Food and Agriculture Organization
of the United Nations

Thirty-third Session

18–20 December 2023
Rome, Italy

FAO Commission for
Controlling the Desert Locust
In South-West Asia

Report of the FAO Commission for Controlling the Desert Locust in South-West Asia

Thirty-third Session

Rome, Italy
18–20 December 2023

Food and Agriculture Organization of the United Nations
Rome, 2024

Contents

Acknowledgements

The participants of the 33rd session of SWAC and the Executive Secretary wish to thank the respective governments, FAO and its country representations, and all international partners for their continuous support of the Commission and its activities. We are grateful that this session could be organized physically and virtually, and acknowledge with gratitude the active participation of those who attended the session and contributed to the frank and useful discussions.

Fariborz Shohraty (I.R. Iran), Ali Babalifashki (I.R. Iran), Mehdi Ghaemian (Expert), Virendra Kumar (India), Shaloo Ayri Bhardwaj (India), Keith Cressman (FAO), Christian Pantenius (Expert), Shoki Al-Dobai (FAO), Shahbaz (Pakistan), Ludovica Tunetti (FAO), Nasser Al-Harthy (Expert)

List of Recommendations

The 33rd session agreed on the following 15 recommendations:

1. **Regarding the Iran/Pakistan joint survey, (a) the improvement suggested by the 2022 Joint Survey should be implemented, (b) the Executive Secretary should initiate the process for the next joint border surveys between I.R. Iran and Pakistan by the beginning of January 2024, and (c) the Executive Secretary to write to both countries about continue emphasizing on the importance of regular joint border surveys.**
2. **Regarding the India/Pakistan joint border meetings, the Executive Secretary should write every year to both countries about a physical meeting every month from June to November.**
3. **The frontline countries are requested to have at least a second national Desert Locust information officer because of better succession planning, and DLIOs in all countries to undergo comprehensive training and retain their positions within their locust departments for a minimum of 10 years. If transferred, the DLIO should be replaced by another DLIO immediately.**
4. **The frontline countries are encouraged to use eLocust3mPRO rather than eLocust3 due to its advantages of cost-effectiveness and better performance.**
5. **The RAMSES (Rv5) should be developed and used by the frontline SWAC countries including training, improvement, and maintenance.**
6. **The Executive Secretary should ensure continuous collaboration and coordination with the CLCPRO and CRC for more engagement of SWAC countries to benefit from the experience of the *dLocust* technology in both regions.**
7. **SWAC countries are urged to advance the biopesticides registration process, use and report on the progress made at the Commissions meetings.**
8. **The Executive Secretary should provide necessary training on the use of biopesticides for SWAC countries, and the capacity development needed for Pakistan to carry out laboratory analysis and registration process.**
9. **The technical reports or materials produced by other Commissions in other languages may be made available in English, as possible, for the benefit of the SWAC countries.**
10. **All countries should update their contingency plans annually and share them with the Executive Secretary.**
11. **The SWAC countries should ensure that relevant and specialized staff are nominated to participate in trainings and workshops organized by the Commission. Criteria for the participants to participate in specialized events should be developed and shared by the Executive Secretary with the request for nomination and screening should be made to ensure the relevant specialist attending the events.**
12. **To ensure better collaboration and cooperation between the three FAO Regional Commissions it is necessary for the Executive Secretary and the Chairperson of each Commission to attend the sessions of other Commissions.**
13. **The Commission urges the government of the Islamic Republic of Iran to ensure the flexibility, as possible, to allow the transfer of funds from FAO to PPO, as it was before 2021.**
14. **The Commission urges the government of I.R. Iran to pay 50% of its accumulated arrears with the condition of lifting the rest of the arrears if this 50% payment will be made by the end of 2025.**
15. **Considering the approaching retirement of the FAO Senior Locust Forecasting Officer who is also the SWAC Executive Secretary, the Commission urges FAO to make possible smooth and quick transition to ensure the continuity of the DLIS service and SWAC Secretariat.**

33rd session of the
FAO Commission for Controlling the Desert Locust in South-West Asia (SWAC)

Opening of the 33rd session

1. The 33rd session was held for the first time again as a physical session since the end of the COVID-19 travel restrictions in Rome, Italy allowing also other participants to contribute virtually. The session was attended by up to 15 participants from member countries and FAO on the opening day.

2. Mr Shoki Al-Dobai, the Team Leader of the Locusts and Transboundary Pests and Diseases (NSPMD) Group at FAO Headquarters, welcomed all participants and opened the 33rd session of SWAC. This session commemorated the 59th year of the FAO Commission in South-West Asia, established in 1964 as the eldest among the three regional FAO Commissions. This 33rd Session was held from 18th to 20th December 2023, in Rome, at FAO headquarters, with a delay of one year due to the COVID-19 pandemic restrictions. He acknowledged the presence of almost all member countries at this Session, except for Afghanistan due to existing political circumstances, and emphasized the high importance FAO is attaching to the challenges posed by the Desert Locust.

