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URGENT ACTION FOR CAPACITY BUILDING TO CONTROL DESERT LOCUST INFESTATION IN THE ISLAMIC REPUBLIC OF IRAN

August 2023

SDGs:	2 ZERO HUNGER
Country:	The Islamic Republic of Iran
Project Code:	TCP/IRA/3801
FAO Contribution:	USD 500 000
Duration:	1 April 2020-15 March 2023
Contact Info:	FAO Representation in the Islamic Republic of Iran FAO-IR@fao.org

Implementing Partners

Plant Protection Organisation (PPO) and Ministry of Agriculture Jahad (MAJ).

Beneficiaries

Staff from the PPO and MAJ; Local farmers.

Country Programming Framework (CPF) Outputs

CPF 2020-2023¬ Priority Area 2: Food and Nutrition Security, and Food Safety.
FAO Regional Office for Asia and the Pacific (RAP) Regional Initiative: Zero Hunger.
RAP Regional Priority: Reduction of animal and plant pests and diseases.

BACKGROUND

On 26 January 2019, almost a week after the Plant Protection Office (PPO) received the 21 January 2019 warning from the Food and Agriculture Organization of the United Nations (FAO) Commission for Controlling the Desert Locust in South-West Asia (SWAC), Desert Locust swarms arrived in the Nakhilou district in the Islamic Republic of Iran's province of Hormozgan. The PPO took immediate action, establishing a Desert Locust central headquarters, and, sending out warning messages to seven provinces that were also at risk of being infested by the swarm.

All existing capacity at the provincial level, including managers, PPO experts and the Control Network staff, numbering nearly 500 people, was used to keep track of the swarm and monitor entrance points, existent egg-laying zones and existent mature locust-infested districts. Supplementing these efforts, 40 Ultra Low Volume (ULV) truck-mounted sprayers, 150 offroad vehicles and 30 000 litres of deltamethrin and malathion were used to eradicate locust populations in the first phase of their invasion. Additionally, ten plane-mounted pesticide sprayers from the Special Services Company saw use in the seven affected provinces. By the end of the 2019 infestation, PPO had treated more than 760 000 hectares of land across nine provinces in order to control the Desert Locust outbreak and mitigate its impact on food security. By the end of that year, two additional provinces had been affected.

The Islamic Republic of Iran has local swarms, with the late spring breeding season bringing rains and increased vegetation that provide a suitable environment for multiplication. These conditions also make the southern part of the country a potential hub for swarms originating from overseas, such as that which emerged from the southern Arabian Peninsula in 2018. Generational overlap may also worsen this situation. As already present locust nymphs, hereafter hoppers, begin to feed off local vegetation and agricultural produce, this vegetation and produce will simultaneously be under threat from migrating locust populations which will feed and then lay their own eggs in already hopper-infested areas.

The original swarm stemmed from cyclones which brought heavy rains to the Empty Quarter in the Arabian Peninsula in May and October of 2018. This resulted in three generations of breeding among latent locust populations that had not been detected or treated. By early 2019, swarms began to migrate out of this area, moving to neighbouring regions, such as the northern part of the Islamic Republic of Iran, and Yemen in the south. Further breeding that occurred that year, coupled with unusual weather and climate conditions in East Africa, resulted the locust being present along the Red Sea coast in Eritrea, Ethiopia, central Somalia and the Sudan.

Additional swarms were present further south in Kenya, South Sudan and Uganda. In Kenya, in late 2019, swarms, with sizes reaching 60 km by 40 km, damaged agropastoral livelihoods and deprived livestock of pasture. The outbreak was expected to continue until June 2020 as a result of conditions favourable for locust reproduction. These swarms were similarly expected to reach as far as southern Ethiopia, northeastern Uganda and southeastern South Sudan. Additionally, the FAO team forecasted that in the first quarter of 2020, due to the wind and rainfall patterns, subsequent breeding generations of Desert Locust swarms could reach much further afield, crossing the Red and Oman Seas and reaching as far as India and Pakistan. These factors, in the aggregate, substantiated the assertion made by FAO's Global Information and Early Warning System that this locust outbreak had been the worst that East Africa had seen in 25 years.

