**EUR 1.000.000**

**Title: Risk Mapping, Monitoring, and Early Warning for early Action for a new threat - Fall Armyworm in Africa**

**Background**

Fall armyworm(*Spodoptera frugiperda*), FAW, is an insect native to tropical and subtropical regions of the Americas. Its larval stage feeds on more than 80 plant species, including maize, rice, sorghum, millet, sugarcane, vegetable crops and cotton. FAW can cause significant yield losses if not well managed. It can have a number of generations per year and the adult moth can fly up to 100 km per night. FAW was first detected in Central and Western Africa in early 2016 (Benin, Nigeria, Sao Tome and Principe, and Togo) and across Southern Africa (except Lesotho and the Island States), in Cameroon, Ghana, Niger and Ethiopia, Burundi, Kenya, Rwanda, and Uganda and it has spread further. Its modality of introduction, along with its ecological adaptation across Africa are still speculative. FAW has quickly dispersed through Africa (officially reported in over 30 African countries), where it now feeds on maize and other crops across more than 35 million of hectares mostly managed by smallholder family farmers. Without adequate surveillance, control and management, the pest is capable of causing significant yield loss and threatening countries and household livelihoods, food and nutrition security.

To respond the challenge, FAO developed a Framework for Partnership for Sustainable Management of the Fall Armyworm in Africa. Based on the action points and recommendations identified in the All Africa Consultation meetings, FAO has formulated a region-wide multi-stakeholder Framework for the Coordinated Management of FAW. The management for the FAW in Africa is composed as follows: Management of FAW; Immediate Recommendations & Actions; Short-term Research Priorities; Medium to Long-term Research; Communications & Training; Surveillance & Early Warning; Policy & Regulatory Support and Coordination. Twenty-seven FAO Technical Cooperation Programme (TCP) projects on FAW are ongoing in twenty-five countries with total funding of 7.9 million USD which focus on FAW research and field management practices.

However, 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) should be established in African countries where Fall Armyworm is currently present as well as in those countries that are potentially threatened by the pest.

**Rationale**

FAW poses a serious threat to food security to vulnerable smallholder farmers in Africa who rely heavily on these crops, particularly maize (most vulnerable to FAW attacks), as a source of staple food and income. There is an urgent need to provide the information and analysis necessary so that decision-makers – from farmers to national-level authorities can prevent, alert, prepare for and respond to the infestation of tens of millions of hectares of maize, sorghum and millet fields across the continent. Innovative digital technology offer an opportunity to efficiently collect the data necessary, consolidate it real-time onto platforms, where it can be used to analyze and model, allowing for real-time effective decision-making. The implementation of these systems at regional level will allow for accurate, timely information and guidance enabling the prevention, early warning, preparedness and response to the Fall Armyworm threat at a number of levels and users: local (farmers, associations), district (control, preparedness, resource allocation, training), national (resource allocations) and global (coordination & resource allocation).

The innovative element in the proposed approach is in the way it links field level detection of an insect pest to real time decision making on risk to household food insecurity at a continental level. With time, different functionalities can be added to the system allowing it to link with national level dashboards on risk and response. In principle, the overall approach is applicable and should be expanded to a wide range of transboundary plant and animal pests and diseases. Therefore this project should lay the foundations for a new way of linking pest incidence to risk across Africa.

**Strategy**

To manage this emerging and potentially devastating new plant pest in Africa, FAO is capitalizing on its expensive knowledge and the successful experience gained from its locust programme in Africa. Given its demonstrated expertise, experience and comparative advantage in continental-wide and global early warning systems for agricultural transboundary pests, FAO leads the establishment and operation of the FAW monitoring and early warning system in partnership with other institutes to ensure the integration of all existing expertise. The Organization is developing two complimentary and innovative systems: the Fall Armyworm Monitoring and Early Warning System (FAMEWS) and the FAW Risk Model and Map (FAWRisk). These two linked systems envisage field-level monitoring of FAW prevalence via an application for smartphones, linked to a global platform that allows real-time mapping and analysis of FAW infestations. This information can be used at a local and national levels to help guide farmers in their prevention, preparedness and response to FAW infestations. The information and analysis can also be used at district, regional, and national levels to prioritize resources for prevention and emergency preparedness in case a response is needed. The FAW prevalence data collected via FAMEWS will also feed the FAWRisk model, which determines the risk of food insecurity due to FAW infestations in specific areas in Africa. FAWRisk examines the dimensions of hazard & exposure, as well as vulnerability and lack of coping capacities to prevent and control the FAW.