3. In the Desert Locust upsurge from 2019 to 2021, the SWAC member countries played a significant role in the region by effectively containing the locust infestations by the end of the summer of 2020. In this context, he underscored the importance of better inter-regional collaboration and learning from each other the experience for the future benefit of safeguarding national food security and livelihoods in all of the three Desert Locust affected regions. It was recalled that the behaviour of Desert Locusts is highly shaped by various biotic and abiotic factors, including climate change, which makes their development, behaviour, and movements even more dynamic and unpredictable in future. To effectively deal with such very dynamic pests, he emphasized the need to become equally more dynamic in the development of advanced technical approaches, and more effective management systems and procedures.

4. The Team Leader expressed the commitment to review and discuss various important topics in this session, including the progress of the work plan since the last session in 2020, challenges faced during the upsurge, analysis of strengths and weaknesses of the locust management systems, and the progress about the adoption of new technologies and means for better survey and control. In addition, the importance of collaboration and cooperation between the three FAO regional commissions was stressed with a focus on joint activities and knowledge sharing. He expressed his gratitude to all attendees, both in person and online, for their participation in this session as well as the FAO colleagues for their important facilitation and support in the past.

5. Mr Keith Cressman, FAO Senior Locust Forecasting Officer at FAO Headquarters in Rome and the Executive Secretary of SWAC, welcomed the participants from the SWAC member states and FAO and appreciated everyone for taking time out of their busy schedules to come to Rome. He mentioned that he has been working in FAO for more than 36 years of which 30 years were as Executive Secretary of SWAC.

6. He highlighted the fact that the 33rd session of SWAC was again the first since the onset of the COVID-19 pandemic that could be organized, both as a normal physical as well as virtual session, and stressed the lesson learned from the pandemic that even a virtual session could offer an advantage of colleagues in SWAC and FAO participating, who otherwise would not be able to travel to a physical session, which actually could have already been done in the past, using virtual technologies.

7. He pointed out that the 33rd session will consist of technical and administrative issues, similar to previous years and emphasized the principle that each session should be held in an informal

atmosphere to allow open discussions. In this way, he encouraged all participants to make the most out of the occasion by learning, discussing openly, and making the best of the opportunity to come to good and sensible decisions and recommendations for the next two years. Finally, he wished the delegates and colleagues a successful 33rd session and a pleasant stay in Rome during the week.

8. Mr Shahbaz, the Chairperson from Pakistan, delivered his welcoming remarks and expressed his gratitude to the FAO for their support in organizing this session and wished for a fruitful outcome of the discussions that should guide the work of the Commission in the coming two years. Mr Allah Ditta Abid, the Plant Protection Advisor and Director-General, of the Department of Plant Protection, Ministry of National Food Security and Research, Pakistan, provided his remarks and thanked the Commission for allowing him to join virtually.

9. Mr J. P. Singh, Plant Protection Advisor (India), joined virtually and shared locust management and advances in the country. He highlighted the use of drones for Desert Locust control in the recent upsurge and requested the Commission to promote experience sharing within SWAC countries and other Commissions. He stressed the importance of the role of the countries to effectively control outbreaks at their onset to prevent the migration of swarms to other countries.

Elections

10. The Member Countries elected Mr Ali Babalifashki from the Islamic Republic of Iran as Chairperson of the current session and Ms Shaloo Ayri, from India as Vice-Chairperson. The elections were accepted with acclaim. A list of participants is presented in Annex 1.

11. The Executive Secretary presented a draft agenda and the timetable of the session that were adopted (Annex 2).

12. The session entrusted the drafting of the report to Mr Christian Pantenius, Desert Locust Expert, with help from the Executive Secretary.

Desert Locust early warning

Desert Locust situation (January 2021 – December 2023) and forecast to spring/summer 2024

13. Mr Keith Cressman gave a presentation that reviewed the Desert Locust situation since the 32nd session (Annex 3). He resumed the past upsurge from 2018 to 2021 in which two cyclones in 2018 eventually gave rise to a serious upsurge that eventually affected the Central Region, East Africa, and southwest Asia.

14. He then gave a presentation on the Desert Locust population developments and the ecological conditions month by month since 2021.

15. In January 2021, there were no sightings of locusts. However, by February, some swarms were present in the interior of Saudi Arabia and some invaded southwest I.R. Iran by March, but without any further migration towards the southeast. As temperatures increased in April, groups of hoppers began appearing, with some hoppers present in May. In May, only a few hoppers and groups remained in Iran. Control operations were done from March to May by ground. Contrary to expectations, there was no locust presence observed during the summer monsoon period, nor during the subsequent winter season.

