Food and Agriculture Organization
of the United Nations

SUPPORT FOR EMERGENCY PREPAREDNESS AND RESPONSE TO STRENGTHEN MANAGEMENT CAPACITIES OF MAGHREB COUNTRIES TO MITIGATE THE IMPACT AND RISK OF FALL ARMYWORM IN NORTH AFRICA

May 2024

SDGs:	2 ZERO HUNGER
Countries:	Algeria, Libya, Mauritania, Morocco, Tunisia
Project Code:	TCP/SNE/3901
FAO Contribution:	USD 500 000
Duration:	22 March 2022–31 December 2023
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Implementing Partners

Ministry of Agriculture, Rural Development and Fisheries of Algeria; Ministry of Agriculture and Livestock and Marine Resources of Libya; Ministry of Agriculture of Mauritania; Ministry of Agriculture and Fisheries of Morocco; Ministry of Agriculture, Water Resources and Fisheries of Tunisia.

Beneficiaries

1 567 farmers and stakeholders in the five Maghreb beneficiary countries; 410 beneficiaries from government plant protection agencies.

Country Programming Framework (CPF) Outputs

Algeria, CPF 2019–2022

Priority 1: Sustainable increase in crop production and productivity.

Libya, CPF 2018–2020

Priority 1: Restoring production and productivity in agriculture and fisheries.

Mauritania, CPF 2017–2021

Priority 1: Inclusive and sustainable agricultural, livestock and fisheries production, creating jobs and added value.

Morocco, CPF 2017–2020

Priority 1: Sustainable, inclusive and effective development of food and forestry systems.

Tunisia, CPF 2016–2020

Priority 1: Promoting crop production systems, strengthening their competitiveness and ensuring their sustainability.

Background

Originating in the Americas, fall armyworm (FAW) is an insect pest that feeds on maize and more than 80 crops, posing a major threat to global food security and the livelihoods of rural populations. In Africa alone, it has the potential to bring about the annual loss of 17.7 million tonnes of maize, with a value of between USD 2.5 and 6.2 billion. With its ability to travel more than 100 km in a single night, FAW spreads quickly thanks to its high reproduction rate, its natural dispersion capacity and international trade. Once established, FAW is impossible to eradicate, making its containment a pressing global challenge.

FAW has already impacted food production and security in Mauritania, and its potential spread poses a threat to neighbouring countries in the Maghreb. To stem this threat, FAO has launched a three-year initiative for Global Action for Fall Armyworm Control, and has urged the International Plant Protection Convention (IPPC) to help with its implementation. This initiative aims to strengthen global, regional and national prevention and sustainable control efforts against FAW.

Mauritania has requested the technical assistance of FAO in countering the threat of invasion by this pest in the country's agricultural production area. In addition, due to the insect's transboundary nature and its geographical coverage, its incursion into neighbouring countries is likely. As a result, the proposed interventions consisted of awareness-raising, monitoring and control actions in Mauritania, as well as preparedness and early control in Algeria, Libya, Morocco and Tunisia.

This project set out to: (i) raise awareness of FAW with training on appropriate management strategies; (ii) train relevant personnel in controlling the spread of FAW; (iii) strengthen capacities in monitoring, surveillance, identification and differentiation of similar insect species. It thus aimed to influence policy changes and the design of integrated pest management strategies, enhance biosecurity control, reduce the effects of an incursion or invasion and ensure sustainable crop production.

Impact

The project has increased the resilience of livelihoods to threats and to crises in the target countries through the adoption of a FAW surveillance, monitoring, early warning and sustainable management system and the strengthening of the capacities of farmers as well as the staff of relevant national plant protection agencies (NPPOs). .

