



Food and Agriculture Organization
of the United Nations

Sustainable management of the Fall Armyworm in Africa

A framework for partnership

(Version 2nd March 2018)

Executive summary

The Fall Armyworm (FAW) has invaded and quickly spread across Africa, infesting millions of hectares of smallholder maize, millet, and sorghum fields. FAW can cause significant yield losses if not well managed or in the absence of natural biological control. The direct actions that can be taken to manage FAW are largely up to farmers in their fields. Thus the main focus and majority of resources should be aimed at helping farmers do their job better. Farmers need understanding, advice, tools, resources, risk management, and a conducive environment to sustainably manage FAW.

Since its arrival in Africa, a series of meetings have been held to raise awareness and coordinate the response to the FAW, among others:

- Consultative meeting, Harare, Zimbabwe, 14-16 February 2017
- Stakeholders consultation meeting on “Fall Armyworm in Africa: Status and strategy for effective management” , Nairobi, Kenya, 27-28 April 2017
- Consultation meeting with partners Accra, Ghana, 17. July 2017
- Global FAW experts meeting, 18-20 July 2017, Accra Ghana
- Farmer Field Schools FAW Curriculum development workshop, 21-25 July 2017
- FAW Training of trainers, Addis Ababa, Ethiopia, 24-28 July 2017
- FAW Training of trainers, Abuja, Nigeria, 5-9 September 2017
- Farmer Field School training, Abuja, Nigeria, 10-15 September 2017
- Sub-regional workshop, Entebbe, Uganda, 18-20 September 2017
- Resource partners consultative meeting, Rome, Italy, 28. November 2017

Many of these events brought together partners to engage in dialogue and seek a coordinated response to the FAW threat. During the April stakeholders consultation meeting in April in Nairobi CIMMYT drafted a document that was turned over to FAO for continued development and finalization. For this purpose, FAO has developed a draft framework for partnership document, inspired and based on the important discussions and outcomes of the Nairobi meeting in April 2017. The framework should seek to bring together all partners into a coordinated and coherent structure, in which they can use their comparative advantages in complimentary and synergistic ways, to maximize efficiency and effectiveness of the FAW response. In assuming this coordination role and as a follow-up of the stakeholders consultation meeting in Nairobi, FAO convened another partners coordination meeting which was held on 17 July 2017 in Accra. Key partners such as AGRA, USAID, DFID, the World Bank, the European Commission, IITA, CABI, and ICIPE attended this meeting. The purpose was to discuss and review the proposed key components of the framework for coordinated FAW management, to identify who is doing what (and who is planning what) and to explore areas of collaboration including resources required to ensure a response to FAW at scale.

Acronyms

AGRA	Alliance for a Green Revolution in Africa
AU	African Union
CABI	Centre for Agriculture and Bioscience International
CARE	Cooperative for Assistance and Relief Everywhere
CBO	Community-based Organization
CGIAR	Consultative Group on International Agricultural Research
CILSS	Permanent Interstate Committee for drought control in the Sahel
CYMMIT	International Maize and Wheat Improvement Center
DFID	Department for International Development (UK)
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EMBRAPA	Brazilian Agricultural Research Corporation
EU	European Union
FAO	Food and Agriculture Organization
FAO-HQ	FAO Headquarter
FAW	Fall Armyworm
FEWSNET	Famine Early Warning Systems Network FFS Farmer Field
GEF	Global Environment Facility
GIS	Geographic Information System
GPS	Geographic Positioning System
HHP	Highly Hazardous Pesticides
IAPSC	Inter African Phytosanitary Council
ICIPE	International Centre of Insect Physiology and Ecology
ICT	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IGAD	Intergovernmental Authority on Development
IITA	International Institute of Tropical Agriculture
INSA	Institut du Sahel
IPC	Integrated Phase Classification
IPM	Integrated Pest Management
NAR	National Agricultural Research
NGO	Non-governmental organization
NPPO	National Plant Protection Organization
NPV	Nuclear Polyhedrosis Virus
OXFAM	Oxford Committee for Famine Relief
PC	Personal Computer
PSU	Penn State University
REC	Regional Economic Communities
SADC	Southern African Development Community
SAPReF	Southern African Pesticides Regulators Forum
SMS	Short Message Service
SSC	South-South Cooperation
TWG	Technical working group
USAID	United States Agency for International Development

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The Framework for partnership for the sustainable management of Fall Armyworm in Africa

The *Framework for partnership for the sustainable management of Fall Armyworm in Africa* is divided into six components:

1. Management of FAW: Farmer education & communication

Tens of millions of smallholder farmers are facing FAW in their crops. They rapidly need the knowledge, recommendations, and tools available to make good management decisions in their fields. Awareness raising and mass communication campaigns are needed, farmer education through a number of fora (national extension programmes, plant health clinics, and Farmer Field Schools) must as rapidly as possible be implemented across the continent. Farmers, governments and extension systems also need sound technical and policy advice, to avoid the use of highly hazardous pesticides and the promotion of safer alternatives.

2. Testing and validation of FAW management practices

The vast majority of smallholder maize, sorghum and millet farmers across Africa do not use inputs in their production. They mostly grow for household consumption and typically receive very low prices for any excess they sell. The options available to them are often limited to locally-available tactics, such as the use of soaps, ash, lime, soil, or local botanicals for direct control, and the recycling of locally-procured pathogens. Such local controls need to be tested and understood. Other, more proven tactics, such as the 'push-pull' use of repellent and attractive plants, need to be tested in different environments and in different cropping-systems. This is urgent need to test and validate many of the locally-available practices.

3. Monitoring, risk assessment & early warning

The appropriate monitoring and use of the information and modelling to develop risk models and maps, as well as information actionable at a local level is fundamental for the prioritization of resources. A data collection application will be developed, linked to a platform that provides real-time data viewing & analysis, and linkage to a risk model and risk mapping.

