



Food and Agriculture  
Organization of the  
United Nations

# MULTI-STAKEHOLDER REGIONAL WORKSHOP IN AFRICA

Innovations for Smallholder Farmers for  
Sustainable Management of Fall Armyworm

Praia, Cabo Verde, 21–24 October 2019





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## SUMMARY

The Plant Production and Protection Division (AGP) of the Food and Agriculture Organization of the United Nations (FAO) and the FAO Regional Office for Africa (RAF) organized the Multi-stakeholder Regional Workshop on Innovations for Smallholder Farmers for Sustainable Management of Fall Armyworm in Africa, 21–24 October 2019 in Praia, Cabo Verde. The workshop included participants from governments of more than 25 African countries; FAO staff from Cabo Verde, RAF and FAO headquarters in Rome; and representatives of various organizations from Africa, Latin America, Europe and North America.

FAO staff from headquarters provided an update on the Global Programme on sustainable Fall Armyworm (FAW) management and an overview of experiences gained in Africa since the first reports of FAW on the continent in 2016. The relevance of the spread of FAW for the Africa region as a whole was also outlined.

African countries with FAW infestation provided updates on the current situation, including measures put in place to raise awareness, strengthen early warning and monitoring systems, and fine-tune integrated pest management (IPM) strategies for long-term sustainable management of FAW. A number of countries (Malawi, Mozambique, Nigeria, United Republic of Tanzania) presented successful examples of innovations available to smallholders in the field.

Experts presented some of the latest innovations for the management of FAW, including: biological control of FAW in Brazil; biopesticides for FAW management; and FAO's FAW Monitoring and Early Warning System (FAMEWS) tool.

Three breakout sessions were organized to discuss the following themes: lessons learned on local solutions; biological control and biopesticides; and use and upscaling of the FAMEWS tool.

A field trip was undertaken that included visits to a number of maize fields with differing levels of FAW infestation and damage. Conditions in the fields and control methods were discussed. The field trip also included a visit to Cabo Verde's National Institute for Agrarian Research and Development (INIDA), where participants were instructed in biocontrol production methods, particularly relating to the production of *Trichogramma* wasps, natural enemies of FAW.

The workshop ended with discussions of key messages from country representatives highlighting priorities and recommendations on key elements of FAW sustainable management.

The key messages were:

- Strengthen national FAW task forces by giving them clear terms of reference with well-defined goals and aligning task force objectives with national budgets and FAO programme objectives.
- Establish and enhance the capacity of national laboratories so they are able to produce biological control agents that are natural enemies of FAW.
- Continue to promote FAMEWS as a leading innovation tool for collecting field data, sharing knowledge and providing control advice on FAW, and make FAO support conditional on its use.
- Conducting a systematic analysis of all local solutions used to combat FAW will support work to scientifically determine their effectiveness and suitability for scaling up in other countries.
- Bolstering farmer field schools (FFS) with specific training in FAW management will ensure they are able to move beyond the FFS model to ensure adequate outreach to all smallholder farmers.
- The International Year of Plant Health 2020 should be used as a unique opportunity to raise awareness of all major transboundary plant pests and diseases, and a FAW Global Symposium should be convened.



## BACKGROUND

FAO's Regional Office for Africa (RAF) and Plant Production and Protection Division (AGP) organized a multi-stakeholder workshop on the sustainable management of fall armyworm (FAW) in Africa, 21–24 October, 2019 in Praia, Cabo Verde.

The FAW is an invasive 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 reported in West Africa. By summer 2019 it had spread to most (but not all) African countries. In recent years, FAO has

been actively engaging with governments and other partner organizations in Africa to provide support for sustainable management of this new pest.

The purpose of the workshop was to invite representatives of governments throughout Africa and the Near East to outline what steps are being taken to manage FAW; to identify what challenges and capacity gaps exist; and to discuss what potential solutions are available to smallholders – who account for 98 percent of maize farmers in Africa – to combat FAW.

