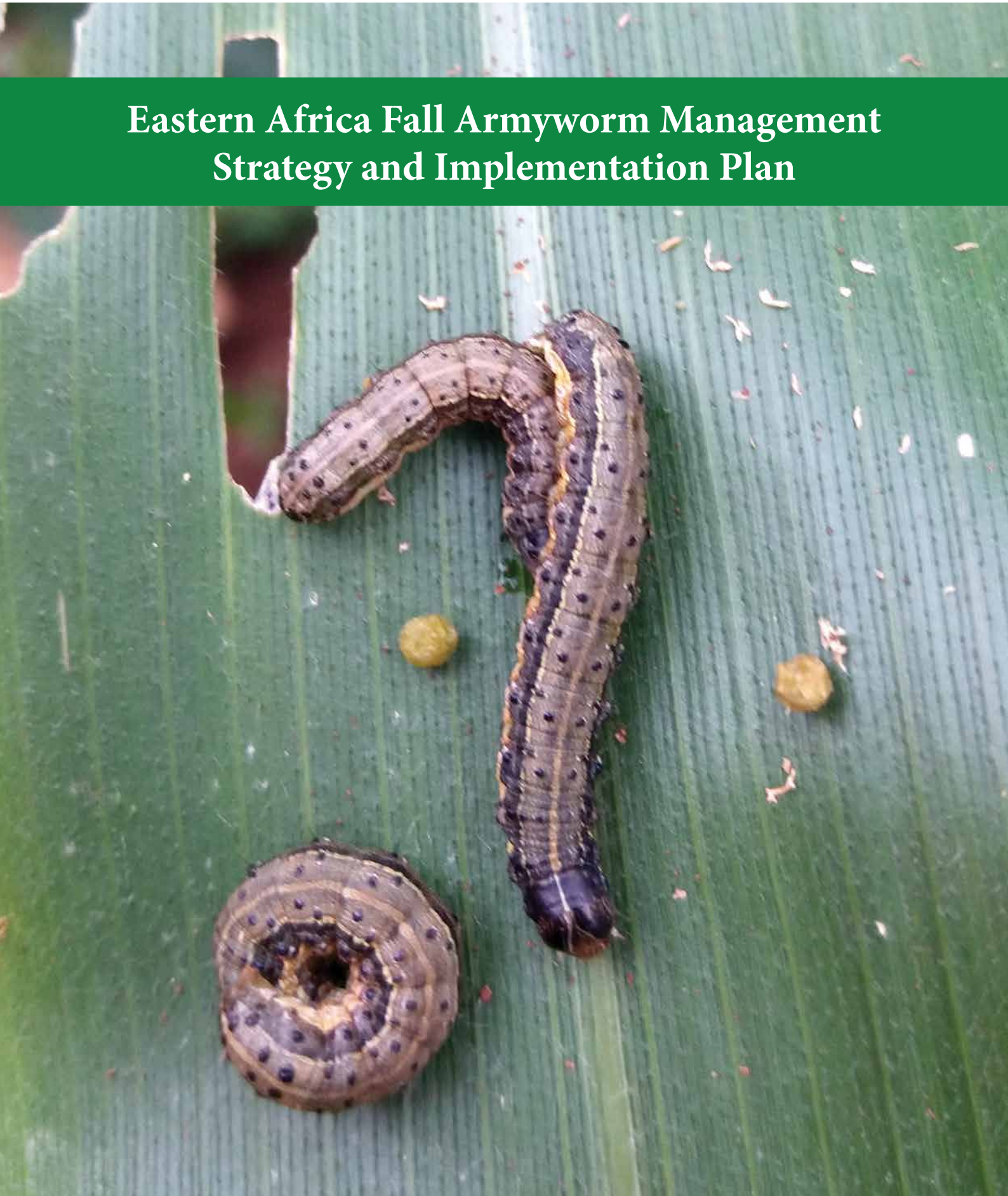




Food and Agriculture  
Organization of the  
United Nations



## Eastern Africa Fall Armyworm Management Strategy and Implementation Plan



This working paper was prepared by Brian Isabirye from ASARECA and Mathew Abang, Solomon Gelalcha and Winfred Hammond from FAO.

Cover photograph ©FAO.

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# **Eastern Africa Fall Armyworm Management Strategy and Implementation Plan**

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
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## About the FAO Subregional Office for Eastern Africa

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The Food and Agriculture Organization of the United Nations' (FAO) Subregional Office for Eastern Africa (SFE) is a multidisciplinary technical and policy advisory office based in Addis Ababa, Ethiopia. SFE serves eight countries, namely Burundi, Djibouti, Ethiopia, Kenya, Rwanda, Somalia, South-Sudan and Uganda; each of which has an FAO country representative. The SFE office is composed of a multidisciplinary team whose technical expertise includes crop and animal production, forestry and natural resource management, land and water management, fisheries and aquaculture, agribusiness and enterprise development as well as policy development. It provides technical and field support in the implementation of initiatives and programmes across the eight countries in the subregion.

### **For more information on the FAO Subregional Office for Eastern Africa's activities, or for copies of this document, contact:**

FAO Subregional Office for Eastern Africa

P.O. Box 5536

Addis Ababa

ETHIOPIA

Email: [FAO-SFE@fao.org](mailto:FAO-SFE@fao.org)

## About the Association for Strengthening Agricultural Research in Eastern and Central Africa

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The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is a not-for-profit subregional organization of the National Agricultural Research Systems (NARS) of 11 member countries, namely Burundi, the Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, South-Sudan, Sudan, Tanzania and Uganda.

ASARECA brings together scientists from the national agricultural research institutions of the member countries, national agricultural extension service providers and other strategic development-oriented partners to generate, share and promote knowledge and innovations to solve common challenges facing agriculture in the member countries.

### **For more information on ASARECA, contact:**

ASARECA Secretariat

Plot 5 Mpigi Road

P.O. Box 765 Entebbe, Uganda

Tel: 256 414 320556/320212

Fax: 256 414 321126

Email: [secretariat@asareca.org](mailto:secretariat@asareca.org)

URL: [www.asareca.org](http://www.asareca.org)



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The workshop was facilitated and the outcomes (implementation plan for the FAW management strategy) were compiled by Winfred Hammond, a consultant at the FAO Regional Office for Africa (RAF). The final report was prepared by Mathew Abang and Solomon Gelalcha of the FAO Subregional Office for Eastern Africa (FAO-SFE) in Addis Ababa, Ethiopia.



## ACRONYMS

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<b>AATF</b>	African Agricultural Technology Foundation
<b>AFAAS</b>	African Forum for Agricultural Advisory Services
<b>AGRA</b>	Alliance for a Green Revolution in Africa
<b>ASARECA</b>	Association for Strengthening Agricultural Research in Eastern and Central Africa
<b>AU</b>	African Union
<b>AU-IAPSC</b>	Inter-African Phytosanitary Council of the African Union
<b>CABI</b>	Centre for Agriculture and Bioscience International
<b>CBSD</b>	Cassava brown streak disease
<b>CGs</b>	Research Centers of the Consultative Group on International Agricultural Research
<b>CGIAR</b>	Consultative Group on International Agricultural Research
<b>CIMMYT</b>	International Maize and Wheat Improvement Center
<b>COMESA</b>	Common Market for Eastern and Southern Africa
<b>DFID</b>	Department for International Development
<b>DLCO-EA</b>	Desert Locust Control Organization for Eastern Africa
<b>EAC</b>	East African Community
<b>EAFAMSIP</b>	Eastern African Fall Armyworm Management Strategy and Implementation Plan
<b>ECA</b>	Eastern and Central Africa
<b>EAFAMSIP</b>	Eastern Africa Fall Armyworm Strategy and Implementation Plan
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FAO RAF</b>	FAO Regional Office for Africa
<b>FAO-SFE</b>	FAO Subregional Office for Eastern Africa
<b>FAW</b>	Fall armyworm
<b>FEWS-NET</b>	Famine Early Warning Systems Network
<b>GDP</b>	Gross domestic product
<b>GIS</b>	Geographic Information System
<b>GMO</b>	Genetically modified organism
<b>GPS</b>	Global Positioning System
<b>HHP</b>	Highly Hazardous Pesticides
<b>IAPPS</b>	International Association for the Plant Protection Sciences
<b>ICIPE</b>	International Centre for Insect Physiology and Ecology
<b>ICRISAT</b>	International Crops Research Institute for the Semi-Arid Tropics
<b>IFPRI</b>	International Food Policy Research Institute
<b>IGAD</b>	Intergovernmental Authority on Development
<b>IITA</b>	International Institute of Tropical Agriculture
<b>IPC</b>	Integrated Phase Classification
<b>IPM</b>	Integrated Pest Management
<b>IRLCO-CSA</b>	International Red Locust Control Organisation for Central and Southern Africa
<b>MAAIF</b>	Ministry of Agriculture, Animal Industry and Fisheries
<b>MLND</b>	Maize lethal necrosis disease
<b>MoA</b>	Ministry of Agriculture
<b>NARIs</b>	National Agricultural Research Institutes
<b>NARO</b>	National Agricultural Research Organisation (Uganda)
<b>NARS</b>	National Agricultural Research Systems
<b>NGOs</b>	Non-governmental organizations
<b>NPPOs</b>	National Plant Protection Organizations

<b>R&amp;D</b>	Research and development
<b>RAF</b>	FAO Regional Office for Africa
<b>RECs</b>	Regional Economic Communities
<b>SFE</b>	(FAO) Subregional Office for Eastern Africa
<b>SSP</b>	Spray service providers
<b>TCP</b>	Technical Cooperation Programme
<b>ToT</b>	Training of Trainers
<b>TWG</b>	Technical Working Group
<b>TPPD</b>	Transboundary plant pests and diseases
<b>UBOS</b>	Uganda Bureau of Statistics
<b>UNDAF</b>	United Nations Development Assistance Framework
<b>UNECA</b>	United Nations Economic Commission for Africa
<b>USAID</b>	United States Agency for International Development

## EXECUTIVE SUMMARY

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This document presents proceedings and outcomes of the joint FAO-SFE-ASARECA *Regional Strategy Workshop on Fall Armyworm (FAW) for Eastern and Central Africa (ECA)*, held at Entebbe in Uganda from 18-20 September 2017. The objectives of the workshop were to: (i) create awareness of FAW among countries in the subregion; (ii) discuss effective and rational subregional management of FAW, building on the continental FAW management framework; (iii) strengthen linkages and the exchange of information among the relevant stakeholders; and (iv) review and validate the ECA subregional emergency response plan and develop an action research strategy/proposal on FAW for resource mobilization.

Participants in the workshop included the Regional Economic Communities (EAC, IGAD, COMESA), ministries of agriculture, National Agricultural Research Institutes (NARIs), universities, National Plant Protection Organizations (NPPOs) of Eastern and Central Africa, ASARECA, FAO, USAID, DFID and the World Bank. Other organizations involved in key crop value chains threatened by FAW, including CIMMYT, ICRISAT, IITA, CABI, DLCO-EA, AATF, ICIPE, AFAAS and private sector actors, also participated in the meeting. Staff from the FAO Subregional Office for Eastern Africa (FAO-SFE) and the eight SFE country offices participated in and provided support to the workshop.