Achievement of results

The expected results were achieved. The project succeeded in raising the awareness of 1 567 farmers and other stakeholders on the FAW threat in the five Maghreb countries. In addition, technical training and pest monitoring actions were conducted in Mauritania, in addition to preventive actions in Algeria, Libya, Morocco and Tunisia, strengthening the capacities and technical skills of 410 government agency personnel. In particular, farmer field schools (FFS) served as a teaching tool for beneficiary training. The activities carried out also enabled all of the beneficiary countries in the Maghreb to set up FAW national monitoring networks, allowing for early detection using pheromone traps as well as the processing of data with the FAW Monitoring and Early Warning System (FAMEWS) mobile application to facilitate decision-making. To this end, 2 500 traps were provided in the host plant production areas of the five beneficiary countries. Likewise, the project supported the adoption of effective FAW monitoring, control and early warning action plans in all of the participating countries, based in particular on scouting and trapping.

The effectiveness of the awareness-raising, training, monitoring and early warning measures is attested by the notable reduction in the amount of FAW-infested area in Mauritania compared with the figures recorded during the previous season.

Implementation of work plan and budget

The activities were carried out according to the work plans, and within the budget allocated to each beneficiary country. A no-cost nine-month extension of the project duration allowed all of the activities to be completed in December 2023.

Follow-up for government attention

The Maghreb Plant Health Committee provides a framework for exchange and collaboration, ensuring the sustainability of exchanges. Nevertheless, legal harmonization is strongly recommended in order to bring about closer cooperation among the countries of the Maghreb, promoting the effective sharing of information, data, reports, guides and publications among the competent authorities of the five beneficiary countries.

The stakeholders of the different participating Maghreb countries are committed to ensuring the continuity of project activities and, as a result, the sustainability of its achievements. Consequently, the national plant protection services in the five beneficiary states should be afforded the required support to ensure such continuity.

Sustainability

1. Capacity development

The technical training and awareness-raising actions strengthened the skills of farmers and members of national institutions in the five beneficiary countries in terms of integrated pest management and FAW identification, detection, monitoring and control. The WhatsApp groups created in each country remain active and serve as a national and regional technical information-sharing and collaboration platform. This national capacity development will ensure the sustainability of the achievements, in particular through the national FAW monitoring, control and early warning plans adopted in the five countries.

2. Gender equality

Pre-existing gender inequalities explain the low rate of participation of female farmers and managers (women accounted for 20 percent of participants in the awareness-raising and training activities). It is, nevertheless, important to stress that the project offered the same opportunities to all, regardless of gender. In addition, in the five Maghreb countries, three female focal points significantly contributed to the achievement of the project objectives.

3. Environmental sustainability

Capacity development in the realm of integrated pest management and alternative methods based on prevention and the use of biopesticides against FAW will help to enhance the effectiveness of agricultural practices while ensuring their environmental sustainability.

4. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

Raising rural communities' awareness of the need to adopt biological pest control methods in their agricultural practices helps to reduce their exposure to chemicals and protects their health.

5. Technological sustainability

The project enabled the introduction of appropriate, user-friendly technologies for enhanced FAW management. Thus, the project strengthened beneficiaries' capacities, allowing for the sustainable use of the FAMEWS mobile application and pheromone-trap monitoring in order to enhance data collection on the insect and its early detection.

6. Economic sustainability

All of the training and awareness-raising actions – as well as the techniques used – will eventually make it possible to considerably reduce the size of FAW-infested areas, thereby ensuring the economic sustainability of rural communities in the beneficiary countries.