### Presentation at INIDA during workshop day trip



## PROGRAMME OUTLINE

- Updates were provided on the regional and global status of FAW as well as an outline of FAO's Global Programme on Fall Armyworm, including strategies/lessons learned for sustainable management of FAW in Africa and Near East countries (also those countries where the presence of FAW has not yet been reported).
- Technical presentations were provided on FAW monitoring and sustainable management, focusing on biological control; biopesticides; FAW ecology and push–pull; socioeconomic impacts of FAW; rearing *Trichogramma*; mating disruption; pheromone traps and lures; the FAO Fall Armyworm Monitoring and FAMEWS; and a case study on FAMEWS use in Mozambique.
- A field trip was undertaken, including visits to fields with varying levels of FAW damage. The field trip also included a visit to Cabo Verde's INIDA facility, where participants were shown how to produce *Trichogramma* and rear other natural enemies of FAW, such as *Bacillus thuringiensis*.
- Three breakout sessions were formed to discuss the following themes: lessons learned on local solutions; biological control and biopesticides; and use and upscaling of the FAMEWS tool. The findings of the discussions were reported back to the plenary to feed into the overall recommendations of the workshop.
- Overall recommendations were developed, based on inputs from FAO, countries, and organizations present.

## OBJECTIVES

The primary objectives of the workshop were to:

- identify priorities for individual countries and understand what capacities exist at national and regional level;
- develop recommendations that would form the basis of a regional plan of action for the sustainable management of FAW in Africa;
- evaluate the possibility of fighting FAW using biological controls, biopesticides, natural enemies and other alternative methods to chemical pesticides, which are costly, damaging to the environment, and often ineffective;
- reinforce the importance of monitoring and early warning and highlight the role that FAO's FAMEWS app and global platform play in collecting valuable data and disseminating knowledge and advice.

## KEY POINTS AND CONSIDERATIONS

FAW is a dangerous transboundary pest with a high potential to spread continually due to its natural distribution capacity and opportunities presented by international trade. Once FAW has arrived in a country, it is there to stay. Eradication is not an option, given the biology and ecology of the insect. This is particularly so in Africa, where there are some 39 million hectares of maize – as well as more than 80 other crops – for the pest to feed on. It is estimated by the Centre for Agriculture and Bioscience International (CABI) that annual maize losses in Africa due to FAW could reach approximately 4.6 million ha, equating to some USD 6 billion. This is not only an economic loss, it is also a major threat to the food security and livelihoods of millions of smallholder farmers.

Since the outbreak of FAW in West Africa in 2016, many activities have been implemented by countries to manage the pest. The first reaction was to use chemical pesticides, but those are neither sustainable nor particularly effective at combatting FAW. That quickly led African smallholders to realize that local solutions – biopesticides, plant extracts, cultural practices such as push–pull, natural enemies and others – can be more effective while having a kinder impact on the environment. Indeed, part of the aim of FAO's Global Programme on Fall Armyworm is to validate which of these options for sustainable management works best in which context, also taking on board experiences from other regions, particularly the Americas where FAW originated.

The idea of learning from, and partnering with, others is not only endorsed by FAO but also by other leading organizations, such as the African Union. In the coming years, we will have to coordinate our response to FAW globally and exchange lessons learned so we can plan for the future. In that regard, FAO is already active and plans to call a Global Symposium on FAW Management in connection with the occasion of the International Year of Plant Health 2020.

### FAO Global Programme

The FAO Global Programme on Fall Armyworm has 12 technical working groups that cover the following key themes for sustainable management: yield loss determination; biological control; biopesticides; risk and impact assessment; monitoring and early

warning; communication and information exchange, awareness and knowledge management; farmer field schools, extension and plant clinics; agroecology; chemical pesticides; host plant resistance; transgenic resistance; and quarantine and phytosanitary measures.

In terms of resource mobilization, FAO has already spearheaded 63 FAW projects with a total value of USD 27.5 million. These projects have been based primarily in Africa, with funds going to 41 African countries. Support for these projects has come from regional donors such as the African Development Bank and international donors such as the Governments of Norway and Ireland. The results of these projects have been overwhelmingly positive but they reach only the tip of the iceberg – 98 percent of those affected by FAW damage in Africa are smallholder farmers, most of whom are not reached by existing programmes. This is one of the great challenges of FAW management: how to reach the most needy with limited resources. More than anything, FAW is a problem for smallholder farmers, so solutions must be geared towards them.

### Beyond pesticides

To combat FAW, it is highly preferable to take an integrated pest management (IPM) approach that goes far beyond chemical pesticides. Apart from being expensive, pesticides do not achieve their aim – indeed, by killing the natural enemies of FAW, they have the contrary effect. Given this, we must look towards locally available solutions that are both effective and kind to the environment. This workshop looked at several of these; e.g. biopesticides derived from neem, biocontrol agents such as *Trichogramma* and *Bacillus thuringiensis*, and common natural enemies such as the earwig. These may have the potential to be effective in the fight against FAW.

