were sent to CABI for molecular confirmation.

This meeting brought together government representatives from twenty countries in the Asian region, FAO staff from countries, RAP and HQ, resource persons from the Asian, African and other regions to exchange information and develop best strategies and action plans for sustainable management of the FAW that is likely to spread further in the Asian continent. The list of participants and the programme are attached in annex 1 and 2.

## PROGRAMME

- Updates on the global status of FAW and strategies/lessons learned for sustainable management, experiences in Africa, and feedback on FAW management in Asian countries with confirmed FAW infestation (India, Sri Lanka, Bangladesh, Thailand, Myanmar, China).
- Technical Working Group presentations and discussions around specific thematic areas: biological control, chemical pesticides, biopesticides, agro-ecological management, monitoring and surveillance of FAW, crop loss assessments, plant resistance, and farmer education and communications. Chairs of Technical Working Groups (created when FAW appeared in Africa) presented technical updates, and facilitated a World Café where participants in the workshop could interact on the specific themes, and reflect on how to integrate lessons learned and gaps into action plans
- Development of action plans, based on different situations found in the region: FAW established and spreading; FAW confirmed and spreading in the field; FAW suspected or likely to arrive in short term; risk for FAW infestation in the future. Countries were grouped to reflect on how to deal with FAW in different situations, as input into country level action plans, and discussion on regional support for FAW (regional TCP). In addition, some cross-cutting themes were discussed as inputs into action plans (policy environment, technical inventory – current situation and future scenarios, institutions and stakeholders; and capacity building).
- Open session on public-private partnerships for sustainable FAW management, with participation of private sector and public institutions (country and international level).

## OBJECTIVES

The objectives of the meeting were:

- Awareness raising of risks of having FAW spread into countries and within countries;
- Introduction of tools and guidance available that help the countries to monitor and sustainably manage FAW ;
- Exchange of experiences and lessons learnt from the recent invasion in Africa, and developing a community of experts to provide technical and policy advice;
- Fine-tuning the strategic framework for sustainable FAW management to the Asian context including actions that can be taken at regional and country level.

## KEY POINTS AND CONSIDERATIONS FOR FAW MANAGEMENT

### *Fall Armyworm sustainable management – here to stay*

The FAW is likely to continue to spread in the Asian region. Once FAW has arrived in a country, it will be there to stay. Eradication is not an option given the biology and ecology of the insect. Sound and sustainable management practices need to be fine-tuned, for farmers and other actors to manage FAW in the short and long-term.

In certain areas, FAW will be able to reproduce the year round, reflecting favourable climatic and ecological conditions during the year. In other areas, low temperatures will not be favourable for all year presence of FAW. However, these can be prone to yearly migrations of FAW, starting with populations that build up elsewhere, and cause yearly occurrences of FAW that will need to be managed.

Infestation by FAW is no reason to panic. Awareness on the insect, monitoring and surveillance, and capacity building for integrate management of FAW are important pillars for an informed response. A panic response like immediate and high use of broadspectrum chemical pesticides can actually delay the build up of natural biological control agents that will help reduce populations of FAW. Responses need to be adapted locally, building on lessons learned elsewhere. In the longer term research can provide additional information and insights on sustainable management.

### *Monitoring and surveillance for FAW*

Systematic monitoring for FAW provides information on whether the FAW is possibly present (in case there is no infestation yet), and on the spread of FAW in a country once infestation is confirmed. This information is the basis for prioritizing actions based on need.

In case of new infestation, confirmation of the species is very important. Morphological characteristics can provide initial information on whether the insect found is indeed FAW (Spodoptera frugiperda). Molecular confirmation can provide a definitive answer. CABI is one of the institutions that can provide molecular analysis. Confirmation is important, for example in Afghanistan and Nepal insects that were suspected to be FAW were confirmed by CABI to be a different Spodoptera, and not FAW, with implications for developing an adequate response.

FAO developed an app, FAMEWS. Data from field scouting and pheromone traps can be entered in this app, and contribute to sharing information on FAW at country and global level. FAO is working with Norwegian Insitute of Bioeconomics (NIBIO) to connect this system to another modelling system, VIPS, and with PennState University on Artificial Intelligence recognition software for FAW. Early warning and surveillance are very important in sustainable management. The FAMEWS is a good option to collect data systematically, but in order to use full potential there needs to by buy-in at national and central level to use this application as the preferred tool. A national point for FAW needs to be identified, as well as a system on who will use the FAMEWS, and what kind of data will be entered. In case FAMEWS will be used at large scale, translation of the app needs to be considered. Protocols for field scouting and pheromone traps can be found on the FAW website, http://www.fao.org/fall-armyworm/en/.

Pheromone traps are very useful for monitoring purposed. Lures for the pheromone traps are very important, and it is necessary to make sure that the right lures are obtained for monitoring. Some countries need specific registration and approval for import of lures. Field scouting complement pheromone traps. A monitoring system for FAW needs to be put in place from local to central level. If so far, no FAW has been found, it is useful to start working on a monitoring system already, giving the fast spread of the pest.

FAW spread from the Americas to other continents is probably due to shipments, trade, people displacements. Adults can also move over 100 km a night. South Korea raised questions on migration routes, especially on the China dynamics. Given experiences with

other pests and migration routes, experts from China feel confident that FAW migration is relatively easy to predict. Radar monitoring and light traps are used to catch moths, those are analyzed for life stages and migration stages. This will be done for FAW as well. Wind directions are also taken into account. More data will improve the quality of the system. During presentations, China shared that given their experiences with large scale monitoring for other pests, they expect further spread, and by summer the FAW might move into the north and north east where there are major maize growing areas. Yearly migrations to these areas are likely. Information exchanges between countries will be important for countries to prepare, and FAO has an important role to play in this.

