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EMERGENCY PREPAREDNESS AND RESPONSE TO STRENGTHEN CAPACITIES OF NENA COUNTRIES TO MITIGATE THE RISK OF FALL ARMYWORM (FAW) IN THE REGION

September 2023

SDGs:



Countries: Jordan, Lebanon, Palestine, the Syrian Arab Republic

Project Code: TCP/RAB/3803

FAO Contribution: USD 500 000

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Implementing Partners

Ministries of agriculture in Jordan, Lebanon, Palestine and the Syrian Arab Republic and national plant protection organizations (NPPOs).

Beneficiaries

Agriculture directorates, extension officers, farmers, pest control specialists, researchers; non-governmental organizations (NGOs), stakeholders of the agriculture sector.

Country Programming Framework (CPF) Outputs

CPF Jordan (2023-2027) Priority 3: Food and agriculture.

CPF Lebanon (2016-2019) Priority 1: Expand economic and livelihood opportunities by strengthening the resilience of smallholder producers and upgrading capacities for sanitary and phytosanitary control.

CPF Lebanon (2016-2019) Priority 2: Improve the performance of the agricultural sector contributing by supporting innovative sustainable agricultural production.

CPF Palestine (2018-2022) Priority 2: Increased competitiveness of the agrifood value chains.

CPF Syrian Arab Republic CPF 2020–2025 Priority 7: Food and agriculture.



BACKGROUND

The fall armyworm (FAW) – scientifically known as *Spodoptera frugiperda* – is an invasive insect pest capable of consuming more than 80 different crop varieties. Initially identified in Africa in 2016, it quickly spread across the globe, resulting in significant damage to key crops, notably maize. Experts project that without effective management, FAW could lead to staggering maize yield reductions ranging from 21 to 53 percent.

The pest was first documented in the Near East and North Africa (NENA) region in 2018, making its appearance in Sudan and Yemen. At the time of writing, Egypt, Jordan, Mauritania, Oman, the Syrian Arab Republic and the United Arab Emirates had also officially acknowledged the presence of FAW. The pest's remarkable ability to migrate, reproduce rapidly and inflict harm on staple crops like maize, sorghum, rice and wheat elevates the risk that it poses to both regional food security and crop production. Maize holds a central role in the NENA region's agriculture, spanning over 1.3 million ha of cultivated land and producing more than 8 million tonnes, with an estimated value surpassing USD 1.8 billion.

Given the continued expansion of FAW across the region and the challenges faced by smallholder farmers in dealing with such a threat, the implementation of sustainable integrated pest management (IPM) strategies becomes essential. In addition, governments in the region need to enhance their institutional capabilities in a number of aspects, including surveillance, early warning systems, pest control and extension services.

In light of this situation, FAO implemented support activities to empower countries in the NENA region, equipping them to proactively prepare for, respond to and mitigate the threat posed by FAW.

IMPACT

The project played a vital role in bolstering the surveillance, monitoring and early warning systems, as well as promoting the sustainable management of FAW, thereby mitigating crop losses and the associated adverse effects on farmers' incomes and food security. Consequently, this project enhanced the resilience of farmers and their livelihoods in Jordan, Lebanon, Palestine and the Syrian Arab Republic against future threats and crises.

By ensuring that farmers have access to adequate capacities and solutions to protect their livelihoods, sustain food production and increase incomes, the project contributed to the achievement of Sustainable Development Goal (SDG) 2, which is aimed at ending hunger, and SDG 1, which aims to end poverty. By ensuring enhanced economic and physical access to nutritious food, this project also contributed to the achievement of SDG 3, which is aimed at improving global health. Through interventions that aim to build the resilience of farming communities to manage increasing pest infestations driven by changing climatic patterns, the project also contributed to the achievement of SDG 6, which promotes urgent actions to combat climate change and its impacts. In addition, by specifically targeting women and young farmers and empowering them with full and effective participation and equal economic opportunities, the project contributed to the achievement of SDG 5, which focuses on achieving gender equality.



ACHIEVEMENT OF RESULTS

Thanks to the project, stakeholders in the agricultural sector were equipped with the necessary skills and tools to effectively prepare for, manage, and mitigate the impact of potential FAW infestations.