16. In January 2022, there were a few sightings of hoppers in Pakistan. Despite some good rains and green vegetation, there was a decline in locust activity in April–May 2022 a clear sign of a recession. From June to October 2022, there were no reports of locusts in India and Pakistan, marking a two-year absence of summer breeding in the region.

17. By April 2023, some locust infestations were spotted in the coastal and interior areas of southwest Pakistan. In May, towards the end of spring 2023, no locusts were observed. A cyclone occurred in June in India and Pakistan, followed by the beginning of the monsoon season and a few adults in Rajasthan, India. The effects of irrigation and vegetation growth along the canal in western India became obvious where locust breeding took place and control operations were conducted in August near the border of Pakistan. By September 2023, no locust activities were anymore observed in the SWAC region for the rest of the year.

18. In his presentation on cyclone incidences during 2021–2023, the Executive Secretary pointed out that two cyclones affected the SWAC region in 2021 and one in 2023, but with no significant effects on the locust population growth. As a result, the Desert Locust situation in the SWAC region remained calm for three years.

19. The forecast for the spring/summer of 2024 depends on predicted rainfall, vegetation growth, locust numbers and the success of survey and control operations. The most recent model forecasts indicate that no significant developments are expected during the upcoming winter season, spanning from December to February, due to cold weather conditions with less rain than normal. However, some uncertainty remains regarding the precipitation outlook and locust developments for the northern Red Sea coast in southeast Egypt and northern Saudi Arabia, which could affect the southwestern coast of I.R. Iran. The country was therefore encouraged to start surveys in this area by February 2024 (Annex 4).

20. During the spring season, starting from April, less rains than normal are expected in Pakistan and India, and as the El Niño phenomenon is weakening, no major locust developments are likely to be expected in the SWAC region. However, the cyclone period needs to be observed that could potentially affect Rajasthan in India as well as Pakistan, particularly the Horn of Africa and Yemen. The monsoon period starting end of June, is expected to be more or less normal with some more rains and consecutive locust infestations.

21. As a result, the likelihood of an upsurge during the first half of 2024 is excluded. However, perhaps small, localized outbreaks in one country may occur, which should be relatively easy to keep under control. In addition, climate change makes it increasingly difficult to make accurate forecasts, it is consequently important to watch the rainfall carefully.

Joint Surveys and Border Meetings (2021–2023)

22. The Executive Secretary also gave an overview of the Desert Locust joint surveys conducted in the spring breeding areas along the border between I.R. Iran and Pakistan during the period from 1995 to 2023. Usually, such surveys are conducted annually in April for about three weeks and are considered one of the primary activities of SWAC to assess the situation and use results for the planning of operations for the upcoming summer period in India and Pakistan. The I.R. Iran and Pakistan surveys suggested improvements in the next survey.

23. In 2019, one joint team conducted surveys over 10 960 km in 28 days and detected more Desert Locust groups and swarms in I.R. Iran than in Pakistan, which was the beginning of the most serious upsurge in the past 25 years.

24. At the same time, the COVID-19 pandemic started, and no joint surveys could be carried out due to the imposed restrictions. Consequently, two separate teams in both countries conducted surveys in 2022 over a distance of 9 328 km in I.R. Iran for 21 days and 7 665 km in Pakistan for 23 days. Due to the poor rainfall and sparse vegetation, only very few adults and hoppers were detected on both sides of the border, indicating no significant developments (Annex 6).

25. The Executive Secretary indicated that in 2023, and after the COVID-19 pandemic ended, no joint surveys were conducted, but recommended:

    - To establish one joint team provided with sufficient local assistant staff;
    - To change a few of the itineraries;

- The team members should be nominated well ahead of the survey;
- Local and experienced drivers (at least one of them be a mechanic) should join the survey team, capable of taking photos of the habitats and locusts;
- eL3mPRO should be used by the survey team with eL3 as a secondary option;
- I.R. Iran payment difficulties of DSA/GOE should be resolved;
- The possibility of using another border crossing on the coast should be explored.

26. With regards to the joint border meetings between India and Pakistan, the Executive Secretary informed the session that the last physical meeting took place in 2019. Due to the COVID-19 restrictions, it was not possible to organize such joint meetings in 2020 and 2021. But one physical meeting took place again in November 2022 involving Desert Locust heads and military staff, and only a few virtual meetings in 2023. As for 2024, FAO should initiate the process for the next joint border meetings in January 2024.

Information and reporting

27. Concerning locust information and reporting it was indicated that 95 033 records were collected between 2019-2020 during the upsurge as compared to the period 2021–2023 when only 77 423 observations were recorded in RAMSES, signifying a recession. It was advised to improve reporting to meet national requirements in collaboration with other countries and DLIS.

28. As far as locust RAMSES data collected during the period from 2021 to 2023 is concerned, the session acknowledged with satisfaction the excellent performance of the survey and control teams in I.R. Iran, Pakistan, and India (Annex 5). As a result, control operations were conducted successfully and at the right time.