Documents and outreach products

- **Saliou Niassy.** 2022. *Guide technique: développement et utilisation de biopesticides pour la gestion durable de la chenille légionnaire d'automne (CLA) en Afrique* [Technical guide: Developing and using biopesticides for sustainable fall armyworm (FAW) management in Africa].
- **Saliou Niassy.** 2022. *Guide technique: contrôle biologique de la chenille légionnaire d'automne (Spodoptera frugiperda) à l'aide de parasitoïdes* [Technical guide: Biocontrol of fall armyworm (Spodoptera frugiperda) using parasitoids].
- **Saliou Niassy.** 2022. *Guide technique: méthodes culturales alternatives de lutte contre la CLA - Culture intercalaire maïs-légumineuses* [Technical guide: Alternative cropping methods for controlling FAW – Intercropping of maize and legumes].
- **FAO.** 2022. *Dépliant sur l'identification et la gestion de la chenille légionnaire d'automne en Afrique du Nord destiné aux techniciens* [Brochure on fall armyworm identification and management in North Africa for technicians] (Arabic, French).
- **FAO.** 2022. *Dépliant sur l'identification et la gestion de la chenille légionnaire d'automne en Afrique du Nord destiné aux agriculteurs* [Brochure on fall armyworm identification and management in North Africa for farmers] (Arabic, French).
- **FAO.** 2022. *Dépliant à l'intention des facilitateurs pour le développement d'un programme CEP* [Brochure for facilitators for the development of an FFS programme] (Arabic, French).
- **FAO.** 2022. *Manuel du facilitateur sur les champs-écoles des producteurs et intégration de la chenille légionnaire d'automne* [Facilitator manual on farmer field schools and the inclusion of fall armyworm].
- **Chebli Abderrahmane.** 2023. *Plan d'action de surveillance du ravageur transfrontalier chenille légionnaire d'automne Spodoptera frugiperda en Algérie* [Action plan for monitoring the transboundary pest Spodoptera frugiperda in Algeria].
- **Sow Moussa.** 2023. *Plan national de la surveillance de la CLA pour la Mauritanie* [FAW national monitoring plan for Mauritania].
- **Jouda Mediouni Ben Jemâa.** 2023. *Plan de surveillance national de la chenille légionnaire d'automne (Spodoptera frugiperda) en Tunisie* [Fall armyworm (Spodoptera frugiperda) national monitoring plan].
- **Malika Bounfour.** 2023. *Plan de surveillance de l'organisme de quarantaine Spodoptera frugiperda au Maroc* [Monitoring plan of the quarantine pest Spodoptera frugiperda in Morocco].
- **Mohamed Ali El Badri.** 2023. *Plan de surveillance de la chenille légionnaire d'automne en Libye* [Fall armyworm (Spodoptera frugiperda) monitoring plan in Libya].
- **FAO.** 2023. *Plan de surveillance régional de l'organisme de quarantaine Spodoptera frugiperda dans les pays de l'Afrique du Nord* [Regional monitoring plan of the Spodoptera frugiperda quarantine pest in North African countries].