During the workshop, presentations highlighted the status of FAW in the subregion, including national and subregional interventions and action plans related to FAW. Thematic areas of the workshop included: (i) an update on the status of FAW in ECA and ongoing response activities; (ii) identification and monitoring of FAW in ECA; (iii) appraisal of damage caused by the FAW on crops and the economy of ECA;

(iv) review of FAW management measures; and (v) review and strengthening of strategic partnerships and coordination related to the control of FAW in ECA.

This document describes five strategic intervention areas identified for sustainable management of FAW in Eastern Africa: (i) development of a FAW monitoring and forecasting system for early detection and action; (ii) appraisal of the options to manage FAW in the ECA subregion; (iii) exploration of mechanisms to ensure effective coordination, communication and awareness raising relating to FAW management; (iv) development of capacity for FAW impact assessment; and (v) development of strategies for resource mobilization towards sustainable FAW management in the subregion.

In addition, the Strategy contains specific objectives and actions for implementation. The intervention areas and actions are perfectly aligned to the continental framework for the coordinated management of FAW Africa titled “Sustainable Management of the Fall Armyworm in Africa – A Framework for Partnership”. Implementing the Eastern Africa Fall Armyworm Strategy and Implementation Plan (EAFAMSIP) will require partnerships and collaboration with a variety of organizations. No one group has the full suite of knowledge and expertise required to implement EAFAMSIP alone. Partners will include farmers and farmer organizations, national research and development agencies, governing bodies, regional economic commissions, intergovernmental organizations, national and international NGOs and a wide range of private sector partners. Policy- and decision-makers are encouraged to establish mechanisms to adapt EAFAMSIP to the national priorities and opportunities.



## 1. KEY MESSAGES



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### Food and Agriculture Organization of the United Nations (FAO)

While speaking at the close of the workshop, the FAO Subregional Coordinator for Eastern Africa and representative to the African Union (AU) and the United Nations Economic Commission for Africa (UNECA), Patrick Kormawa, noted that FAW is a regional challenge that requires a coordinated solution in terms of monitoring and early warning, management, communication and awareness, impact assessment and resource mobilization. He added that the subregional strategy identifies institutions and partners responsible for various tasks at subregional and national levels. He thanked national governments and development partners for allowing FAO to take leadership in coordinating this effort. “FAO is grateful to countries in the subregion for giving us the coordination role in tackling the FAW problem,” he said. “Our mandate is to end hunger in the world and we are taking it seriously,” he added.

The Eastern Africa subregion already suffers from conflict, war, internal displacement, youth urban

migration and refugee migration; and currently from the threat of FAW. In fact, FAW has great potential for aggravating the situation. Strategies for effective interventions to stem the spread and impact of FAW need to encompass short-, medium- and long-term solutions. Farmers need to be provided with up-to-date knowledge of factors affecting their production, to help them improve their farming practices. Information such as rainfall forecasts needs to be shared routinely with farmers. Resource mobilization and allocation need to be evidence-based and supported by a sound implementation strategy. Research and interventions need to be farmer focused to effectively address farmers’ needs. Pesticides have been the main recourse for controlling FAW, but more needs to be done to make farmers aware of the limitations and dangers of pesticides, especially under the conditions of use in the subregion. GMOs may be promising, but issues related to seed systems as well as the availability and effective implementation of biosafety regulations limit their use.

FAO plays the leading role in the coordination of FAW management efforts in Africa. The existing

continental framework for FAW management needs to be cascaded to the subregional and national levels for effective implementation, and in a coordinated manner. There is a need to harness synergies and avoid duplication, e.g. through the preparation of joint manuals.

For effective FAW control, the theory of change needs to be adopted: (i) there needs to be better coordination at national and subregional level; (ii) communication among all stakeholders has to be improved; (iii) there has to be an impact assessment to determine the effect of FAW; (iv) farmers must be empowered; and (v) efforts have to focus on sustainable management.

Mr Kormawa stated that FAO was playing a key role in coordinating FAW management in Africa, for instance through:

- (a) working with partners to develop a continental framework for FAW management;
- (b) high-level policy advocacy including at the level of the AU;
- (c) preparation of FAW manuals and training of trainers;
- (d) strengthening capacity of several African countries via FAO's technical cooperation programme (TCP) and other projects;
- (e) development of a mobile-based platform for continent-wide collection, processing and sharing of FAW data in Africa.

Mr Kormawa concluded by saying that "the rapid spread of FAW in Africa in just one year justifies the need to act swiftly and appropriately".

Mathew Abang, Crop Production Officer at the FAO Subregional Office for Eastern Africa, outlined efforts made at the subregional level to address the FAW menace. He said most countries have developed national FAW action plans. TCP projects are already ongoing in several countries (e.g. Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Uganda) including donor (e.g. USAID, SIDA, UKAID, JICA) funded projects, while new projects are being developed.

FAO has been facilitating information and knowledge exchange among countries within Eastern Africa, and between the various subregions, as well as enhancing South-South Cooperation. FAO is implementing a project funded by USAID/OFDA on *Establishing an emergency community-based Fall*

*Armyworm monitoring, forecasting, early warning and management system in eastern Africa*, in collaboration with the Desert Locust Control Organization for Eastern Africa (DLCO-EA), CABI, ICIPE and Ministries of Agriculture of Eastern African countries. Also, a subregional FAW Training of Trainers Workshop has been conducted (Addis Ababa, 24-28 July 2017) to increase the skills and knowledge of national plant protection and extension experts on FAW.

### **Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)**

On his part, the Interim Executive Secretary of ASARECA, Cyprian Ebong, emphasized the need for collaboration and joint scientific interventions, especially since "the level of agroecological heterogeneity in Eastern and Central Africa is very high".

ASARECA is in a strong position to forge collaborations with various FAW R&D stakeholders in the subregion, including RECs, FAO, CGIAR centers, AGRA, governments and other development partners in the fight against FAW. FAW will impact differently on the agricultural sector for both commercial farmers and small-scale/subsistence farmers. The impact will also be different on agriculture-based households headed or dominated by women or girls. There is a need for the quick conversion of research findings into actions, as well as the application of currently available knowledge to begin solving farmer problems. There is furthermore a need to strengthen alliances and synergies among institutions in this effort. Strong leadership is required for FAW management and a subregional approach is the way forward.

Mr Ebong further said that resources are limited and there is a need to form strong partnerships and align priorities for maximum leverage. To reach out to all partners and form inclusive partnerships, and at the same time understand and appreciate each partner's value addition, requires a coordinated framework. Solutions need to be practical and address government concerns and priorities. It is important to know the impact that climate change will have and the countries that are likely to be most affected. We also need to know which conditions will aggravate the impact of FAW. There is a need to predict the future impact and spread of FAW based on the effects of climate change.

Dr Brian Isabirye, Theme Leader ASARECA, presented research work to predict the future scenario of FAW in Africa by looking at models of FAW behaviour in Latin America compared with regions in Africa with similar conditions. He said that based on similarity of climatic conditions in Latin America, only a small proportion of the continent has been affected; meaning that there is still potential for the pest to spread further to other areas on the continent. Based on the occurrence of ideal ecological conditions in the Middle East, Asia and Europe, FAW is likely to spread to new continents if not properly managed in Africa. Presently, FAW does not seem to prefer tropical forests, but as climatic conditions change, the situation is likely to favour FAW proliferation. Africa currently relies more on reactionary measures and a fire brigade approach. There is a need to generate information that will allow evidence-based decision-making for sustainable FAW management in Africa.

### **Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)**

The Director-General of the National Agricultural Research Organisation (NARO) of Uganda and Board Chair of ASARECA, Ambrose Agona, who represented the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), said: “Since different countries are at different levels of agricultural research and development, a comprehensive, transboundary and coordinated approach will support resource-constrained countries to fight pests and diseases, while reducing the risk of these countries becoming reservoirs of damaging crop pests.”



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## 2. BACKGROUND

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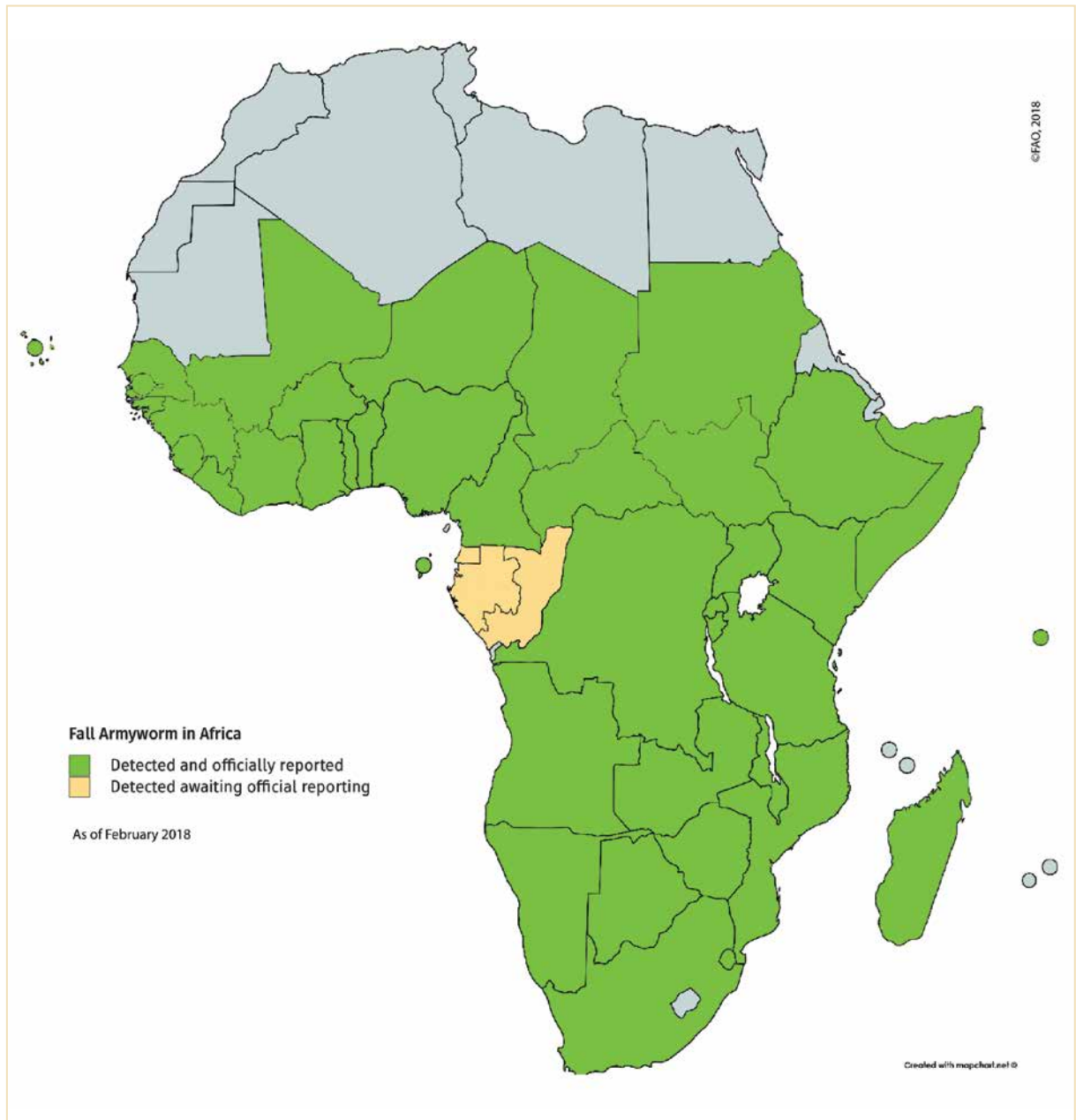
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The invasive fall armyworm (FAW), or *Spodoptera frugiperda*, is a pest ravaging crops in over 44 African countries. It is native to the Americas, but recently spread to Africa, with its occurrence first reported in West and Central Africa in early 2016. It spread to southern Africa in late 2016, and by early 2017 was confirmed in East Africa (FAO, 2017). FAW attacks more than 80 different plant species including maize, a major food staple in sub-Saharan Africa, upon which more than 300 million people depend. If FAW is not effectively controlled, it is expected to cause a US\$3bn loss to maize in Africa along with serious food shortages in the next year (IAPPS, 2017).