### *Integrated Pest Management is preferred strategy for sustainable FAW management*

Integrated pest management is the best strategy to deal with the pest. Some tactics were discussed in some detail during the World Café on different technical themes.

One key IPM element that stressed during the meeting is that there are indigenous natural enemies (parasitoids and predators) that can parasitize or predate on FAW. Optimizing this natural biological control is a first step to regulate populations of FAW in a sustainable manner. More research is to be done on the range of natural enemies already present in Asian (maize) ecosystems. Once FAW infestation is confirmed, it is important to promote conditions under which natural enemy populations can build up, i.e. in particular avoiding broadspectrum chemical pesticides that affect natural enemy populations in negative ways.

With time, optimizing natural biological control can be a cornerstone of sustainable FAW management, after initial imbalances level out. Another consideration is to explore introducing biological control – including releases of already known natural enemies, or exploring introduction of natural enemies of importance in the area of origin, but not present in Asia (or Africa).

The work on India on biocontrol is very promising. It includes a wide range of options (natural enemies, entomopathogens, biopesticides, nematodes, etc). India plans to carry out extensive surveys and species diagnostics to get a better overview of the situation, and is ready to share experiences and expertise with other countries in the region. Other Asian countries also have experiences with biological control. There are important resources to tap for sustainable IPM.

Agro-ecological approaches underpin good IPM. In general, the Asian region has quite a good understanding on and experience these aspects, and how to use them in IPM. Agro-ecological approaches consider the ecosystem, and include soil health management, and promoting diversity of cropping systems (including push-pull technologies) for sustainable pest management.

Even if options are available for sustainable management of FAW IPM that avoid use of chemical pesticides, farmers and plant protection systems often use them as a first response when they are confronted with a new pests. In reality, farmers often have easiest access to cheap and broadspectrum pesticides that are highly hazardous and that can disrupt biological control. This is a concern to address. In addition, chemical pesticides that are organophosphates and pyrethroids are not effective for FAW management since resistance has developed, even if these pesticides are being promoted as suitable for FAW control.

Seed treatments are being tried in Africa and in Asia, and it might seem promising, but is not considered compatible with IPM strategies since it affects populations of natural enemies, and possibly pollinators and birds depending on the type of chemicals used. Blanket recommendations for seed treatments in large areas can cause problems, including development of resistance. Seed treatments should only be considered after a careful assessment, limiting such treatments to hot spots for limited periods of time, responding to high population pressures. In Africa some experiences included use of some neonicotinoids that have

been banned for use in Europe. Normally those banned in the EU would not be considered in the African context, but given the pressure of FAW infestations, they are now being used. In most cases information on pesticides (and registration) is difficult to access.

More and better information is needed an actual costs and benefits, including externalities (environment, health) that still are not systematically considered in cost/benefit analysis – in a general sense, not just for FAW.

There is also a strong interest in biopesticides for FAW. Availability is often an issue. Procedures to register biopesticides are often complex and time consuming. Better harmonization, information exchange, acceptance of information from other countries in registration process can help to make this easier. Farmers need to well trained to understand the mode of action of biopesticides, this will help them to make good decisions on their use. For botanicals, access to neem is relatively easy, but for others this is different. Guidelines on safe use of botanicals are needed as well.

More information is needed on genetic resources and FAW management, including information on transgenics.

The meeting had some discussion on options for transitioning to an IPM scheme where synthetic pesticides are not needed. Optimization of natural biological control is a first step. Also other IPM options need to be considered to manage the agro-ecosystem in the best way.

## TECHNICAL INVENTORY OF IPM FOR FAW – WHAT IS IN PLACE, WHAT TO BE DONE TO STRENGTHEN IPM?

**PROMOTE:**

- Field observations and scouting as basis for management decisions
- Farmer based methodologies like applying ash, sand and lime in whorls
- Hand collection of egg masses
- But also continue further research and promotion of these options
- Allow build up of populations of natural biological control agents (conserve, attract, release)
- Diversify the environment for example use of intercropping, push-pull technologies, farm-forestry systems
- Use of biopesticides, entomopathogens, ensure it is functional
- Early planting, in a coordinated manner, even though this will be difficult to do in practice
- Use of monitoring tools. Information on absence is just as important as information on presence!
- Use of pheromone traps to help scouting
- Good evaluations to be done of different IPM approaches to strengthen IPM responses
- Strengthen capacity at on biocontrol, bioagents in the region through through regional or international trainings, building on assessment of available expertise and skills
- Set up units to produce insect pathogens – there are some good examples of where this was done to manage Spodoptera, but also examples where this was not successful. Can be done at more central and/or local level. Thailand has experience with community pest management centers that produce bioagents to release to the field. Release of bioagents means that chemical pesticide use is not compatible.
- Ensure good communication to avoid panic that leads to poor responses like overuse of broadspectrum pesticides
- Provide assistance with molecular identification of FAW
- Threshold levels – establishing threshold levels can be done, but often not very useful for a variety of reasons
- Detect resistance development for insecticides, and document this well. Organophosphates and pyrethroids are not useful for FAW control

**AVOID:**

- Staggered seeding
- Adhoc applications of insecticides that are not based on observations/scouting in the field
- Insecticides that kill natural enemies
- Abandoning infested fields
- Excessive Nitrogen fertilizers

## AWARENESS AND CAPACITY BUILDING FOR FAW MANAGEMENT

Awareness and capacity building is very important for developing adequate responses and for fine-tuning sustainable FAW management. Capacity building needs to be done at all levels, from local to central – including government, farmers, extension workers, regulators, agro-dealers and other stakeholders. Training needs to be adapted to local context, addressing specific opportunities and gaps for FAW management.