Achievement of results - Logical framework

Expected Impact	**Increase the resilience of livelihoods to threats and crises in the target countries through enhanced surveillance, monitoring and early warning, as well as sustainable management of fall armyworm**			
Outcome	Reduce fall armyworm's impact in the target countries in terms of declining harvests, farmer income and food security			
	Indicator(s)	- Effective measures implemented to manage FAW risk in the beneficiary countries. - Reduction in yield loss.		
	Baseline	- Preliminary awareness-raising actions for Mauritania and lack of awareness-raising for the other Maghreb countries. - To date, the presence of FAW has not been reported in the Maghreb countries, with the exception of Mauritania since 2020, where it caused damage in four wilayahs. Losses caused specifically by this pest were significant in 2021, according to the country's Plant Protection Department.		
	End Target	- Reduction of FAW's impact in the affected country (Mauritania) and preparation of preventive control in the unaffected countries (Algeria, Libya, Morocco, Tunisia). - Limiting the establishment of FAW and its extensive spread, with the consequent impact upon crop production.		
	Comments and follow-up actions to be taken	- To reduce FAW's impact, an integrated management approach adapted to local conditions in each country was adopted, based on integrated biocontrol and monitoring. All of the beneficiary countries adopted a monitoring and early warning plan based on scouting and trapping. - Since the introduction of FAW in Mauritania, significant damage has been reported in the country, threatening smallholders' financial and food security. Measures were taken to reduce the losses, including producer awareness-raising and training, scouting missions, the placement of traps and national capacity building on FAW biocontrol. The efficacy of these measures is attested by the notable reduction in the FAW-infested area in Mauritania compared with the previous season.		
Output 1	Increased awareness of fall armyworm among farmers, communities and other stakeholders			
	Indicators		Target	Achieved
	Number of specialists, farmers and other stakeholders who have been made aware of FAW and its impact on farming, food security and livelihoods.		500 farmers, specialists and other stakeholders.	Yes
	Baseline	0		
	Comments	Most of the Maghreb countries, with the exception of Mauritania, are yet to record the introduction of FAW on their territory. Consequently, awareness-raising actions on the pest's potential impact on food security are essential, in order to implement an effective early warning system and avoid the spread of this insect. Thanks to the project's actions, stakeholders in the different Maghreb countries, with the support of FAO experts, raised the awareness of 1 567 participants, including farmers, specialists and other actors.		
Activity 1.1	Organize the inception and experience-sharing workshop			
	Achieved	Yes		
	Comments	The project's inception workshop was held from 31 May to 2 June 2022 in Nouakchott, bringing together 24 participants from Algeria, Egypt, Lebanon, Libya, Mauritania, Morocco and Tunisia. As part of this workshop, experts from the Mashriq countries (Egypt and Lebanon) shared their experiences with the Maghreb countries on FAW management, in particular on techniques to breed FAW natural enemies, as well as the FFS approach. The inception workshop also enabled the sharing of specific experiences implementing the FFS, as well as a training course on use of the FAMEWS application for FAW monitoring.		

Activity 1.2	Communication support	
	Achieved	Yes
	Comments	To promote FAW awareness-raising, all Maghreb countries were provided with FAO support through documents prepared by its experts. Two brochures were produced in Arabic and French: one on FAW identification, for the benefit of farmers; the other on integrated FAW management, which was produced for field technicians. The dissemination of these documents was entrusted to the national project heads in each country in order to ensure distribution at awareness-raising days and workshops. The electronic version of these documents is widely distributed nationally via WhatsApp. Likewise, national and regional WhatsApp groups were created to facilitate the sharing of achievements and experiences among the various participants in each country, including experts from Egypt and Lebanon.
Activity 1.3	Teaching material	
	Achieved	Yes
	Comments	FAO provided brochures in Arabic and French with a description of FAW, its biology and its life cycle. These documents were prepared by FAO experts and distributed at training workshops for managers as well as at the farmer awareness-raising days. In addition, FAO provided a manual and a brochure for FFS programme facilitators. These two documents were widely distributed in the different countries. Guides on sampling, setting the traps and using the FAMEWS application were also distributed to stakeholders interested in FAW issues.
Activity 1.4	Awareness-raising meetings	
	Achieved	Yes
	Comments	A number of awareness-raising meetings were organized as part of the broader effort to raise awareness of the threat posed by FAW. In Tunisia, three awareness-raising meetings were held for the regional agricultural development commissions (Bizerte, Zaghouan, Manouba, etc.), technicians and farmers, with a total of 95 participants. In Libya, awareness-raising campaigns were conducted with 120 technicians and 260 farmers in the different regions of the country.
Activity 1.5	Farmer field schools	
	Achieved	Yes
	Comments	To inform producers of the status of FAW and train them in its identification, biology and control, regional gatherings and meetings were held to raise the awareness of stakeholders on the ground and ensure the success of the FAW risk-awareness campaign. In Mauritania, 36 awareness-raising meetings were held in the seven “governorates”, or wilayahs, for 649 farmers, including 164 women. As part of the implementation of the activities called for under the letter of agreement between FAO and the National Centre for Agricultural Research and Development (CNRADA), a campaign was conducted with resource people, including 99 large-scale producers, in 18 villages across three wilayahs in the south of the country. In Morocco, the National Office for Food Product Safety held three training and awareness-raising days on 16 and 23 February 2023 in Marrakesh and Kénitra, respectively, and on 2 March 2023 in Agadir, with 110 farmers (including 22 women) attending. In Libya, three field visits by technical trainers raised FAW awareness among 260 farmers.
Activity 1.6	Regional concluding workshop	
	Achieved	Yes
	Comments	A regional concluding workshop was held on 14 and 15 December 2023 in Nouakchott, Mauritania, with some 20 attendees from the five Maghreb countries and a representative of the Arab Maghreb Union. This workshop provided an opportunity to present the project’s overall achievements in the five countries and the results of the letter of agreement with CNRADA on alternative FAW control methods. It also allowed the Maghreb countries to share their experiences in managing the insect pest in order to ensure its continued monitoring and control.

