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STRENGTHENING CAPACITIES TO CONTAIN AND MANAGE *FUSARIUM OXYSPORUM* F.SP. *CUBENSE* TROPICAL RACE 4 ON BANANAS IN LEBANON

January 2024

SDGs:



Country:

Lebanon

Project Code:

TCP/LEB/3803

FAO Contribution:

USD 131 000

Duration:

1 January 2021–21 December 2023

Contact Info:

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Implementing Partner

Ministry of Agriculture (MoA).

Beneficiaries

Banana farmers, technical staff and other stakeholders in the banana sector.

Country Programming Framework (CPF) Outputs

CPF 2023-2026

Output 3: Resilience of agrifood actors increased following a humanitarian-development-peace nexus approach for sustainable livelihoods. Sub-Output 3.3: Early warning, preparedness and response to threats, hazards, and shocks for resilient livelihoods. Sub-Output 3.4: Knowledge and data generated for evidence-based decision making in a crisis context.



BACKGROUND

Banana Fusarium wilt disease, one of the most destructive diseases of banana, is caused by the soil-borne fungus *Fusarium oxysporum* f. sp. *cubense* (Foc). In the 1950s, the epidemic caused by Race 1 of the pathogen wiped out the banana industry in Central America and the Caribbean. The effects of Foc Race 1 were overcome by a shift to resistant Cavendish cultivars, which are widely found in markets today and are the source of 99 percent of banana exports.

Symptoms of Fusarium wilt appeared in bananas from the Cavendish group in 1967 in Taiwan and the strain was identified in 1994 as a new race, Tropical Race 4 (TR4). Subsequently, Foc TR4 spread throughout South-east Asia, reaching the Middle East in 2013 and being reported in 27 countries, where it caused serious economic losses. It was expected that, by 2028, the disease would lead to a loss of an estimated 160 000 ha globally and the loss of direct employment for approximately 240 000 banana workers.

The pathogen can survive in the soil for several years and cannot be controlled by fungicides or eradicated by fumigants. The use of healthy planting material and resistant varieties is the most efficient method of management. In pathogen-free regions, effective quarantine measures are essential. In affected areas, early detection, the rapid destruction of infected plants and on-farm restrictions are the only way to control and contain the disease. Surveillance thus remains a key priority in Foc TR4 response.

Banana is one of the main strategic crops in Lebanon, covering about 2 321 ha and producing around 71 625 tonnes per year, mainly from South Lebanon. According to the MoA 2010 census, the number of banana growers was around 1 700. Lebanon exports from 25 000 to 45 000 tonnes of bananas per year and imports from 61 000 to 135 000 tissue culture banana seedlings.

In 2013, Fusarium wilt disease caused by Foc TR4 was detected in two locations in South Lebanon. In 2014, the phytosanitary certificate required for the import of banana seedlings (decision 782/1 of 2011) was amended to include 'free of Foc TR4' (Decision 292/1). However, no legal or technical measures were taken to eradicate or contain the disease. In 2019, following the outbreak of a lethal disease in South Lebanon, a preliminary survey was carried out by the MoA and the Lebanese Agricultural Research Institute (LARI) to identify the causal agent and assess the geographical distribution of the disease. The presence of Foc TR4 was detected in ten different locations in South Lebanon. It was noted that the management of the disease was almost absent in the infested areas and that there was a lack of awareness among farmers and banana stakeholders with regard to the disease and its potential economic impact on banana production.

It was recognized that the absence of appropriate phytosanitary measures and the lack of management practices for Fusarium wilt could lead to staggering losses in banana production and trade, affecting the livelihoods of farmers and impairing food security. The aim of the project was thus to develop a national programme for the containment and management of Fusarium wilt caused by Foc TR4. For this purpose, it would focus on i) the development and implementation of a strategy and action plan for containment and management of Foc TR4, ii) the strengthening of national capacities for the surveillance, containment and management of Foc TR4, iii) the conduct of Foc TR4 surveillance in banana production areas, and iv) the development of a follow-up action plan for project sustainability.



IMPACT

The results of the project will contribute to increasing farmers' preparedness when exposed to hazards and to reducing the risk of significant economic losses through disease. This, in turn, will improve their livelihood by saving their farms and will enhance the resilience of the banana sector in Lebanon and all its beneficiaries.