4. Longer-term research & innovations

There are many promising and possible responses to FAW in Africa that require long-term research an investment in innovations. From digital sensors and diagnostics to landscape ecology and molecular biology, there are many areas that merit research and local capacity-development.

5. Policy & regulatory support

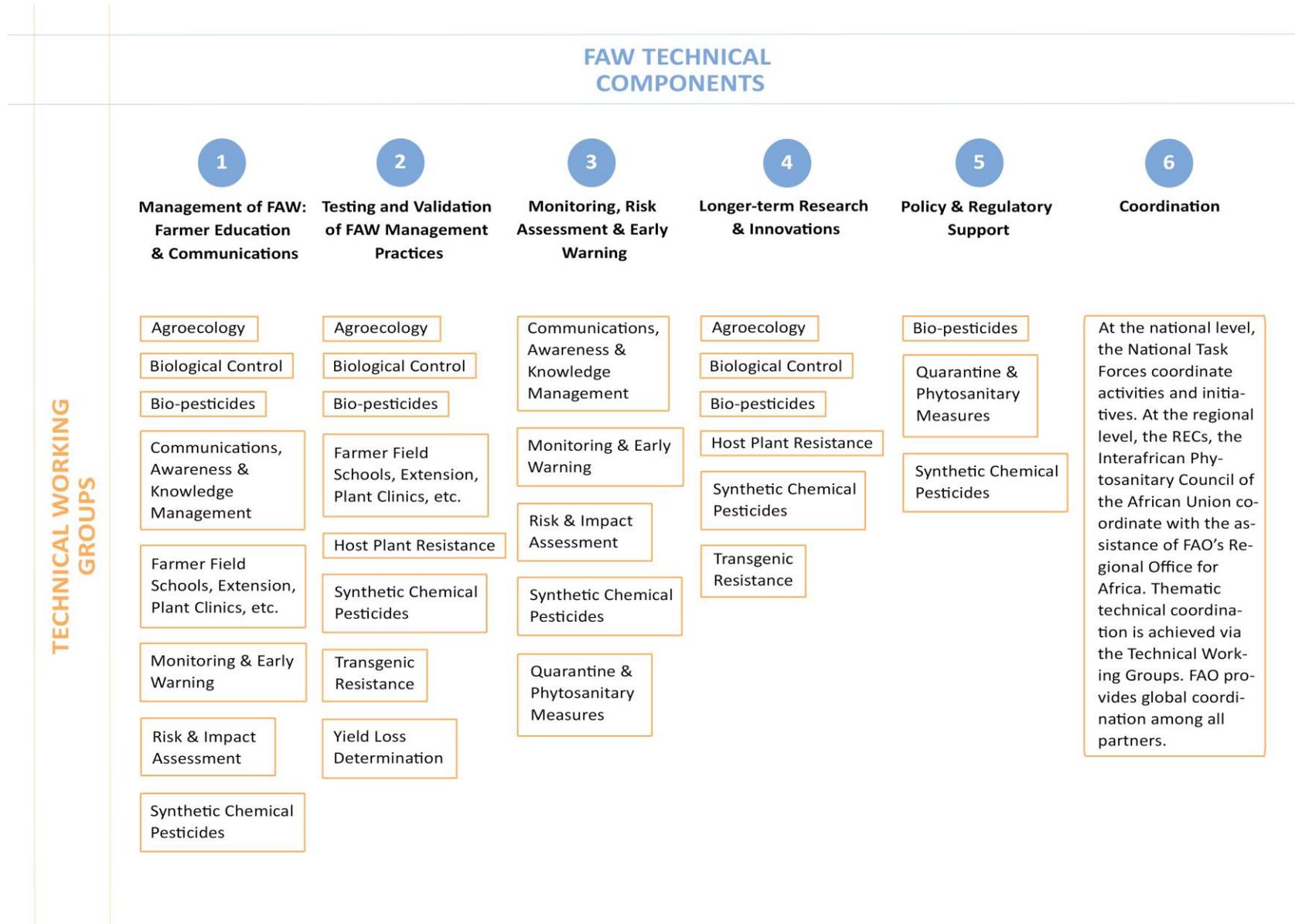
Farmers' decisions in the field are directly influenced by national policies and regulations. For FAW management this is especially true for pesticides policies, regulations and programs.

6. Coordination

FAW response requires good coordination, from a local, through national to international levels. National Task Forces should be established in each country and the technical working groups should be supported at an international level.

To strengthen coordination, FAO has facilitated the establishment of twelve technical working groups (TWG), which became functional during the second half of 2017. They are a further development of the work streams that were discussed during the Nairobi meeting. They bring together experts from relevant development partners to share, review, discuss, prioritize and develop joint work plans and proposals. The TWGs directly support the components of the Framework (see graphics below). The on-going engagement in this technical coordination has resulted in putting more technical substance into the *Framework for partnership for the sustainable management of Fall Armyworm in Africa*.

Technical working groups support to framework components



1. Management of FAW: Farmer education & communication

Smallholder family maize farmers in Africa need immediate knowledge, understanding, and tools to sustainably manage FAW in their fields. The key concepts and principles, messages, and practices must be gathered together and made available to farmers in a structured way, so that they can try them, learn from them, and evaluate them.

Based on how smallholders manage FAW in the Americas, training and awareness raising material is to be prepared, highlighting immediate recommendations such as:

- Take preventive action by increasing plant diversity in plots. Maize mixed in plots with cassava or yams or other crops may be less attractive to female FAW moths. Some plant species repel female FAW moths. This is the basis of the 'push-pull' technology: including a plant species that 'pushes' FAW away from maize and to plants that 'pull' them (attract them), where they can be easily controlled.
- Farmers should visit their fields frequently to observe, learn, and take action. During the first 40 days after planting, they should walk through their fields every 3-4 days. While doing this, they should observe the general health of the plants, FAW populations and natural enemies, and take actions (e.g. mechanical control).
- Farmers need to learn that maize plants can compensate for certain levels of foliar damage. A low percentage of plants infested will not reduce maize yield dramatically and that there can be important populations of natural enemies of FAW that can provide important natural control. They need to learn how to conserve them, attract them, or harvest and use them.
- Effective and sustainable FAW management requires action. Some of the actions prevent FAW, others are required when something goes wrong in the system and there are high levels of FAW infestation in the field. Actions must be economically justifiable. Local controls need to be studied.