Awareness about FAW was raised among all targeted stakeholders, including farmers and rural communities, extension officers, pest control specialists, researchers, national authorities, and non-governmental organizations (NGOs), with around 3 000 beneficiaries participating in a range of training programmes, workshops, and meetings. The national capacities and technical skills of experts from the ministries of agriculture and researchers from research institutes were particularly strengthened in FAW identification and monitoring, IPM, and biological control. Farmer field schools (FFS), an FAO approach to strengthening farmers for decision-making in a participatory and experiential way, were established, and FFS facilitators were trained on field scouting, FAW trapping, the use of the FAW monitoring and early warning system (FAMEWS) and damage and yield loss estimation for subsequent dissemination of knowledge and skills to farmers. Additionally, demonstration field plots were created to showcase tangible results of the IPM strategy for FAW control, encompassing approaches such as the push-and-pull method, which promotes the integration of plants that repel pests to deter them from the primary crop, and plants that attract pests to lure them towards designated areas or traps where their numbers can be managed.

Action plans for the surveillance, monitoring, and early warning of FAW were developed in all four countries. To ensure capacities in surveillance and facilitate plan implementation, 547 experts were trained, and equipment, tools and inputs such as synthetic pesticides and biopesticides were procured for national authorities.

Finally, the project contributed to the development of national biocontrol strategies and to the enhancement of the capacities and capabilities for the identification of natural FAW enemies and their mass production and release as biocontrol agents. In all four countries, different species of FAW natural enemies were identified, resulting in the identification of different species that were previously unrecorded.

In Jordan, the assessment of the national capacity for mass production of FAW natural enemies resulted in a comprehensive assessment report, alongside the establishment of the country's inaugural biological control laboratory for FAW, which was partially equipped under the project. Additionally, two agriculture experts from the Ministry of Agriculture (MoA) of Jordan were trained in the Syrian Arab Republic on the mass rearing and use of biological agents against FAW infestation. In the Syrian Arab Republic, the project fortified the capacities of four biological control units for the mass rearing of natural FAW adversaries.

The project helped to strengthen the synergies between agriculture institutions, the private sector, and farmers, especially those involved in the production of maize, and acted as a catalyst to support any future activities related to FAW monitoring, surveillance, biological control, and IPM control. Partnerships among ministries of agriculture, research centres, academia, and the public and private sectors across the four participating countries were effectively established and strengthened. A number of technical visits and exchanges of expertise in the field of biological control were performed in Egypt, Jordan and the Syrian Arab Republic. This successful collaboration among NENA countries paved the way for future partnerships for FAW biological control.

IMPLEMENTATION OF WORK PLAN AND BUDGET

Starting amid COVID-19 movement constraints, the project faced obstacles in executing a range of activities, notably in-person training sessions and meetings. Consequently, certain training activities were transitioned to online formats, while other activities were conducted in-person while adhering to limitations on the number of participants imposed by the restrictions.

Due to the prevailing political situation and security concerns, it was not possible to conduct the regional workshop on biological control in the Syrian Arab Republic. The political and economic situation in Lebanon resulted in the delay of a number of activities, including pest monitoring and FFS implementation, while in Jordan, the assessment of the biological control laboratory could not be completed due to the international expert's inability to travel to the country.

To address these delays and ensure the successful execution of all activities, the project was granted a no-cost extension. The project's extension also enabled the support of FFSs and demonstration plot activities before the seeding season to emphasize a preventative approach rather than a curative one.





FOLLOW-UP FOR GOVERNMENT ATTENTION

While the project successfully provided training to a significant number of specialists and farmers in FAW monitoring and management, further training sessions are required to sustain the continued dissemination of this knowledge.

Sustaining the project's results demands additional resources and a strong commitment. It is recommended that funding be secured for further actions related to FAW management, especially for the enhancement of monitoring and early warning systems.

SUSTAINABILITY

1. Capacity development

The project enhanced the capacities of a number of stakeholders in FAW monitoring, biological control, rearing, and release of FAW natural enemies, as well as IPM. Training sessions were organized for farmers, researchers, and extension officers to identify FAW and follow protocols for sustainable FAW control. New FAW management techniques were introduced to farmers through FFS and demonstration field plots. A total of 25 FFSs were successfully established in the four participating countries, and 31 individuals received training as FFS facilitators. A total of 419 farmers received training in FAW field scouting, monitoring, trap utilization, and IPM through the FFSs. These farmers will promote sustainability by disseminating the knowledge and skills gained to fellow farmers within their community and neighbouring areas.