29. The question was raised about how to continue and sustain the training of the national Desert Locust information officers (DLIO) in the future because of the high staff turnover, and how to share the knowledge and experience for training of staff in the region. It was therefore recommended that each frontline country be requested to have at least a second national Desert Locust information officer because of better succession planning and DLIOs in all countries to undergo comprehensive training and retain their positions within their locust departments for a minimum of 10 years.

Recommendation 1. Regarding the Iran/Pakistan joint survey, (a) the improvement suggested by the 2022 Joint Survey should be implemented, (b) the Executive Secretary should initiate the process for the next joint border surveys between I.R. Iran and Pakistan by the beginning of January 2024, and (c) the Executive Secretary to write to both countries about continue emphasizing on the importance of regular joint border surveys.

Recommendation 2. Regarding the India/Pakistan joint border meetings, the Executive Secretary should write every year to both countries about a physical meeting every month from June to November.

Recommendation 3. The frontline countries are requested to have at least a second national Desert Locust information officer because of better succession planning, and DLIOs in all countries to undergo comprehensive training and retain their positions within their locust departments for a minimum of 10 years. If transferred, the DLIO should be replaced by another DLIO immediately.

The uptake of new innovations

eLocust3mPRO

30. Mr Keith Cressman provided an overview of the advances made to develop data recording systems since 2015 of *eLocust3, eLocust3m*, *eLocust3g,* and *eLocust3w* to allow national survey and control officers and field staff in frontline locust-affected countries to record observations and transmit the data from the field to their respective national locust centres.

31. In his presentation, he pointed out the advantages and disadvantages of each of the data recording and transmission tools developed so far and highlighted the comparative benefits of the latest app, *eLocust3mPRO*, released in 2021.

32. The *eLocust3mPRO* application can be used with all types of mobile phone operating systems and can be handled easily also by assigned field staff. It provides the most cost-effective and comprehensive facility to record, view and transmit locust information directly into the central RAMSES database of the national locust information officers. The *eLocust3mPRO* application was thus highly recommended.

33. The Executive Secretary pointed out that *eLocust3mPRO* has successfully been introduced in the SWAC region. Since 2022, eLocust3mPRO has become the primary data recording and transmission device in I.R. Iran, India, and Pakistan. Meanwhile, the other FAO regional locust commissions are gradually moving towards adopting this new technology.

34. Ms Shaloo Ayri, the delegate from India, emphasised the advantages of opting for eLocust3mPRO in the Locust Warning Organization (LWO) over the eLocust3 tablets by outlining the benefits and drawbacks of each app. This ultimately highlighted elocust3mPRO as the comparatively more cost-effective option with superior performance.

Recommendation 4. The frontline countries be encouraged to use eLocust3mPRO rather than eLocust3 due to its advantages of cost-effectiveness and better performance.

RAMSES

35. With regards to the recent technical developments of the central RAMSES (*Reconnaissance and Management System of the Environment of Schistocerca*), Mr Mehdi Ghaemian, Desert Locust Expert from I.R. Iran, informed the meeting that RAMSES has originally been developed to help national Desert Locust information officers (DLIOs) in locust-affected countries to store and manage locust data that has been collected by the field teams during survey and control operations.

36. This data is being registered and transmitted by using advanced applications such as *eLocust3* and *eLocust3mPRO*. The field data is imported automatically into RAMSES and can be displayed using overlays of different static and dynamic maps and satellite imagery etc, and dynamic imagery comprising individual layers of rainfall estimates, MODIS imagery, and greenness maps as well as separate layers that contain the locust data for each of the locust stages.

37. The current version of RAMSES (Rv4.1) was launched in 2015, which means that the technology is becoming obsolete soon. Although Rv4.1 is so far still working well, some of the OpenJUMP open-source GIS functions are no longer supporting it. Most of the custom applications have a lifetime of about six years. Therefore, it is essential to use the latest technologies for RAMSES.

38. New GIS engines are nowadays available, which are faster, more accurate and have more functions that could be applied in a new RAMSES version (Rv5). By using the QGIS functions, upcoming locust observations would become more plausible and compatible with the central SWARMS database and GIS at FAO HQ. The main idea behind Rv5 is to analyze data rather than only store it (Annex 7).

39. The question was raised of which RAMSES version would eventually be preferred by the countries and reference was made to the DLIO workshop held in Sharm El Sheik, Egypt, in May 2023, where the Rv5 was presented and strongly recommended as future technology by the participants.