At farmer level, the region has a large experience with Farmer Field Schools that are seen as a good entry point to integrate FAW management into existing (or new) field schools – curricula need to be adapted to this end. To rune FFS (refresher) training of FFS facilitators on FAW are required. Depending on the importance and spread of the FAW, consideration needs to be given on how to scale up training to reach sufficiently large numbers of farmers for an adequate response. In additions to FFSs, complementary approaches to share information and knowledge can be used, like for example videos. Also linking with CABI's plant clinics is another option to reach more farmers. In addition to FFSs, there is also scope to develop shorter courses for farmers using participatory processes and discovery learning.

## YIELD LOSSES ATTRIBUTED TO FAW – DATA ON IMPACTS OF FAW

There is a need to collect better evidence on actual impacts of FAW. Damage assessment is an immediate concern. The FAW might feed on the plant, causing quite visible leaf damage, for which the plant can compensate, depending on crop stage and general conditions. Farmer perceptions of actual damage (yield loss) are often overestimated. Scouting for FAW and actual yield cuts provide more accurate information on damage and yield losses. When working on assessments of impacts of FAW, a combination of farmer perceptions and actual yield loss data will give better estimates than relying upon only one methods. KOBO collect platform could be used for data collection.

When assessing impacts of FAW, other data are relevant as well. For example, cost benefit analysis of control options, and where relevant, an assessment of externalities to get a good understanding of impacts and management options.

## FUTURE EXCHANGES FOR SOUND FAW MANAGEMENT

Collaboration and exchange between Africa and Asia collaboration is relevant and interesting. Asian countries are ahead in biocontrol and biopesticides, and this relevant for Africa as well. Identifying Asian experts for Technical Working Groups will be done as a follow up of the meeting. In addition, exchanges of FAW within (existing) Asian networks will be highly relevant.

## ACTION PLANS FOR FAW MANAGEMENT

Participants in the workshop developed outlines for action plans that are situation-based:

- No FAW yet, likely infestation in short to medium term
- No FAW yet/FAW suspected, infestation imminent/to be confirmed
- FAW confirmed recently, spreading at field level
- FAW confirmed over 4 months ago, spreading and infesting increasing number of fields

Generic versions of action plans for different situations are provided below, reflecting discussions and experiences of participants in the workshop. These action plans can be used as basis for country action plans, reflecting the specific context. With the FAW rapidly spreading action plans will need to be updated accordingly.

## CAPACITY BUILDING

Capacity building for FAW is important at institutional, community, and individual level

The ministry of Agriculture and Extension services/Training institutes needs capacity strengthening on technical knowledge of the FAW, and how to sustainably manage it at field and policy level. Strategies and action plans need to reflect efforts to manage FAW. Monitoring of FAW needs to be integrated in the action plans. FFSs are to be promoted at policy level.

Research also has to contribute to fine-tuning best IPM options for longer-term management of FAW, and needs access to latest information from the research community. Participatory research will help identifying best local solutions.

At community level there is a need to train farmer organizations, FFS groups, cooperatives on FAW IPM. It is important to train agro-dealers at local level in sustainable options for FAW management to ensure they provide reliable information to farmers. Curricula and modalities for such trainings are to be developed, and integrated into for example existing FFS curricula, etc. Training should focus on small scale and big scale farmers.

Individuals understanding the FAW challenge is very important. FAW needs to be integrated into programmes for students, since it is a problem to be dealt with in the future. Communication to larger audiences and at community level is important as well.

## NO FAW YET/FAW SUSPECTED, INFESTATION IMMINENT

Actions focus on response after confirmation, building on action points laid out in situation with no FAW present yet

| PREPAREDNESS | IMMEDIATE/SHORT TERM |
|---|---|
| • Task force and focal point on FAW already identified and in place, following up on situation<br>• Phytosanitary systems put on alert for FAW<br>• Monitoring ongoing, especially in areas where FAW is most likely to arrive (border areas) with pheromone traps, field scouting. Staff trained on FAW/aware of possible infestations, additional trainings to take place<br>• In case of suspected arrival of FAW, ensure proper pest identification – through morphology and molecular confirmation. Confirmation of identification to be reported to IPPC, and to start rolling out management of FAW at field level<br>• Build capacity in the plant protection system on FAW, including workshops and awareness raising meetings | |
| **CONFIRMED FAW INFESTATION** | **SHORT TO MID TERM** |
| • Intensify surveys at district and provincial levels where FAW is already present, or where it is likely to arrive<br>• Share information on further presence and spread of FAW using data from monitoring and surveillance systems<br>• Start field management programme for FAW. Avoid panic by raising awareness and sharing information through media and other channels.<br>• Identify IPM and biocontrol options from the beginning, and fine-tune those at field level. Discuss chemical control as immediate response, advantages and disadvantages, and consider whether this is suitable in the context<br>• Work with media to inform and raise awareness at large scale on FAW<br>• Conduct Training of Trainers and Farmer field schools for FAW IPM, and start trainings as soon as possible in areas with infestation confirmed | |
| **INFORMATION EXCHANGE** | **IMMEDIATE TO LONG TERM** |
| Exchanges with other countries are relevant. | |

## FAW CONFIRMED RECENTLY, INITIAL SPREAD AT FIELD LEVEL

| **MONITOR FAW, COLLABORATE, AND APPLY BIOCONTROL** | **SHORT TERM** |
|---|---|
| • Conduct surveillance for FAW in all maize growing areas<br>• Distribute information on FAW through different media<br>• Collaboration between agencies to exchange information on FAW<br>• Support and release bio-agents for FAW control | |
| **CONTINUE MONITORING, TRAIN FARMERS, CONDUCT RESEARCH** | **MEDIUM TO LONG TERM** |
| • Define and implement relevant research and studies on management including more information on chemicals (toxicity, application techniques, costs and benefits);<br>• Release bio-agents for FAW management and document results<br>• Continue monitoring using pheromone traps<br>• Work with community pest management centers/community groups to produce bio-agents locally | |
| **INFORMATION EXCHANGE** | **IMMEDIATE TO LONG TERM** |
| Exchanges with other countries are relevant. | |