Aligned with national policies and strategies, these interventions guarantee that both national extension officers and communities are equipped to carry out field activities up to the necessary standards.

2. Gender equality

Women and men benefited equitably from the results achieved within the project. In all workshops, training sessions, and implementation activities, the engagement of both men and women was guaranteed.

Efforts directed at safeguarding the livelihoods and food security of smallholder maize farmers in regions affected by FAW have notably benefited women and youth.

3. Environmental sustainability

The project committed to advancing environmental sustainability by advocating for the adoption of biopesticides and alternative methods in the management of FAW, while discouraging the use of highly hazardous pesticides. A significant emphasis was placed on enhancing national capacities for the mass rearing and production of natural enemies of FAW. Utilizing an IPM approach will further contribute to reducing the risks associated with FAW by integrating environmental sustainability practices.

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

This project advocated for the adoption of pesticide-free alternatives, prioritizing the well-being of farmers and thereby leading to improved working conditions and supporting the Right to Decent Work. The resulting stability in livelihoods and income, stemming from increased resilience to future FAW infestations, also contributes to upholding the Right to Food.

5. Technological sustainability

The introduced technologies, suitable and adaptable for both smallholder and large-scale maize farmers, are making valuable contributions to FAW monitoring and control, while also considering the constrained resources at the community level for long-term management. Some of the project activities, especially the establishment of FFSs, were grounded in existing local expertise and knowledge, enabling the integration of recently introduced practices and empowering stakeholders to operate independently in the future.

6. Economic sustainability

The project provided assistance in formulating biological control protocols and identifying potential indigenous enemies of FAW, offering solutions that are both cost-effective and accessible to the beneficiaries. In addition, the knowledge and skills acquired by farmers will enable them to mitigate the impacts of FAW infestation, thereby preventing potential significant economic losses.

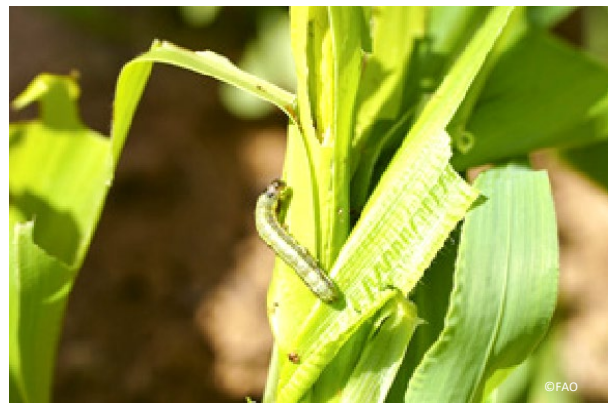


DOCUMENTS AND OUTREACH PRODUCTS

- ❑ **Al-Juboori, I.** 2021. *A guideline on integrated control strategies for fall armyworm*. Jordan.
- ❑ **FAO/Ministry of Agriculture of Jordan.** 2021. *The fall armyworm in Palestine*.
- ❑ **FAO/Ministry of Agriculture of Jordan.** 2021. *Recommendations to the farmers to control fall armyworm*.
- ❑ **Al-Juboori, I. Elkahky, M. & Yaseen, T.** 2021. *The fall armyworm, a transboundary pest that threatens crops and food security*. Cairo, Egypt. 140 pp. <https://bit.ly/45Rpo03>.



- ❑ **FAO & the Ministry of Agriculture of Jordan.** 2022. *The fall armyworm: IPM components and control in Jordan*.
- ❑ **S. M. Alheshoosh.** 2022. *Master's degree thesis on novel eco-friendly management tactics of fall armyworm and its preference for different cultivars of maize in Jordan*. Mutah University, Jordan.
- ❑ **Moussa, Z. & Yaseen, T.** 16-21 October 2022. *Poster on beneficial insects associated with fall armyworm in Lebanon*. Thirteenth Arab Congress of Plant Protection, Hammamet, Tunisia.
- ❑ **FAO/Ministry of Agriculture of Lebanon.** 2023. *The fall armyworm biological characteristics and IPM programme in Lebanon*.