### Scientific validation of alternative approaches and use of innovative solutions

The effectiveness of many of the proposed solutions for managing FAW still has to be tested – indeed, one of the key recommendations of this workshop was



to conduct applied research to validate which local solutions work best and in what conditions. In the meantime, FAO reiterated in this workshop the need to practise IPM based on good agronomic practices such as diverse cropping, crop rotation, use of healthy seed stock and non-invasive mechanization. However, traditional means alone are not enough, which is why we must also be open to new methods of managing FAW and other pests.

One of the key tools available for sustainable management is FAMEWS, FAO's free mobile app, which allows farmers to detect and record FAW damage in their fields and upload valuable data about the pest and their own farming practices to

the FAMEWS global platform. FAMEWS is also an important knowledge resource that educates farmers on all major aspects of FAW and its management. This valuable tool helps us build a local, national, regional and global picture of the spread of the pest and collect supporting data to understand under what conditions infestation and spread happen.

Farmer field schools (FFS) are another way of reaching farmers in affected countries. With regard to FAW management, workshop participants felt that FFS curricula should be updated to incorporate specific lessons on FAW that can be replicated and taught beyond the FFS network.

#### Using FAMEWS in the field to detect FAW damage





## **Coordinated international approaches, with adequate national resourcing**

The situation has now reached a critical point – merely relying on conventional approaches, FAW will continue to spread at high speed. Instead, we need to manage FAW in a more holistic way that addresses all three dimensions of sustainability: economic, social and environmental. That is why this workshop called for a more coordinated response from the international community.

With particular reference to Africa, FAO called for the adoption of regional, sub-regional and national FAW management approaches, as part of the next phase of a Global Action to manage this pest in the coming years (2020–2022). Regional and sub-regional approaches should be overarching and serve the national needs through capacity development and technical, financial and human resource support to countries. However, each country should also set aside its own resources to tackle its unique priorities, something which emerged very strongly in the country presentations of this workshop. In particular, FAW management task forces in countries should be empowered so that they have adequate – and regular – resourcing, clear terms of reference tied to specific objectives, and alignment with broader government objectives on transboundary pests and diseases and with FAO programmes.

The case of Cabo Verde, the workshop host country, is a good example. It is developing its own national response, including through expanding the capacity of the National Institute for Agrarian Research and Development (INIDA) to support the development of biological control techniques to manage FAW. A number of other African countries are taking similar steps; however, there are also some that have been slow to react and risk being left behind.

## **Sustainability and focus on smallholders**

Whatever support FAO and other organizations can offer will never be enough. Countries will need to come up with their own solutions to manage the problem in a bespoke manner that befits their own particular context. In doing this, they will also have to ensure that resources are available to all smallholders, leaving no one behind.

## LIST OF COUNTRY PRESENTATIONS

The following countries made presentations during the first two days of the workshop.

- Benin

- Cabo Verde

- Cameroon

- Côte d'Ivoire

- Ghana

- Guinea-Bissau

- Iraq

- Malawi

- Mauritania

- Mozambique

- Nigeria

- Sudan

- Tunisia

- United Republic of Tanzania

- Zambia

## FIELD TRIP

The workshop included a field trip which took in a number of maize fields in Cabo Verde's Santiago Island, as well as a visit to the INIDA institute.

Maize is an important crop on Santiago Island, grown in both the dry lowlands, where irrigation is practised, and in the more mountainous central part of the island, where crops are rainfed. As rainfed crops are located at higher elevations and often on slopes, no chemical fertilizers or pesticides may be used due to risk of contamination from runoff water.

### Field visits

Workshop participants first visited a few of the rainfed maize fields of the Cabo Verde Ministry of Agriculture and Environment. These had evident FAW infestation – FAW eggs, larvae and moths were all found. This presented an opportunity for participants to get a close look at both the pest itself – in various stages of maturity – and the damage it wreaks. As the maize plants had not yet reached maturity or borne any fruit, it was difficult to tell what the overall effect of the FAW damage would be on yield.

FAW larva and leaf damage



What could be measured was the extent of the foliar damage. Participants used FAO's state-of-the-art mobile FAMEWS app, which applies artificial intelligence technology to detect presence of FAW on individual maize plants. These data can then be uploaded to the FAMEWS global platform to give a near real-time picture of pest infestation levels.

One of the core objectives of the workshop was to demonstrate the usefulness of the FAMEWS tool to country representatives, instruct them in the tool's use, and encourage them to advocate for its upscaling in their home countries.