ACHIEVEMENT OF RESULTS

The project raised farmers' knowledge on the measures needed to prevent the introduction of the disease into their fields and its further spread. It also worked to establish a robust foundation for the development of an efficient and reliable method for the early detection of Foc TR4.

The project strengthened national capacities in the prevention, containment and management of Foc TR4 through a series of awareness-raising seminars and training events for farmers, and the provision of training of trainers (ToT) for technical staff from the MoA and LARI, as well as by producing extension materials that contribute to the achievement of the project outcome.

A national strategy and an action plan for the containment and management of Foc TR4 were developed and submitted to the MoA. In addition, a nationwide survey was conducted to assess the extent of Foc TR4 spread, and a methodology established for early detection of the disease.

IMPLEMENTATION OF WORK PLAN AND BUDGET

The start of the project was hindered by the delayed nomination of the NPC from the MoA and by COVID-19 restrictions. Delayed implementation during the first year of the project affected the field survey and awareness-raising seminars. A no-cost extension was granted in February 2023, enabling project activities to be completed within the planned budget. During implementation, activities planned in South Lebanon were postponed or cancelled as the result of a security risk that emerged in early October 2023.

FOLLOW-UP FOR GOVERNMENT ATTENTION

It is recommended that the necessary phytosanitary and plant quarantine measures be implemented to contain and manage Foc TR4. The MoA and related authorities should update the regulatory framework and put in place new regulations to contain and manage the disease. A review and update of the existing regulatory framework related to Foc TR4 phytosanitary and plant quarantine measures should be made, covering such issues as the containment of Foc TR4 within infected sites and measures to prevent the introduction of Foc TR4 at entry points.

The project established a robust foundation for developing an efficient and reliable operational monitoring system for the early detection of Foc TR4. Further efforts should be made to refine this system.

SUSTAINABILITY

1. Capacity development

Project activities were implemented in coordination with the MoA. The field survey was conducted by MoA staff, who were trained in the surveillance, containment and management of Foc TR4. This will ensure sustainability of the project results. The project also developed an informal partnership with the South Lebanese Farmers Syndicate. This will contribute to project sustainability as the syndicate includes most banana farmers in the country.

2. Gender equality

The project met the needs of targeted beneficiaries, including men and women in all project activities. Women represented 13 of the 29 trainees. This was reflected by the number of MoA and LARI technical staff provided who benefited from capacity development activities, including training.

3. Environmental sustainability

The main aim of the project was to strengthen national capacities to contain and manage Fusarium wilt in banana. Farmers were informed on the best ways to prevent the entry of the disease, as no pesticides can treat the infection and their use is both unproductive and potentially harmful to the environment.



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

Throughout project implementation, human rights were respected, and all activities were implemented without discrimination and in full transparency. The project involved MoA technical staff members in the field survey, selecting them solely based on their previous expertise in pest surveillance and the location of their duty stations within the targeted banana cultivation area.

5. Technological sustainability

The project assisted CNRS in the development of an efficient and reliable operational monitoring system for the early detection of Foc TR4. In this regard, CNRS has expressed its willingness to continue the work, improve the developed methodology and raise its accuracy level.

The project strengthened national capacities to contain and manage Foc TR4 and raised farmers' awareness about the disease and the prevention measures required. The knowledge acquired by MoA staff members will also enable them to sustain project results.

6. Economic sustainability

The South Lebanese Farmers Syndicate has demonstrated its willingness to invest in this sector, to the benefit of farmers and the sustainability of the sector.

The project developed a technical booklet on the Fusarium wilt of banana, to be distributed for free to banana farmers and other beneficiaries, and shared online on all FAO platforms and the MoA website. Farmers and other beneficiaries can also reach out to MoA agents to request help regarding the disease and its management.



DOCUMENTS AND OUTREACH PRODUCTS

- ❑ **Viljoen, A. and Mostert, D.** 2023. *Field diagnostics and sample collection guide for Fusarium Wilt of Banana - A surveillance manual*. June 2023.
- ❑ **Mostert, D.** 2023. *Review of the regulatory framework and required phytosanitary and plant quarantine measures to be implemented in Lebanon to contain Foc TR4*. July 2023.
- ❑ **Mostert, D. and Safieddine, M.** 2023. *National action plan for the management of Fusarium wilt Tropical Race 4 in Lebanon*. July 2023.
- ❑ **FAO.** 2023. *Booklet on Fusarium oxysporum f. sp. cubense Tropical Race 4 (Foc TR4)*. Beirut.