Recommendation 5. The RAMSES (Rv5) should be developed and used by the frontline SWAC countries including training, improvement, and maintenance.

dLocust

40. Mr Mohamed Lemine Hamouny, Executive Secretary of CLCPRO, virtually discussed the development of drone technology (*dLocust*) in Desert Locust management. The Desert Locust Information Service (DLIS), along with the FAO Regional Commissions for Controlling the Desert Locust in the Western Region (CLCPRO) and the Central Region (CRC), initiated the process to explore the options for utilizing the drones as an advanced data collection tool. The intention was to use drone technology to detect and potentially control Desert Locust infestations in extremely remote areas that are difficult to access, ensuring they do not go unnoticed or unmanaged.

41. After several on-site and online technical meetings, the draft technical specifications for the drone for locust survey have been developed, followed by an international call for expression of interest of potential suppliers. The customization of functionalities and improvements required were identified through several field-testing exercises carried out in CLCPRO and CRC that finally resulted in a fully developed and operational fixed-wing drone prototype provided by HEMAV foundation from Spain for locust survey was used for the first time in 2021. Nowadays, 16 drones have been acquired by CLCPRO and have been used in survey operations by Mauritania and other member countries, and seven drones have been acquired by CRC member countries (Saudi Arabia, Sudan, and Ethiopia).

42. While drones were operationally in CLCPRO, the issue of improvement of the visual camera and data transmission systems needs to be addressed.

43. With the aim to expand the options of drone technologies and suppliers with enhanced performance and capacity, a second international call for expression of interest was released in 2022 and field testing with two offered drone prototypes was carried out in Oman in January 2023. These two types will undergo further customization to fully fit the goals.

44. In order to support FAO's efforts in introducing and boosting the use of drone technology for locust survey and control operations, an independent advisory group of experts, the Locust Drone Technology Advisory Group (LDAG), was established in 2022. The LDAG is an independent voluntary group of senior experts that provides support and advice to the Locust and Transboundary Plant Pests and Diseases Team (NSPMD) and the Desert Locust regional commissions on the development and operation of drone technology for locust survey and control operations.

45. The group with the support of the FAO and regional commissions team developed technical specifications for a rotary drone prototype for locust control. An international call for expression of interest has been launched by the FAO procurement service based on the developed TS. Offers received for drones for locust control were reviewed and field testing of drone prototypes of prequalified companies will be carried out in February 2024.

46. The discussion raised some pending constraints to be considered such as the absence of the regulations for the use of drones in many countries and the necessary permissions from the governments in the respective countries for using this technology. Also, the lifespan of the batteries needs to be enhanced to improve the practical use of drones under operational conditions.

Recommendation 6. The Executive Secretary should ensure continuous collaboration and coordination with the CLCPRO and CRC for more engagement of SWAC countries to benefit from the experience of the *dLocust* technology in both regions.

Biocontrol

47. Mr Shoki Al-Dobai gave a presentation on the issue of alternative control options to chemical pesticides in locust control and their comparative advantages and disadvantages (Annex 8).

48. In recent years, people around the world have raised growing concerns about the significant risks that non-selective conventional insecticides used for locust control pose to animal and human health, as well as to the environment in general. This has led to the prohibition of an increasing number of chemical pesticides for pest control in many countries and a shift towards researching environmentally safer control options.

49. The development of more selective alternatives, such as biopesticides, took more than 30 years of research and resulted eventually in commercial products based on the fungus *Metarhizium acridum*. These products offer effective eco-friendly and very specific solutions against locusts without harming non-target organisms or the environment. However, limited awareness of its actual effects and cumbersome registration processes, such as the difficulties in carrying out mortality assessment trials in the field, hampered so far its broader use in locust-affected countries.

50. FAO has been advocating and practising the use of biopesticide through workshops, field demonstrations and operational applications, based on *Metarhizium,* since the late 1990s with increasingly positive results.

51. After some discussions, the Session concluded to encourage the progress on biopesticide registration in SWAC countries, addressing the registration challenges, and proposing appropriate policies to encourage broader acceptance of biopesticides in locust control.

52. Mr Shahbaz, the delegate from Pakistan, requested the help of FAO for the capacity building on the lab analytical methods of biopesticides and the evaluation of registration applications based on the FAO guidelines and tools for biopesticide registration.

Recommendation 7. SWAC countries are urged to advance the biopesticides registration process, use and report on the progress made at the Commissions meetings.

Recommendation 8. The Executive Secretary should provide necessary training on the use of biopesticides for SWAC countries, and the capacity development needed for Pakistan to carry out laboratory analysis and registration process.