#### Using the FAMEWS mobile app to detect FAW damage



#### Cabo Verde research and production facility

INIDA is a biological control facility under the auspices of the Cabo Verde Ministry of Agriculture and Environment and was founded almost 40 years ago. The facility closed in the 1990s but has been regenerated since 2018 with the help of FAO and other partners, including the Brazilian Agricultural Research Corporation (Embrapa).

INIDA's laboratory has so far produced around 2 000 eggs, but many more will be required before there is enough *Trichogramma* to start covering even small areas. It is estimated that around 100 000 *Trichogramma* wasps are required to cover one hectare of maize. In the INIDA fields outside the laboratory, releases of *Trichogramma* from Brazil

INIDA is now developing capacity for the production of biological control agents – e.g. *Trichogramma* wasps and *Bacillus thuringiensis* bacteria – that have been shown to be effective in the control of FAW. Specifically, workshop participants viewed a laboratory where *Trichogramma* eggs can be produced using a mix derived from cornflower and brewer's yeast. Participants were given a demonstration of the process required to produce the eggs, which then form larvae before becoming *Trichogramma* adults.

#### Using Pheromone traps to detect the presence of FAW and level of infestation





have had some effect on reducing FAW damage so far, but greater quantities of the parasitoid wasps are needed.

The last field visit was to a plantation run by a farmers' cooperative, which had little damage after a recent *Trichogramma* release (using imported wasps produced by Embrapa in Brazil). The plantation

offered encouraging evidence as to the potential of *Trichogramma* as an effective predator of FAW.

The trip concluded with visits to the Serra Malagueta Natural Park and Tarrafal Beach on the northwestern coast, giving a comprehensive picture of the diverse ecosystems and growing conditions for maize that exist on Santiago Island.

#### Farmer representing maize farmers' cooperative



## BREAKOUT SESSIONS

Breakout sessions were held around three major themes: lessons learned on local solutions; biological control and biopesticides; and use and upscaling of the FAMEWS tool.

Below are the main findings.

### Local solutions to manage FAW

- Farmers use a range of local techniques and natural enemies to manage FAW, including: neem extract, neem oil and neem soap; garlic and onion extract; *Bacillus thuringiensis*; hand-picking; FAW egg crushing; egg crushing plus neem powder mixed with soapy water and neem oil; soapy water; plain water; neem leaves crushed, soaked overnight and filtered in the morning; finely ground soil (particularly fibre-rich red clay); ash; rotation cropping; community demonstration plots; chemical pesticides; biopesticides; wild sunflower; other botanicals.
- The range of solutions used shows the potential for integrated pest management based upon good agronomic practices and local solutions that are suitable for the context/ climate.
- Given the downsides of chemical pesticides and the mixed results achieved by farmers in relation to some biopesticides and other solutions, there is a huge knowledge gap in terms of which solutions work and how they work. More applied research is needed in this area and validated results should be communicated widely so that they can be scaled up. Preserving yield quantity should not be the only criterion for success; other elements, such as crop quality and environmental sustainability, are also important.
- Some botanicals, such as neem, can have toxicological effects, so it is important that farmers have clear guidance as to the dosage they should be applying when using botanical extracts. Standard protocols should be

developed in support of smallholder farmers.

- In terms of training, a number of points are crucial: identification of FAW, knowing the biology and ecology of the pest; listening to farmers' successful experience on sustainable management; using available tools, including FAMEWS, that spread knowledge and offer guidance to farmers on what steps to take.

### Biological control and biopesticides

- There needs to be harmonization on the registration and use of biopesticides.
- Training and capacity development in biological control should include the development of inclusive inventories of natural enemies. This needs to detail how these parasitoids act and in what context, and what the broader impact of natural enemies is in relation to other pests (not just FAW).
- National laboratories for biological control must be set up with national resources; these laboratories should be supported and guided by larger, overarching sub-regional laboratories.
- Use of pheromone traps and lures should be systematic, with correct placement of the traps and lures, and regular monitoring and analysis.

### FAMEWS

- Persuade governments to endorse and support the widespread adoption of FAMEWS so that it is viewed as a national tool which was developed by FAO, rather than an FAO tool imposed on governments and smallholders. FAO Representatives should play a decisive role in making the case for the tool's usefulness. Incentives should be provided for farmers, extension agents, policymakers and others to use FAMEWS, e.g. by offering free data credit or partnering with telecommunications providers to offer attractive rates.
- Train farmers, technicians, extension agents and others in the use of FAMEWS and urge

governments to avail of the FAMEWS tool to provide national FAW situation bulletins.