Given these events, this project's objective was first and foremost to enhance the capacity of the PPO of the MAJ to monitor and control Desert Locusts, the most significant migratory pest in the Islamic Republic of Iran. Furthering the PPO and MAJ's capacity in these respects will leave them better equipped to contend with the expected locust outbreak in late spring and mitigate the harm inflicted on vegetation and agriculture.

Impact

This project successfully supported the Government of the Islamic Republic of Iran in developing strategies and capacity to better contend with outbreaks of the Desert Locust. It successfully trained hundreds of individuals regarding locust biology and behaviour, with additional trainings conducted on up-to-date practices associated with the surveillance, monitoring, control and management of Desert Locust infestations.

Implemented activities contribute to better management of locust outbreaks, which help to mitigate the negative effects outbreaks have on agriculture and local flora. Such effects help protect food production and local vegetation thereby contributing to SDG 2, the aim of which is ending hunger by 2030.

Achievement of results

Broadly speaking, the project materially achieved its stated objectives. There were issues and adjustments due to the COVID-19 pandemic situation; however, these issues either abated or were overcome with the team materially advancing its objectives to train the stated number of individuals and provide the necessary material assistance. The project successfully procured a sufficient quantity of equipment needed for field operations and monitoring in five targeted southern provinces. Local stakeholders and concerned government officers were successfully trained on proper use of this equipment. In addition to this training, these same individuals received technical and practical training based on FAO's technical Desert Locust standard operating procedures (SOPs). Material information from these trainings were also textualized, translated and published so that they could then be distributed so as to increase the general public's knowledge with respect to these pests and proper practice regarding the monitoring, reporting and control of them. This training also included instruction on the use of the FAO Desert Locust Information Service's (DLIS) mobile application for locust monitoring.

At the governmental level, the project bettered the concerned provinces Desert Locust infestation preparedness, early warning mechanisms and response capacity. This was done through the training of plant protection and agricultural officers and extension staff. Additionally, in conjunction with local government bodies, the project's efforts resulted in a national Desert Locust contingency plan to be activated in cases of national, locust-related emergencies. The project resulted in material betterments that can be efficiently adopted by the beneficiaries at both the governmental and public level.

Although consistent training, knowledge refreshing and effective logistical management is necessary to maintain the infrastructure developed by the project, its maintenance will ensure the mitigation of harm done to local agriculture and flora by the Desert Locust. This will intrinsically further the Islamic Republic of Iran's efforts at achieving Sustainable Development Goal (SDG) 2.

Implementation of work plan and budget

In addition to its effect on implementing the work plan due to travel restrictions and the closure of government offices, the COVID-19 pandemic limited the team's capacity to implement field-level activities. These included some field trainings and visits to affected provinces. This was, however, overcome through the implementation of virtual trainings until such time that the pandemic had subsided and in-person training could resume. It was necessary to secure approval for the extension of the project timeline in order to complete training activities and to acquire the necessary equipment, all of which had been delayed by the pandemic. Additionally, the budget needed to be increased. All activities were successfully implemented within this increased budget.

Follow-up for government attention

Given the cyclical nature of locust infestation, it will be necessary for the MAJ and PPO to review and adjust plans and procedures established in partnership with FAO as future circumstances dictate. Additionally, continuous monitoring of electronic educational resources will be necessary to ensure that the eLocust3m mobile phone application is properly used and updated as new information becomes available. Government action will also be needed should it be necessary for a simplified Persian-language version of the application to be developed and promulgated. In terms of field activities, the maintenance of equipment related to locust surveillance, monitoring and eradication will also be necessary moving forward.

SUSTAINABILITY

1. Capacity development

As a result of the capacity building provided for PPO and MAJ staff in the field on risks of Desert Locust, and awareness-raising activities, the technical and institutional knowledge of PPO and MAJ staff and beneficiaries was enhanced, thereby helping them to effectively address threats and crises facing the agricultural sector and to mitigate the impact of Desert Locust in the country.

2. Gender equality

Enhancing the participation of women was an essential consideration for the project. During the project's planning stages, it was expected that between 30 and 40 percent of the participants in trainings, workshops and project implementation activities would be women. In actuality, women made up between 40 and 50 percent of participants. During the project's lifecycle, gender mainstreaming became standard practice and equal opportunity was afforded to both men and women to participate in, and benefit from, project activities at all levels.