Improving Desert Locust management

53. Mr Mohamed Lemine Hamouny presented a brief presentation of the CLCPRO commission with the ten member countries (Algeria, Burkina Faso, Chad Libya, Mali, Mauritania, Morocco, Niger, Senegal, and Tunisia) that were established in 2002. The Commission aims to promote national and regional collaboration to enforce preventive control and to deal with Desert Locust invasions in West and Northwest Africa through (a) strengthening the institutional capacity by the creation of autonomous locust units and (b) securing the financial mechanisms for the operation of the Commission through the obligatory contribution of the trust fund and voluntary contribution of an emergency fund in addition to extra-budgetary resources, i.e. current three million research project funded by the French Development Agency. The CLCPRO Executive Secretary presented the capacity development programmes and new tools and technologies being recently supported or developed by the Commissions: (i) development of contingency plan at national and regional level, (ii) a Monitoring System of National Locust Control Mechanisms (SVDN) that allows countries and CLCPRO's secretariat to have a real-time the situation of all human and materiel resources available for locust control through a web database, (iii) a monitoring and evaluation system to improve continually the implementation of normative activities, (iv) a list of environmental requirements to evaluate the performance in respecting the human and environmental health standard, and (v) CLCPRO's 2023–2027 regional training plan that focus on regional training-of-trainers, national training, long individual training such as master degree and specialized technicians on locust sciences and concerning the technical innovation. CLCPRO is

engaged with the other commissions in introducing drone technologies and improving data tools collection and management that was done by DLIO.

54. CLCPRO has organized ministerial meetings since 2009, which resulted in the tripling of the annual member contributions to the current annual contribution of USD 632 000. The Regional Funding for Locust Risk Management (FRGRA) was set up in 2018 by 6 out of the 10 member countries with a current balance of USD 3 million. An Intervention Force (*Force d'intervention dans la region occidentale, FIRO*) was established to rapidly respond to major outbreaks in the region. It is composed currently of 32 4WD vehicles and 16 drones based along two bases in Chad and Mauritania. Lastly, good progress has been achieved so far in promoting biological control such as registration in eight of the countries and the procurement of 1.5 tons for the benefit of the countries in which the biopesticides are registered.

55. Mr Shoki Al-Dobai presented a brief presentation of the FAO Regional Commission for Controlling the Desert Locust in the Central Region (CRC) on behalf of the CRC Executive Secretary. The CRC was established in 1965 and has 17 member countries (Bahrain, Djibouti, Egypt, Eritrea, Ethiopia, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, United Arab Emirates, and Yemen). The Commission's role is similar to CLCPPRO and SWAC where the three commissions play a crucial role in FAO's worldwide early warning system. As a result of the activities carried out, member countries have made significant strides in establishing and strengthening their national preventive management capabilities. In 2022, a Master of Science Program in Desert Locust Management was created, and the programme was established in cooperation with CLCPRO at the Hassen Institute in Morocco. Seven students from CRC member countries (Egypt, Eritrea, Ethiopia, Saudi Arabia, Syria, Sudan, and UAE) will join the first academic year in 2023/2024.

56. Mr Shoki Al-Dobai raised the question of the appropriate approaches to further strengthening the national early warning system and rapid response capacities for emergency prevention.

57. He pointed out that the usual observation after a locust upsurge or plague ends is that the national capacities and capabilities are deteriorating rapidly during recessions as governments give less attention to the Desert Locust problem and its prevention. Consequently, the reactions at the onset of an upsurge are initiated usually too late and in an uncoordinated manner to achieve a significant impact on locust infestations and risks end up in a crisis, which is weakening coordinated response actions and management of staff and logistics even further.

58. During the discussion, Ms Shaloo Ayri gave an overview of arrangements implemented in India to maintain and further enhance the preventive Desert Locust management strategy in the country and various tactics. Some key components highlighted include regular:

    - Maintenance and repair of equipment;
    - Staff training programmes;
    - Surveys even during recessions to monitor locust developments and their habitats;
    - Mock exercises to practice various techniques, tactics, and response strategies to locust outbreaks, which are carried out twice per year and help check the preparedness level and identify gaps in the response system;
    - Indo-Pakistan border Meetings to coordinate joint actions between both countries;
    - Locust awareness campaigns to raise awareness among the local communities about locusts, their behaviour, and the measures taken in case of outbreaks in which the local population can help in early reporting and effective response;
    - Annual updating of the national contingency plans.

59. These initiatives collectively contribute to a more proactive and coordinated approach to managing Desert Locusts in India, emphasizing preparedness, training, cooperation, and awareness among stakeholders involved in combating locust invasions.

60. The Session highly appreciated the well-organized preventive management efforts in India and encouraged the other member countries to learn from this illustration.

61. The delegates indicated that they have contingency plans and shared information on their locust management programmes on preparedness (Annex 9).

62. The session enquired about the possibility of having reports and other technical material developed by the other two commissions (CRC/CLCPRO) in the English language to be shared with SWAC countries.

63. The session emphasized the importance of the stability of the professional staff and the quick replacement of the outgoing staff with new ones to avoid any technical gaps in the locust management units. It was pointed out the importance of maintaining regular training programmes and having the technically proper and specialized staff members attending the relevant capacity development programmes provided by the Commission to ensure the sustainability of the technical capacity and maximum benefit to the locust management unit. Lastly, if possible, technical reports and material from other locust commissions could be available in English. From the results of the discussion, some recommendations were made.