## FAW CONFIRMED, INCREASING NUMBER OF FIELDS INFESTED, FAW SPREADING WITHIN THE COUNTRY

| **IDENTIFICATION OF THE FAW** | **OCCURS IN THE PAST, VERY IMPORTANT FIRST STEP** |
|---|---|
| Proper identification of the FAW is very important to determine actions! This is a reminder to all countries that might have to deal with FAW infestation. Identification occurs in the past for this group of countries<br>• Identification through morphology<br>• Identification through molecular studies<br>• Reporting to IPPC<br>• Request technical assistance | |

| **AWARENESS BUILDING OF ALL STAKEHOLDERS** | **SHORT TO LONG TERM** |
|---|---|
| • Create a task force on FAW (national focal point, steering committee and task force at different levels)<br>• Raise funds as relevant, identify whether technical assistance is needed<br>• dentification of key stakeholders for management (and of project stakeholders in case of project)<br>• nception workshop (in case of project)<br>• Communication materials prepared and distributed in local languages<br>• Materials prepared on risks of pesticides | |
| **NATIONAL FAW MONITORING NETWORK** | **SHORT TO LONG TERM** |
| • High level meeting to agree on tools used for FAW monitoring, including discussion on FAMEWS<br>• Training on tools to be used<br>• Equipment for monitoring procured – pheromone traps and possibly other equipment | |
| **FAW FIELD MANAGEMENT** | **SHORT TO LONG TERM** |
| • Training of trainers on FAW management to prepare FFS training<br>• FFS implemented at field level<br>• Identification of naturally occurring biocontrol agents<br>• Mass scale production of parasitoids and predators and releases<br>• Studies and research for FAW IPM, for example<br>o Evaluation of bio-pesticides<br>o Identification of alternative lower risk synthetic pesticides<br>o Development and implementation of cultural practices for FAW management<br>o Estimations of yield losses due to FAW<br>o Host plant resistance studies<br>o Development of economic threshold levels for FAW<br>o Identification of host plants and FAW strains<br>o Population dynamics studies on FAW<br>• Continuous monitoring and evaluation | |
| **INFORMATION EXCHANGE** | **IMMEDIATE TO LONG TERM** |
| Exchanges with other countries are relevant. | |

The participants also discussed policies and enabling environments, and the institutional framework, to promote sustainable FAW management, and came ups with considerations for the longer and shorter term that are relevant for FAW, but also for other (invasive) pests.

## POLICY AND ENABLING ENVIRONMENT FOR SUSTAINABLE FAW MANAGEMENT

What are the critical gaps that affect FAW tools for management?

**POLICY LEVEL RELATED:**

- Biological control policies
- Pesticide registration and health and environmental effects
- Post-registration monitoring, environmental impact
- Seed treatments
- Plant quarantine policy
- Environmental legislations

**ACTION POINTS**

- Encourage regional harmonization and regulations, using digitalized systems
- Implement code of conduct, harmonize guidelines at regional level
- Crop grouping initiatives in the region
- Share knowledge on best biocontrol options, regional sharing mechanism
- Enforce pesticide management rules and monitor fraudulent pesticides
- Robust capacity building for IPM and biocontrol
- States to ensure sustainable funding for pest management
- Strengthen SPS systems
- Sharing information on migration trajectory
- Seed treatments for FAW – should they be mandatory? This was debated, since it is not compatible with IPM. Using some low risk chemicals in areas where FAW would persist or migrate, seed treatments might be an option. Limiting seed treatments to hotspots might be best in case of need. Development of resistance is another concern

# INSTITUTIONS AND FAW

## GOVERNMENT INSTITUTIONS

The Ministry of Agriculture (including Extension services) are to take the lead in FAW management, and need to set up a steering committee on FAW, involving relevant policy makers. Appoint a focal point in the National Plant Protection Organization for FAW, and create a task force committee. Set up this structure at central government level, but also at provincial and district levels, with similar tasks as committee at central level

District agricultural offices are key institutions with subject matter specialists in place. They will train farmer-facilitators, technician-facilitators and farmers. Farmer groups need to be involved in testing and validation management options, together with officers. Field surveys are to be done to get good insight in the situation. Many countries in the region have a long experience on IPM, which is a good entry point. Refresher courses and TOTs for FAW IPM need to be arranged, involving key institutions.

Local production of biocontrol agents is to be explored at pilot basis, by IPM groups. In several countries there are examples of community based production of biocontrol agents (Nepal, Thailand) that can serve as examples.

## RESEARCH

Research needs to be engaged as well, and should engage with farmer groups to provide support. The local context is important in fine-tuning solutions. Each country is to define specific research priorities, these can possibly include further work on resistant/tolerant varieties, yield loss assessments, range of host plants of FAW in local context, biocontrol options. Universities play an important role in further testing of FAW IPM options, and validating them with FFS groups.

Linkages with international research institutes are to be set up on FAW. Activities for collaboration with international research should be coordinated by the steering committee.

## ROLES OF FAO AND CABI

FAO is to provide policy and technical support; capacity building; training of trainers expert services; TCPs as initial step to benefit countries; support countries to create linkages with international institutions

CABI can help with species identification, provide guidelines and manuals and support activities similar to FAO

Development partners and resource mobilization. The Ministry of Agriculture is an important driver in linking with development partners and to identify funding support for the work to be done on FAW. Other stakeholders are involved as well, like NGOs, CBOs.