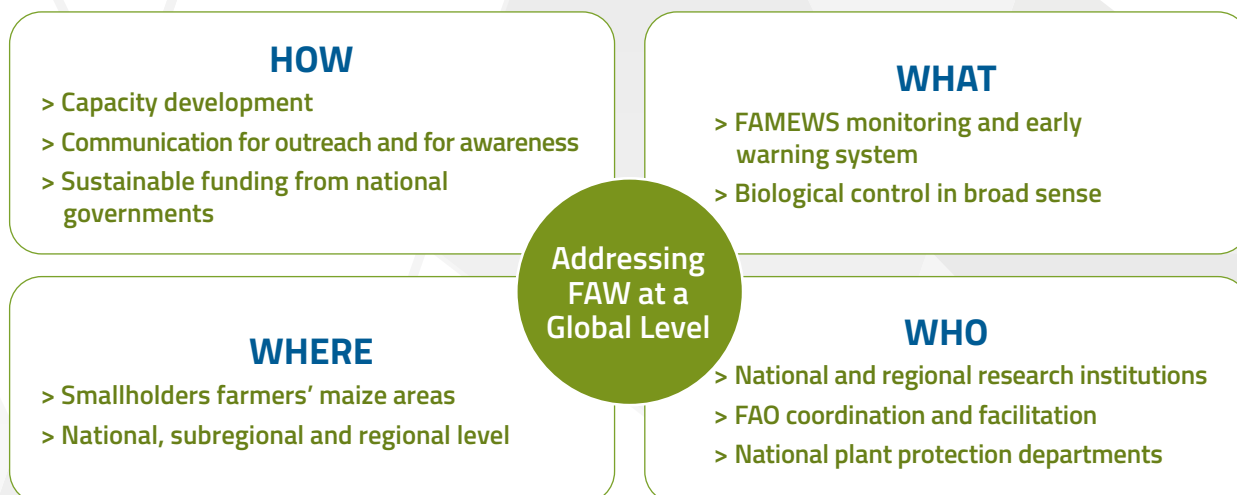
- Extend the app and platform so that they also cover other pests (plans are already underway in this regard).
- Use major regional bodies such as Southern African Development Community (SADC), Economic Community of West African States (ECOWAS) and Intergovernmental Authority on Development (IGAD), as communication

conduits to spread the word about the benefits of FAMEWS.

- Work on stabilizing the app so that it can be updated automatically (without having to remove previous versions) and made available on Google Play Store. Have a version available for iPhone as soon as possible, as well as a lighter version that removes some functionality but still allows for detection support and data gathering.



## KEY MESSAGES AND RECOMMENDATIONS



On the final day of the workshop, participants met for a plenary session. Rapporteurs reported back main findings from each of the breakout group sessions from the afternoon of 22 October, examining local solutions, biological control and biopesticides, and upscaling of the FAMEWS app.

Each country representative was given the floor to address two issues: what actions their country would take going forward; and what external support their country still required. Representatives of regional organizations and CGIAR were also given the opportunity to make any additional points regarding their support for countries' national action plans.

### KEY MESSAGES

- Biocontrol, as well as identification and rearing of natural enemies of FAW, must be reinforced at local and regional levels.
- Funding is required to implement national action plans and train technical people on key aspects of FAW control.
- Outreach of FAMEWS should be expanded as a monitoring and educational tool.
- Regional economic organizations play a major role in facilitating funding and information sharing, and must use this role to support FAW management efforts.

- A global strategy is needed to promote increased use of biological control as a sustainable, non-toxic method of managing FAW.
- Developing and delivering more successful and sustainable approaches to managing FAW requires the expertise of FAO, as well as research and development partners at national and regional levels.

The last session of the plenary was open to the floor to define the main recommended actions coming out of the workshop, based on the findings of the breakout group sessions and the key messages of the country representations. Recommendations were grouped under five main headings: policy support, capacity development, applied research, communication, and other recommendations.

### RECOMMENDATIONS

#### 1. POLICY SUPPORT

##### GOVERNMENTS:

##### National action plans

- These plans should align national level budget with FAW management objectives so that regular funding is allocated and integrated into National Plant Protection Offices.
- They should adopt a cost-sharing model so

that solutions are sustainable and not always dependent on external resources (financing, technical, human resources).