ACHIEVEMENT OF RESULTS - LOGICAL FRAMEWORK

Expected Impact	Increase the resilience of livelihoods to threats and crises in target countries by supporting, surveillance, monitoring, early warning, and sustainable management	
Outcome	Reduce the impact of the fall armyworm on target countries in terms of crop losses, farmers' income, and food security	
	Indicator	<ul style="list-style-type: none"> - Effective measures implemented to manage the risk of FAW in recipient countries. - Reduction in yield loss.
	Baseline	<ul style="list-style-type: none"> - Baseline data on the applied preventive measures by countries before the project. - Estimated losses as indicated by a baseline study.
	End Target	<ul style="list-style-type: none"> - Pest management approaches are developed and validated and national work plans are developed. - Reduce the losses due to FAW to below 10 percent.
	Comments and follow-up action to be taken	<ul style="list-style-type: none"> - All targets were fully achieved. - FAW management approaches were developed and implemented. This resulted in the development of four national plans, encompassing FAW surveillance, monitoring and biological control, in the four participating countries. - FFS facilitators were trained on FAW identification, biology and sustainable management practices, IPM, biopesticides and the use of natural enemies. In addition, government extension officers and plant protection specialists participated in training programmes and workshops on monitoring and early warning systems, biological control and IPM strategy. - In Jordan, the FAW infestation rate decreased to 5 percent in the demonstration field thanks to the application of the biopesticides, which is significantly lower than the 30 percent infestation rate in the control field where IPM tactics were not implemented. - In Lebanon, a field assessment revealed that the project led to a reduction in corn infestation by FAW, resulting in minimized yield loss, while the number of treatments was reduced by up to 50 percent in comparison with the beginning of the infestation. - In Palestine, the FAW infestation rate decreased to 4.4 percent in the demonstration fields with IPM practices compared to 35 percent in the control fields with traditional practices. - In the Syrian Arab Republic, the introduction of Trichogramma and Bracon through field releases resulted in a substantial decrease in FAW infestation, reducing it from 50 percent to 6 percent. - The following follow-up actions should be considered: <ul style="list-style-type: none"> - enhance the early warning system for FAW; - monitor the propagation of FAW and its impact on a range of crops; - support the implementation of the push-and-pull strategy and the production of biopesticides; - ensure the sustainability of collaboration by participating governments to continue these awareness programmes and training with regard to the sustainable management of FAW; and - continue financial support to bolster the national capabilities for biological control in Lebanon and Palestine, as well as to maintain the viability of the FFS.

Output 1	Increased awareness of FAW among farmers, communities, and other stakeholders		
	Indicators	Target	Achieved
	Number of specialists, farmers, and other stakeholders who have become aware of FAW and its impact on agriculture, food security and livelihoods.	400 farmers, specialists and other stakeholders.	Yes
Baseline	0		
Comments	Around 2 570 farmers, specialists, researchers and other stakeholders have become aware of the impact of FAW on agriculture: 400 in Jordan, 1 195 in Lebanon, 775 in Palestine, and 600 in the Syrian Arab Republic.		
Activity 1.1	Potential partners and stakeholders		
	Achieved	Yes	
	Comments	<ul style="list-style-type: none"> – This activity focused on conducting an analysis of partners and stakeholders, emphasizing their roles in addressing the issue of FAW infestation in the countries involved. – On 23 February 2021, a virtual inception workshop was convened for 25 critical stakeholders and project partners, encompassing farmers, extension specialists, pest control experts, researchers, academics, university professors, agriculture directorates and NGOs, during which the roles of each partner were defined, and discussions regarding project objectives and proposed workplans took place. – All identified stakeholders, including recently graduated engineers, students and teachers of agricultural technical schools received awareness about FAW and its impact on food security. – Between one and three meetings on stakeholder awareness were organized in each of the four participating countries. 	
Activity 1.2	Communication materials		
	Achieved	Yes	
	Comments	<p>In correlation with Activity 1.2, communication and educational materials were created and distributed to stakeholders, encompassing:</p> <ul style="list-style-type: none"> – 1 500 brochures distributed in Jordan with recommendations in Arabic for farmers on FAW management (in Arabic). – 2 500 brochures distributed in Jordan on the FAW, IPM components, and control (in Arabic). – 1 000 brochures distributed in Palestine on the FAW (in Arabic). – 4 000 brochures distributed in Lebanon on the FAW biological characteristics and IPM. – 100 posters distributed in Lebanon on the integrated management of FAW infestation on corn. – 700 copies of seven different posters distributed in the Syrian Arab Republic on topics related to FAW biology, monitoring and integrated management. – videos for farmers' awareness on topics such as handling traps to monitor FAW, biology of FAW and damages and the use of predators and natural enemies on FAW. 	
Activity 1.3	Educational materials		
	Achieved	Yes	
	Comments	<p>This activity focused on producing and distributing educational materials. Presentations detailing the biology and monitoring of the FAW, as well as IPM, were prepared and shared with MoA personnel as part of a range of training initiatives. Guidelines in Arabic, instructing on the utilization of the FAMEWS application for monitoring FAW, were also prepared. In addition, brochures, posters and videos were developed for educational purposes under Activity 1.2.</p>	
Activity 1.4	Awareness meetings		
	Achieved	Yes	
	Comments	<p>A total of eight awareness sessions addressing the threat presented by FAW were organized (four in Palestine, two in Jordan and one each in Lebanon and the Syrian Arab Republic), engaging a total of 72 participants.</p>	