The FAWRisk model and its maps can be used by partners at all levels (global to local) for decision-making, planning and implementation of FAW prevention and control measures. The model builds on and incorporates various underlying information systems which cover different aspects of exposure to the pest - including maize, sorghum and millet cropping areas and production levels, vulnerability to impact – by using the Integrated Phase Classification System (IPC) and measures of chronic poverty, as well as household and national level response capacities to cope with and respond to the pest. Prior to full implementation and operationalization, various elements of the system will need to be developed and tested. We are proposing two pilot countries per region (West, Central, Eastern and Southern Africa), so in a total of 8 countries.

 In order to be effective, after testing in the selected countries, FAMEWS and FAWRisk need to be implemented at scale across Africa. If this is done then, it will allow accurate collection of geo-referenced data and their reporting and display in real-time on a platform available to all for analysis and decision-making, enabling resources to be directed to areas and livelihoods most at risk from the pest. Both FAMEWS and FAWRisk are compatible with existing networks and systems in Africa dealing with plant pest detection, monitoring and management, including the Plantwise and Prise systems managed by CABI and the pest monitoring system set up by Cropwatch Africa. Compatability with these systems will allow data sharing and exchange for mutual benefits.[[1]](#footnote-1)

The current total funding for FAO intervention on FAW is USD 13 million of which USD 10 million are from FAO’s budget. FAO total needs for FAW management are USD 87 million. This proposal of USD 1 million comprises the finalization of the digital platform, trainings, pilot implementation, data quality control, and technical support to ensure that at national and local levels the system is used and generates actionable information. In addition, other elements will be included to improve its accuracy and coverage. For example, the integration of an automatic diagnostic tool to immediately identify maize damage associated with FAW, AAW and stem borer into the FAMEWS mobile app and the auto-classification and quantification of FAW damage and monitoring changes over time by using a combination of drones and high-resolution satellite imagery Sentinel-2, Terrabella, RapidEye).

All outputs and knowledge gained through the use of these tools will be shared within the FAO thematic Working groups created to tackle the FAW issue and amongst the greater FAW community. In addition, donors, government bodies and national FAW Taskforces, as well as key regional bodies, including SADC, ECOWAS, CILSS and IGAD will be specifically targeted to ensure that they receive information from the FAMEWS and FAWRisk platforms on a regular basis, as well as when a particularly high risk / alert is identified. At the field level, the data collected and the good practices identified will be shared through the FAMEWS mobile app with farmers and producers’ organizations. Trainings and capacity building will also be provided through the network of Famers’ Field Schools, and the dedicated curricula on FAW and Integrated Pest Management which was launched in February 2018.

Partnerships and coordination

Overall coordination will be provided by the FAO Plant Production and Protection Division (AGP), in collaboration with the FAO Emergency Operations and Rehabilitation Division (TCE), with the FAO Regional Office for Africa (RAF), the FAO Resilient Hubs and FAO’s Technology Division (CIO). Staff members of FAO will be available for coordination and implementation in the field. Partners include Penn State University, University of Barcelona, ICIPE, CIMMYT, CABI and Google.

In terms of collaboration mechanism, FAO has established a number of thematic Working Groups to ensure that the highest level of expertise is matched with the needs of FAW-affected countries, researchers, donors and other partners and stakeholders. The WGs consist of leading experts, donors and governments, meeting virtually at least once a month. The following specific WGs have been created:

1. Yield Loss Determination
2. Biological control
3. Bio-pesticides
4. Risk & Impact Assessment
5. Monitoring & Early Warning
6. Communication, Awareness & Knowledge Management
7. Farmer Field Schools, Extension, Plant Clinics, etc.
8. Agroecology
9. Synthetic Chemical Pesticides
10. Host Plant Resistance
11. Transgenic Resistance
12. Quarantine & Phytosanitary Measures

Cross-cutting issues

Cross-cutting issues include emergency, food and nutrition security, rural poverty, transboundary pests & diseases/food chain crisis-FCC, and resilience.

Activities

The main activities in the implementation and scale-up are regional and national-level trainings, technical backstopping, and local capacity-development.

1. Technical consultations, software development, testing and evaluation for the finalization of digital platform;
2. Guidelines on the operational use of the Fall Armyworm Monitoring and Early Warning System (FAMEWS) and the Fall Armyworm Risk Model (FAWRisk) ;
3. Regional workshops for FAW national focal persons on the operational use FAMEWS and FAWRisk including mapping and data analysis;
4. Regional workshops on the operational use and maintenance of traps by farmers and community focal persons;
5. National workshops to introduce FAO’s FAW Monitoring & Early Warning System tool (application for hand held devices) and train in use.

Timeframe

The proposed intervention will be implemented over a 24-month period within 30 days from the date of receipt of the first instalment of financing.