Avoiding highly hazardous pesticides

In urgent response to the new, threatening-appearing damage, some governments have responded by purchasing and distributing pesticides. Some countries have reported the distribution or use of Highly Hazardous Pesticides for FAW. Most smallholder maize farmers cannot afford to use any purchased commercial pesticides, given the low price they receive for the maize they sell.

Mass communication campaigns

The recommended practices and actions should be synthesized into key concepts and messages. The messages are useful in creating and maintaining a harmonized, consistent narratives to be used in all media and mass communication campaigns. The concepts form the basis of extension and learning-by-doing activities with extensionists and farmers. These concepts can be used in Farmer Field School trainings and other manuals. They are described in more detail in the section on Communication & Training. The key concepts will have to be

reviewed, further developed and modified as more learning and prioritization evolves over time.

Several other communication mechanisms for awareness creation are key in ensuring that as many farmers as possible are aware of the available management options. Among them are; mass media, ICT, communication materials in local languages; e.g. visual objects such as posters, programs, leaflets etc. can be effective tools for communication with and to train farmers.

Awareness creation of the policy makers through the production of policy briefs as well as involving them in field exposure visits are some of the activities that can lead to government buy in into support for promoting the sustainable management options among the smallholder farmers.

National FAW Task Forces will have a key role to coordinate the development of action plans for the immediate awareness campaign and crash courses and provide the coordination services for immediate action.

National extension services and farmer organizations

Some countries have strong Agricultural Extension Service that need to be strengthened through trainings and access to materials on FAW management. In other cases other extension outreach occurs via farmers associations and support from NGOs. CABI also supports Plant Health Clinics that are implemented under the Plantwise program. These clinics provide another opportunity for developing smallholder capacity for managing the FAW in a sustainable manner.

Farmer Field Schools (FFS)

Farmer education and community action are important elements in the strategy to best manage FAW populations. Sound understanding of biology and ecology of the pest, surveillance at community and field level and fine-tuning management strategies underpin community action. FAO has promoted FFSs as platforms for farmers to learn and exchange for nearly three decades. The FFS approach is being used in over 90 countries, for a vast range of topics, with support from multiple partners including national and local governments, farmer organizations, IFAD, World Bank, GEF, the EU, many bilateral donors, Oxfam, CARE, and many other international and national NGOs. A number of African governments in affected countries have integrated FFS in their extension systems and conduct FFS every year through government budgets, or have developed FFS national strategies (Rwanda, Burkina Faso, Burundi, Mali, Mozambique and others).

In 2017, FAO released the [Global Farmer Field School Platform](#), the global knowledge center on Farmer Field Schools with over 90 countries involved and 15 international partner

organizations including IFAD, GEF, Bioversity International, bilateral donors, international NGOs and others.

A rapid investigation of the different FFS projects in the FAW affected countries in Africa conducted through the Global FFS Platform shows that more than 4,000 FFS are scheduled to be implemented in 2017, reaching out to more than 100,000 farming households.

In addition, in coming years, 5000 facilitators will be trained and over 40,000 FFS will be implemented in affected countries in Africa.

This component is supported by the following TWGs:

- Biological control
- Bio-pesticides
- Monitoring & Early Warning
- Communication, Awareness & Knowledge Management
- Farmer Field Schools, Extension, Plant Clinics, etc.
- Agroecology
- Synthetic Chemical Pesticides

Key objectives and activities of management of FAW: Farmer education & communication component

Objective	Activities	Partners
Promote pesticide registration reviews and harmonization to ensure that Highly Hazardous Pesticides are not registered and appropriate bio-pesticides are registered for use against FAW.	<ul style="list-style-type: none"> ✓ Conduct reviews of current national and sub-regional pesticide registrations to determine if HHPs are registered for FAW. ✓ Review registrations to determine if bio-pesticides effective for FAW are registered. ✓ Complete report and present to authorities for action ✓ Provide follow-up actions ✓ Determine priorities for emergency registrations. 	<p>FAO National Pesticide Registrars Sub-regional pesticide organizations</p>
Provide up-dated information on effectiveness of chemical insecticides for FAW.	<ul style="list-style-type: none"> ✓ Compile and distribute information on effectiveness of non-HHP registered for FAW use from literature. ✓ Compile and distribute information from published literature on resistance found in FAW to compounds. 	<p>FAO NPPOs Sub-regional Pesticide Organizations Inter-African Phytosanitary Council</p>
Compile Key Concepts and Messages for farmer training and communication.	<ul style="list-style-type: none"> ✓ Revise and distribute key concepts for FAW management for farmers. ✓ Validate and review at national level and in local languages. 	<p>FAO NPPOs NARS CABI NGOs CGIAR</p>
Use consistent concepts and messages for use in farmer training & in mass communication campaigns.	<ul style="list-style-type: none"> ✓ Develop key messages. ✓ Develop visual and audio training material on insect identification, biology, ecology and key management messages. ✓ Translate and edit into at least 20 languages. ✓ Conduct mass media campaigns – (rural radio, Dimitra Clubs, TV programmes, internet and social media), regional, sub-regional, national, and local. ✓ Train local journalists 	<p>FAO NPPOs NARS CABI AGRA CGIAR</p>