Activity 1.5	Farmer Field Schools		
	Achieved	Yes	
	Comments	<ul style="list-style-type: none"> Four training programmes were conducted for 30 FFS facilitators (three in Jordan, ten in Lebanon, five in Palestine and 12 in the Syrian Arab Republic). A total of 24 FFS were also implemented (12 in the Syrian Arab Republic, five in Palestine, four in Lebanon and three in Jordan), allowing for the graduation of 419 farmers on subjects such as FAW field scouting, monitoring, the utilization of traps and IPM. In Jordan, 45 farmers participated in sessions held at three FFSs located in Deir Alla, Southern Shouneh, and Al-Aghwar al-Janubi. In Lebanon, a total of 56 farmers, three of whom were women, enhanced their understanding of FAW biology, monitoring techniques, IPM, and the application of FAMEWS through bi-weekly sessions conducted at the FFSs. In Palestine, 96 farmers participated in sessions held in five FFSs in Beit Hanoun, Khan Yunis, Kardala, Jericho/Al-Jiftlik, and Hebron. In the Syrian Arab Republic, 222 farmers were trained on FAW monitoring and IPM through sessions held at 12 FFSs. 	
Output 2	Capacities and technical skills of government personnel and institutions are improved in the monitoring and management of the FAW		
	Indicators	Target	Achieved
	Number of specialists and researchers who received technical training on FAW.	More than 400 specialists and researchers.	Yes
Baseline	0		
Comments	<ul style="list-style-type: none"> The national capacities and technical skills of specialists from the ministries of agriculture, researchers from research institutes, and others were improved. In Lebanon, a total of 33 engineers from the MoA, seven of whom were women, were selected to conduct the FAW survey. A total of 15 engineers from the MoA and the Lebanese Agricultural Research Institute (LARI) and 16 participants, two of whom were women, from private companies received technical training on FAW. 		
Activity 2.1	Training on pest identification and monitoring		
	Achieved	Yes	
	Comments	<ul style="list-style-type: none"> Both virtual and in-person training of trainers (ToTs) were organized, focusing on FAW identification and monitoring. These sessions included the engagement of NPPOs from different countries. The primary objective was to synchronize FAW surveillance programmes, enhance competencies in activities such as planning, mapping, and forecasting, improve pest reporting, conduct thorough field scouting, determine economic thresholds, assess the damage, and estimate yield loss. In Lebanon, a national survey team from the MoA was selected to take the virtual ToT training on FAW biology, identification, monitoring, field scouting, and damage assessment, with the participation of the national project coordinator and the head of the Plant Protection Service of the MoA. In Palestine, around 105 specialists were trained in FAW identification and monitoring. 	
Activity 2.2	Training on data analysis		
	Achieved	Partially	
	Comments	<ul style="list-style-type: none"> ToTs on the use of FAMEWS were performed virtually for all four countries. Training for data collection and validation was also performed in each country. Challenges were encountered in using the FAMEWS mobile application, particularly in uploading the collected data to the FAMEWS Global Platform. 	
Activity 2.3	FFS facilitators		
	Achieved	Yes	
	Comments	<ul style="list-style-type: none"> An FFS guide, previously developed by FAO in Arabic, was used for training FFS facilitators. Across all four countries, a total of four training programmes were coordinated to train 30 FFS facilitators (three in Jordan, ten in Lebanon, 12 in the Syrian Arab Republic and five in Palestine). The training encompassed FAW biology, identification, monitoring, field scouting and damage assessment. 	