### **National FAW task forces**

- National task forces should be trained and guided in their activities at a regional or sub-regional level. For national task forces to operate effectively, there should be a clear roadmap and terms of reference, adequately trained personnel, and a strategy that aligns the goals of the task force with the national budget. Task forces should have cross-sector representation and should have shared responsibility to address priority interventions identified in the national action plan for management of FAW. Stakeholders that make up the task force and propose activities should also contribute to implementation of those activities (financially, technically, or in some other way).

### **REGIONAL ECONOMIC COMMUNITIES:**

- These should endorse the harmonization of a biopesticides legal framework.
- They should ensure that the approaches are consistent with, and brought through in, national actions, while also aligning with the FAO programme.
- They should connect political levels in the region to mainstream regional response to FAW and form a coordinated front, particularly for the occasion of the International Year of Plant Health 2020.
- They should also raise awareness among policymakers and decision makers – particularly in those countries where FAW has not yet arrived – on the economic, social and livelihood threats of the pest.

### **RESEARCH INSTITUTES**

- The work of national research institutes needs to be better coordinated across the region so that the results of applied research on FAW management techniques can be shared among countries, leading to best practices being established on the basis of scientific research.

## **2. CAPACITY DEVELOPMENT**

A paradigm shift requires looking at the bigger picture and considering that FAW exists in a context of other pests and widespread pesticide

use – capacity development needs to take place in this broader context. Otherwise, it was argued, excessive pesticide use will result in the killing of all natural enemies of different types of pest. Capacity development – with the required funding backed up by explicit government commitment – is needed at all levels (farmers, extension agents, policymakers, researchers, governments).

### **TRAINING**

- Collaboration is needed with research institutions to organize training and capacity development in biological control, development of inclusive inventories and impact studies of natural enemies (with the support of governments, South–South Cooperation partners and national and regional research institutes).
- Training is necessary at the regional/national level on the rearing and release of FAW natural enemies.
- National laboratories for biological control should be set up with national resources. National laboratories should be supported and guided by larger, overarching sub-regional laboratories.
- Farmers themselves need more training on how to deal with FAW and on when they should intervene (training should be provided through farmer field schools, extension agents and others).
- Increased support for systematic surveillance/monitoring is necessary. Often traps/lures are placed at the beginning of a field and nowhere else, rendering them largely ineffective. Task forces should offer technical guidance on where and when to set traps, managing traps and regular data uploading, as well as sending experts to train farmers and help in scouting.

### **FAMEWS**

- FAO's FAMEWS tool provides immediate advice to users (farmers, extension agents, etc) as soon as they enter data from field scouting and trap checking, which gives several management options and next steps that can be undertaken. FAMEWS also allows users to enter much useful information, including information on their farming practices and ways of managing FAW and other pests. It is important to use FAMEWS regularly so that a dynamic picture builds up of the state of FAW in a field – when these data are aggregated with data from other fields it helps

create a local, regional and national picture that could help in targeting interventions.

- Given the usefulness of FAMEWS as both a data collection and educational tool for farmers, it should be endorsed by all national governments and upscaled so that as many farmers, communities and extension agents as possible use it to educate farmers, share experiences and identify hot spots and priorities.
- Incentives should be provided to support the upscaling of FAMEWS, e.g. free phone data to support connectivity to the FAMEWS global platform.

### 3. APPLIED RESEARCH

#### LOCAL INNOVATIONS

A priority is to analyse and validate the efficacy of local solutions used to manage FAW so that, if effective, they can be adopted elsewhere and applied in the correct manner by farmers, communities and extension services.

#### FAMEWS

- FAMEWS is considered as a key research tool. It allows for the field level collection of relevant data, which can then inform areas of applied research. It is an essential connector between farmers and national and regional research institutes.
- FAMEWS is also a conduit for providing the latest, updated advice to farmers as soon as it becomes available from researchers.

#### INCLUSIVE RESEARCH

- More data and research are needed on patterns of use for biopesticides.
- More research is needed linking climate variables and trends of infestation for FAW, e.g. the difference in incidence levels of FAW and other pest infestations in high rainfall areas versus low rainfall or drought areas.
- The FAMEWS global platform offers a mechanism to analyse interactions between FAW and agroecological factors including climate change.
- More data about the presence/absence, population and distribution of FAW native natural enemies are needed.

### 4. COMMUNICATION

#### OUTREACH

Outreach needs to be comprehensive at the local, national and regional levels. All key players must be aware of the dangers of FAW infestation.