At a continental level, the pest is reported to have so far affected maize and other crops in over 44 countries, seven of which are in Eastern Africa (Figure 1). Since its emergence in the Eastern Africa subregion, FAW has caused significant infestation of maize. Recent reports show that in Ethiopia, about 600 296 ha (about 60 percent of total); in Kenya, about 250 000 ha (12.5 percent of total); in Rwanda, about 20 626 ha (about 32 percent of total); and in Uganda about 980 000 ha (about 75 percent of total) of maize have been infested with FAW (Country Presentations, Regional Strategy Workshop on FAW Management in Eastern and Central Africa, Entebbe, Uganda, September 2017).



Figure 1. Distribution of fall armyworm in Africa as of February 2018<sup>1</sup>



1 <http://www.fao.org/3/a-bt415e.pdf>

Affected countries in the subregion have already started interventions by implementing their national action plans facilitated by FAO and other partners. Most of the countries have so far managed to control FAW through regular monitoring, pesticide application, and hand-picking of FAW larvae. Some countries have prepared their national strategies and action plans on FAW prevention and control (e.g. Ethiopia, Kenya, Rwanda, South Sudan and Uganda), while others have not (Burundi, Djibouti and Somalia). The pest is yet to be reported in Djibouti.

Combining the estimated current and projected economic losses to yield for maize and sorghum alone, for the African countries where FAW has been confirmed, suggests that the insect is already threatening nearly nine percent of the total combined agricultural GDP of these countries (CABI Evidence Note, 2017). This is based on an assumed average of 52 percent area of crops infested over the next year and 30 percent average yield loss to maize; 16 percent to sorghum. This assumption does not take into account possible additional losses through impacts on associated industries (e.g. seed farms) or other crops. In all confirmed and suspected FAW affected countries, these form a total value at risk of over \$US13.3 billion.

The sudden appearance of FAW in the subregion is a major concern in that it came after a prolonged drought and at the onset of the main cropping season. This negatively impacts drought recovery efforts that had been put in place by the various governments in the subregion. Uganda, for instance, produces close to three million metric tonnes of maize grain annually, which supports the livelihoods of over 3.6 million households (FAO, 2016)<sup>2</sup>. Based on estimated yield loss from FAO case studies of 5-77 percent, the presence of FAW in Uganda could translate to an annual loss of at least 450 000 metric tonnes of maize annually, equivalent to US\$ 192 857 000. FAW is a dangerous transboundary pest with a high potential for spreading due to bioecological and trade aspects. The control of FAW in Brazil cost US\$600 million per year, which gives an idea of the magnitude of the damage the pest can cause.

Recognizing that FAW is a regional challenge that requires a coordinated response across the research-development continuum, FAO and ASARECA organized a workshop (18-20 September 2017, Entebbe, Uganda) during which stakeholders in Eastern Africa developed a strategy and implementation plan (EAFAMSIP) that involved all the major actors in the subregion concerned with the fight against the invasive pest.

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2 <http://www.fao.org/faostat/en/#data/QC>

### 3. RATIONALE FOR A COMMUNITY-BASED INTEGRATED PEST MANAGEMENT (IPM) APPROACH

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FAW is a community threat, thus effective management requires a community-based integrated pest management approach. Due to inadequate knowledge of this new pest, governments of affected east African countries embarked on massive chemical spray operations, accompanied by awareness campaigns, in an attempt to contain the pest. Likewise, desperate affected farmers applied different types of pesticides, with little guidance on appropriateness, human safety or environmental considerations. Farmers felt the need for repeated pesticide applications, which in most cases were not effective against the pest. All these could potentially have long-term health, socio-economic and environmental impacts on the region.

Unguided use of pesticides may not only result in environmental contamination, it can also increase the cost of production through frequent costly and ineffective spraying. This poses a real challenge to sustainable and profitable production of major cereals among smallholder farmers given current low productivity levels and low input production systems in Eastern Africa. There is also the additional risk of

heightened pesticide residues in the production environment and in consumed produce. Women are responsible for performing most farming tasks, including application of pesticides. An increased demand for pesticide application to protect the crop from FAW will translate into more exposure to pesticide for these women.

Given that the pest is new, the challenge for its management will be to establish a baseline on the impact of FAW, in terms of losses and the economic and environmental impacts of FAW control, on vulnerable smallholders. This would be part of the case for investment in programmes aimed at improved practices for control of the pest at lower economic and environmental costs. It would also be an element in monitoring progressive efforts to reduce the impact of the pest.

IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. Through the IPM approach, EAFAMSIP will use current and comprehensive information on the life cycle of the

pest (FAW) and its interaction with the environment. Therefore, IPM is a knowledge-intensive approach to manage the pest safely and keep the damage below economic threshold levels. Unlike the single pest control methods such as the use of pesticides, IPM follows and makes use of a bottom-up approach, wherein the farmers are empowered in decision-making on whether or not to use the available pest management option. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates that they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment<sup>3</sup>. In effect, no single FAW control method has been found to be effective. For instance, even though mechanical control interventions such as hand-picking in Ethiopia and other countries in the subregion seemed helpful, it was not effective by itself because of the lack of appropriate technique to remove the naturally hiding larvae efficiently without damaging the crop.

Furthermore, most available pesticides are not effective to control FAW once the larvae enter into the whorl of the maize.

Many of the technologies developed in pest management have not been effectively disseminated to farmers due to technical, institutional and socio-economic constraints. Such constraints will also contribute to proven FAW management techniques being poorly implemented in affected communities. These constraints mainly arise from:

- (a) lack of a reliable extension infrastructure and inefficiencies of top-down R&D approaches;
- (b) farmers' poor knowledge of the biology of FAW;
- (c) farmers' lack of access to FAW-resistant/tolerant crop varieties;
- (d) poor understanding and application (by researchers, extension agents and farmers) of the joint learning activities needed to promote IPM;
- (e) weakness of available mechanisms to scale up and scale out proven IPM options;
- (f) weaknesses in mechanisms used to forge productive partnerships at the community level;
- (g) ineffective project monitoring and evaluation capacities; and
- (h) lack of standardized FAW impact assessment.



3 <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/ipm/en/>



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## 4. SCOPE OF STRATEGY

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The proposed strategy will have a two-tiered and phased approach, covering the immediate and short-term actions (0-18 months), as well as medium-term (18- 36 months) actions. The strategy will cover all Eastern Africa (SFE) countries that have been affected by the FAW (Burundi, Ethiopia, Kenya, Rwanda, South Sudan and Uganda), as well as those at high risk (Djibouti and Somalia). Partners will implement their own activities that contribute to specific outputs. FAO will provide coordination to enable sharing of information among the partners.

## 5. OBJECTIVE

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The objective of the strategy will be to support countries in the subregion to strengthen the capacity of smallholder farmers to contain and manage the FAW effectively to minimize its impact on the food security and livelihoods of farming households in Eastern Africa.

## 6. BENEFICIARIES AND STAKEHOLDERS

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The main beneficiaries will be an estimated 210 million male and female farmers and their households in eastern Africa, as well as farmworkers whose food security and economic livelihoods are dependent on agriculture and its value chains.

## 7. ALIGNMENT AND STRATEGIC FIT

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The strategy fits perfectly within the *Framework for the Coordinated Management of FAW in Africa*, which has four main components for management of FAW: early warning and monitoring; impact assessment; management options; and coordination. FAO-SFE has been actively involved in the development of the framework and will ensure that EAFAMSIP activities are aligned/coordinated with planned interventions in the framework.

The All Africa Meeting on FAW in Nairobi (27-28 April 2017) came up with an action plan/recommendations for putting in place a multi-institutional continent-wide operational framework for the control of FAW involving FAO, CIMMYT, IITA, AGRA, MoAs, NPPOs, regional research institutions and regional economic communities (RECs) across Africa. EAFAMSIP fits within the continental action plan and brings together key actors required for a coordinated response to FAW.

Furthermore, the objectives of this subregional strategy are directly linked to FAO's Strategic Objective 5, *Increase the resilience of livelihoods to threats and crises*; and to the FAO Regional Office for Africa (RAF) Regional Initiative 3, *Building Resilience in the Drylands of Africa*. It is also linked to Regional Initiative 2, *Sustainable production intensification and value chain development in Africa*, as FAW poses a direct threat to the productivity of major crops and the development of these crop value chains.

The proposed actions of the strategy are also relevant to the Country Programming Frameworks and the United Nations Development Assistance Framework (UNDAF) of all SFE member states, as they address pertinent issues related to capacity building, disaster risk management and gender-effective response to food and agricultural threats that the eight countries are all striving to address.

## 8. STRATEGY AND METHODOLOGY



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EAFAMSIP is inspired by and aligned to the continental framework for the coordinated management of FAW in Africa titled *Sustainable Management of the Fall Armyworm in Africa – A Framework for Partnership* (FAO, 2018). It has four major components: i) monitoring and forecasting of FAW; ii) sustainable management of FAW; (iii) FAW impact assessment; and iv) coordination, communication and training of FAW management.

The strategy follows the community-based IPM approach in all components in order to: (i) improve access to and know-how of the proven IPM options by the farmers; (ii) ensure community ownership and uptake of available FAW IPM interventions; and (iii) make use of farm resources and farmer capabilities to avoid or manage risks (such as sudden FAW

infestation) that would otherwise have serious consequences in the farming system.

The strategy is expected to be implemented in two phases, namely immediate to short-term (0-18 months) and medium-term (18-36 months). The interventions will be implemented by the various organizations and institutions, particularly those identified at the Entebbe workshop (Table 1). Lead institutions in specific thematic areas will be responsible for harnessing synergies among the respective collaborating stakeholders. FAO will provide overall coordination of the subregional programme. The implementation plan of the Eastern African Fall Armyworm Management Strategy is summarized in Table 1.

## FAW STRATEGY COMPONENTS

### 8.1 Component 1: FAW monitoring and early warning

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This component has been partially funded under a project titled Establishing an emergency community-based FAW monitoring, forecasting, early warning and management system in Eastern Africa, with the following expected outputs:

#### Output 1. Monitoring and forecasting system for FAW early detection and action developed

##### 8.1.1 At community level

###### Activities

- Conduct district meetings aimed at awareness creation and stakeholder buy-in;
- Identify high-risk villages;
- Organize village meetings, community awareness campaigns and field days for awareness creation, buy-in and dissemination of FAW information;
- Identify community focal persons (scouts);
- Train community focal persons in field scouting, monitoring of presence or absence of FAW, mobile-based data collection/reporting and pest management.