Activity 2.4	Training on FAW management		
	Achieved	Yes	
Activity 2.4	Comments	<ul style="list-style-type: none"> – In Jordan, approximately 80 individuals underwent training in FAW IPM through four dedicated sessions. – Lebanon hosted training sessions for 302 beneficiaries in FAW biology and monitoring, 285 beneficiaries in IPM, 284 beneficiaries in FAMEWS and 268 beneficiaries in biological control. – In Palestine, 388 beneficiaries received similar training. – In the Syrian Arab Republic, 222 individuals benefited from 18 training sessions on FAW management. 	
	Demonstration plots		
Activity 2.5	Achieved	Yes	
	Comments	<ul style="list-style-type: none"> – A total of 11 demonstration fields were established to validate the efficacy of recommended pesticides in controlling FAW, thus safeguarding the environment along with FAW natural enemies. – In Jordan, five demonstration plots were established at Deir Alla, Southern Shouneh, Ghor es-Safi, Zarqa and Balqa. – In Lebanon, two demonstration plots were established at Kfarzabad and Housh Al Oumara in the Bekaa Valley. – In Palestine, three demonstration plots were established: one in Beit Hanoun in the North Gaza Governorate, one in Khan Yunis in the Khan Yunis Governorate and one in Kardala in the northern Jordan Valley. – In the Syrian Arab Republic, one demonstration plot was established in Damascus, focusing on the implementation of an IPM strategy. 	
Output 3	Effective action plans for surveillance, monitoring, and early warning of FAW in participating countries are developed		
	Indicators	Target	Achieved
	<ul style="list-style-type: none"> – FAW monitoring system put in place in each target country. – FAW management action plans in place in each target/participating country. 	<ul style="list-style-type: none"> – 1 000 data points. – 4 action plans. 	Yes
Baseline	<ul style="list-style-type: none"> – 0 – 0 		
Comments	FAW monitoring was put in place and four comprehensive action plans were developed in the participating countries.		
Activity 3.1	Surveillance action plan		
	Achieved	Yes	
Activity 3.1	Comments	<ul style="list-style-type: none"> – Four comprehensive action plans for FAW surveillance and early warning were developed. – Alongside these action plans, training sessions were conducted for 269 specialists in Lebanon, 222 specialists in the Syrian Arab Republic, 37 specialists in Palestine and 19 specialists in Jordan. – Surveys were conducted on around 150 ha in the Syrian Arab Republic, 40 ha in Jordan and 25 ha each in Lebanon and Palestine. 	
	Provide equipment, tools, and inputs for surveillance		
Activity 3.2	Achieved	Yes	
	Comments	<ul style="list-style-type: none"> – In order to ensure the national capacities in conducting surveillance interventions, the following equipment was procured for national authorities: <ul style="list-style-type: none"> - In Jordan, 15 smartphones, ten traps, 40 lures and 40 strips. - In Lebanon, 40 smartphones and 377 traps. - In Palestine, 41 smartphones (13 in the Gaza Strip and 28 in the West Bank), 400 traps (200 in the Gaza Strip and 200 in the West Bank) and 2 000 lures (1 000 in the Gaza Strip and 1 000 in the West Bank). - In the Syrian Arab Republic, 30 smartphones, 500 traps, 2 000 lures and 2 000 strips. 	
Activity 3.3	Regional and National Action Plans		
	Achieved	Yes	
Activity 3.3	Comments	Four action plans were developed in the four participating countries.	