- A Strategic Communication Plan on FAW should be prepared at the regional level.
- A more comprehensive approach requires going beyond farmer field schools. An example of such an approach is found in Nigeria, where an information package is sent to smallholders at all levels on farming practices, including on how to manage FAW.
- To aid knowledge sharing and data dissemination, FAW databases and repositories need to be developed that are available to, and at the service of, all countries in the region.
- It is important to share good practices on management of FAW and other pests from farmers' experiential learning.
- Protocols should be shared across countries.
- Smallholders need ongoing information and support to deal with FAW, so tools to deliver such messaging should be relevant to the context (It is important to note that many smallholders do not have access to phones or technological communication tools).
- Schools are a very effective way of delivering messages. If schools teach children about FAW, the children can then relay those messages back to their parents.

#### Consolidated messages

- For the unique opportunity presented by the International Year of Plant Health 2020, countries should have a concerted communication drive to target policymakers at national, regional and global levels on the importance of strong national, regional and global responses to FAW.
- Strong FAW-related content is fundamental – this includes disaggregated data such as information on yield losses linked to FAW, facts on pesticides (e.g. toxicity effects, cost-benefit estimates), and evidence-based information on



biological control agents and biopesticides.

- The use of pesticides will kill natural enemies that we are promoting to control FAW in the field.

## 5. OTHER RECOMMENDATIONS

- ■ Emphasize the importance of regional and global coordination by looking beyond FAW and taking a holistic approach, linking national task forces with regional task forces and coordinating bodies such as FAO. It is important to link FAW-related activities with those related to other pests and diseases.
- Encouraging private sector involvement is needed so that it links with national programmes and supports activities that countries would not be able to undertake on their own.
- Increased cooperation between countries, particularly neighbouring countries, is suggested. When dealing with a transboundary pest such as FAW, national actions can only go so far - if neighbouring countries do not address their problems, national efforts could go to waste.
- Developing monitoring and early warning systems such as FAMEWS is needed for major transboundary plant pests other than FAW – e.g. *Tuta absoluta*, fruit flies, MLND, Fusarium wilt TR4, etc.



## ANNEX I – FULL PROGRAMME

### MULTI-STAKEHOLDER REGIONAL WORKSHOP ON SUSTAINABLE FALL ARMYWORM MANAGEMENT IN AFRICA

Praia, Cabo Verde, October 21 - 24, 2019

Day 1. Monday, 21 October		Chair: Jorge Brito	
08:30 – 09:00	Arrival and registration at Hotel Oásis Atlântico Praiamar		
09:00 – 09:30	<b>Session 1.</b> Opening	■ Welcome	FAO Representative, Cabo Verde
		■ Special remarks	Hans Dreyer, Director, Plant Production and Protection Division, FAO
		■ Opening address	Gilberto Silva, Minister of Agriculture and Environment, Cabo Verde
		■ Workshop objectives and programme (5 min)	Jean Bahama, FAO
09:30 – 10:00	Coffee break and group photo		
10:00 – 10:30	<b>Session 2.</b> Introduction to FAW and lessons learned from FAO FAW Global Programme	■ FAO FAW Global Programme update (15 min)	Elisabetta Tagliati, FAO
		■ FAW Ouagadougou meeting report (15 min)	Benoit Gnonlonfin, ECOWAS
10:30 – 12:30	<b>Session 3.</b> Lessons and experience on FAW management from Africa	Country presentations	
12:30 – 13:30	Lunch break		
13:30 – 16:00	<b>Session 3. (cont.)</b> Lessons and experience on FAW management from Africa	Country presentations	
16:00 – 16:30	Coffee break		
16:30 – 17:45	<b>Session 4.</b> FAW monitoring and sustainable management	■ Biopesticides for FAW Management (15 minutes)	Holly Popham, AgBiTech
		■ FAO FAW Monitoring and Early Warning System (FAMEWS) (30 minutes)	Keith Cressman, FAO
		■ Case study of FAMEWS use in Mozambique (15 minutes)	Hernani Domingos Cugala, FAW-FFS Mozambique
17:45-18:00	Questions and Answers		
18:30 – 21:00	Welcome Cocktail	Hotel Oásis Praiamar	