Private sector and input suppliers. They provide bioagents, biopesticides and pesticides. Local dealers often provide direct support to farmers. This can be problematic, as the advice is not always sound. Local agro-dealers need to be trained on better and more safe options for IPM.

Cooperatives have human resources and financial resources that can help in FAW management.

Community schools are very important, creating awareness for teachers and children on FAW management will help the larger community to get better information.

The role of media can share relevant information on FAW. They need to be capacitated to do so. Media can include videos, radio, etc.

## ACTION PLANS AT REGIONAL AND GLOBAL LEVEL

RAP will develop a regional TCP to assist a number of countries in further developing and implementing strategies for FAW management. TCPs are already in place in Sri Lanka and Bangladesh (country level). Several countries expressed interest in joining the regional TCP, or in developing country level TCPs. RAP will elaborate a draft regional TCP and share with interested countries for finalization soon, so the project will be operational by July 2019. Further fund raising can be considered.

Participants in the workshop expressed strong interest in further regional collaboration and exchange. A specific area of work is the development and promotion of options using biocontrol agents, entomopathogens, biopesticides for management of FAW. Some countries are offering to share their expertise. This area of work can be one of the topics under the regional TCP. Other mechanisms for further work can be explored. In general, information exchange on FAW in the region and between regions is valuable.

AGP is working to develop an interregional TCP on FAW, to continue to share knowledge between countries.

AGP will link with experts in the Asian region and RAP to ensure Asian participation in technical working groups. Other mechanisms in place in the region will continue to facilitate exchange of information, like APPPC.

## OPEN SESSION ON PUBLIC – PRIVATE PARTNERSHIPS FOR SUSTAINABLE FAW MANAGEMENT

As part of the meeting a debate was organized with participants from the private sector (International Biocontrol Manufacturers Association, Angkor Green, Croplife), the public sector at government level (representatives from research institutes in China and India) and international level (icipe, FAO). Some panelists joined in by skype. Panelists discussed and shared views on sustainable FAW management in the short and longer term. Research on biocontrol options is ongoing, and seems to be promising. Links with the commercial sector to improve access for farmers is important. Production of biocontrol, biopesticides can be done by the private sector, but there are also examples of farmers and communities engaging in local production. Possibly linkages with private sector can focus at different levels to improve access.

An important question was also cheap control (using cheap pesticides) versus biocontrol solutions that can be more expensive. Externalities need to be considered when assessing these options. What matters to farmers in the long run is the quality and reliability of the options used. Management needs to consider all IPM options, besides pesticides and biocontrol.

Global/regional harmonization and information exchange for registration of biocontrol options can help improve access. Quality standards however need to be met throughout. Currently registration is a lengthy process in most cases.

The public sector has some interesting options but better collaboration with the private sector can help to make these options available reducing the time needed to get options into hands of farmers.

## FOLLOW UP ACTIONS

- Develop the regional TCP for FAW and share with interested countries.
  - o Action: RAP, share draft with interested countries by mid-April
- Mobilize other resources for FAW work
  - o Action: RAP to contact regional offices of Asian Development Bank, World Bank, etc. to seek additional regional funding
- Continue information exchange on spread of FAW, on management of FAW
- Action: RAP and AGP, continuousFacilitate exchanges between countries in the Asian region on biocontrol options for FAW, ensuring strengthening of capacity at country and community levels to better manage FAW.
  - o Action RAP, second half 2019 (part of TCP?)
- Promote use of FAMEWS in Asian region.
- Plan Farmer Field School implementation.
- Integrate Asian experts into TWGs, explore other mechanisms for exchange
  - o Action: RAP and AGP, mid-May
- Fine-tune country action plans, identify resources for implementation, request support as needed, contribute to exchange
  - o Action: participants in workshop to share feedback with government to refine action plans and share back with RAP – May 2019

# ANNEX 1. LIST OF PARTICIPANTS

| COUNTRY | NAME | DESIGNATION | ORGANIZATION | EMAIL |
|---|---|---|---|---|
| Afghanistan | Mr. Shah Mahmood Sadeed | National Seed and Seed Industry Development Specialist | Ministry of Agriculture, Irrigation and Livestock | Shah.MahmoodSadeed@fao.org |
| Bangladesh | Mr. Anil Kumar Das | National Consultant (Program) | FAO Bangladesh | anil.das@fao.org |
| Bhutan | Mr. Tshelthrim Zangpo | Plant Protection Officer | National Plant Protection Center, Department of Agriculture, Ministry of Agriculture and Forests | tzangpo@moaf.gov.bt |
| Cambodia | Mr. Samoul Oeurn | Vice Chief | Department of Plant Protection Sanitary and Phytosanitary, General Directorate of Agriculture | oeurn.samoul@gmail.com |
| | Mr. Sothy Uch | Deputy Director | General Directorate of Agriculture | uch.sothy@yahoo.com |
| | Mr. Kosal Oum | Assistant FAO Representative (Programme) | FAO Cambodia | Kosal.Oum@fao.org |
| Cameroon | Mr. Komi Kouma Mokpokpo Fiaboe | Senior Scientist; Entomologist & IPM Specialist | IITA - International Institute of Tropical Agriculture | K.Fiaboe@cgiar.org |