Activity 3.4	Provide inputs for pest control	
	Achieved	Yes
	Comments	<ul style="list-style-type: none"> – Synthetic pesticides and biopesticides were provided for the implementation of the demonstration plots. – In Jordan, 5 kg of emamectin benzoate, 5 litres of indoxacarb, 5 litres of alpha-cypermethrin, 8 litres of lufenuron, 4 litres of azadirachtin and 10 litres of <i>Bacillus thuringiensis</i> were procured. – In Lebanon, 8 kg of emamectin benzoate, 4.8 litres of indoxacarb, and 90 litres of <i>Bacillus thuringiensis</i> were procured. – In Palestine, 4 kg of emamectin benzoate (2 kg in the Gaza Strip and 2 kg in the West Bank), 8 litres of lufenuron (4 litres in the Gaza Strip and 4 litres in the West Bank), 10 litres of azadirachtin (5 litres in the Gaza Strip and 5 litres in the West Bank) and 8 litres of <i>Bacillus thuringiensis</i> (4 litres in the Gaza Strip and 4 litres in the West Bank) were procured. – In the Syrian Arab Republic, 165 litres of emamectin benzoate, 75 litres of indoxacarb, 180 litres of alpha-cypermethrin, and 20 litres of atabron 5 percent were procured.
Activity 3.5	Support national capacity for the production of biocontrol agents	
	Achieved	Yes
	Comments	<ul style="list-style-type: none"> – National capacities for the survey and identification of natural enemies were enhanced. – In Jordan, a survey of FAW's natural enemies was carried out in the Jordan Valley and in the country's Eastern Desert. Different species of FAW natural enemies were identified. <i>Chelonus inanitus</i> and the egg parasitoid <i>Telenomus remus</i> were recorded for the first time. Other non-specific natural enemies such as aphid lions, earwigs, lady beetles and predatory bugs were also found. A FAO specialist in biological control assessed Jordan's capabilities for the large-scale production of natural enemies for controlling FAW, leading to the development of an evaluation report. Subsequently, the first biological control laboratory for FAW in the country was established in Deir Alla in the Jordan Valley. To equip this laboratory, a number of tools such as moth cupboards, egg cupboards, a breeding unit and cylinders were procured, as were instruments, including three air conditioners, one incubator, two air pumps, two scales, two microscopes and two humidifiers. Furthermore, two agricultural experts from the MoA underwent comprehensive training in the Syrian Arab Republic on the large-scale production of FAW natural enemies and biological agents. – In Lebanon, a survey on FAW natural enemies identified 20 parasitoids, 36 predators and two hyperparasitoids. Notably, among the findings, ten new species were documented in the country. Among these newly discovered species, two predators and one parasitoid hold significance as beneficial insects – <i>Orius minutus</i>, <i>Anthocoris minki</i> and <i>Cotesia congregata</i>, respectively. – In Palestine, a study was conducted to assess FAW's natural predators, resulting in the collection of 30 specimens from the Gaza Strip and 52 from the West Bank. Subsequently, these specimens were sent to the University of Jordan in Amman for identification, where they were recognized as <i>Chrysoperla carnea</i>, <i>Anthocoris sp.</i>, <i>Telenomus remus</i> and spiders. – In the Syrian Arab Republic, a survey of FAW natural enemies resulted in the identification of a range of different species, including <i>Trichogramma sp.</i>, <i>Bracon sp.</i>, <i>Cotesia sp.</i>, <i>Orius minutus</i>, <i>Chrysoperla carnea</i>, <i>Coccinella septempunctata</i> and <i>Hippodamia variegata</i>. During evaluation, the larval parasitoid <i>Bracon</i> exhibited superior effectiveness against fourth instar larvae in comparison to those in the fifth and sixth instars. Remarkably, when maize plants were treated with a combination of <i>Trichogramma</i>, <i>Bracon</i>, <i>Chrysoperla carnea</i> and emamectin benzoate, the FAW infestation rate plummeted from 60 percent to 6 percent. On the other hand, the mortality rate of FAW ranged from 70 percent to 80 percent when treated with <i>Beauveria bassiana</i> (at a concentration of 107 spores/ml) and <i>Bacillus thuringiensis</i> (at a concentration of 107 cells/ml). This result was significantly divergent from the mortality observed when employing the insecticide chlorpyrifos ethyl. Finally, the national capacities of four biological control units located in Hama, Latakia, Homs and Tartus were enhanced, focusing on the mass rearing of FAW and other hosts, as well as the natural enemies. The units were also provided with two fermenters under the project.

Partnerships and Outreach

For more information, please contact: Reporting@fao.org

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