Recommendation 9. The technical reports or materials produced by other Commissions in other languages may be made available in English, as possible, for the benefit of the SWAC countries.

Recommendation 10. All countries should update their contingency plans annually and share them with the Executive Secretary.

Recommendation 11. The SWAC countries should ensure that relevant and specialized staff are nominated to participate in trainings and workshops organized by the Commission. Criteria for the participants to participate in specialized events should be developed and shared by the Executive Secretary with the request for nomination and screening should be made to ensure the relevant specialist attending the events.

Recommendation 12. To ensure better collaboration and cooperation between the three FAO Regional Commissions, it is necessary for the Executive Secretary and the Chairperson of each Commission to attend the sessions of other Commissions.

Recommendations of the 32nd session

64. The participant reviewed the progress of the 21 recommendations made by the 32nd session, including carryover of previous sessions and several new recommendations. This included the further strengthening of national capacities, developing a SWAC dashboard, registering biopesticides, extending the deadline for I.R. Iran to pay half of its arrears, and encouraging SWAC countries to meet their financial obligations to SWAC and Desert Locust Control Committee (DLCC). Of these recommendations, seven were completed, nine were partially completed, and five with no action was done since 2021.

65. It was agreed that the following 32nd session recommendations should be carried over during the next biennium, with amendments, and reflected in the work plan:

- The annual Iran/Pakistan joint survey should continue, and the process should be initiated by the SWAC Secretariat and countries five months in advance (Recommendation 3, SWAC32);
- One locust officer each from Afghanistan and India is suggested to join the portion of the Iran/Pakistan Joint survey that is carried out on the coast of I.R. Iran (Recommendation 4, SWAC32);
- The Indian/Pakistan Joint border meetings should resume as soon as possible under the auspices of FAO SWAC and in the presence of the Executive Secretary. An official letter to be sent by FAO management to both countries to facilitate the meeting on borders (Recommendation 5, SWAC32);

- FAO should develop a module, rather than a dashboard, in eL3mPRO as part of a comprehensive locust management system for the SWAC member countries that would assign tasks to survey, control and efficacy teams (Recommendation 14, SWAC32);
- All countries are requested to assume their financial obligations to SWAC in a timely and regular manner and inform the Executive Secretary accordingly (Recommendation 16, SWAC32);
- All countries are requested to assume their financial obligation to DLCC in a timely and regular manner and inform FAO accordingly (Recommendation 17, SWAC32).

Financial health of the Commission

66. Since the last 32nd session, the annual contributions were received from India and Pakistan with no arrears up to December 2023 in the India account and USD 27 798.55 arrears in the Pakistan account. No annual contribution was received from Afghanistan since 2019, which makes the outstanding amount of the country USD 16 500. No change in the status of the contributions of I.R. Iran with no contribution received up to December 2023.

67. By December 2023, without counting the I.R. Iran, the level of arrears had increased from 16.2% to 19.72% with arrears of USD 13 741 in 2023 compared to USD 11 291 in 2021 from Afghanistan and Pakistan. India has no arrears. Nevertheless, the arrears of the I.R. Iran have increased and reached a total value of USD 494 971.03 with no contributions at all since 2017. As of 12 December 2023, the total outstanding amount of the TF account is USD 539 269.58. More details of the status of the contribution of each country to the SWAC TF for the last five years can be found in Annex 10.

68. The total income from 2021–2023 member contributions amounted to USD 212 745.79. The total expenditure for 2021–2023 was USD 159,114.77 of which USD 91 330.57 was charged against the SWAC Trust Fund and USD 67 784.20 was paid by FAO Regular Programme support. As of 11 December 2023, the balance of the SWAC Trust Fund is USD 532,212.47. The summary of the financial health of the SWAC Trust Fund for the last five years (annual expenditure, balance, and income) is presented in Annex 10 of the SWAC TF.

Accounts for 2021–2023

69. The Executive Secretary presented the final accounts for 2021–2023 (Annex 10). The total income from 2021–2023 member contributions amounted to USD 212 745.79. The total expenditure for 2021–2023 was USD 159,114.77 of which USD 91 330.57 was charged against the SWAC Trust Fund and USD 67 784.20 was paid by FAO Regular Programme support. About the 2021–2023 budget approved at the last session (USD 432 311), there was an underspending of USD 340 980.43, mainly due to the following reasons:

    (a) Unpaid cost for the Iran/Pakistan Joint Survey 2022 which amounts to USD 16 765. FAO still trying to find a solution to pay the participants and the team leader for these costs.

    (b) Some activities and procurements were funded by the regular programme CTA fund which is an important saving on the SWAC TF.