##### 8.1.2 At national level

###### Activities

- Establish national FAW task forces or committees for coordinated action;
- Assign FAW focal persons at different government levels (national, district);
- Scouting, monitoring of FAW using pheromone traps and early warning;
- Contribute FAW data to a central database and continent-wide monitoring and management;
- Create awareness through meetings and information/communication tools such as bulletins, manuals, field guides, posters and data sheets;
- Conduct national and district-level training of trainers (ToT) for community focal persons (FAW biology, ecology, management, monitoring and safety);
- Ensure that national plant protection officers conduct regular seasonal monitoring;
- Provide incentives for plant protection officers and extension agents to support community

based FAW monitoring, early warning and management;

- Procure tools and equipment (e.g. pheromone traps, magnifying lenses, GPS, vehicles, stationery and GIS equipment).

##### 8.1.3 At subregional level

###### Activities

- Subregional organizations coordinate FAW activities (monitoring, data storage “link with continent-wide data repository – FAOHQ”, information sharing);
- Provide harmonized protocols for monitoring and reporting to national levels;
- Link designated FAW diagnostic laboratories with international and national entities;
- Strengthen communication networks and linkages in terms of mobile-based data collection, reporting and regular information sharing;
- Conduct subregional training, workshops and research;
- Set up a regional server and website;
- Develop or adapt available harmonized standard field guides and protocols.

### 8.2 Component 2: FAW management options

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Following the outbreak of FAW in Eastern Africa, farmers and governments in the affected countries predominantly used synthetic pesticides, especially organophosphates, synthetic pyrethroids, a few neonicotinoids and in some cases cocktails of pesticides, in an effort to control the outbreak. These were mostly emergency responses, which were often not based on results of pesticide efficacy testing. The Eastern African Fall Armyworm Management Strategy and Implementation Plan (EAFAMSIP) will facilitate the training of farmers in the subregion in the integrated and sustainable management of FAW. Such training will be led by the extension staff supported by the crop protection units/NPPOs as well as other research and development organizations.

To encourage community ownership of FAW management techniques, EAFAMSIP will reach out to the affected farming communities by promoting the effective use of community-based IPM approaches/practices among farmers through training. EAFAMSIP will work closely with extension officers, NGOs, farmers’ associations and other partners to ensure



the fastest and greatest possible dissemination of effective and sustainable FAW management practices. Key pest awareness and education channels to be used will include (i) national extension services; (ii) community-based FAW monitoring, early warning and management system; (iii) Farmer Field Schools; (iv) CABI Plantwise Plant Health Clinics; and (v) mass communication campaigns.

FAW management options will be rolled out in two phases: (i) immediate to short-term (0-18 months); and (ii) medium-term (18-36 months).

### Component 2.1 Management of FAW (immediate actions)

#### Output 2.1.1 Existing knowledge on behaviour and ecology of FAW improved

- Conduct analysis of knowledge gaps and use gap analysis to inform research and related action (e.g. use of mobile apps for data collection and reporting on pest behaviour).

#### Output 2.1.2 Access to information on effective FAW management in the subregion promoted

- Make FAW field management guides and manuals available to stakeholders.

#### Output 2.1.3 Management of FAW using biocontrol options (e.g. pathogens and parasitoids) promoted

- Inventorize available biopesticides for FAW management in the subregion;
- Raise awareness of and increase training on biocontrol agents and their identification by farmers;
- Advocate for fast-tracking of registration of biopesticides for the control of FAW;
- Development of user-friendly protocols for the identification of biocontrol agents by farmers.

#### Output 2.1.4 Management of FAW using effective cultural practices promoted (Examples: crushing egg masses, picking of larvae, planting time, fertilizer application, indigenous farmer knowledge, intercropping (not crop rotation), agroforestry, habitat management (plant diversity, e.g. through climate smart push-pull technology)

- Inventorize farmer practices to manage FAW in the subregion;
- Avail guidelines in the manual on cultural control;

- Awareness and training on FAW life cycle for application of cultural management practices (egg crushing, hand-picking).

#### Output 2.1.5 Management of FAW using effective botanicals (Neem, Tephrosia, etc.) promoted

- Inventorize available botanicals for FAW management;
- Quick evaluation of botanicals present with farmers;
- Raise awareness and training on botanicals for FAW management.

#### Output 2.1.6 Management of FAW using low-risk and effective synthetic pesticides supported

- Generate and avail the list of highly hazardous pesticides (HHPs) to all countries in the subregion;
- Disseminate information on HHPs to stakeholders;
- Generate lists of available low-risk synthetic pesticides;
- Fast track registration of low-risk chemicals;
- Advocate for and create awareness of pesticide risks among all stakeholders;
- Promote and train spray service providers (SSPs) in the safe use of chemicals.

#### Output 2.1.7 Host-plant resistance I (natural/conventional breeding) developed and promoted (44 insect-resistant maize hybrids and open pollinated varieties (OPVs) already released in sub-Saharan Africa)

- Screen already released insect-resistant maize germplasm (inbred lines, hybrids and - OPVs) for possible resistance to FAW.

#### Output 2.1.8 Evidence-based advice on option of transgenic host plant resistance provided

- Facilitate high-level policy consultations on the use of transgenics minimizing pesticide use on FAW;
- Test the locally available Bt germplasm against introduced FAW.

## Component 2.2 Management of FAW (short-term actions)

### Output 2.2.1 Management of FAW using biocontrol options (pathogens and parasitoids) developed and promoted

- Inventorize indigenous natural enemies (pathogens and parasitoids);
- Select and evaluate the efficacy of the biocontrol agents;
- Test and register biopesticides proven effective for other pests to manage FAW;
- Conduct assessment and promotion of registered biopesticides to manage FAW;
- Establish/review/harmonize the regulatory framework for registration of biopesticides.

### Output 2.2.2 Effective cultural practices for the management of FAW developed and promoted

- Evaluate the effectiveness of farmer practices in the management of FAW;
- Evaluate the effect of different crop combinations on population dynamics of FAW and its natural enemies;
- Verify the push-pull system for FAW management;
- Promote proven cultural practices.

### Output 2.2.3 Effective botanicals (e.g Neem and Tephrosia) for management of FAW promoted

- Perform bioassay and determine effective rates of application;
- Validate botanicals in the field;
- Promote proven botanicals.

### Output 2.2.4 Management of safe and low-risk synthetic pesticides supported

- Evaluate the efficacy of low-risk pesticides;
- Create awareness of low-risk pesticides;
- Harmonize pesticide legislation/registration;
- Train on pesticide-resistance management plan.

### Output 2.2.5 Host plant resistance I (natural/conventional breeding) developed

- Identify sources of resistance to FAW in sorghum;
- Evaluate FAW-resistant maize germplasm from CIMMYT.

### Output 2.2.6 Host plant resistance II (transgenics)

- Explore humanitarian licensing of transgenes.

## Component 2.3 Management of FAW (medium-term actions)

### Output 2.3.1 Management of FAW using biocontrol options (pathogens and parasitoids)

- Scale out the biopesticides;
- Release proven natural enemies.

### Output 2.3.2 Host plant resistance I (natural/conventional breeding) developed

- Intensify breeding activities for FAW resistance in maize and sorghum germplasm;
- Fast track the release and registration of new varieties with FAW resistance;
- Adopt harmonized seed policies for sharing of FAW-resistant varieties.

### Output 2.3.3 Evidence base for option of transgenic host plant resistance strengthened

- Evaluate new Bt genes/gene pyramids for FAW resistance;
- Conduct training on insect resistance (Bt gene) management.

### Output 2.3.4 Effective IPM package to manage FAW developed

- Evaluate a complete package of effective control measures.

## 8.3 Component 3: FAW impact assessment (ex-ante, midterm and ex-post analysis)

The impact of FAW needs to be assessed qualitatively and quantitatively in order to inform decision-makers and to evaluate the relevance and efficiency of the FAW management interventions. During the Addis Ababa FAO-SFE ToT workshop on FAW management in Eastern Africa (FAO, 2017), it was agreed that common assessment tools should be used for the various FAW assessments including field infestation, yield loss and impact on food security and livelihoods. Though some assessments have been done to quantify impact, these still require systematization and harmonization. EAFAMSIP will provide support to increase the capacity of countries to ascertain and quantify the impacts of FAW on household food security and the livelihoods of smallholder farming households. It will also contribute to estimating the various aspects of the damage and losses caused by the pest at national and subregional levels. The

massive use of pesticides to control FAW could have serious environmental consequences. EAFAMSIP will develop assessment tools to evaluate the impact of FAW on the environment. The impact assessment component will provide baseline data, as well as establish a broader monitoring and evaluation system for the management of FAW, linking closely with the early warning and monitoring components, and acting as an important source of information for the overall FAW management interventions. The outputs of the impact monitoring system will feed into and inform broader food security analytical processes and products including vulnerability assessments, Integrated Phase Classification (IPC) analysis and FAO and other partner Global Early Warning Information Systems. The following will be the key activities:

**Output 3.1 Capacity of stakeholders to assess the incidence and severity of FAW infestations strengthened**

- Farmers to scout for the presence of FAW (eggs, larvae, pupa and the moth) (cost of scouting);
- Assess the level of infestation/damage from the corners of the garden along the diagonal transect (cost of assessment);
- Document and assess indigenous knowledge for advice.

**Output 3.2 Yield and postharvest losses caused by FAW established**

- Develop a field FAW assessment tool (controlled vs uncontrolled) (research needs);
- Establish yield losses (actual harvest against a typical harvest, with control that allows for estimation of cost of FAW infestation);
- Assess price differential due to FAW damage;
- Identify and record changes in crop production and profitability along the value chain (research needs).

**Output 3.3 Impact of FAW damage on household food security, livelihood systems and transboundary activities determined**

- Conduct subregional training of trainers for national plant protection staff and extension staff on FAW assessment;
- Quantify available and accessible seed and food stocks;
- Quantify the impact of FAW on household income and expenditure;
- Document changes in consumption behaviour and energy requirements (context specific);

- Assess livelihood changes, coping strategies and vulnerability (at community and national levels);
- Document the impact of FAW on social behaviour and gender roles and responsibilities;
- Assess the effect of FAW on GDP, exports and imports.

**Output 3.4 Impact of pesticide use for FAW management evaluated**

- Form interagency FAW Impact Assessment Technical Working Groups;
- Assess transboundary (trade, population movement, etc.) impact;
- Assess human health hazard caused by pesticide use due to FAW;
- Document environmental damage caused by use of chemical pesticides;
- Assess impact of pesticide use on natural enemy;
- Advocate and integrate FAW assessment tools in country-level vulnerability and food security assessment initiatives;
- Transform the interagency FAW Impact Assessment Technical Working Group into an FAW Monitoring and Evaluation unit to ensure the development of a harmonized framework;
- Share information on FAW impact through various food security coordination mechanisms.