<p>Develop and make available reference leaflets, photos, videos, posters, and pamphlets in a variety of languages to be distributed and adapted locally.</p>	<ul style="list-style-type: none"> ✓ Consolidate key concepts and messages for farmers and decision-makers in many languages. ✓ Develop stock materials (leaflets, photos, videos) and make them available for free and public distribution. 	<p>FAO NPPO NARI CABI Lancaster CGIAR</p>
<p>Develop a live repository for the current state-of-knowledge about FAW in Africa, including a portal and coordination and publication of the “Handbook of FAW in Africa”</p>	<ul style="list-style-type: none"> ✓ Develop FAW in Africa Portal ✓ Develop and agree to outline of “Handbook of FAW in Africa” ✓ Coordinate contributions, reviews, and publication. 	<p>FAO CABI CGIAR Universities Lancaster U</p>
<p>At least 10.000 extensionists have the capacity to provide training to farmers regarding sustainable FAW management.</p>	<ul style="list-style-type: none"> ✓ Prepare technical material ✓ Identify and train 250 trainers ✓ Host national workshops. 	<p>FAO NPPOs NARS</p>
<p>At least 10 million farmers have the knowledge and information via 40.000 Farmer Field Schools to manage FAW sustainably.</p>	<ul style="list-style-type: none"> ✓ Development of curricula and training materials for incorporating FAW related topics in FFS curricula (Agro-ecosystem Analysis, experiments and special topics) ✓ Develop and conduct refresher courses and trainings for 300 FFS master trainers and 5000 FFS facilitators ✓ Develop and implement 70 000 FAW short crash courses of 2-3 days in the rural villages including through Open Day visits in nearby FFS. ✓ Farmer to Farmer Exchange visits and “farmer congresses” ✓ Facilitate the development of community management plans in communities where FFS are implemented ✓ Mapping, coordination, and planning of FFS initiatives through the Global FFS Platform 	<p>FAO FFS Sub-regional Networks NPPOs</p>

2. Testing & validation of FAW management practices

There are a number of significant knowledge gaps that should be filled in order to provide farmers with better guidance in how to manage FAW. These tests and validations could be tested both on research stations, and through action-research with farmers, for instance through Farmer Field Schools (FFS) and other related farmer-led extension approaches:

- Determination of yield loss from FAW under different conditions representative of the range of contexts in Africa (soil types and nutrition, crop nutrition, moisture availability, variety, stage of infestation, etc.). Based on these studies and the costs and effectivity of control and the prices received by farmers for their harvest, action thresholds can be developed and recommended.
- Inventory of natural enemies (predators, parasitoids, pathogens) of FAW in its new range in Sub-Saharan Africa. Quantification of their importance in FAW population management. Identification of gaps and candidates for classical biological control introductions from the Americas.
- Effectiveness, availability, costs and recommendations for the use of biological pesticides. Among the botanical pesticides, neem has been widely tried, along with many native African plants. Among the biological pesticides, virus (Nuclear Polyhedrosis Virus - NPV), bacteria (*Bacillus thuringiensis* - Bt), and fungi (*Metarhizium* and *Beauveria* spp.) have all shown promise.
- Explore local production and application of biological control agents, especially the egg parasitoid *Trichogramma*, NPV virus and Bt bacterium.
- Testing a classical biological control approach through exploration, introduction, evaluation and release of natural enemies from outside Africa.
- Review of cropping patterns and landscape information to determine area-wide management and recommendations based on FAW ecology. Effect of planting dates and staggered plantings on FAW infestation and damage.
- Studies of the influence of plant diversity (multi-cropping systems and the use of border plantings) to reduce FAW oviposition and increase populations of natural enemies.
- Trials of cultural practices (application of ash to whorls, use of soaps, sprays of sugar water to attract and feed natural enemies) to test their validity and effectiveness.
- Benefit-cost analysis of the different FAW control options, comparing benefits (estimated value of abated loss) to costs (including labor, control products, health and environmental costs).

This work will be done in the context of developing a Network of active, motivated FAW researchers across Africa. The emphasis will be on national agricultural universities and research institutes. Work at national universities has the added benefit of training students while conducting the research. Much of the work can be done in the context of thesis research, most typically at the Masters' degree level. Pairing will be sought for the national universities with the international research centers and universities.

South-South cooperation, especially among researchers and practitioners from the Americas and counterparts in Africa will be promoted, both through study tours, short-term exchanges, joint research projects and participation in international symposia.

The results of the short-term studies will be published and shared at annual regional symposia organized to bring together the researchers to share and discuss their work.

In addition, a reference compendium, the Fall Armyworm in Africa Handbook will be produced and published, serving as a reference guide to collect in one publication in an organized manner the information necessary upon which to base management decisions. The Handbook will be available in print and as a living document publically available on the internet.

The potential for local production of biological control methods, especially the egg parasitoid *Trichogramma*, the bacteria *Bacillus thuringiensis*, and the Nuclear Polyhedrosis Virus will be carefully studied to determine the feasibility of setting up local production facilities and businesses. Local businesses that produce products and provide advisory services may offer interesting opportunities for rural youth employment and entrepreneurs.

This component is supported by the following TWGs:

- Yield Loss Determination
- Biological control
- Bio-pesticides
- Farmer Field Schools, Extension, Plant Clinics, etc.
- Agroecology
- Synthetic Chemical Pesticides
- Host Plant Resistance
- Transgenic Resistance

Testing & validation of FAW management practices component: Key objectives and activities