Output 2	The capacities and technical skills of staff and government agencies are enhanced through FAW monitoring and management		
	Indicators	Target	Achieved
	Number of specialists and researchers having received technical training on FAW.	More than 400 specialists and researchers.	Yes
	Baseline	Lack of specialists trained in controlling FAW.	
	Comments	The project was devised in close collaboration with the competent authorities in order to build capacities and enhance technical skills and thus ensure its sustainability. The proposed interventions consisted of technical training and monitoring and control actions in Mauritania, as well as preventive actions in Algeria, Libya, Morocco and Tunisia. This strengthening of the capacities of government staff and agencies directly benefited 410 specialists or resource people in the different Maghreb countries.	
Activity 2.1	Training on pest identification, biology and monitoring		
	Achieved	Yes	
	Comments	To strengthen the FAW monitoring and management capacities and technical skills of staff at government agencies, national training and awareness-raising workshops focusing on pest identification, biology and monitoring were held for technicians, researchers and stakeholders in the five Maghreb countries. In all, 117 individuals benefited from these training activities: 21 in Ghardaia Region (Algeria), 19 in Kaédi Region (Mauritania), 20 in Rabat Region (Morocco), 21 in Al-Khums Region (Libya) and 36 in Hammamet Region (Tunisia).	
Activity 2.2	Support national biocontrol capacity in the affected country		
	Achieved	Yes	
	Comments	A memorandum of understanding was signed by FAO and CNRADA in Mauritania providing for capacity development in alternative control measures for FAW. This agreement made it possible to equip the laboratory for breeding natural enemies, in particular *Trichogramma* and *Telenomus*, and to benefit from the expertise of the International Centre of Insect Physiology and Ecology (ICIPE) so as to strengthen the capacities of CNRADA technicians in breeding and alternative methods to chemical control.	
Activity 2.3	Support national biocontrol capacity in the affected country		
	Achieved	Yes	
	Comments	To ensure monitoring and early detection, all of the Maghreb countries took part in comprehensive training courses on monitoring with pheromone traps and data collection through the FAMEWS mobile application and its data analysis and visualization platform, making it possible to map the data collected in each field inspection and/or check pheromone traps. A total of 131 participants benefited from these training activities: 21 in El Oued Region (Algeria), 20 in Kaédi Region (Mauritania), 36 in Kénitra Region (Morocco), 21 in Al-Khums Region (Libya) and 27 in Sousse Region (Tunisia).	
Activity 2.4	Support national biocontrol capacity in the affected country		
	Achieved	Yes	
	Comments	In order to train facilitators in the basic concepts and principles of implementing and running FFS and managing FAW, national workshops were held for 128 participants. In Mauritania, the national training workshop was held in Boghé on 15 and 16 November 2023 for technicians from the wilayahs of Assaba, Guidimakha, Gorgol and Brakna. In Morocco, the national training workshop was organized by the National Agricultural Advisory Board on 2 March 2023 in Agadir for 38 facilitators. In Libya, the training workshop was attended by 55 facilitators. In Tunisia, the national training workshop was held in Tabarka from 23 to 25 November 2022 for 27 facilitators. In addition, a facilitator's manual was prepared (in Arabic and French) on FFS and the inclusion of FAW.	
Activity 2.5	Training on fall armyworm management in Mauritania		
	Achieved	Yes	
	Comments	Given that for the time being FAW has been detected only on Mauritanian soil, the training workshops and field seminars on its management, impact and control have focused on this country.	