**8.4 Component 4: Coordination, communication and awareness**

Effective containment and management of FAW is a necessity that requires commitment from governments in the subregion, as well as the active participation of all stakeholders through a well-coordinated and coherent roadmap. Key FAW implementation partners include governments, DLCO-EA, RECs (EAC, IGAD, COMESA), CIMMYT, AGRA, CABI, ICIPE, IITA and others. This coordination will be at national and regional levels. Coordination will also aim to provide advocacy for FAW investment; harness collective capacities of stakeholders through synergistic actions; develop standard assessment tools, standard training curricula, multi-stakeholder contingency planning; and promote sharing of best practices, knowledge and lessons learned in FAW containment and management. All affected countries in Eastern Africa have adopted the approach of creating a national FAW task force or committee. These taskforces are chaired by the Ministries of Agriculture, with members drawn from research,

extension, the National Plant Protection Organization, the private sector, farmers' organizations and others. EAFAMSIP will support the formation of these structures, drawing lessons from the community-based Armyworm Monitoring, Forecasting and Early Warning System, and subregional projects on the management of transboundary plant pests and diseases (TPPDs) such as maize lethal necrosis disease (MLND) and cassava brown streak disease (CBSD) in Eastern Africa. Key activities of Component 4 are:

#### Component 4.1 Coordination (streamline FAW actions in ECA within existing institutions)

##### Output 4.1.1 Functional subregional FAW coordination platform established

- Develop a coordinated subregional strategy and action plan for research and management of FAW;
- Conduct policy advocacy and awareness creation on FAW in line with existing RECs policies and protocols;
- Strengthen subregional capacity development for the management of FAW;
- Facilitate coordinated communication among stakeholders;
- Create a central web portal to serve as a one-stop point for information on FAW initiatives from other portals;
- Form the working groups and support them in their mandate (e.g. identify FAW research and management priorities for technical working groups).

##### Output 4.1.2 Functional subregional technical working groups (ad hoc) established

- Collaborate in the implementation of project activities towards defined FAW research and management;
- Collaborate in the development and management of knowledge and information (e.g. joint development of FAW manual) and share phytosanitary information;
- Collaborate in policy advocacy;
- Collaborate in quality control (e.g. peer review of technical documents).

##### Output 4.1.3 Functional national FAW coordination platforms established/strengthened

- Coordinate national efforts to manage FAW among different organizations, to ensure

coherent, consistent response and including monitoring, awareness campaigns and mobilizing resources for training programmes;

- 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 on field efforts aimed at improving 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" subgroup);
- 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 and information).

##### Output 4.1.4 Functional national technical working group established

- Collaborate in implementation of project activities towards defined FAW research and management;
- Collaborate in development and management of knowledge and information (e.g. FAW manual and phytosanitary information);
- Collaborate in policy advocacy;
- Collaborate in quality control (e.g. peer review of technical documents).

#### Component 4.2 Communication and awareness

##### Output 4.2 Development and wide dissemination of appropriate information on the management of FAW ensured

- Establish communication working groups at subregional to national levels;
- Develop, package and disseminate information.



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## 9. PROJECT MONITORING AND REPORTING

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The project will develop a participatory and harmonized approach to implementation. Monitoring and evaluation will be done using a Results Framework with clearly defined outcomes and outputs, milestones and progress indicators. This will provide a basis for assessing progress as well as the impacts of the implementation of activities; as well as setting benchmarks for achievement and reporting.

Table 1. Implementation Plan for the Eastern African Fall Armyworm Management Strategy

Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>1. FAW MONITORING AND FORECASTING (SMF)</b>				
<b>Output 1</b> FAW monitoring and early warning system for early detection and action developed	<b>A. Community level</b> (a) Conduct district meetings for awareness creation and stakeholder buy-in (b) Identify high-risk villages (c) Village meetings for awareness creation, buy-in and dissemination of FAW information (d) Identify community focal persons (scouts) (e) Train community focal persons in scouting, monitoring of presence or absence of FAW (using pheromone traps), and reporting using mobile app (f) Community awareness and field days	NPPOs	Ministry of Agriculture (Plant Protection); farmers' unions; local NGOs	By 2018
	<b>B. National level</b> (a) Monitoring and forecasting (b) Create awareness (bulletins) (c) Make long-term plans at national level (d) Resource mobilization (e) National ToT (FAW biology, ecology, management, monitoring, safety – IPM) (f) National plant protection officers conduct regular seasonal monitoring (g) Incentives for plant protection officers and extension agents (h) Assign focal persons at different government levels (national, district...) Centralize data at national level and create data base (i) Procurement of tools and equipment (pheromone trap set, rain gauges, magnifying lenses, GPS, vehicles, stationery, GIS) (j) Preparation of manuals, field guides, posters, data sheets, etc.	NPPOs	(a) International organizations including FAO, CIMMYT, ICIPE, DLCO-EA, IRLCO-CSA, AU, ASARECA and CABI National Offices and NGOs) (b) NARS, universities (c) Development; humanitarian partners like USAID. (d) Local government	By 2018
	<b>C. Sub-regional level</b> (a) Regional organizations take on FAW coordination (monitoring, data storage “link with continent-wide data repository – FAO HQ”, information sharing) (b) Provide harmonized protocols for monitoring and reporting to national levels (c) Designated FAW diagnostic labs (linked with international and national entities) (d) Regular information sharing (e) Regional training, workshops, research (f) Set up regional server and website (g) Adapt available harmonized standard field guides and protocols			

Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>2.1 MANAGEMENT OF FAW (immediate actions)</b>				
<b>Output 2.1.1</b> Existing knowledge on behaviour and ecology of FAW improved	Conduct analysis of knowledge gaps and use gap analysis to inform research and related action	ASARECA	NARIs (11 members countries in ECA)	By 2018
<b>Output 2.1.2</b> Access to information on effective FAW management in the subregion promoted	Make FAW field management guides and manuals available to stakeholders	FAO, USAID, CIMMYT, CABI	USAID, FAO, ICIPE, CABI, AGRA, IITA, ICRISAT, ASARECA, NARIs, etc.	By 2018
<b>Output 2.1.3</b> Management of FAW using bio-control options (pathogens and parasitoids) promoted	Inventorize available biopesticides for FAW management	CABI	IITA, ICIPE, NPPOs, Private Sector	By 2018
	Advocate for fast-track of registration of biopesticides for control of FAW	FAO	NPPOs, RECs, AU-IAPSC, EAFF, national farmer organizations, private sector	Start by 1 Jan 2018
	Raise awareness and conduct training on biocontrol agents and their identification by farmers	NPPOs	Private sector, national farmer organizations, FAO, CABI	Start by Jan 2018
	Develop user-friendly protocol for identification of biocontrol agents by farmers	CABI	NPPOs, NARIs, national farmer organizations, private sector	30 Oct 2017
<b>Output 2.1.4</b> Management of FAW using effective cultural practices promoted	Inventorize farmer practices to manage FAW	NPPOs	NARIs, FAO, national farmer organizations	31 Oct 2017
	Avail guidelines in the manual on cultural control	CIMMYT	NPPOs, NARIs, FAO	31 Oct 2017
	Conduct awareness creation and training on FAW life-cycle for application of cultural management practices (egg crushing, hand-picking)	NPPOs	CABI, NARIs, FAO	31 Oct 2017
Examples: (a) Crushing egg masses (b) Hand-picking of larvae (c) Planting time (d) Fertilizer application (e) Indigenous farmer knowledge (f) Intercropping (not crop rotation) (g) Agroforestry (h) Habitat management (plant diversity, e.g. through climate smart push-pull technology)				

Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>Output 2.1.5</b> Management of FAW using effective botanicals (Neem, Tephrosia) promoted	Inventorize available botanicals for FAW management	IITA	ICIPE, NPPOs, private sector, CABI	30 Nov 2017
	Quick evaluation of botanicals	NARIs	NPPOs, national farmer organizations	By 2018
	Raise awareness and conduct training on botanicals for FAW management	NPPOs	NARIs, private sector, national farmer organizations, FAO, CABI	Start by Jan 2018
<b>Output 2.1.6</b> Management of FAW using low-risk and effective synthetic pesticides supported	Generate and avail the highly hazardous pesticides (HHP) list to all countries in the subregion	FAO	NPPOs, National Pesticide Control Organizations	31 Oct 2017
	Disseminate information on HHPs to stakeholders	NPPOs	FAO, National Pesticide Control Organizations	31 Oct 2017
	Generate the list of available low-risk synthetic pesticides	FAO	FAO, National Pesticide Control Organizations	31 Oct 2017
	Fast track registration of low-risk chemicals	National Pesticide Control Organizations	Private sector, NARIs, NPPOs, FAO	Start by 31 Oct 2017
	Advocate and create awareness of pesticide risk involving all stakeholders	FAO	NPPOs, national farmer organizations, private sector	Start by 31 Oct 2017
	Promote and train spray service providers (SSPs) in the safe use of chemicals	NPPOs	NARIs, FAO, national farmer organizations, private sector	Start by 31 Oct 2017
<b>Output 2.1.7</b> Host Plant Resistance I (natural/conventional breeding) developed and promoted  44 insect-resistant maize hybrids and OPVs already released in SSA	Screen already released insect-resistant maize germplasm (inbred lines, hybrids and OPVs) for possible resistance to FAW	CIMMYT	Screen already released insect-resistant maize germplasm (inbred lines, hybrids and OPVs) for possible resistance to FAW	Host Plant Resistance I (natural/conventional breeding)  44 insect-resistant maize hybrids and OPVs already released in SSA
<b>Output 2.1.8</b> Evidence-based advice on option of transgenic host plant resistance provided	Conduct high-level policy consultations on the use of transgenics to minimize pesticide use on FAW	National Science Councils/ Commissions	National Biosafety Authorities, private sector, NPPOs, NARIs, IFPRI, AATF	30 Nov 2017
	Test the locally available Bt germplasm against introduced FAW	NARIs	Private sector, NPPOs, CIMMYT, BeCA, universities	Start by 31 Oct 2017



Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>2.2 MANAGEMENT OF FAW (short-term actions)</b>				
<b>Output 2.2.1</b> Management of FAW using biocontrol options (pathogens and parasitoids) developed and promoted	Inventorize indigenous natural enemies (pathogens and parasitoids)	IITA	ICIPE, CABI, NARIs, BecA, JKI-Germany	Start by 1 Jan 2018
	Select and evaluate efficacy of the biocontrol agents	NARIs	NARIs, NPPOs, private sector, universities, JKI-Germany, ICIPE, CABI, BecA	2018
	Test and register biopesticides proven for other pests to manage FAW	NARIs	NARIs, NPPOs, private sector, universities, JKI-Germany, ICIPE, CABI, BecA	2018
	Demand assessment and promotion of registered biopesticides to manage FAW	NPPOs	NARIs, FAO, private sector	2018
	Establish/ review/harmonize the regulatory framework for registration of biopesticides	FAO (with RECs)	NPPOs, CABI, AU-IAPSC	Start by 1 Oct 2017
<b>Output 2.2.2</b> Management of FAW using effective cultural practices developed and promoted (a) Crushing egg masses (b) Hand-picking of larvae (c) Planting time (d) Fertilizer application (e) Indigenous farmer knowledge (f) Intercropping (not crop rotation) (g) Agroforestry (h) Habitat management (plant diversity, hedgerows)	Evaluate the effectiveness of farmer practices	NARIs	NPPOs, FAO, ASARECA	Start by 1 Jan 2018
	Evaluate effect of different crop combinations on population dynamics of FAW and its natural enemies	ICIPE	NARIs, NPPOs, CABI	Start by 1 Jan 2018
	Verify the push-pull system for FAW management	ICIPE	NARIs, NPPOs, CABI	Start by 1 Jan 2018
	Promote proven cultural practices	NPPOs	FAO, CABI, NARIs, ICIPE	1 Jan 2019
<b>Output 2.2.3</b> Management of FAW using effective botanicals (Neem, Tephrosia) promoted	Bioassay and determination of effective rates of application	ICIPE	NARIs, BecA, universities	Start by 1 Nov 2017
	Field validation of botanicals	NARIs	ICIPE, CIMMYT, private sector, universities	Start by 1 Jan 2019
	Promote proven botanicals	NPPOs	NARIs, FAO, ICIPE, CIMMYT, CABI, private sector	Start by 1 Jan 2019
<b>Output 2.2.4</b> Management of safe and low-risk synthetic pesticides supported	Evaluate the efficacy of low-risk pesticides	NARIs	NPPOs, private sector	Start by 1 Nov 2017
	Create awareness of low-risk pesticides	NPPOs	National Pesticide Control Organizations, Crop Life, CABI, FAO	Start by 1 Nov 2017
	Harmonize pesticide legislation/ registration	FAO (with RECs)	NPPOs, NARIs, CABI	Start by 1 Nov 2017
	Train on pesticide-resistance management plan	NPPOs	NPPOs, FAO, CABI	Start by 1 Nov 2017

Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>Output 2.2.5</b> Host Plant Resistance I (natural/conventional breeding) developed	Identify sources of resistance to FAW in sorghum	ICRISAT	NARIs, IITA, universities IAEA, INTSORMIL	Start by 1 Nov 2017
	Evaluate FAW-resistant maize germplasm from CIMMYT	NARIs	IITA, CIMMYT, universities	Start by 1 Nov 2017
<b>Output 2.2.6</b> Host Plant Resistance II (transgenics)	Explore humanitarian licensing of transgenes	CIMMYT	National Biosafety, Authorities, private sector, NARIs	2018
<b>2.3 MANAGEMENT OF FAW (medium-term actions)</b>				
<b>Output 2.3.1</b> Management of FAW using biocontrol options (pathogens and parasitoids)	Scale-out of the biopesticides	NPPOs with private sector	NPPOs, NARIs	2019
	Release of proven natural enemies	NARIs	ICIPE, IITA, CABI, FAO, NPPOs	2019
<b>Output 2.3.2</b> Host Plant Resistance I (natural/conventional breeding) developed  44 insect-resistant maize hybrids and OPVs already released in SSA	Intensify breeding activities for FAW resistance in maize and sorghum germplasm	CIMMYT, ICRISAT	IITA, NARIs	2018
	Fast track release and registration of new varieties with FAW resistance	NARIs, NPPOs	CIMMYT, ICRISAT, IITA, private sector	2019
	Fast track delivery and adoption of harmonized seed policies for sharing of FAW-resistant varieties	NPPOs	RECs, private sector, FAO, Public Seed Sector Seed Traders Associations	2018
<b>Output 2.3.3</b> Evidence base for option of transgenic host plant resistance strengthened	Evaluate new Bt genes for FAW resistance	CIMMYT	AATF, NARIs, National Biosafety Agencies	2019
	Train on insect resistance (Bt genes) management	CIMMYT, AATF	ICIPE, NPPOs, NARIs	2019
<b>Output 2.3.4</b> Effective IPM package to manage FAW developed	Evaluate a complete package of control measures for effective and sustainable management of FAW	NARIs	NPPOs	2020

Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>3. FAW IMPACT ASSESSMENT (ex-ante, midterm and ex-post analysis)</b>				
<b>Output 3.1</b> Capacity of stakeholders to assess the incidence and severity of FAW infestations strengthened	Farmers to scout for the presence of FAW (eggs, larvae pupa and the moth) (Cost of scouting)	NARIs	Farmer and farmer groups, extension	Oct 2017 and continuous
	Assess the level of infestation/damage from the corners of the garden along the diagonal transect (cost of assessment)	NARIs	Extension, farmer and farmer groups	Oct 2017 and continuous
	Assess and document indigenous knowledge	CABI	NARIs, ASARECA, farmer groups	Jan 2018
<b>Output 3.2</b> Yield and postharvest losses caused by FAW established	Conduct field experiment (controlled vs uncontrolled) (research needs)	NARIs	Academia, farmer and farmer groups, extension	March 2018
	Estimate yield loss (typical harvest against a typical harvest with control (cost estimate)	NARIs	Academia, farmer and farmer groups	April 2018
	Assess price differential due to FAW damage	ASARECA	FEWS-NET, FAO, farmer and farmer groups, academia, ASARECA	Jan 2018
	Identify and record changes along the value chain (research needs)	FAO	Farmer, farmer groups, academia	July 2019
<b>Output 3.3</b> Impact of FAW damage on household food security, livelihood systems and transboundary activities determined	Quantify the available and accessible stock (seed and food)	FAO	Extension services, NARIs, ASARECA	Oct 2017
	Quantify the impact of FAW on household income and expenditure	Food Economy Group (FEG)	IFPRI, farmer and farmer groups	Jan 2018 Jan 2021 Jan 2023
	Document changes in consumption behaviour and energy requirement (context specific)	ASARECA	Farmer groups, NARIs	March 2019
	Assess livelihood changes, coping strategies and vulnerability (community and national level)	FEWS NET (Famine Early Warning Systems Network)	Farmer and farmer groups, academia, FEG, ASARECA	March 2019
	Document the impact of FAW on social behaviour and gender roles and responsibilities	ASARECA	Extension, NARIs, FAO, academia	Jan 2018 Jan 2021 Jan 2023
	Assess effects of FAW on GDP, exports and imports	EPRC/IFPRI	National Bureau of Statistics, academia	Jan 2019, Jan 2023
<b>Output 3.4</b> Impact of pesticide use for FAW management evaluated	Assess transboundary (trade, population movement, etc.) impact	ASARECA	NARIs, academia, FAO	Jan 2019, Jan 2023
	Assess human health hazard caused by pesticide use due to FAW	Academia, university/ School of Public Health)	Ministry of Health, ICIPE, National Bureau of Standards	Jan 2019, Jan 2023
	Document environmental damage caused by use of chemical pesticides	ICIPE	Academia, NARI, NEMA, CABI	Jan 2019, Jan 2023
	Assess impact of pesticide use on natural enemy	ICIPE	CABI, academia, extension, farmer and farmer groups	Jan 2019, Jan 2023

Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>4. COORDINATION, COMMUNICATION AND AWARENESS</b>				
<b>4.1 Coordination (to streamline a mechanism for coordinating FAW actions in ECA/Africa within existing institutions)</b>				
<b>Output 4.1.1</b> Functional subregional FAW coordination platform established	<ul style="list-style-type: none"> <li>(a) Develop coordinated subregional strategy and action plan for research and management of FAW</li> <li>(b) Conduct policy advocacy and awareness creation on FAW in line with existing RECs policies and protocols</li> <li>(c) Strengthen subregional capacity development for management of FAW</li> <li>(d) Facilitate coordinated communication among stakeholders</li> <li>(e) Create a central web portal to serve as a one-stop point for FAW information on FAW initiatives from other portals</li> <li>(f) Form and support working groups in their mandate (e.g. identify FAW research and management priorities for technical working groups)</li> </ul>	FAO	National task forces, ASARECA, RECs, DLCO/EA, AU, EAGC, EAFF, CABI, ICIPE, CIMMYT, ICRISAT, USAID, USAID/FEWSNET, DFID, WB	Oct to Dec 2017
<b>Output 4.1.2</b> Functional subregional technical working groups (ad hoc) established	<ul style="list-style-type: none"> <li>(a) Collaborate in implementation of project activities towards defined FAW research and management</li> <li>(b) Collaborate in development and management of knowledge and information (e.g. FAW manual, phytosanitary information)</li> <li>(c) Collaborate in policy advocacy</li> <li>(d) Collaborate in quality control (e.g. peer review of technical documents)</li> </ul>	Lead will depend on thematic focus	Lead will depend on thematic focus	Ongoing starting Oct 2017



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Outputs	Activities	Lead institution	Collaborating institutions	Time frame
<b>Output 4.1.3</b> Functional national FAW coordination platforms established/strengthened	(a) Coordinate national efforts to manage FAW among different organizations to ensure a coherent, consistent response and including monitoring, awareness campaigns and mobilizing resources for training programmes (b) 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 (c) 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" subgroup) (d) 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 and information)	NPPOs	Broad-based public-private partnership	Oct to Dec 2017
<b>Output 4.1.4</b> Functional national technical working group established	(a) Collaborate in implementation of project activities towards defined FAW research and management (b) Collaborate in development and management of knowledge and information (e.g. FAW manual and phytosanitary information) (c) Collaborate in policy advocacy (d) Collaborate in quality control (e.g. peer review of technical documents)	Lead will depend on thematic focus	Depending on technical thematic area	Ongoing, starting Oct 2017
<b>4.2 Communication and awareness</b>				
<b>Output 4.2</b> Development and wide dissemination of appropriate information on management of FAW ensured	(a) Establish communication working group at subregional to national levels (b) Develop, package and disseminate information	CABI /MoA, ASARECA, NARI communication team, FAO, NGOs, farmer associations, private sector		<ul style="list-style-type: none"> <li>• Working group by Sept 2017</li> <li>• Ongoing</li> </ul>

## ANNEX 1. PARTICIPANTS

No.	Name	Organisation	Title	Country	Email address
1	Mr Zakayo Kinyua Murimi	Kenya Agriculture and Livestock Research Organization (KALRO)	Head, Crop Health Research	Kenya	kinyuazm@gmail.com
2	Mr Emmanuel Okogbenin	AATF	Director, Technical Operations	Kenya	E.Okogbenin@aatf-africa.org
3	Mr Daniel Kimani Karanja	CABI	Deputy Director, Development	Kenya	d.karanja@cabi.org
4	Ms Tracy McCracken	USAID	SPS Technical Advisor, Regional Economic Integration Office	Kenya	tmccracken@usaid.gov
5	Mr Douwehan Hodeba Mignouna	BECA	Director	Kenya	D.Barasa@cgiar.org
6	Ms Lilian Njeri Gichuru	AGRA	Associate Programme Officer	Kenya	LGichuru@agra.org
7	Mr Boddupalli M. Prasanna	CIMMYT	Director, Global Maize Programme	Kenya	b.m.prasanna@cgiar.org
8	Mr Ivan Rwomushana	ICIPE	IPM Scientist	Kenya	irwomushana@icipe.org
9	Ms Penina Wanja Gichuru	EAGC	Associate Programme Officer	Kenya	pgichuru@eagc.org
10	Mr Cyril Ferrand	FAO Resilience Team for East Africa	Resilience Team Leader	Kenya	Cyril.Ferrand@fao.org
11	Ms Deborah Duveskog	FAO Resilience Team for East Africa	Community Adaptation and Resilience Officer	Kenya	Deborah.Duveskog@fao.org
12	Mr Wilson Ronno	FAO-Kenya	Crop Production/ Agronomist Officer	Kenya	Wilson.Ronno@fao.org
13	Mr Haïssama Ali Ahmed	Directorate of Agriculture and Forestry (DAF)	Plant Protection and Production Officer	Djibouti	alihaissama@gmail.com
14	Mr Samatar Omar Djama	CERD	Senior Biology Researcher	Djibouti	slysam2007@yahoo.fr
15	Mr Idris Farah Miguil	FAO-Djibouti	Plant Protection and Production Expert	Djibouti	idfami@yahoo.fr
16	Mr Morris Felix Juma Tabiano	Ministry of Agriculture and Food Security	Senior Inspector for Plant Protection	South Sudan	otavisno@gmail.com
17	Mr Lawrence Otika Joseph Kedi	FAO South Sudan	Agricultural Officer	South Sudan	Lawrence.Kedi@fao.org
18	Mr Osman Ahmed Jimale	MoA	Director of Plant Protection	Somalia	osmjimale@hotmail.com
19	Mr Alphonse Owuor	FAO-Somalia	Entomologist	Somalia	Alphonse.Owuor@fao.org
20	Mr. Alexis Mpawenimana	MoA	Entomologist	Burundi	almpawe2@gmail.com
21	Mr Pascal Ndayiragije	FAO-Burundi	Entomologist	Burundi	Pascal.Ndayiragije@fao.org
22	Mr Jean Claude Rwaburindi	FAO-Rwanda	Agricultural Value Chain Expert	Rwanda	jean.rwaburindi@fao.org