ACHIEVEMENT OF RESULTS - LOGICAL FRAMEWORK

Expected Impact	Contributed to the improvement of food security and farmer's livelihood in Lebanon (SDG 1, 2, 12)		
Outcome	National capacities for Foc TR4 prevention, containment and management strengthened		
	Indicator	Percentage of farmers implementing prevention, containment and management measures of Foc TR4.	
	Baseline	0	
	End Target	At least 30% of the targeted/trained banana farmers (200) adopted and implemented appropriate prevention and management measures.	
	Comments and follow-up action to be taken	It was impossible to determine the adoption rate of the disease management measures by banana farmers directly after project closure. A field assessment should be conducted in the medium to long-term to obtain a realistic figure. In addition, the target of 200 farmers could not be reached for many reasons, including the delay in project initiation and the security situation, which hindered the full implementation of activities.	
Output 1	A national strategy and an action plan for containment and management of Foc TR4 submitted to MoA		
	Indicators	Target	Achieved
	Number of national strategy and an action plan for the containment and management of Foc TR4.	One national strategy and an action plan technically cleared by the FAO Lead Technical Officer (LTO) for the containment and management of Foc TR4 finalized and presented to stakeholders.	Yes
Baseline	Decision 782/1 on the import of banana seedlings, and its amendment 292/1.		
Comments	The project drafted a national action plan for the containment and management of Foc TR4, including: i) the potential impact of Foc TR4 in Lebanon, ii) an action plan for the confinement of Foc TR4, iii) a national contingency plan for Foc TR4, iv) the implementation of the Foc TR4 containment strategy, v) capacity, collaboration and coordination, and vi) the feasibility of implementing the contingency plan for Foc TR4. The national action plan was submitted to the MoA, which, in its turn, will work with stakeholders such as municipalities, the South Lebanese Farmers Syndicate and LARI to set up a dedicated task force with the mandated authority to deal with and respond to new cases of Foc TR4.		
Activity 1.1	Conduct an inception workshop		
	Achieved	Yes	
	Comments	An inception workshop was conducted on 24 May 2022 in the presence of the Director General of the MoA, the Lead Technical Officer, MoA staff, LARI and farmers.	
Activity 1.2	Update the regulatory framework of the phytosanitary measures for Foc TR4		
	Achieved	Yes	
	Comments	The international expert reviewed the current regulatory framework and suggested that phytosanitary and plant quarantine measures be implemented to contain and manage Foc TR4 in Lebanon. Suggested updates include the following: i) review and update the regulatory framework of banana phytosanitary and plant quarantine measures for Foc TR4; ii) assess the phytosanitary and plant quarantine measures taken at entry points to prevent the introduction of Foc TR4 and suggest all necessary measures; and iii) identify specific phytosanitary and plant quarantine measures to be implemented at national level to contain Foc TR4 within infected sites and to prevent its spread to uninfected sites. The MoA and other related authorities should work on updating the regulatory framework and put in place new regulations to contain and manage the disease.	
Activity 1.3	Conduct population data verification about banana farmers		
	Achieved	Yes	
	Comments	The South Lebanese Farmers Syndicate provided the project with a list of banana farmers located in South Lebanon, the main banana production area. WhatsApp groups were created by the national consultant (NC) for better communication. The National Council for Scientific Research (CNRS) developed a distribution map of banana cultivation areas for 2022, which helped the project to locate banana fields.	