Objective	Activities	Partners
Create and coordinate an African Network of National Research & Development for FAW.	<ul style="list-style-type: none"> ✓ Identify National Agricultural Universities, National Research Institutes and existing sub-regional and regional networks to participate in the Network. ✓ Hold initial meeting to determine short-term (less than 3 years) research priorities and develop annual work plan. ✓ Hold monthly virtual meetings to share advances and prioritize. ✓ Hold annual meetings to present results, determine priorities, and develop new annual work plan. 	FAO CGIAR ICIPE National Agricultural Universities NARS Existing sub-regional and regional networks
Determine yield loss due to FAW and develop action thresholds.	<ul style="list-style-type: none"> ✓ Identify and form a committee (of the Network) of researchers and professors to develop protocols and carry out trials. ✓ Develop standardized protocols for field trials. ✓ Regional workshop to discuss and train to protocols ✓ Field trials measuring yield response to FAW infestation levels. 	Network FAO CGIAR NARS NPPOs Universities
Promote the use of bio-pesticides and botanical pesticides.	<ul style="list-style-type: none"> ✓ Identify and develop South-South Cooperation of use of bio-pesticides and botanicals (Brazil, Colombia, Cuba, Mexico) ✓ Conduct trials to determine effectiveness, appropriate formulations, dosage levels, and application strategies for bio-pesticides and botanicals. ✓ Identify and support at least five local businesses to produce and market bio-pesticides and botanicals. ✓ Host four sub-regional symposia/fairs of botanical and bio-pesticides 	FAO CGIAR ICIPE Lancaster U. CABI NARS NPPOs

<p>Determining the efficacy of natural enemies (predators, parasitoids and pathogens) on FAW to evaluate the potential for conservation / classical biocontrol strategies.</p>	<ul style="list-style-type: none"> ✓ Determine priorities. ✓ Design protocols. 	<p>CGIAR ICIPE Universities</p>
<p>Determining the efficacy of cultural control options against FAW, including planting dates, handpicking, use of soil & ash, plant diversity, etc.</p>	<ul style="list-style-type: none"> ✓ Determine priorities. ✓ Design protocols. ✓ Conduct field trials. ✓ Analyze data and prepare reports. ✓ Publish results. 	<p>Network FAO NARS NPPOs Universities FFS</p>
<p>Test plant diversity, push-pull, multicropping systems in relation to FAW management</p>	<ul style="list-style-type: none"> ✓ Develop concept note ✓ Submit and obtain funding ✓ Conduct trials 	<p>CGIAR ICIPE NARs</p>
<p>Management options tested through FFS and lessons learned from FFS reported through the Global FFS Platform</p>	<ul style="list-style-type: none"> ✓ Baseline data collection ✓ Action-research and Participatory Technology Development: facilitate farmer-researchers participatory processes to test and adapt sustainable management options through experiments in Farmer Field Schools and in farmer fields ✓ Collection and consolidation of FAW curriculum and successful management options locally-adapted to African smallholders ✓ Facilitate interactive Community of Practice on FAW management through FFS, via the Global FFS Platform 	<p>FAO National Extension services</p>

3. Monitoring, risk assessment & early warning

The capacity of many African countries to detect and react promptly to new pest invasions, through regular monitoring and surveillance, is often limited. A Fall Armyworm Monitoring and Early Warning System (FAMEWS) has been designed and will be implemented across the continent. The system has objectives and consist of two primary components: in-country monitoring and surveillance at the community (farmer) level and early warning that encompasses the community (farmer), district, national, sub-regional and regional levels. The development and delivery of the system will be done in concert with structures put in place at these different levels for the coherent and coordinated management of FAW across the continent (e.g. village level pest management groups/communities as well as task forces or steering committees at district, national, sub-regional and regional levels).

The monitoring component of the system will be implemented within the context of existing such as national extension services, Farmer Field Schools (FFS), farmer groups, organizations and associations, and other community-based systems.

The system will consist of field data collected from fields and traps with lures. The field data consist of infestation levels of maize, sorghum or millet plants, and the traps report female adult moth populations, lured by a synthetic pheromone. The traps & lures, and field scouting protocols have been standardized and training is beginning of their implementation.

An application for smartphones has been developed by FAO for collecting the data and is being implemented. The data are transmitted to a cloud-based storage, where they are accessible globally and linked to a platform that allows real-time mapping and analysis of both movement patterns and historical changes. These data can be use at a number of different levels for different purposes:

- Community (farmers): immediate control
- District: threat potential, pesticide needs
- National: planning, food security assessment, task force
- Sub-regional: food security assessment, planning
- Regional: food security assessment, planning
- Global: assessment of migration and expansion

Implementation of the system will require large-scale standardized training and teaching material, including a comprehensive training manual and online YouTube videos. Training should be provided to all individuals involved in data collection, recording and transmission not only initially but updated refresher training should be conducted on a regular basis.

Risk modelling and mapping

In addition to FAMEWS, FAO has developed a risk modeling and mapping tool (FAWRisk), allowing for the district-level risk of FAW to food insecurity to be determined. The model and mapping will use data on the risk to food insecurity, as caused by FAW, including dimensions of hazard & exposure, as well as vulnerability and lack of coping. The data on exposure will be collected from the FAMEWS prevalence data. The model has been developed and is being refined in the technical working group on Risk and Impact.

This component is supported by the following TWGs:

- Risk & Impact Assessment
- Monitoring & Early Warning
- Communication, Awareness & Knowledge Management
- Synthetic Chemical Pesticides
- Host Plant Resistance

Monitoring, risk assessment & early warning component: Key objectives and activities