| | | | | |
|---|---|---|---|---|
| China | Mr. YANG Puyun | Director | Division of Pest Control | yangpy@agri.gov.cn |
| | Ms. CHANG Xueyan | Deputy Director | Division of Plant Protection and Quarantine | ippc@agri.gov.cn |
| | Ms. Rong Fu | Programme Officer | FAO | rong.fu@fao.org |
| Ethiopia | Mr. Tadele Tefera Mekonnen | Senior Scientist | International Centre of Insect Physiology and Ecology | t.tefera@cgiar.org; ttefera@icipe.org |
| India | Mr. Shri H.S. Devaraja | Joint Director | Agriculture (Fertilizer & Plant Protection), National Bureau of Agricultural Insect Resources (NBAIR) | devshs123@gmail.com |
| | Dr. Chandish R Ballal | Director | National Bureau of Agricultural Insect Resources (NBAIR) | ballanchandish@gmail.com |
| | Dr. S. K. Malhotra | Agriculture Commissioner | Ministry of Agriculture and Farmers Welfare | agricommissioner@gmail.com |
| | Ms. Anne Sophie Poisot | Adviser, Sustainable Agriculture | FAO-India | annesophie.poisot@fao.org |

| | | | | |
|---|---|---|---|---|
| Indonesia | Mr. Muhammad Azrai | Director | Indonesian Cereals Research Institute, Ministry of Agriculture | azraimulia@gmail.com |
| | Mr. Amran Muis | Researcher | Indonesian Cereals Research Institute, Ministry of Agriculture | amran.muis@yahoo.co.id |
| | Ms. Juniati | Programme Assistant | FAO Indonesia | J.Juniati@fao.org |
| Kenya | Mr. Charles Midega | Senior Scientist | International Centre of Insect Physiology and Ecology | cmidega@gmail.com |
| | Mr. Gospel Omanya | Technical Lead | African Agricultural Technology Foundation (AATF) | g.omanya@aatf-africa.org |
| Korea | Dr. Jong-Ho LEE | Senior Researcher, Plant Pest Control Division | Ministry of Agriculture, Food and Rural Affairs | acarologist@korea.kr |
| Lao PDR | Mr. Vongpaphane Manivong | Director | Ministry of Agriculture and Forestry | v.manivong@gmail.com |
| | Mr. Siriphonh Phithaksoun | Director | Plant Protection Center, Department of Agriculture, Ministry of Forestry | syriphonh@gmail.com |
| | Mr. Phoukaothong Sikaison | Head | Integrated Pest Management, Plant Protection Center, Department of Agriculture, Ministry of forestry | sphoukaothong@yahoo.com |
| Malaysia | Ms. Lailatul Jumaiyah Saleh Huddin | Principal Assistant Director | Plant Biosecurity Division | lailasaleh@gmail.com; lailasaleh@doa.gov.my |

| | | | | |
|---|---|---|---|---|
| Myanmar | Ms. Xiaojie FAN | FAO Representative | FAO-Myanmar | Xiaojie.fan@fao.org |
| | Dr. Ye Tint Tun | Director | General Department of Agriculture | dgdoa.mm@gmail.com; dgdoamm@gmail.com |
| | Mr. Aung Kyaw Oo | Director | Plant Protection Division | directorppddoa@gmail.com |
| Nepal | Dr. Binod Saha | Assistant FAOR-Programme | FAO Nepal | Binod.Saha@fao.org |
| | Mr. Shalikram Adhikari | Senior Plant Protection Officer | Plant Quarantine and Pesticide Management Center | Salikum@gmail.com |
| Nigeria | Dr. Georg Goergen | Entomologist | IITA | |
| Norway | Mr. Udaya Sekhar Nagothu | Director (CID) | Norwegian Institute of Bioeconomy | Nagothu.UdayaSekhar@nibio.no |
| Pakistan | Dr. Shakeel Ahmed khan Seed | Sector Specialist | FAO Pakistan | shakeel.ahmedkhan@fao.org |
| | Mr. Imtiaz Ali Gopang | Food Security Commissioner II | Ministry of National Food Security &Research, Govt of Pakistan Islamabad | imtiazgopang@gmail.com |
| Philipines | Ms. Jasmine E. Magtibay | Prgramme Assistant | FAO Philippines | Jasmine.Magtibay@fao.org |
| | Ms. Wilma Cuaterno | Chief | Crop Pest Management Division | cuaternowilma@gmail.com |
| Sri Lanka | Ms. K N C Gunewardene | Principal Agriculture Scientist (Entomology) | Department of Agriculture (DoA) | nishanthigun@yahoo.com |
| | Dr. Dharmassree Wijeratne | Assistant FAOR-Programme | FAO Sri Lanka | Dharmassree.Wijeratne@fao.org |
| | Mr. R.S.C.W.M.A.B.M. Wijayatunga | Assistant Director | Extension and Training Centre, Peradeniya | anuraratsri@gmail.com |
| Thailand | Mr. Pichate Chaowattanawong | Plant Pest Expert | Department of Agriculture | Pichate126@gmail.com |
| | Mr. Sarute Sudhi-Aromna | Senior Entomologist | Plant protection Research and Development Office, Department of Agriculture (DOA) | sarutes@yahoo.com |