3. Environmental sustainability

Environmental mainstreaming was taken into consideration at every level, with FAO standard practices being used to ensure minimal environmental harm and impact. The project procured and transferred to local actors ULV formulations of the insecticide deltamethrin, based on FAO Emergency Centre for Locust Operations safety standards and technical clearances. As it relates to the use of insecticides, the project used barrier treatments as an effective means of chemical control, which allows for rapid treatment of large areas infected with Desert Locusts while simultaneously limiting the effect of pesticides on non-target organisms. Furthermore, field procedure, including such activities as selection, purchase, storage, treatment, monitoring, clean up and disposal of the chosen insecticide, was based on FAO's "From the factory to the field" procedure, itself based on the emergency prevention system for transboundary animal and plant pest and diseases. These processes helped to mitigate the inevitable collateral damage to human health, non-target organisms and the environment caused by the use of insecticides. The conveyance of best practices to local actors helps to increase the likelihood of responsible and sustainable use of insecticides in the future.

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

The project contributed to the economic and environmental development of local communities by protecting their farms, fields and orchards thereby safeguarding local livelihoods and food sources.

5. Technological sustainability

The project's introduced technologies are simple to implement and suited to the circumstances faced by Iranian farmers and extensionists. For example, the eLocust3m mobile application allows national survey and control officers in locust-affected countries to record and transmit data in real-time via satellite from the locality to their national locust centres and can be used by FAO DLIS to assess existent situations, forecast future developments and warn locust-affected countries of locust invasions.

Sharing knowledge and technical expertise has been the backbone of the project, as this is the principle means through which stakeholders are able to educate themselves about locusts and best practices with respect to them. Through a series of technical meetings, the project team and the PPO officers jointly discussed the issues and methods that would be best suited to the local context. Additionally, the training package was provided based on the FAO DLIS technical vision and local training needs and the required resources to meet those needs. As a result, the project was able to share relevant experiences that are adoptable by both technical officers and non-technical personnel, such as local farmers.

6. Economic sustainability

The project assisted the PPO and MAJ in combating a transboundary insect that has become the most significant migratory pest in the Islamic Republic of Iran. This was done through capacity building, the object of which was to contain and control expected outbreaks of the Desert Locust in late spring. This effort will help mitigate its destructive effect thereby safeguarding agriculture-based livelihoods.

Documents and outreach products

- **Ahmadifar, M., Farshad, R. & Chalaki Zebardast, M.** 2022. *Desert Locust's survey and control in Sistan and Baluchistan province (training report)*. Tehran, Plant Protection Organization. 11 pp.
- **Ahmadifar, M., Farshad, R. & Chalaki Zebardast, M.** 2022. *Desert Locust's survey and control in Hormozgan province (training report)*. Tehran, Plant Protection Organization. 12 pp.
- **Ahmadifar, M., Farshad, R. & Chalaki Zebardast, M.** 2022. *Desert Locust's survey and control in Fars province (training report)*. Tehran, Plant Protection Organization. 11 pp.
- **Ahmadifar, M., Farshad, R. & Chalaki Zebardast, M.** 2022. *Desert Locust's survey and control in Bushehr, Khuzestan, Fars, Lorestan, Kuhgiloyeh and Buyerahmad provinces (training report)*. Tehran, Plant Protection Organization. 19 pp.
- **Cressman, K. & Symmons, P.M.** 2023. *Desert Locust Guidelines: 1-Biology and behaviour (technical guidance manual).* Ahmadifar, M., Ghaemian, M. & Chalaki Zebardast (PPO translators). Tehran, FAO. 51 pp.