<p>Implement and use FAMEWS, the harmonized monitoring system, consistent data collection and analysis system and early warning system, and FAWRisk, the risk modelling and mapping platform</p>	<ul style="list-style-type: none"> ✓ Conduct regional workshops, using Skype when possible, to obtain agreement on standardized FAW data. ✓ Evaluate different trap designs and pheromone lures. ✓ Determine the correct trap placement in the field based on existing knowledge. ✓ Standardize on a single trap design and pheromone lure. ✓ Develop guidelines on the operational use and maintenance of traps. ✓ Procurement and distribution of pheromone traps. ✓ Conduct regional workshops on the operational use and maintenance of traps. ✓ Testing of field data collection system (application for smartphones) ✓ Development of a centrally located cloud-based Internet platform. ✓ Server hosting, hardware and software maintenance. ✓ Prepare and disseminate useful and timely advice and early warning products to stakeholders ✓ Provide training to stakeholders on the use of early warning products. 	<p>FAO DFID ICIPE CABI U Barcelona PSU CIMMYT NARS AGRA</p>
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<p>Generate detailed and dependable knowledge on host range and migration patterns of FAW in the context of African agro-ecologies and cropping systems, to develop and disseminate appropriate management options.</p>	<ul style="list-style-type: none"> ✓ Determine standardized lure and trap to be used. ✓ Procurement of pheromone traps. ✓ Determine the correct trap placement in the field based on existing knowledge. ✓ Develop guidelines on the operational use and maintenance of traps. ✓ Conduct regional workshops on the operational use and maintenance of traps. 	<p>FAO USDA ICIPE Lancaster U CABI</p>
<p>Organize and conduct annual FAW research seminar and knowledge & service fair</p>	<ul style="list-style-type: none"> ✓ Organize annual 3-day international scientific seminars to assemble and share the best knowledge of FAW in Africa and host a knowledge and service fair, where service providers can present and explain their services. 	<p>CABI FAO Private sector</p>
<p>Implement Risk Modelling and Mapping System</p>	<ul style="list-style-type: none"> ✓ Further refine risk model and mapping. ✓ Include inputs from FAMEWS field and trap data 	<p>FAO DFID ICIPE NARS Universities</p>

4. Longer-term research & innovations

In addition to the short-term (two years or less) that needs to be completed, other research activities will take longer, typically between two and five years.

A number of key areas that require longer-term research include:

- Measuring the long-term impacts (on human health and the environment) of extensive and intensive pesticide use.
- Determination and implementation of classical biological control programmes (importation and release of naturally occurring biological control agents from the Americas to Africa).
- Conventional and genetically engineered host-plant resistance variety development and deployment.
- The effects of cropping systems, especially conservation agriculture on FAW ecology and management.

This component is supported by the following TWGs:

- Biological control
- Bio-pesticides
- Agroecology
- Synthetic Chemical Pesticides
- Host Plant Resistance
- Transgenic Resistance

Longer-term research & innovations component: Key objectives & activities

Objective	Activities	Partners
Determine human health and environmental impact of synthetic pesticides	<ul style="list-style-type: none"> ✓ Determine appropriate monitoring mechanisms for measuring human health and environmental impacts. ✓ Implement programme to monitor and report on impacts. ✓ Analyze results, write reports and present results in appropriate fora. 	FAO, CABI NARS NPPOs Universities Pesticide Regulatory Agencies
Determine potential for and implement if appropriate classical biological control programmes (importation and liberation of naturally-occurring biological control agents from the Americas to Africa).	<ul style="list-style-type: none"> ✓ Conduct surveys to determine biological control organisms of FAW present in Africa and determine if any important organisms are missing. ✓ Carry out biosafety review for possible importation of organisms from the Americas. ✓ If appropriate, conduct foreign exploration for biological control organisms in areas of origin. ✓ Introduce organisms into Africa, following appropriate biosafety protocols and procedures. 	CGIAR ICIPE NPPOs Universities FAO
Determine the effects of cropping systems, especially conservation agriculture on FAW ecology and management.	<ul style="list-style-type: none"> ✓ Design studies to test effects of cropping-systems on FAW. ✓ Conduct studies, analyze results, publish papers and present them. 	FAO CGIAR ICIPE NARS National Universities
Develop conventional and transgenic FAW resistant varieties and test.	<ul style="list-style-type: none"> ✓ Testing and introgression of conventionally-derived FAW resistance_(from identified CIMMYT and USDA-ARS germplasm sources) into Africa-adapted maize germplasm, followed by varietal release, seed scale-up 	CIMMYT AATF IITA USDA NARS Private Sector

	<p>and delivery of improved maize hybrids/varieties.</p> <ul style="list-style-type: none"> ✓ Testing and publishing the efficacy of relevant Bt Cry/Vip3A transgenic events against FAW, and release of FAW-resistant transgenic maize germplasm in countries outside South Africa, where appropriate, after necessary regulatory approvals and consultations. The use of transgenic crops requires training of the farming communities on the “refugia” strategy to maintain the efficacy of the transgene as well as to avoid rapid build-up of insect resistance against the transgene 	
<p>Further develop the FAMEWS and FAWRisk systems, especially the incorporation of innovative technological solutions (drones, etc)</p>	<ul style="list-style-type: none"> ✓ Determine priority new developing technologies and services to incorporate into FAMEWS and FAWRisk ✓ Develop concept notes and seek funding 	<p>FAO Partners of technical working group Private sector</p>

5. Policy & regulatory support

Policy and regulations

Highly Hazardous pesticides have been reported to be used in large quantities in response to FAW infestations. Among all pesticide products on the market, a relatively small number have an extremely high potential to severely impair human health and the environment. The cost effectiveness of these products is always negative when the externalities on public health and environmental degradation are considered. This is true especially in developing countries and economies in transition, where proper risk mitigation measures, such as protective clothing or properly maintained application equipment, may not be in place. Low-risk alternatives exist, which might however not be readily available to farmers in Africa.

Regulatory actions to ensure that products authorized and used do not pose unacceptable adverse effects and that facilitate the registration of low-risk products are key to the long term sustainability of FAW management. Activities include:

- Create adequate awareness among policymakers and regulatory organizations on the need for fast-tracked testing, registration and quality management of FAW management options (e.g., biopesticides / botanicals / natural enemies /low-risk synthetics);
- Organise regional workshops for national pesticide regulatory authorities and their regional networks (e.g. SAPReF, EAC technical working groups, INSAH for CILSS) to:
 - Review the list of registered pesticides and identify sources for low-risk, IPM compatible products already registered or legally available in respective countries, in the region or globally; Exchange experiences on their use and efficacy;
 - Identify priorities the testing/development of new products with the highest potential to be effective;
- Complete and publish a study on the costs and returns of maize among smallholders. Examine the true costs of pesticides (including effectiveness, human and environmental risks, and impacts on trade).
- Demonstrate the effectiveness of public investments in extension and agricultural research & training.
- Conduct policy analysis on support for smallholders: Prices received, price transmission, aggregation & infrastructure, farmer organizations, & insurance & other risk-transfer mechanisms.