| | | | | |
|---|---|---|---|---|
| Timor-Leste | Ms. Maria Odete do Ceu Guterres | General Director, Agriculture | Ministry of Agriculture and Fisheries | guterreso@ymail.com |
| Uganda | Mr. Ivan Rwomushana | Senior Scientist, Invasive Species Management | CAB International (CABI) | I.Rwomushana@cabi.org |
| Vietnam | Mr. Nguyen Quy Duong | Deputy Director General | Plant Protection Department-MARD | duongnq.bvtv@mard.gov.vn |
| | Mr. Bui Xuan Phong | Head | Plant Protection Department-MARD | phongbx.bvtv@mard.gov.vn |
| | Mr. Kris A.G. Wyckhuis | Honorary Associate Professor/CEO | China Academy of Agricultural Sciences/ University of Queensland/ Chrysalis Consulting | kagwyckhuys@gmail.com |
| Zambia | Mr. Moses Mwale | Director | Zambia Agriculture Research Institute (ZARI) | MwaleMP@yahoo.com |
| Australia Embassy | Ms. Apinya Buakla | Research Officer (Agriculture) | Department of Agriculture and Water Resources, Australia Embassy Bangkok | apinya.buakla@dfat.gov.au |
| AVA | Mr. Muhammad Izaan bin Istijab | Scientist | Agri-Food & Veterinary Authority of Singapore | muhd.izaan_istijab@ava.gov.sg |
| NIBIO | Ms. Berit Nordskog | Researcher | NIBIO-Norwegian Institute of Bioeconomy | berit.nordskog@nibio.no |
| USAID | Mr. Sutham Phurahong | Project Management Specialist | Office of Economic Growth and Vulnerable Population (EGVP), USAID/ RDMA | sphurahong@usaid.gov |
| | Dr. Mustapha El Hamzaoui | Director | USAID | melhamzaoui@usaid.gov |
| CABI | Dr. Malvika Chaudhary | Regional Coordinator Asia Plantwise | CABI | m.chaudhary@cabi.org |

| | | | | |
|---|---|---|---|---|
| IPPCAAS | Prof. Zhenying Wang | Professor | Institute of Plant Protection, Chinese Academy of Agricultural Sciences | wngzy61@163.com, zywang@ippcaas.cn |
| ZJU | Prof. Du Yongjun | Professor | Institute of Pesticide and environmental Toxicology | yongjundu@zju.edu.cn |
| NBERC | Mr. Ziwen Yang | Chief Scientist of HAAS, Director General of NBERC | Hubei Academy of Agricultural Sciences , National Biopesticide Engineering Center | ziwen.yang@nberc.com |
| Lancaster | Dr. Kenneth Wilson | Professor | Lancaster University | ken.wilson@lancaster.ac.uk |
| USA | Mr. Paul C Jepson | Professor | Oregon State University | paul.c.jepson@gmail.com |
| IRRI | Dr. Buyung Asmara Ratna Hadi | | IRRI | b.hadi@irri.org |
| USA | Mr. Peter McCloskey | Professor | Pennsylvania State University | petermccbseey1@gmail.com |
| WFP | Ms. Valerif Habbel | | WFP | |
| | Dr. John Antony Wightman | Principle Scientist and Director | Natural Resource Development International Pest Management Hemp Farming Systems | |
| Thailand | Ms. Areepan Upanisakorn | Director | IPM-GAP Rice Production | areepanu@gmail.com |
| Singapore | Dr. Vasant L. Patil | Director | Science & Regulatory Affairs | Vasant.patil@croplifesaia.org |

| | | | | |
|---|---|---|---|---|
| Thailand | Mr. Pruetthichat Punyawattoe | Senior Entomologist | Department of Agriculture | pruetthichat@yahoo.com |
| | Ms. Sasiprapha Marach | Subject Matter Specialist, Professional level | Department of Agricultural Extension (DOAE) | sasi88memo@gmail.com |
| | Ms. Chonticha Rakkrai | Agricultural Research Officer, Senior Professional Level | Departmen of Agriculture | rakkrai@yahoo.com |
| | Ms. Sumana Simasalit | Director | Pest Forecasting and Early Warning Group | sumana_sima@hotmail.com |
| | Mr. Anut Buranapanichpan | Subject Matter Specialist, Practitioner level | Department of Agricultural Extension (DOAE) | anut.brnp@gmail.com |
| | Dr. Jaruwat Thowthampitak | Lecturer | Faculty of Agriculture, Kasetsart Univeristy | agrjwt@ku.ac.th |
| | Ms. Saengkhae Nawanich | Researcher (Entomology) | Kasetsart Univeristy | ijssan@ku.ac.th |
| FAO-HQ | Mr. Keith Cressman | AGPM | Plant Production and Protection Division | Keith.Cressman@fao.org |
| | Mr. Allan Hruska | Principal Technical Coordinator | Plant Production and Protection Division | Allan.Hruska@fao.org |
| FAO-HQ | Mr. Huyam Ahmed Mohammedelamin Salih | Agricultural Officer | Plant Production and Protection Division | Huyam.Salih@fao.org |
| | Mr. Neil Keiht Marsland | Senior Emergency and Rehabilitation Officer | Emergency and Rehabilitation Division | Neil.Marsland@fao.org |
| | Mr. Hans Martin Dreyer | Director | Plant Production and Protection Division | Hans.Dreyer@fao.org |

| | | | | |
|---|---|---|---|---|
| FAO RAP | Ms. Kundhavi Kadiresan | Assistant Director-General | FAO-RAP | |
| | Mr. Jong-jin Kim | Deputy Regional Representative | FAO-RAP | Xiangjun.Yao@fao.org |
| | Ms. Xiangjun Yao | Regional Programme Leader | FAO-RAP | |
| | Mr. Sridhar Dharmapur | Senior Food Safety and Nutrition Officer | FAO-RAP | Sridhar.Dharmapuri@fao.org |
| | Ms. Marjon Fredix | Agricultural officer | FAO-RAP/AGP | Marjon.Fredrix@fao.org |
| | Ms. Jan Willem Ketelaar | | FAO-RAP | |
| | Ms. Amgalan Ariumbold | Plant Production Consultant | FAO-RAP | Amgalan.Ariumbold@fao.org |
| | Ms. Zhang Wei | Loaned Consultant | FAO-RAP | wei.zhangR@fao.org |
| | Mr. Bo Zhou | Agriculture Officer (Plant Production) | | |
| | Ms. Akiko Yokota | | FAO-RAP | |
| | Mr. Yoenten Phuentshok | Junior Professional Officer | FAO-RAP | |
| | Mr. Allan Dow | Regional Communication Officer | FAO-RAP | |
| | Mr. Pierre Ferrand | Agriculture officer (agro-ecology) | FAO-RAP | |
| | Ms. Nongyao Ruenglertpanya | Programme Assistant | FAO-RAP | Nongyao.Ruenglertpanya@fao.org |