- **Cressman, K.** 2023. *Desert Locust guidelines: 2-Survey (technical guidance manual)*. Ghaemian, M. & Chalaki Zebardast (PPO translators). Tehran, FAO. 66 pp.
- **Cressman, K.** 2023. *Desert Locust guidelines: 3-information and forecasting (technical guidance manual)*. Ahmadifar, M., Chalaki Zebardast, M. & Ghaemian, M. (PPO Translators). Tehran, FAO. 56 pp.
- **Cressman, K.** 2023. *Desert Locust guidelines: 4-control (technical guidance manual)*. Ahmadifar, M., Chalaki Zebardast, M. & Ghaemian, M. (PPO Translators). Tehran, FAO. 95 pp.
- **Cressman, K. & Symmons, P.M.** 2023. *Desert Locust guidelines: 5-Campaign organization and execution (technical guidance manual)*. Ahmadifar, M., Chalaki Zebardast, M. & Ghaemian, M. (PPO Translators). Tehran, FAO. 66 pp.
- **Everts, J.W. & van der Valk, H.** 2023. *Desert Locust guidelines: 6-Safety and environmental precautions (technical guidance manual)*. Ahmadifar, M., Chalaki Zebardast, M. & Ghaemian, M. (PPO Translators). Tehran, FAO. 99 pp.
- **FAO.** 2023. *Standard operating procedures (SOP) for Desert Locust aerial survey and control (manual)*. PPO Translators. Tehran, FAO. 24 pp.
- **FAO.** 2023. *Standard operating procedures (SOP) for Desert Locust ground survey (manual)*. PPO Translators. Tehran, FAO. 30 pp.
- **FAO.** 2023. *Standard operating procedures (SOP) for Desert Locust control (manual)*. PPO Translators. Tehran, FAO. 22 pp.
- **FAO.** 2023. *Standard operating procedures (SOP) for Desert Locust biology and behaviour (manual)*. PPO Translators. Tehran, FAO. 22 pp.
- **FAO.** 2023. *Urgent action for capacity building to control Desert Locust infestation in the Islamic Republic of Iran*. Tehran, FAO. 4 pp
- **PPO.** 2023. *National Desert Locust contingency plan of the Islamic Republic of Iran (policy plan)*. PPO Translators. Tehran, PPO. 32 pp.

ACHIEVEMENT OF RESULTS - LOGICAL FRAMEWORK

Expected Impact	**Ensure food and nutrition security through improved control, monitoring and early warning measures for the Desert Locust**	
Outcome	Enhanced technical capacity for early warning, monitoring and management of the Desert Locust in the Islamic Republic of Iran	
	Indicator	Number of provinces with enhanced technical capacity for Desert Locust management
	Baseline	None
	End Target	Five Provinces: Bushehr, Fars, Hormozgan, Khuzestan and Sistan and Baluchistan
	Comments and follow-up action to be taken	All project activities were successfully completed and implemented in the five targeted southern provinces. The project improved Desert Locust technical background knowledge and technical capacity by providing Persian-language translations of FAO's Desert Locust SOP's and guidelines. The efforts of the project bettered the nation's preparedness, early warning and response capacity at the national level among plant protection and agricultural officers and extension staff through the development of the country's Desert Locust comprehensive country contingency plan. Within the first three months of the project, Desert Locust control equipment was provided to each of the five target provinces, including ULV formulated pesticide (Deltamethrin), vehicle-mounted sprayers and backpack and hand portable ULV sprayers. Survey equipment was also provided to the five plant protection centres in each of the five provinces. This included laptops, smartphones and tablets. Personal Protective Equipment (PPE) was also provided. In addition to material support, the project developed a training package for approximately 320 plant protection and agricultural officers and extension staff. The subject matter of this training was Desert Locust biology and behaviour, necessary safety measures when engaging in Desert Locust-related activities and control measures necessary for mitigating the harmful effects of outbreaks. However, COVID-19 often precluded meetings, as well as in-person trainings for master trainers, as planned by technical officers at FAO headquarters. However, virtual training and the eventual abatement of the pandemic allowed for in-person training activities to resume despite previous interruptions. The project's beneficiaries, namely the MAJ and its sub-organs, such as the PPO, are in a position to adopt the project's practices and procedures so as to more effectively survey, control and manage future Desert Locust outbreaks in the Islamic Republic of Iran. With this said, continued training and refresher courses for staff and maintenance of equipment is necessary to ensure continued meaningful use of the project outputs.
Output 1	**Expertise among all stakeholders (agricultural officers/plant protection officers/locust officers) on Desert Locust survey, control, reporting, and safety increased**	
	Indicators	Target / Achieved
	Number of people trained.	320 people, i.e., 16 trainings for approximately 20 participants. / Yes
Baseline	0	
Comments	A total of 320 Desert Locust and Agricultural experts from five target provinces were involved in 16 rounds of both virtual and field training workshops, to increase and enhance the technical capacity and expertise among stakeholders (agricultural/plant protection/locust officers) in the MAJ on Desert Locust biology and behaviour, surveillance, control, reporting and necessary safety measures related to the pest. The main objective of this training was to refresh information, knowledge and expertise of relevant personnel in the five concerned provinces. These trainings required the development of two letters of agreement (LOAs). Under the first LOA, operational from 1 December 2021 to 30 March 2022, 212 agricultural/PPO officers from three of the concerned provinces (Fars, Kerman, and Sistan and Baluchistan) received necessary technical training on Desert Locust biology and behaviour and were given surveillance and control demonstrations based on FAO's technical Desert Locust SOP and guidelines. During the second LOA, operational from 5 January 2023 to 28 February 2023, 108 agricultural/PPO officers from the provinces of Bushehr and Khuzestan were similarly trained. In order to ensure that this training and technical knowledge was accessible to as many stakeholders as possible, Persian-language versions of material were created and disseminated. This training was foundational to general, national level preparedness, which itself was helped by the development of a comprehensive country contingency plan with respect to the Desert Locust to be implemented should unprecedented emergencies arise.	