Activity 1.4	Design and conduct a baseline survey	
	Achieved	Partially
	Comments	<p>A baseline was envisaged during the first year of the field survey to assess the level of farmers' awareness of the disease and their possible implementation of prevention measures in their banana fields. However, owing to delays in starting the project, the baseline and endline surveys (Activity 4.2) were replaced by a pre- and post-test conducted within farmers' seminars (Activity 2.3) to determine the extent to which farmers gained information. The test consisted of ten questions in the form of multiple choice and True/False answers. Some questions in the pre-test were randomly answered, while the post-test showed a better understanding of the disease symptoms and management measures to be implemented to keep the disease out of their fields.</p> <p>The pre-test showed that some farmers were not aware that a new disease was attacking their banana fields, while others had limited awareness of it. The training enhanced their knowledge of the life cycle of the disease and of how to prevent the infection by implementing biosecurity measures, such as planting seedlings produced only from tissue culture.</p>
Activity 1.5	Perform a multi-stakeholder consultation to develop a national strategic programme and an action plan for the containment and management of Foc TR4	
	Achieved	Yes
	Comments	<p>The international expert, in coordination with the NC, conducted consultation meetings with the head of the Plant Resources Directorate at the MoA, the heads of border points at the seaport and airport, LARI, the private sector, farmers' associations and farmers. This helped to develop a national action plan for the containment and management of Foc TR4.</p>
Activity 1.6	National strategy and action plan development	
	Achieved	Yes
	Comments	<p>The international expert, in coordination with the NC, developed a national action plan comprising four main components: i) containment measures of the disease and means to prevent its spread to other production areas; ii) development of a contingency plan when new outbreaks of the disease are suspected; iii) the introduction of legislation dealing with Foc TR4 in Lebanon and means to regulate such legislation; and iv) capacity and coordination efforts to execute the national contingency plan.</p>
Activity 1.7	Conduct one validation workshop with stakeholder representatives	
	Achieved	No
	Comments	<p>This activity was cancelled because of the unstable security situation prevailing in the country. Nevertheless, all stakeholders were in close collaboration during project implementation.</p>

Output 2	National capacities for surveillance, containment and management of Foc TR4 enhanced		
	Indicators	Target	Achieved
	Number of technical staff, farmers and other stakeholders who benefited from the capacity building.	-At least 20 technical staff from MoA and LARI trained in Foc TR4 surveillance, containment, management. -At least five technical staff from MoA and LARI trained in the use of remote sensing systems in pest surveillance. - At least 30 representatives from the private sector and other stakeholders. - At least 200 banana farmers and workers.	Partially
Baseline	0		
Comments	A ToT was conducted for 28 technical staff members from the MoA and LARI, exceeding the target by 140%. Training in remote sensing systems in pest surveillance programmes was conducted for 13 technical staff, exceeding the target by 260%. Awareness-raising seminars were held for 101 farmers, achieving 50.5% of the target. The project was unable to reach the target of private-sector representatives and banana farmers benefiting from capacity development activities owing to delays in starting the project and the unstable security situation that prevailed in the country, hindering the full implementation of planned activities.		
Activity 2.1	Conduct one ToT workshop on surveillance, containment and management of Foc TR4		
	Achieved	Yes	
	Comments	A ToT was conducted on 24 May 2023 by an international expert. The training covered the surveillance, containment, and management of Foc TR4. Attendees included technical staff from the MoA (Plant Protection Service, regional services and heads of the main border points) and from LARI. Attendees from MoA included the survey team that conducted the field survey. The total number of attendees was 28, including 12 women, exceeding the target by 140%. Below are links to the online platforms of FAO Lebanon used to disseminate this activity and improve project visibility. Facebook: bit.ly/48nen04 X: bit.ly/42KxLKC and bit.ly/3SJ7wjg	
Activity 2.2	Conduct two training workshops for field engineers from the private sector and other stakeholders		
	Achieved	Partially	
	Comments	This activity was only partially conducted, as few field engineers were invited to the farmers' awareness-raising seminars (Activity 2.3). The unstable security situation in the country, which began in October 2023, hindered the implementation of the activity.	
Activity 2.3	Conduct ten awareness-raising seminars for banana farmers/workers, producers and other stakeholders in prevention, field detection, containment and management of Foc TR4		
	Achieved	Partially	
	Comments	The project conducted seven awareness-raising seminars for 101 banana farmers, achieving 50.5% of the target. The delay in starting the project and the unstable security situation hindered the full implementation of this activity. Many farmers were not aware of the disease, and the seminars contributed to raising their knowledge of Foc TR4 and the biosecurity measures necessary to prevent both the introduction of the disease into their fields and its further spread.	
Activity 2.4	Conduct a training workshop on the use of remote sensing systems in pest surveillance programmes		
	Achieved	Yes	
	Comments	A one-day training workshop on the use of remote sensing systems in pest surveillance programmes was held at CNRS premises on 7 November 2023. The training was attended by 13 participants, including seven women, thereby exceeding the initial target by 260%. The attendees raised their knowledge in remote sensing, Geographic Information System and methods to identify the banana disease using satellite images and field spectrometers.	
Activity 2.5	Prepare and disseminate extension materials on Foc TR4 identification, containment and management		
	Achieved	Yes	
	Comments	One booklet, in Arabic, on Foc TR4 was developed, designed and printed. The booklet was delivered to the MoA to be distributed to banana farmers.	
Activity 2.6	Prepare and execute public awareness campaigns on Foc TR4 impacts and promotion of management strategies		
	Achieved	No	
	Comments	An awareness-raising movie about the disease was planned to be developed by filming in South Lebanon, the main production area of banana and that in which the disease was reported. Given the unpredictable security situation prevailing in the country, specifically in South Lebanon, and based on security advisory instructions, filming was cancelled.	