This component is supported by the following TWGs:

- Bio-pesticides
- Synthetic Chemical Pesticides
- Quarantine & Phytosanitary Measures

Policy & regulatory support component: Key objectives & activities

Objective	Activities	Partners
<p>Create appropriate policy framework for pesticide use for FAW.</p>	<ul style="list-style-type: none"> ✓ Create adequate awareness among policymakers and regulatory organizations on the need for fast-tracked testing, registration and quality management of FAW management options and the review of chemicals currently being used for FAW control and their hazards. ✓ Organize regional workshops for national pesticide regulatory authorities and their regional networks. ✓ Review registrations of pesticides for FAW 	<p>FAO Regional Pesticide Commissions NARS NPPOs CABI</p>

6. Coordination

Coordination of FAW response in Africa is needed at multiple levels: local, national, regional, and international. FAO will directly provide the coordination at an international level, while supporting the regional and sub-regional bodies, and the National Task Forces. Technical coordination will take place via the technical working groups.

National coordination

Several countries have already adopted the approach of creating a National FAW Task Force or committee. Typically chaired by Ministry of Agriculture, they include research, extension, National Plant Protection Organisation, private sector, farmers' organisations and others. The purpose of this group would be to:

- Coordinate national efforts to manage FAW among different organizations, to ensure coherent, consistent response and including monitoring, awareness campaigns, mobilizing resources for training programmes, etc.;
- Engage with the relevant regulatory authorities to fast-track testing, validating and registering of FAW control options that are not available in the local market;
- Monitor status of FAW in the country, and produce progress reports regarding field efforts to improve farmers capacity to manage the pest (through Farmer Field Schools and other means), maps (in association with the early warning component, building national capacity to use mapping tools) and guidance documents (may include a "data analysis" sub group);
- Mobilize resources from within government and/or from development partners for national programme activities (promotion of management approaches, including Farmer Field Schools, early warning and monitoring activities & information, etc.).

Regional coordination

The **Regional Economic Communities steering group** (ECOWAS, SADC, IGAD, ECCAS) – will share information and analysis based on programmes at regional level, and will be made up of the agriculture department of the REC, with a representative members drawn from each of the countries.

The RECs will support both face-to-face and video conference meetings between representatives of the national task forces on the evolving situation. This should include sharing of status reports from countries, identification of what has worked and what has not, identification of best options for managing the pest, identification of themes for research, dissemination of information and communication, recommending policies and strategies to facilitate FAW management, etc.

Each REC would need resources and capacity to play a role in FAW coordination, with staff to be hired within the REC, typically in the Agriculture and Environment Department or similar.

Africa-wide coordination

The third level of coordination involves Africa-wide activities under the auspices of the African Union (AU).

This framework to guide the development of programmes to improve the management of FAW in Africa can only succeed with the strong political support at the highest possible level. The AU Department on Rural Economy and Agriculture will also host the main framework “steering group”, to coordinate donor efforts at national, regional and continental level. This group will be made up of the main stakeholders in FAW management (see diagram), and will be the main forum for discussion of the impact assessment exercises as well as programme progress reporting.

AU specialist entities such as the InterAfrican Phytosanitary Council (IAPSC), as the Regional Plant Protection Organisation, will have a specific role in continent-wide information sharing, and to handle occasional meetings of the various Africa-wide technical advisory groups on FAW. IAPSC may also convene international technical meetings on technical aspects of FAW control, in association with the main International Agricultural Research Institutions active in this area (CIMMYT, IITA, ICIPE, etc.).

FAO will coordinate the international response via the technical working groups and the *Framework for partnership*.

Thematic technical coordination

Thematic technical coordination is achieved via the technical working groups (TWGs). The TWGs bring together experts and practitioners from a diverse group of organizations globally to review, synthesize and analyze areas of work for the development and implementation of the FAW work. Currently there are twelve groups; more could be added. They are convened by a lead member who chairs monthly virtual meetings to develop common approaches and work. Several groups have already developed joint proposals. Minutes of the meetings are shared with other groups and FAO provides over-arching coordination to the groups.

Coordination component: Key objectives & activities

Objective	Activities	Partners
Create and maintain fluid and coherent coordination among actors and levels	<ul style="list-style-type: none">✓ Creation of national task forces or coordination platforms with leadership and terms of reference established.✓ Regular meetings of national coordination platforms.✓ Support to regional and sub-regional coordination mechanisms.✓ Coordinate technical working groups.	FAO National task Forces RECOs Interafrican Phytosanitary Council African Union

Annex 1: Framework log-frame

Sustainable Management of Fall Armyworm (FAW) in Africa Logical Framework			
OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	PARTNERS
Goal: Reduce food insecurity and poverty through sustainable management of FAW	G1 % (percentage) reduction in food insecurity G2 % reduction in poverty	Official statistics	
Outcome 1 Improved access to and use of sustainable management practices by smallholder farmers for FAW	1a % of farmers who can identify FAW and use at least two sustainable management practices. 1b % of farmers who have participated in FAW management education. 1c % of national extension providers trained in FAW management.	1a,b, Household survey 1c National extension program data.	
Outputs 1.1 Farmers education courses completed	1.1a # (number) of Farmer Field Schools or similar courses offered. 1.1b% of farmers who have participated in FAW training.	FFS database	FAO CABI NGOs Extension Services
1.2 Mass communication campaigns to accompany farmer education completed	1.2a # of mass communication campaigns carried out 1.2b % of farmers who have heard or participated in mass communication campaigns	1.2a Campaign records 1.2b Household surveys	FAO CABI USAID CGIAR