Day 2. Tuesday, 22 October		Chair: Celestino Tavares	
09:00 – 09:20	<b>Session 4.</b> FAW monitoring, and sustainable management (cont.) (10 min presentations)	■ FFS Global network for FAW	Mathew Abang, FAO
		■ Socio-economic impact of FAW	Neil Marsland, FAO (via Skype)
09:20 – 09:30		Questions and answers	
09:30 – 11:00	<b>Session 5.</b> FAW sustainable management. (10 min presentations)	■ ICIPE (Kenya): FAW ecology (push/pull)	Sevgan Subramanian
		■ IITA (Nigeria): Biological control	Komi Fiaboe
		■ ICRISAT (Niger): Biological control of FAW in Africa	Malick Ba
		■ EMBRAPA (Brazil): Local production of <i>Bacillus thuringiensis</i> in Brazil	Rose Monnerat
		■ Provivi (USA): Mating disruption	Philip Rollinson
		■ Russell IPM (UK): Trap lures	Nayem Hassan
10:30 – 11:00		Questions and answers	
11:00 – 11:30	Coffee break		
11:30 – 12:10	<b>Session 6.</b> Innovations from the field: Successful examples of sustainable management by smallholders. (10 min presentations)	■ Mozambique	Hernani Domingos Cugala, FAO
		■ Malawi	George Phiri, FAO
		■ Nigeria	Ijadare Olaniyi - Crop Pest Control Officer & Extension Agent
		■ United Republic of Tanzania	Never Zekeya, Nelson Mandela African Institution of Science and Technology
12:10-12:30		Questions and answers	
12:30 – 13:30	Lunch break		
13:30 – 17:00	<b>Session 7.</b> Working group discussions	FAW Sustainable Management 3 breakout groups, discussions on: ■ Lessons learnt on local solutions ■ Biological control and biopesticides ■ Adoption and upscaling of FAMEWS	Orlando Sosa Jean Bahama Tristan Nondah Mathew Abang Thaer Yaseen
17:00 – 17:30	Information	Cabo Verde: <i>Integrated Pest Management programme in Cabo Verde. Information on the field visit.</i>	Carla Tavares, Ministry of Agriculture and Environment, Cabo Verde



<b>Day 3. Wednesday, 23 October</b>			
08:30 – 17:30	<b>Session 8.</b> Field & lab visit	Visit to biological control laboratory and fields with biocontrol practices	Meet in front of Hotel Oásis Atlântico Praiamar at <b>8:15</b>
<b>Day 4. Thursday, 24 October</b>			<b>Chair: Carla Tavares</b>
09:00 – 09:30	<b>Session 9.</b> The way forward: Priority actions for scale-up	Break out group 1 reports	
		Break out group 2 reports	
		Break out group 3 reports	
09:30 – 11:00	Final country and organization contributions	Each country/organization states what actions they can take to improve FAW management and outlines where they feel support is needed	
11:00 – 11:30	Coffee break		
11:30 – 13:00	<b>Session 9. (cont.)</b> The way forward: Priority actions for scale-up	Plenary discussion to focus on recommended actions to take forward based on outcomes of breakout groups and country/organization representations.	
13:00 – 13:30	<b>Closing session</b>	Angela Moreno, National Institute for Agrarian Research and Development (INIDA) Ana Laura Touza, FAO Representative, Cabo Verde	
	Lunch		

## ANNEX II – ACRONYMS

<b>AU/IAPSC</b>	African Union/Inter-African Phytosanitary Council
<b>CABI</b>	Centre for Agriculture and Bioscience International
<b>CGIAR</b>	Formerly: Consultative Group on International Agricultural Research
<b>CILSS</b>	Permanent Interstate Committee for Drought Control in the Sahel
<b>CORAF</b>	West and Central African Council for Agricultural Research and Development
<b>ECOWAS</b>	Economic Community of West African States
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FAW</b>	fall armyworm
<b>FAMEWS</b>	Fall Armyworm Monitoring and Early Warning System
<b>FFS</b>	Farmer field schools
<b>GIZ</b>	German Corporation for International Development
<b>ICIPE</b>	International Centre of Insect Physiology and Ecology
<b>ICRISAT</b>	International Crops Research Institute for the Semi-Arid Tropics
<b>IGAD</b>	Intergovernmental Authority on Development
<b>IITA</b>	International Institute of Tropical Agriculture
<b>INIDA</b>	National Institute for Agrarian Research and Development (Cabo Verde)
<b>IPM</b>	Integrated pest management
<b>MAA</b>	Ministry of Agriculture and Environment (Cabo Verde)
<b>RAF</b>	FAO Regional Office for Africa
<b>SAA</b>	Sasakawa Africa Association
<b>SADC</b>	Southern African Development Community

## ANNEX III – LIST OF PARTICIPANTS

### Regional FAW workshop

Cabo Verde, 21-24 October 2019

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## MORE INFORMATION

[www.fao.org/fall-armyworm](http://www.fao.org/fall-armyworm)  
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