Output 3	Surveillance conducted to assess the extent of Foc TR4 spread		
	Indicators	Target	Achieved
	Number of surveyed areas (sites) in the country for Foc TR4.	To be assigned after the start of the project and the population data verification (Activity 1.3).	Partially
Baseline	Number of sites covered and number of samples collected in the preliminary survey carried out in 2019.		
Comments	<p>It was agreed to take 500 plant samples and 50 soil samples. A nationwide field survey was conducted in banana plantations. Banana plant samples were collected from symptomatic plants and soil samples from infected fields.</p> <p>In total, 177 plant samples and 24 soil samples were collected and delivered to the laboratory for diagnosis.</p>		
Activity 3.1	Develop a system for surveillance of Foc TR4		
	Achieved	Yes	
	Comments	<p>A surveillance system was developed in coordination with the international expert, the NC and National Project Coordinator (NPC), and the LARI and CNRS focal points, under the supervision of the LTO. The system consisted of collecting plant samples from symptomatic banana plants, and soil samples from infected fields, and sending them to the laboratory for diagnosis. The developed surveillance manual (Activity 3.2) included a detailed methodology of sampling. The sampling datasheet was uploaded on tablets, using the Open Data Kit (ODK) mobile application, for data collection during the field survey. The GPS locations of the visited sites as well as the laboratory results were sent to CNRS to feed the machine learning algorithm developed by the Council, which can classify and detect the presence of banana wilt.</p>	
Activity 3.2	Develop a Foc TR4 surveillance manual		
	Achieved	Yes	
	Comments	<p>A surveillance manual was developed in collaboration with the international expert, including: i) An introduction on Banana Fusarium wilt TR4, ii) Symptoms of banana Fusarium wilt, iii) Steps to be followed to conduct the Foc TR4 survey in banana plantations, before, during and after the survey, iv) Materials required for surveillance, v) Collection of data, vi) Collection of samples, and vii) Shipment of samples to the laboratory. The manual was developed in both English and Arabic, and was shared with the survey team.</p>	
Activity 3.3	Establish a Foc TR4 national surveillance team		
	Achieved	Yes	
	Comments	<p>A survey team was established comprising MoA technical staff with experience in pest surveillance and whose duty stations fall within the targeted banana cultivation area. The survey team was composed of 13 surveyors, of whom seven were women. The surveyors were divided into seven groups to conduct a nationwide survey in all banana cultivation areas located in the districts of Tyre, Saida, Chouf, Byblos and Keserwen. The survey team attended the ToT with the international expert (Activity 2.1) and acquired the necessary knowledge to conduct the survey.</p>	
Activity 3.4	Procurement of equipment, materials and supplies for field surveys and laboratory analyses		
	Achieved	Yes	
	Comments	<p>The project procured all necessary equipment for plant and soil sampling, including latex gloves, shoe covering, knives, duct tape, disinfectants, spray bottles, shovels, funnel, gallons, plastic boxes, scissors, paper towels sterilized in the laboratory, envelopes, spray paints, adhesive labels, marker pens, pens, notebooks, zipper bags, tote bags and rubber boots. A real-time polymerase chain reaction machine was procured by the project and delivered to LARI, in addition to the laboratory consumables required to conduct the laboratory analyses for Foc TR4. The South Lebanese Farmers Syndicate contributed to the project by procuring and covering the expenses of laboratory consumables for 500 plant samples.</p>	
Activity 3.5	Conduct a nationwide field survey of Foc TR4		
	Achieved	Yes	
	Comments	<p>A nationwide field survey was conducted in banana plantations to assess the extent to which Foc TR4 had spread after the 2019 survey. Based on the international expert's recommendations, one or two plant samples were taken from symptomatic plants in the same infected field. Soil samples were collected from infected banana fields. Data were collected using ODK mobile application uploaded on tablets. The field survey covered 257 banana sites in 49 villages within five cazas as follows: Chouf: 5 villages (51 sites); Byblos: 7 villages (20 sites); Keserwen: 6 villages (20 sites); Saida: 21 villages (117 sites); and Tyre: 10 villages (49 sites). In total, 177 plant samples and 24 soil samples were collected and delivered to the mycology and nematology laboratories for diagnosis. The results showed a spread of the disease in South Lebanon (Saida and Tyre), while Byblos, Keserwen and Chouf remained pest free.</p>	