Activity 1.1	Provision of training equipment	
	Achieved	Yes
	Comments	Five master training kits including equipment and devices required for the assessment of temperature, humidity and wind speed and direction were provided. Additionally, a psychometer, a wind meter and compass along with equipment required for sprayer calibration such as a tachometer, droplet counting templates and oil and water sensitive papers, were procured to be used by three master trainers in Desert Locust survey and control training workshops.
Activity 1.2	Improvement of Master Trainer technical knowledge and skills	
	Achieved	Partially
	Comments	Three existing English-speaking master trainers had been provided by the PPO to be trained by a technical officer from the Plant Production and Protection Division at FAO headquarters. The objective of this training was to improve their knowledge base and to review and reinforce their existent knowledge and technical skills. However, due to COVID-19 restrictions and tight project deadlines, in consultation with the PPO, the existing master trainers were authorized to proceed with the broader trainings without completing the otherwise standard training and evaluation sessions.
Activity 1.3	Master Trainers provide national training	
	Achieved	Yes
	Comments	16 rounds of training workshops for 320 plant protection and agricultural officers in the five provinces of Bushehr, Fars, Hormozgan, Khuzestan, and Sistan and Baluchestan were conducted covering Desert Locust biology and behaviour, surveillance, control, reporting and necessary safety measures.
Activity 1.4	Development of locust education tools	
	Achieved	Partially
	Comments	The original plan was to work with software developers to create a Persian-language app accessible to local farmers, which would help educate them with respect to salient information concerning the Desert Locust. However, after several discussions and technical meetings with the PPO app development consultants, and in consultation with the Lead Technical Officer (LTO) and the PPO, it was decided that the budget for this activity would be reallocated so as to acquire 60 tablets and 23 smartphones. This was done as a result of time constraints and an appreciation of this task's potential to consume a great deal of time. However, FAO DLIS had already developed the "eLocust3m mobile application," which was available for free on Google Play and the Apple mobile application store. This app tracks and monitors Desert Locust across its range and transmits data in real time from the field to national locust centres. It also offers information and educational resources concerning locust biology, tracking and control.