# ANNEX 2. PROGRAMME

| **DAY 1. WEDNESDAY, 20 MARCH** | | |
|---|---|---|
| 09.00 – 09.30 | Opening session | • Welcome address and opening remarks:<br>o Ms. Kundhavi Kadiresan, Assistant Director-General and Regional Representative for Asia and the Pacific, FAO<br>o Ms. Surmsuk Salakpetch, Director-General, Department of Agriculture, Ministry of Agriculture and Cooperatives, Thailand<br>• Purpose and expected outputs of the meeting: Ms. Xiangjun Yao, RAP Programme Leader, FAO |
| 09.30 – 10.30 | Session 2. Introduction to FAW and lessons learned from FAO Global Programme | • FAO's Global FAW Programme: Mr. Hans Dreyer, AGP Director<br>• Global update FAW spread and implications regarding threat & management preparedness – lessons learned (AGP Director/Allan Hruska) |
| 10.30 – 11.00 | | Coffee break & photo |
| 11.00 – 12.30 | Session 3: Lessons and experience on FAW management from Africa | • Felicia Ansha-Amprofi, Ghana<br>• Moses Mwale, Zambia<br>• Tadele Tefera, ICIPE |
| 12.30 – 13.30 | | Lunch break |
| 13.30 – 16.00 | Session 4: country status of FAW in Asia (awareness, monitoring, immediate response, mid and long term strategies) | • India<br>• Bangladesh<br>• Sri Lanka<br>• Thailand<br>• China<br>• Myanmar |
| 16.00 – 16.30 | | Coffee break |

| | | |
|---|---|---|
| 16.30 – 18.00 | Session 5: FAW monitoring and surveillance<br>Panel Discussion | • Introduction of FAO tools FAMEWS, Nuru, Keith Cressman, FAO<br>• China experience in monitoring and management of migratory pests, Wang Zhenying, CAAS, China<br>• VIPS System Berit Nordskog, NIBIO, Norway |
| **DAY 2, THURSDAY, 21 MARCH** | | |
| 9.00 – 9.30 | Session 6. FAW knowledge management and technical working groups | Introduction of Technical Working Groups for FAW management, and partnerships: overview. Allan Hruska, FAO |
| 10.00 —10.30 | Session 6 continued | World Café – Technical Working Groups<br>• Biological control (G. Goergen)<br>• Chemical control (P. Jepson)<br>• Biopesticides (K. Wilson)<br>• Agroecology (C. Midega)<br>• Monitoring & Early Warning Systems (K. Cressman)<br>• Impact Assessment (N. Marsland)<br>• Strengthening farmers' capacities to manage FAW: FFSs, Participatory Action Research, Farmer Innovations (A.S. Poisot) |
| 10.30 – 11.00 | | Coffee break |
| 11.00 – 12.30 | Session 6 continued | World Café continued |
| 12.30 – 13.30 | | Lunch break |
| 13.30 – 15.00 | Session 7. TWG feedback and way forward | Feedback on World Café – main points raised, lessons learned, moving towards action plans |
| 15.00 – 15.30 | | Tea break & announcements |

| | | |
|---|---|---|
| 16.00 – 16.45 | Session 8. Action plans– situation based: preparedness, early arrival FAW, sustainable management of FAW | • Introduction on developing Action Plans<br>• Group discussions on developing situation-based action plans<br>• Brainstorming on 4 pillars underpinning action plans<br>• Policy and Enabling Environment<br>• Technical inventory, current practices<br>• Institutions<br>• Capacity development |
| 16.45 – 17.30 | Session 8. Action plans– situation based: preparedness, early arrival FAW, sustainable management of FAW | Group discussions continued |
| **DAY 3, FRIDAY, 22 MARCH** | | |
| 8.30 – 09.30 | Session 8. Action plans – situation based: preparedness, early arrival FAW, sustainable management of FAW | Group work on country action plans |
| 09.30 – 10.30 | Session 8. Action plans for FAW in Asian region – national and regional level | • Presentation selected country Action Plans<br>• Technical Working Groups on FAW – Asian participation<br>• Other regional mechanisms for exchange on FAW, action points<br>• Regional TCP and other initiatives |
| 10.30 – 11.00 | | Coffee break |
| 11.00 – 1200 | Session 9. Lessons learned, way forward Way forward – lessons learned, key messages to share in the region on FAW | |
| 12.00 – 13.00 | | Lunch break |
| 13.00 – 15.00 | Session 10.<br>Potential for public-private partnership in FAW management | • Panel discussion<br>• Introduction of panel members<br>• Introduction : public-private dialogue in Africa, lessons learned (AGP Director)<br>• Prospects on FAW management – panel members<br>• Q & A – discussions<br>• Conclusions |
| 15.00 – 15.15 | Closing | Mr. Jong-Jin Kim, Deputy Regional Representative, FAO Regional Office for Asia and the Pacific |

# CONSULTATIVE MEETING ON FALL ARMYWORM IN ASIA

## BANGKOK, MARCH 20-22, 2019

*Meeting Report*

This meeting aimed at exchanging information and developing best strategies and action plans for sustainable management of the Fall Armywom that is likely to spread further in the Asian continent.

Working for #ZeroHunger

Photo cover: © FAO/A.Poisot



© FAO, 2019
CA4603EN/1/05.19