No.	Name	Organisation	Title	Country	Email address
23	Mr Patrice Hakizimana	USAID	Agriculture and Rural Development Specialist	Rwanda	phakizimana@usaid.gov
24	Mr Winfred Hammond	FAO-RAF	Consultant	Ghana	winfredniokaihammond@gmail.com
25	Mr Georg Goergen	IITA	Entomologist, Biodiversity Centre/ Biological Control Centre for Africa	Germany	G.Goergen@cgiar.org
26	Mr Jörg Wennmann	Institute for Biological Control (Julius Kühn-Institut)	Specialists in biological control	Germany	
27	Mr Dietrich Stephan	Institute for Biological Control (Julius Kühn-Institut)	Specialists in biological control	Germany	Dietrich.Stephan@julius-kuehn.de
28	Mr Stephan Winter	Leibniz Institute DSMZ-German Collection of Microorganisms and Cell Cultures	Head of the Plant Virus Department	Germany	
29	Ms Regina Eddy	USAID	Africa Division Country Strategy and Implementation Office	USA	reddy@usaid.gov
30	Mr Joseph Huesing	USAID	Senior Biotechnology Advisor	USA	jhuesing@usaid.gov
31	Mr Christopher Samuel Muriu Njoroge	ICRISAT	Cereals and Legumes Pathologist, Eastern and Southern Africa	Malawi	S.Njoroge@cgiar.org
32	Mr Brian Katongo Nsofu	COMESA	SPS Coordinator - Investment Promotion & Private Sector Dev. (IPPSD)	Zambia	BNsofu@comesa.int
33	Mr Fahari Gilbert Marwa	EAC	Principal Agricultural Economist	Tanzania	fmarwa@eachq.org
34	Ms Joyce Mulila Mitti	FAO-SFS	Plant Production and Protection Officer	Zimbabwe	Joyce.MulilaMitti@fao.org
35	Mr Ben Cattermoul	DFID	Livelihoods Adviser	Uganda	b-cattermoul@dfid.gov.uk
36	Mr Charles Owach	FAO-Uganda	Assistant FAO Representative, Programme	Uganda	Charles.Owach@fao.org
37	Mr Martin Ameu	FAO-Uganda	Programme Associate	Uganda	Martin.Ameu@fao.org
38	Mr Paul Emuria	FAO-Uganda	Programme Officer	Uganda	Paul.Emuria@fao.org
39	Mr Emmanuel Zziwa	FAO-Uganda	Programme Officer	Uganda	Emmanuel.Zziwa@fao.org
40	Ms Bui Thi Lan	FAO-Eritrea	FAO Representative in Eritrea	Eritrea	BuiThi.Lan@fao.org

No.	Name	Organisation	Title	Country	Email address
41	Mr Yeneneh Belayneh	USAID	Senior Technical Adviser	USA	ybelayneh@usaid.gov
42	Dr Allan Hruska	FAO-HQ	Senior Agricultural Officer, TCIA	Italy	Allan.Hruska@fao.org
43	Mr Zebdewos Salato Amba	Ministry of Agriculture and Natural Resources	Plant Protection Director	Ethiopia	zebdewosalato@yahoo.com
44	Mr Bayeh Mulatu Aregaye	FAO-Ethiopia	IPM Expert	Ethiopia	Bayeh.Mulatu@fao.org
45	Mr Stephen Wangai Njoka	DLCO-EA	Director	Ethiopia	swnjoka@yahoo.com
46	Mr Felege Elias Masresha	DLCO-EA	Information and Forecasting Officer	Ethiopia	felege.elias@dlcoea.org.et
47	Mr Abdelfattah Mabrouk Amer	Inter-African Phytosanitary Council, IAPSC, AU	Senior Scientific Officer	Cameroon	abdelfattahsalem@ymail.com
48	Mr Patrick Kormawa	FAO-SFE	SRC	Ethiopia	
49	Dr Mathew Abang	FAO-SFE	Crop Production Officer	Ethiopia	
50	Mr Solomon Gelalcha	FAO-SFE	Consultant	Ethiopia	
51	Mr Khidir Gibril Musa Edres	Agricultural Research Corporation	Director-General	Sudan	khidirgme@outlook.com
52	Mr Alex Mayamba	Researcher	Uganda Farmer's Federation	Uganda	alexmayamba@gmail.com
53	Mr Sergei John Mutahiwa	Ministry of Agriculture	Principal Agricultural Officer	Tanzania	smutahiwa@yahoo.com
54	Dr Muo Kasina	KALRO	Centre Director Entomologist	Kenya	muo.kasina@kalro.org
55	Mr Simeon Rakotomamonjy	FOFIFA	DED, Scientific Director	Madagascar	simeon.rakotomamonjy@gmail.com
56	Mr Elsadig Suliman Mohamed	Agricultural Research Corporation	Director-General	Sudan	elsadigmohamed1953@gmail.com
57	Ms Anita Tumuhairwe	UNADA	Programme Officer	Uganda	tumuhairweanita@gmail.com
58	Mr Hussein Mansoor	Ministry of Agriculture	DRD	Tanzania	hussein.mansoor@gmail.com
59	Mr Mbikayo Nkonko	INERA	Plant Breeding	D. R. Congo	mbikayijeanalbert@yahoo.fr
60	Mr Ambrose Agona	NARO	Director-General	Uganda	aagona@hotmail.com, aagona@naro.go.ug, dgnaro@naro.go.ug
61	Ms Stella Adur Okello	NARO/NACCRI	Research Officer	Uganda	seokello@gmail.com
62	Mr Joseph Oryokot	World Bank	Snr Agricultural Specialist	Uganda	joryokot@worldbank.org
63	Ms Christine Alokite	CABI	Communication & Extension Scientist	Uganda	c.alokit@cabi.org
64	Mr Robert Kalyebara	ABI TRUST	Head Technical	Uganda	robert.kalyebara@abi.co.ug
65	Mr David Wozemba	Palladium	Snr Technical Manager	Uganda	david.wozemba@thepalladiumgroup



No.	Name	Organisation	Title	Country	Email address
66	Mr Stephen T. Byantwale	Ministry of Agriculture	Ag. Commissioner Crop Protection	Uganda	byantwale@gmail.com
67	Mr John W. Bahana		Farmer	Uganda	john.bahana@gmail.com
68	Ms Anne M. Akol	Makerere University	Associate Professor Entomology	Uganda	aakol@cns.mak.ac.ug
69	Mr George Tadu	Ministry of Agriculture	Research Director	South Sudan	georgetadu57@gmail.com
70	Dr Cyprian Ebong	ASARECA	Interim Executive Secretary	Uganda	c.ebong@asareca.org
71	Dr Brian Isabirye	ASARECA	Leader SAFSN and NRMES Themes	Uganda	b.isabirye@asareca.org
72	Mr Moses Odeke	ASARECA	Monitoring, Evaluation & Learning Unit	Uganda	m.odeke@asareca.org
73	Mr Ben Ilakut	ASARECA	Publications Officer	Uganda	b.ilakut@asareca.org
74	Ms Jolly Basemera	ASARECA	Head HR & Administration	Uganda	j.basemera@asareca.org
75	Mr Zainab Kyeyune	ASARECA	Accounts Assistant	Uganda	z.kyeyune@asareca.org
76	Ms Racheal N. Musisi	ASARECA	Administrative Assistant	Uganda	r.namuzibwa@asareca.org

## ANNEX 2. WORKSHOP PROGRAMME

### DEVELOPING A STRATEGIC PLAN FOR THE CONTROL OF FALL ARMYWORM FOR EASTERN AND CENTRAL AFRICA

RESORT BEACH HOTEL ENTEBBE, UGANDA

18-20 SEPTEMBER 2017

Facilitator: Dr Winfred Hammond

Time	Activity	Remarks
ARRIVAL OF PARTICIPANTS: 16–17 SEPTEMBER 2017		Ms Racheal Namuzibwa
<b>DAY 1: MONDAY 18 SEPT</b>		
08.00 – 8.30	<b>REGISTRATION</b>	<b>Ms Rachael Namuzibwa</b>
08.30 – 09.00	Self introduction	Facilitator
<b>Session I: OPENING CEREMONY</b>		<b>Rapporteurs</b>
09.00 – 09.10	Welcome remarks: Executive Secretary ASARECA	Dr Cyprian Ebong
09.10 – 09.20	Video on FAW from FAO-CIMMYT-AGRA-April (2017) Workshop	FAO-CIMMYT-AGRA
09.20 – 09.35	Remarks from ASARECA	Chairman BoD ASARECA Dr Ambrose Agona (NARO-Uganda)
09:35– 09:45	Remarks from World Bank	WB
09:45 – 09:55	Remarks from DFID	DFID
09:55 – 10:05	Remarks from USAID	USAID
10:05 – 10:15	Remarks from EU	EU
10:15 – 10:30	Remarks from FAO	FAOSFE-SRC & Rep to AU and UNECA
10.30 – 10.45	Official opening remarks	Minister of Agriculture, Uganda
10.45–11.15	<b>HEALTH BREAK/Group photo</b>	<b>HOTEL</b>
<b>Session II</b>		<b>Facilitator/ Rapporteurs</b>
11.15 – 11.30	Understanding Fall Armyworm (FAW) Invasion: How dangerous is/could the scourge be?	Dr Brian E. Isabirye (ASARECA)
11.30 – 11.45	Status of Africa-wide response to FAW and the context of the FAO-ASARECA Workshop: Objectives and expected outputs	Dr Mathew Abang (FAO-SFE)
11.45 – 12.00	Discussions	Facilitator/ Rapporteurs
	Country presentations	
12.00 – 01.15	Status and progress of research and management of FAW in Kenya, Uganda, Tanzania, South Sudan, Sudan, Ethiopia, Eritrea, Madagascar, Rwanda, Burundi and Tanzania	NARIs of the respective countries
01.15 – 02.00	<b>LUNCH BREAK</b>	<b>HOTEL</b>
02.00 – 02.30	Presentation and discussion of the outcome of the USAID-CIMMYT Manual Preparation workshop	
02.30 – 03.00	Discussion of ECA region country FAW research and management report status	
03.00 – 04.00	Presentations by RECs on their role in prevention and management of transboundary pests in the subregion	IGAD, EAC, COMESA representatives
04.00 – 04.30	Farmer Field Schools and other key messages/approaches for control of FAW	Dr Allan Hruska - FAOHQ
04.30 – 05.00	<b>HEALTH BREAK</b>	<b>HOTEL</b>
05.00 – 05.30	<b>General discussion and end of Day 1</b>	<b>Facilitator/Organizers</b>