Output 2	**Improved data collection, early warning systems and response speed**		
	Indicators	Target	Achieved
	Number of data collection e-platforms developed.	One simplified elocust3 for non-technical users.	Partially
Baseline	0		
Comments	In order to enhance public awareness of Desert Locust morphology, biology and behaviour, surveillance, control and safety methods, a discussion regarding the development of an educational, simplified, Persian-language mobile application similar to elocust3m was had during several meetings with the project LTO, technical officers at FAO headquarters and the PPO. It was decided that, as a result of Persian not being an identified operating language for either eLocust3 or eLocust3m, and most technical experts who use this application having already been properly trained in its use, it was unnecessary to develop a simplified, local language version of the application. Instead, technical experts and officers were assigned to teach local stakeholders how to use the FAO DLIS application during the course of the project. In support of this, technical equipment such as tablets and smartphones were provided. The PPO will evaluate whether the development of an educational mobile app is worthwhile after the conclusion of the project. This decision will, among other things, be based on whether the trainings related to elocust3m were sufficient, and, whether persistent demand for a simplified Persian-language version of the app justifies its creation being made a priority.		

Activity 2.1	Development of data collection tool	
	Achieved	Partially
	Comments	After numerous discussions with the PPO, the LTO and the TCO, 60 tablets and 23 smartphones were procured and transferred to PPO such that eLocust3m could be installed on these devices, improving access to the benefits afforded by this application.

Activity 2.2	Data collection tools deployed to the field		
	Achieved	Yes	
	Comments	23 smartphones procured and transferred to PPO.	
Output 3	Action for Desert Locust control implemented through equipping Desert Locust Control Centres		
	Indicators	Target	Achieved
	Number of Desert Locust control centres equipped.	Expected at project completion: two centres in the southern Islamic Republic of Iran.	Yes
Baseline	0		
Comments	Equipment sufficient to furnish Desert Locust survey and control centres in five southern Iranian provinces (Khuzestan, Bushehr, Hormozgan, Fars and Sistan and Baluchistan) was procured and transferred to the PPO. This equipment included: vehicle-mounted, backpack-portable and handheld ULV sprayers using ULV pesticide for Desert Locust chemical control, as well as sufficient PPE for those who engage in chemical control operations.		
Activity 3.1	Procurement of control equipment		
	Achieved	Yes	
	Comments	25 vehicle-mounted, 7 backpack and 50 handheld ULV sprayers handed over to the PPO.	
Activity 3.2	Procurement of safety equipment		
	Achieved	Yes	
	Comments	500 sets of Desert Locust surveillance kit, including shirts, pants and hiking boots were procured. Additionally, 500 sets of PPE, including goggles, masks, protective overalls, boots, caps and nitril and polyvinyl gloves were procured and transferred to the PPO.	
Activity 3.3	Procurement of data management and communications equipment		
	Achieved	Yes	
	Comments	Two laptops were procured and handed over to the PPO.	
Activity 3.4	Procurement of requisite pesticides		
	Achieved	Yes	
	Comments	10 400 litres of deltamethrin ULV 12.5 g/L procured and transferred to the PPO.	
Output 4	**Development of Integrated Desert Locust management strategy**		
	Indicators	Target	Achieved
	Number of reports developed.	One final report.	Yes
Baseline	0		
Comments	A national level Desert Locust comprehensive country contingency plan was formulated and promulgated so as to enhance preparedness and response capacities and to better develop an integrated Desert Locust management strategy to be implemented in case of unprecedented emergencies.		
Activity 4.1	Improvement of early detection and rapid response capacity to Desert Locust infestations in Iran		
	Achieved	Yes	
	Comments	As per the project document, a two-day workshop was to be held for the PPO's provincial heads, locust officers and other key persons involved in the locust control campaign. The topics of these discussions were to be the project's achievements, how to address existing problems, lessons learned, and ways to improve so as to be better prepared for future upsurges and outbreaks. After consulting with the PPO and the LTO, it was decided that the PPO senior and technical Desert Locust experts would prepare a comprehensive national country contingency plan.	
Activity 4.2	Strengthening preparedness strategies within the targeted provinces		
	Achieved	Yes	
	Comments	The technical national contingency plan was developed under the leadership of the PPO's technical unit. This effort emphasized effective early warning strategies, monitoring and controlling Desert Locusts, including assessments of existent Desert Locust threats, the history of previous outbreaks, grounding of field operations in a sound understanding of locust biology, preventive control strategies, assessments of previous control campaigns, resource availability in the PPO, effective pesticide use for chemical control operations, and maintenance of necessary logistics infrastructure, such as vehicles and aircraft.	

Partnerships and Outreach
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CD1223EN/1/06.24