Activity 3.6	Conduct laboratory analyses		
	Achieved	Yes	
	Comments	FAO signed an LoA with LARI for the provision of laboratory diagnosis to detect Foc TR4. The mycology and nematology laboratories received 177 plant samples and 24 soil samples, respectively. Laboratory results confirmed the presence of Foc TR4 in 73 plant samples, and the infestation of all soil samples with nematodes. Eight different genera were identified, i.e. <i>Pratylenchus</i> spp., <i>Helicotylenchus</i> spp., <i>Radopholus similis</i> , <i>Rotylenchulus reniformis</i> , <i>Tylenchulus semipenetrans</i> , <i>Meloidogyne</i> spp., <i>Tylenchorynchus</i> spp. and <i>Paratylinchus</i> spp.	
Activity 3.7	Initiate the use of remote sensing tools for the detection and monitoring of Foc TR4		
	Achieved	Yes	
	Comments	FAO signed an LoA with CNRS for the provision of remote sensing services to develop an operational monitoring system to identify and map the presence of Foc TR4 on banana in Lebanon. The GPS locations of the visited sites along with the survey results (positive or negative) were shared with CNRS to feed the machine learning algorithm developed by the Council to classify and detect the presence of Foc TR4. The developed system and methodology yielded promising results, especially in accurately identifying and monitoring banana fields, to facilitate early detection of Foc TR4. The accuracy rate of the developed system was approximately 60% for healthy and asymptomatic plants identified by the surveyors.	
Activity 3.8	Develop a system for data analysis and distribution maps of Foc TR4		
	Achieved	Yes	
	Comments	A map showing disease distribution based on the laboratory results was developed by CNRS.	
Output 4	A follow-up action plan for project sustainability submitted to MoA		
	Indicators	Target	Achieved
	Number of follow-up action plan.	One follow-up action plan for project sustainability.	Yes
Baseline	0		
Comments	The project drafted a national plan and a contingency plan to deal with new cases of the disease. Given the current economic crisis faced by Lebanon, project sustainability might be at risk because of the lack of financial resources needed by MoA staff to perform their duties, in particular by conducting a periodic field survey.		
Activity 4.1	Establish a follow-up team for Foc TR4		
	Achieved	Yes	
	Comments	A follow-up team was established, including the National Plant Protection Organization at the MoA and the survey team from the MoA, in addition to the South Lebanese Farmers Syndicate. Farmers should report any new cases to the MoA, which will then take samples for laboratory diagnosis.	
Activity 4.2	Design and conduct an endline survey		
	Achieved	No	
	Comments	The endline survey had been planned for the second year of the project, with the aim of assessing farmers' adoption rate of the biosecurity measures of Foc TR4. As the survey and awareness-raising seminars were conducted in the last few months of the project, it was difficult to conduct an endline survey on farmers' adoption of the recommended measures. Following delays in starting the project, the baseline (Activity 1.4) and endline surveys were replaced by a pre and post-test conducted during the farmers' seminars (Activity 2.3) to determine the extent to which farmers gained knowledge, as described above.	
Activity 4.3	Prepare a follow-up action plan		
	Achieved	Yes	
	Comments	The project drafted follow-up actions and a contingency plan to deal with new cases of the disease, including: i) reporting, ii) investigation, iii) identification of a disease, iv) dealing with an outbreak by establishing a pest management team, implementing an eradication plan, conducting surveillance and containing an outbreak, v) documentation of an outbreak, and vi) communication with the affected farmer, community and plant protection authorities, and awareness-raising. Given the economic crisis and currency depreciation affecting the country, and specifically the public sector, it is difficult for the MoA to adopt and implement such plans. Despite the knowledge transfer achieved under this project, the sustainability of results might be at risk and may not be fully achieved owing to the lack of financial resources required to maintain a periodic monitoring of the disease.	
Activity 4.4	Conduct a project wrap-up workshop		
	Achieved	No	
	Comments	Considering the unstable security situation in the country, the project was not able to conduct the wrap-up workshop.	

Partnerships and Outreach

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