Beneficiaries and End-Users

Smallholder African farmers will be a primary beneficiary of these tools. Social media will be utilized to connect directly with farmers and communities (e.g. WhatsApp FAW Community and FFS groups). These end-users will also be recipients of training vis-à-vis FFS and other community-based support programmes. Other beneficiaries will include national FAW taskforces, Ministries of Agriculture and other public institutions related to agriculture, food security, risk management and emergency response and resilience, which will be better able to monitor and manage the pest at localized and national levels. Sub-regional institutions including SADC, CILSS, IGAD and ECOWAS, as well as the African Union will also benefit and will be better able to advice on allocation of resources as will donor agencies.

**Results-based management logical framework**

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| **EUR 1.000.000** **Title: Risk Mapping, Monitoring, and Early Warning for Early Action for a new threat – the Fall Armyworm in Africa** |
| **Objective: Reduce threats of hunger and food insecurity through risk monitoring and early action against the FAW** |
| **Expected result:** An Early Warning and Risk Mapping system for Fall Armyworm in Africa that allows for decision-making from local to global levels, resulting in more resilient livelihoods in Africa with reduced humanitarian risk. |
| **Output 1:** System augmented to incorporate new digital technologies that enhance its functionality and usefulness. |
| Activities* **Activity 1.1:** Integrate an automatic diagnostic tool to immediately identify maize damage associated with FAW, AAW, stem borer into the FAMEWS mobile app
* **Activity 1.2:** Undertake auto-classification and quantification of FAW damage and monitoring changes over time by using a combination of drones, high-resolution satellite imagery (from the Europeans (Sentinel-2) and others (Terrabella, RapidEye)), field data from the FAMEWS mobile app, and Google Earth Engine
* **Activity 1.**3 Ensure continued development of FAWRisk and gradual incorporation of FAW management and response variables , and link to national Risk and Response dashboards
* **Activity 1.4:** Develop a landscape model that incorporates the above-mentioned inputs to manage FAW in Africa
* **Activity 1.5:** Enhance an open-access global platform for data query, mapping, analysis and the provision of early warning and food insecurity risk modelling to national decision-makers, and its integration with other data collection systems, impact assessment models and national FAW situation dashboards
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| **Output 2:** Farmers, communities, and governments implementing and using FAW risk mapping, monitoring, and early warning tool to sustainably manage FAW in Africa. |
| Activities* **Activity 2.1:** Develop guidelines on the operational use of the Fall Armyworm Monitoring and Early Warning System (FAMEWS) and the FAW Risk Mapping model (FAWRisk)
* **Activity 2.2:** Develop an offline advisory system integrated into the FAMEWS mobile app that provides immediate response guidance to farmers and communities based on field scouting and pheromone trap data they have collected
* **Activity 2.3:** Conduct regional workshops to train FAW national focal persons on the operational use FAMEWS including mapping and data analysis
* **Activity 2.4:** Produce and distribute communication & training material
* **Activity 2.5:** Provide technical backstopping
* **Activity 2.6:** Undertake platform adjustment for local use
* **Activity 2.7:** Build capacities of local institutions in use of system
* **Activity 2.8:** Carry out regular Monitoring & Evaluation of use of system.
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**The proposed results and activities to be implemented over a period of 2 years will require a contribution of EUR 1 million from the Government of Belgium. The detailed estimated budget is detailed below:**

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| **Budget item** | **Total (EUR)** |
| **Personnel** | 160,000 |
| *GIS specialist* | 80,000 |
| *Modelling specialist* | 80,000 |
| **Contracts** | 150,000 |
| *Software and IT solutions* | 50,000 |
| *Satellite imagery* | 80,000 |
| *Landscape modelling* | 20,000 |
| **Casual labour** | 25,000 |
| **Travel** | 150,000 |
| **Training** | 234,579 |
| *4 regional workshops on FAMEWS operational use (80 persons trained)* | 117,289.5 |
| *4 regional workshops on FAWRisk (80 persons trained)* | 117,289.5 |
| **Expendable** | 30,000 |
| **Non Expendable** | 35,000 |
| **Technical support services** | 100,000 |
| *Reporting* | 5,000 |
| *Evaluation* | 10,000 |
| *Technical Backstopping* | 85,000 |
| **General operating expenses** | 50,000 |
| **Sub-Total**  | 934,579 |
| Support Costs (7% of subtotal) | 65,421 |
| **Total** | **1,000,000**  |

1. <https://www.cabi.org/projects/project/62774> ;

<https://www.cabi.org/projects/our-plantwise-programme/> [↑](#footnote-ref-1)