Time	Activity	Remarks
<b>DAY 2: TUESDAY 19 SEPT</b>		
09.00 – 09.15	<b>Session III Group work</b> Setting priorities for FAW research and management for the ECA subregion	Facilitator
09.15 – 10.45	<p><b>Group 1:</b> Surveillance and community-based forecasting (more details to be provided)</p> <p><b>Group 2:</b> Management options. Which knowledge and information exists/needs to be researched to enhance management of FAW in ECA; status of knowledge on containment and management options; what technologies, innovations and management practices (TIMPs) are possible, available and affordable by smallholder farmers? What are the glaring knowledge gaps in the development and deployment of FAW TIMPs? What are the best ways for fast tracking their dissemination and up/outscaling?</p> <p><b>Group 3:</b> Coordination, communication and awareness. What are the gaps in knowledge regarding policy instruments, institutions and coordination mechanisms? Define structures for coordination at East Africa subregional level, national level, etc. Identification of partners and their roles. What is the socioeconomic impact of FAW for informing policy and response plans?</p> <p><b>Group 4:</b> Capacity building (for sustainable management): researchers, extension personnel, farmers/producers, managers (decision-makers). What capacity (human and infrastructure) gaps exist or should be built to leverage FAW research in the subregion?</p> <p><b>Group 5:</b> Resource mobilization. What are the required resources and how best can they be harnessed for FAW management?</p>	
10.45 – 11.15	<b>Health break</b>	Hotel
11.15 – 01.00	Plenary presentations and discussions	Group secretaries/ Rapporteurs
01.00 – 02.00	<b>Lunch break</b>	
02.00 – 03.30	Consolidation of the group work into research for development project pillars. Breaking into thematic groups, alignment with working groups of the continental framework	Facilitator
03.30 – 04.00	<b>Health break</b>	
04.00 – 04.30	Plenary session for thematic group presentations	
04.30 – 05.00	General discussions and end of Day 2	
<b>DAY 3: WEDNESDAY 20 SEPT</b>		
09.00 – 09.15	<b>Session IV. The Strategic Plan</b>	
09.15 – 11.00	Consolidation of the East and Central Africa Strategic Plan and Roadmap for actions	Facilitator/Organizers
11.00 – 11.30	<b>Health break and departure on field trip</b>	
AFTERNOON	Field trip	Organizers

## ANNEX 3. WORKSHOP CONCEPT NOTE

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### CONCEPT NOTE REGIONAL WORKSHOP FOR DEVELOPING STRATEGIES AGAINST FALL ARMYWORM IN EASTERN AND CENTRAL AFRICA

#### *Introduction*

Fall Armyworm (FAW), or *Spodoptera frugiperda*, is an insect pest that feeds on more than 80 crop species, causing damage to economically important cultivated cereals such as maize, rice and sorghum, and also to legumes, vegetable crops and cotton. FAW is native to tropical and subtropical regions of the Americas. The adult moth is able to move over 100 km per night. It lays its eggs on plants, from which larvae hatch and begin feeding. High infestations can lead to significant yield loss. Farmers in the Americas have been managing the pest for many years, but at significant cost.

FAW was first detected in Central and Western Africa in early 2016 (Sao Tome and Principe, Nigeria, Benin and Togo) and in late 2016 and 2017 in Angola, Botswana, Burundi, Cote d'Ivoire, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Namibia, Niger, Rwanda, Sierra Leone, South Africa, Tanzania, Uganda, Zambia and Zimbabwe, and it is expected to move further. Although it is too early to know the long-term impact of FAW on agricultural production and food security in Africa, it has the potential to cause serious damage and yield losses. FAW's presence in Africa is irreversible. Large-scale eradication efforts are neither appropriate nor feasible. Gathering and analysing experiences and best practices from the Americas will help design and test a sustainable FAW management programme for smallholders in Africa.

#### *Context and rationale of an Eastern and Central Africa FAW subregional meeting*

Following the first reports of the FAW in Africa (Goergen et al., 2016), FAO took immediate action to support countries in responding to the threat of FAW on the continent. A consultative meeting was held in Harare, Zimbabwe (14-16 February 2017) with government officials and stakeholders from Southern Africa to provide an update on the current situation, and support emergency preparedness and

rapid pest management response. FAO undertook a series of quick actions such as the development and sharing with countries of a technical guide for FAW identification, protocols to assess levels of infestation and damage, and recommendations for management options including support to governments in the development of action plans.

Two further meetings on FAW, one for the SADC region as a follow-up to the Harare consultative meeting and a second one (All Africa) jointly organized by FAO, AGRA and CIMMYT, were held in Nairobi (25-28 April 2017). The All Africa meeting gathered partners from government, national, regional and international research and development institutions, academia and donor agencies as well as representatives from the private sector. The meeting came up with a set of action points and recommendations addressing research gaps, the need for more knowledge on the pest's behavioural and biological adjustments to the African ecological context, monitoring, early warning and forecasting, contingency planning, impact assessment and short-, medium- and long-term measures for management of the pest. The meeting participants also agreed that FAO should take a lead coordination role in FAW response in Africa.

This Eastern and Central Africa FAW Meeting jointly organized by the FAO Subregional Office for Eastern Africa (FAOSFE) and ASARECA, aims to address FAW-related issues in the context of Eastern and Central Africa within the framework of the overall Africa-wide response. The meeting will also provide a platform to receive, review and propose amendments to the FAO Eastern Africa regional FAW project, ultimately enhancing ownership and implementation coordination.

Countries in Eastern and Central Africa are inadequately equipped and ill-prepared to control FAW in isolation. In light of the significance of maize and other major staple crops, it is urgent to find an immediate, collective and concerted response to the imminent spread of this serious pest across the ECA subregion. It is obvious that a coordinated subregional effort can yield better results than having each country carry out its own research

and response initiatives in isolation. While the SADC FAW Technical Meeting and the FAO-AGRA-CIMMYT made efforts to have a fairly wide representation of the key stakeholders across the ECA region, a number of partners and indeed ECA countries were not represented at the meeting. For instance, status reports from Madagascar, Eritrea and Sudan were not presented at the meeting, while representation from the National Agricultural Research Institutes (NARIs) in ECA was very scanty. Further, many Regional Economic Communities (RECs: COMESA, IGAD and EAC) were not represented, despite the strategic importance of such actors in the management of transboundary pests like FAW. As such, an ECA stakeholder consultation meeting to develop an ECA-wide FAW emergency as well as R4D response plan is warranted. It is also very likely that the private sector and development partners' mobilization for response has been insufficient at the ECA-level. The southern Africa and continental approach may also have missed critical analysis of ECA-specific constraints and opportunities for FAW management. Consequently, it may be difficult to identify areas for quick-wins and specific targets reflecting maximum pay-offs. Finally, lack of a deeper ECA-level reflection and deliberation may limit the possibilities for analysing and learning lessons and experiences from other parts of Africa (such as the SADC), and hence making it hard to guide the policy-makers in the RECS (COMESA, IGAD and EAC). It is from this perspective that ASARECA and FAO are organizing a subregional stakeholders' meeting to tackle issues concerning the management of FAW in ECA.

### Objectives

The main objectives of the meeting are to:

- 1) Discuss solutions leading to rational management of FAW including creating a system that ensures the development and seamless flow of FAW technologies, innovations and management practices (TIMPs) among ECA countries;
- 2) Strengthen linkages among government regulatory institutions, RECs, research (NARIs) and development partners in ECA to tackle the FAW effectively;
- 3) Familiarize stakeholders with the procedures for identifying and controlling the spread of FAW in Eastern and Central Africa;

- 4) Synthesize current lessons learned and existing knowledge and agree on an effective communication and dissemination strategy for FAW in line with stakeholder needs and interests.
- 5) Raise awareness of FAW in countries where it has been detected and countries where it has not yet been reported;
- 6) Review/validate an ECA subregional emergency response plan and develop an action research strategy/proposal for the above interventions for possible funding.

### Expected outputs

Expected results that will be delivered during the workshop are:

- 1) Knowledge of participants regarding damage caused and spread of FAW is improved;
- 2) Report on prospective measures for FAW management from the experience of previously invaded countries and within the ECA region;
- 3) Establishment of a basis and modalities for regional collaboration for the management of FAW;
- 4) A subregional strategy for restricting the spread of FAW in ECA is developed.
- 5) Eastern Africa FAW regional response and development research proposal.

### Methodological approach

The meeting will include plenary sessions, working group sessions and a field trip to the National Crops Resources Research Institute. The plenary sessions will focus on presentations from ASARECA, FAO, CIMMYT, AATF, CABI, ICIPE, AFAAS, NPPOs, private sector actors, ECA-based 11 NARIs, on the following technical themes:

- 1) Update on the status of FAW in ECA and ongoing response activities;
- 2) The identification and monitoring of FAW in ECA;
- 3) Damage caused by the FAW to crops and the economy of ECA;
- 4) FAW management measures;
- 5) Strategic partnerships and coordination around the control of FAW in ECA.

Discussion sessions will follow each presentation. The working groups will discuss issues related to:

- 1) Review of the status of the concrete steps agreed in Nairobi, and proposal to continue the

- momentum around identified priority actions;
- 2) Emergency response (identification of priority control measures against FAW);
  - 3) Key researchable issues and knowledge gaps for FAW management;
  - 4) Coordination of FAW response across ECA.

#### ***Venue and duration of the workshop***

It is expected that the meeting will be held in Entebbe, Uganda and will last three days from 18 to 20 September 2017. The exact venue will be communicated later.

#### ***Participants***

Participants will come from Regional Economic Communities (EAC, IGAD, COMESA), Ministries of Agriculture, National Agricultural Research Institutes (NARIs), universities and the National Plant Protection Organizations (NPPOs) of eastern and central Africa in addition to ASARECA, FAO, USAID, DFID and the World Bank. Other organizations involved in key crop value chains threatened by FAW will be invited to take part in the meeting. These participants will include CIMMYT, ICRISAT, IITA, CABI, DLCOEA, AATF, ICIPE, AFAAS, NPPOs and private sector actors.

#### **ASARECA contact**

Dr Brian E. Isabirye

Email: [b.isabirye@asareca.org](mailto:b.isabirye@asareca.org)

Tel: +256772352739

#### **FAO contact**

Dr Mathew M. Abang

Email: [Mathew.Abang@fao.org](mailto:Mathew.Abang@fao.org)

Tel: +251-935986406