Outcome 2 FAW management practices tested & validated	2a # of countries with registered HHP for FAW 2b # protocols and studies designed and financed 2c # trials implemented	2a,b Household survey	
Outputs 2.1 Pesticide recommendations completed	2.1a # of HHPs eliminated from registration & use 2.1b # of trials and registrations of new pesticides	2.1a,b Monitoring report	FAO CGIAR CABI SADC NAROs
2.2 Institutions chosen and protocols completed	2.2a # of protocols developed and approved. 2.2b # of institutions chosen to participate in trials	2.2a,b Monitoring reports	FAO CGIAR NAROs
2.3 All practices tested	2.3a # of recommended practices identified 2.3b % of recommended practices tested 2.3 c # of publications of results	2.3a Proposal with practices 2.3b Reports of trials 2.3c Published papers	NAROs Agricultural universities CGIAR FAO CABI Lancaster U
Outcome 3 Monitoring, Early Warning, and Risk Assessment System of FAW functioning and used	3a # countries using FAMEWS and FAWRisk		
Outputs 3.1 Farmers, communities, and governments implementing system (data input)	3.1a # data inputs per country	Platform registry	FAO CABI CGIAR Penn State U
3.2 Farmers, communities and national governments using system to make decisions regarding FAW management	3.2a # farmers, countries and organizations using system to prioritize and make decisions regarding FAW management	Evaluation report	FAO NPPOs NAROs CABI ICIPE

Outcome 4 Longer-term innovations generated for managing FAW in Africa	4a # of projects investigating longer-term innovations for FAW management 4b # of African institutions engaged in longer-term innovation studies		
Outputs			
4.1 Priority longer-term innovation studies identified and funded	4.1 # of longer-term innovation studies identified and funded	Proposal of studies	CGIAR NAROs Universities
4.2 Longer-term innovation studies completed	4.2a # of longer-term innovation studies completed	Trial reports Published papers Innovations generated	CGIAR NAROs Universities
Outcome 5 Policies and regulations support sustainable management of FAW	5a # countries that have appropriate pesticide policies in place 5b		
Outputs			
5.1 Pesticide policies eliminate use of Highly Hazardous Pesticides and free distribution of such pesticides	5.1 # countries that have policies in place eliminating the use of HHPs for FAW control.	Country survey report	FAO Pesticide Registrars CABI
5.2 Fast-tracking of bio-pesticide policies and procedures in place	5.2 # countries that have fast-tracking of bio-pesticides policies and procedures in place	Evaluation report	FAO Pesticide Registrars
Outcome 6 FAW response coordinated across countries and the continent	6a # countries with functioning FAW national task forces 6b % of countries participating in regional FAW coordination		
Outputs			
6.1 FAW national task forces functioning	6.1 # countries with functioning FAW national task forces	Coordination report	FAO National Task Forces
6.2 Technical working groups functioning	6.2a # institutions participating, joint proposals and activities implemented	Report of technical working groups	FAO All partners

Annex 2: FAW Technical working groups

FAW Technical working groups

02 March 2018

Summaries

Yield loss determination

The Yield Loss Determination TWG will develop uniform protocols for experimentally determining yield loss due to FAW infestation. This will be done, along with the field trials and analysis with a network of collaborators from across Africa, who will present and synthesis the results.

Biological control

The *Biological control* TWG will coordinate surveys of naturally-occurring biological control agents across Africa to determine which species are present where, what level of natural control they are achieving, and search for species missing in Africa, but known to be present in the Americas – candidates for classical biological control.

Bio-pesticides

The *Bio-pesticides* TWG brings together researchers, practitioners and regulators to facilitate the sharing of information about effective bio-pesticides and determine their use and knowledge gaps in Africa. The TWF works closely with the private sector to facilitate trials in Africa against FAW and with regulators to facilitate review process to register bio-pesticides for FAW in Africa.

Risk & impact assessment

The *Risk & impact assessment* TWG continues the development of models of risk to food insecurity due to FAW and to assess the impacts of FAW on household food insecurity.

Monitoring & early warning

The *Monitoring and early warning* TWG supports the work of MEW for FAW, specifically in the development of FAMEWS, the Fall Armyworm Early Warning System, recently launched in Africa. A mobile app has been developed to capture data on field infestations and adults trapped with lures. The information is fed into a global platform, where the information can be used to make decisions about the allocation of resources and management, as well as be used for modelling of movement and early warning. The group helps guide the development of further development and use of FAMEWS.

Communication, awareness & knowledge management

The *Communication, awareness & knowledge management* TWG shares and prioritizes common key messages to be used in coordinated communication campaigns across Africa. It relays messages to key intermediaries and develops joint publications.

Farmer Field Schools, extension, plant clinics, etc.

The *Farmer Field Schools, extension, plant clinics, etc.* TWG develops materials for participatory farmer education, coordinates on-going activities, and develop joint, coordinated plans, programmes and projects for farmer education.

Agroecology

The *Agroecology* TWG reviews evidence regarding the agroecology of FAW in Africa, makes recommendations useful for immediate control tactics, identifies knowledge gaps, prioritizes future research, and develops joint proposals.

Synthetic chemical pesticides

The *Synthetic chemical pesticides* TWG reviews the chemical pesticides being used or recommended for FAW in Africa and provides an evidence-base for decision-makers to reduce the risks of their use, focusing on Highly Hazardous Pesticides. The group works closely with decision and policy makers to communicate the risks of certain pesticides and facilitate discussions with regulators about the evidence-base of pesticides and FAW control.

Host plant resistance

The *Host plant resistance* TWG shares information about the latest developments in host plant resistance to FAW and communicates the information to national programmes and other audiences.

Transgenic resistance

The *Transgenic resistance* TWG reviews and shares information about the development of transgenic resistance to FAW and communicates this information to national programmes and other audiences.

Quarantine & phytosanitary measures

The *Quarantine & phytosanitary measures* TWG reviews the regulatory status of FAW, especially its impact on trade and communicates this information.

Annex 3: Technical working groups members

26 February 2018

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