Activity 2.6	Training on biocontrol methods and the FFS approach	
	Achieved	Yes
	Comments	A regional workshop on biocontrol, natural enemy-breeding, alternative FAW control methods and the FFS approach was held from 9 to 11 August 2022 in Tunisia, with 32 participants from the five Maghreb countries. This workshop aimed to present the basic concepts and principles for implementing and running the FFS, integrated management and the alternative FAW control method, as well as FAW's main natural enemies and breeding techniques.
Activity 2.7	Demonstration plots	
	Achieved	Yes
	Comments	To enhance integrated FAW management, FAO supported the services of CNRADA, which was the national research structure best suited to ensure the sustainability of natural enemy-breeding activities. The Centre's laboratory was thus provided with the entomological equipment needed to breed and release FAW's natural enemies. To promote the use of biopesticides against FAW, the project provided 31 litres of biopesticide (RAPAX AS) to the Plant Protection Directorate in order to treat infested maize fields. For the biopesticide to be effective, the treatment must be repeated on a number of occasions. This will be carried out after the end of the project.
Activity 2.8	Supply monitoring equipment, tools and inputs	
	Achieved	Yes
	Comments	To ensure the insect's monitoring and early detection by setting up a pheromone trap network, the project provided trapping kits to the five Maghreb countries. As a result, 800 traps were supplied in Algeria, 500 in Libya, 800 in Mauritania, 200 in Morocco and 500 in Tunisia. In addition, 3 200 litres of insecticide were supplied in Algeria, 2 000 in Libya, 3 200 in Mauritania, 1 200 in Morocco and 2 000 in Tunisia. Lastly, 2 000 pheromones were distributed in Algeria, 2 000 in Libya, 3 200 in Mauritania, 1 200 in Morocco and 2 000 in Tunisia. To facilitate the use of the FAMEWS mobile application for onsite data collection and FAW monitoring, 154 tablets and smartphones were provided (40 in Algeria, 40 in Libya, 19 in Mauritania, 15 in Morocco and 40 in Tunisia).

Output 3	Effective action plans are drawn up for fall armyworm monitoring, control and early warning in the participating countries		
	Indicators	Target	Achieved
	- FAW monitoring system implemented in each target country (Algeria, Libya, Mauritania, Morocco and Tunisia). - FAW management action plans implemented in each target/participating country.	- 1 000 data points. - Five action plans.	Yes
	Baseline	- None. - No action plan.	
	Comments	All of the Maghreb countries currently have a national FAW monitoring network, allowing for early detection using pheromone traps as well as data processing via the FAMEWS application to facilitate decision-making. In addition, 2 500 traps were provided in the production areas of host plants, primarily maize, and 777 traps were recorded as being installed in four Maghreb countries (390 in Libya, 55 in Mauritania, 195 in Morocco and 137 in Tunisia). Moreover, five national monitoring, surveillance and early warning plans were drawn up for the five Maghreb countries, as was a plan for the regional monitoring of the quarantine pest *Spodoptera frugiperda* for the Maghreb.	

Activity 3.1	Surveillance action plan	
	Achieved	Yes
	Comments	The five Maghreb countries drew up national surveillance plans.
Activity 3.2	Regional and national action plans	
	Achieved	Yes
	Comments	On the basis of the national surveillance plans, the project drew up a regional plan for monitoring of the quarantine pest *Spodoptera frugiperda* titled *Plan for the Regional Monitoring of the Quarantine Pest* Spodoptera frugiperda *in the Maghreb Countries*. This plan provides for collaboration and coordination among the countries for the sustainable management of the pest.

Partnerships and Outreach
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