    (c) Some activities were not undertaken by the countries like Pakistan still needs to procure VHS Air Band transceivers. FBA was sent to the FAO regional office but still no action has been taken. Similarly, no action was taken by Pakistan for the printing of the SOP and the translation and the printing of the DLMTM since this is no longer needed by the country.

    (d) Some activities did not take place at all as they were difficult to implement like the IRN survey exchange in Oman, the Master Trainer ToT regional workshop in Turkey and some procurement activities like the survey kits.

70. As of 20 December 2023, the balance of the SWAC Trust Fund was USD 450 000. This is the budget available for the planning of 2024–2025 SWAC activities.

71. By the end of 2023, without counting the I.R. Iran, the level of arrears had increased from 16.2% to 19.72% with arrears of USD 13 741 in 2023 compared to USD 11 291 in 2021 from Afghanistan and Pakistan. India has no arrears. Nevertheless, the arrears of the I.R. Iran have increased and reached a total value of USD 494 971.03 with no contributions at all since 2017. In 2021, annual contributions were received from India (USD 84 394.34) covering all its arrears and a partial contribution from Pakistan (USD 17 884.45). Annual contributions were received in 2022 from India (USD 40 500) and a partial contribution from Pakistan (USD 14 033), and in 2023 from India (USD 40 500) and a partial contribution from Pakistan (USD 15 424). It was noted that no contributions were received from Afghanistan from 2020 and no contribution from I.R. Iran.

Recommendation 13. The Commission urges the government of the Islamic Republic of Iran to ensure the flexibility, as possible, to allow the transfer of funds from FAO to PPO, as it was before 2021.

Recommendation 14. The Commission urges the government of I.R. Iran to pay 50% of its accumulated arrears with the condition of lifting the rest of the arrears if this 50% payment will be made by the end of 2025.

Work plan for 2024–2025

72. The Commission delegates identified their priorities for expenditure in 2024–2025 including the standard and new items and agreed on a total expenditure with support costs of USD 451 322 (Annex 11).

(a) Standard expenditures

IRN/PAK Joint Survey. This includes a joint survey consisting of a single Iran/Pakistan team during April each year and includes one locust officer each from India and Afghanistan in the coastal portion of the Iranian joint survey between Chabahar and Bandar Abbas.
Session travel and GOE. The Trust Fund will support the participation of the person responsible for the national locust programme in each member country at the 34th session of SWAC.
eLocust3 transmission. The Trust Fund will cover the costs associated with activation and monthly data transmission and subscriptions for eLocust3 in the three frontline countries, if needed, in 2024 since most countries use eL3mPRO instead.
National training. The Trust Fund will support more national training workshops in 2024–2025 upon request by the member country including workshop dates, participants, trainers, subjects, and detailed budget. A report should be prepared by the country for each workshop.
CLCPRO/CRC/SWAC interregional Locust Information Officer workshop. The Trust Fund will support the participation of two designated national locust information officers from the three frontline countries that use RAMSES GIS regularly at the annual interregional CLCPRO/CRC/SWAC workshop in 2025.
SWAC regional Locust Information Officers workshop. The Trust Fund will support the participation of two designated national locust information officers from the three frontline countries that use RAMSES GIS regularly at an annual regional SWAC workshop to be held in Dubai or Rome.
DLCC. The Trust Fund will support the participation of one person in each member country who is responsible for the national locust programme at the 43rd session of the DLCC to be held in 2025.
New technology support. Financial and technical support for updating RAMSES GIS functionality and other innovative technologies that may arise.

(b) New expenditure

National mock exercise for preparedness. The Trust Fund will support every year a surprise mock exercise in each country to test the national contingency plan and preparedness.

Promotion of biopesticides. The Trust Fund will contribute to addressing the registration challenges and proposing appropriate policies to encourage broader acceptance of biopesticides in locust control in the frontline countries.
Capacity building of biopesticide for Pakistan. FAO will provide support to Pakistan to improve lab analytical methods for biopesticides and evaluate registration applications based on FAO guidelines and tools.
eL3mPRO tasking module. The Trust Fund will help to cover the costs of developing a module in eL3mPRO that would expand the ability to improve more information about different survey and control officers and their operations, which would present a holistic, regional view while containing comprehensive details for every country to meet national needs.
Contingency plans training with CRC support. Whenever there is a workshop in CRC, SWAC should come so that both commissions can learn about the different updated contingency plans.
Drone training for locust survey with CRC and CLCPRO. Workshop, field-testing, and training should occur in 2024 with the other two commissions about the benefits and experience of the *dLocust* technology.
Environmental, Health and Safety Standards (EHSS). Locust management officers from SWAC countries (Iran and Pakistan) could join and benefit from the exercises implemented by CRC.
Spraying maintenance training for India. An expert from CRC should be assigned to support India and deliver training on sprayer maintenance.
RAMSESv5. The delegates agreed that the latest technology and open-source functions for RAMSES be developed based on the SWARM GIS and the GIS engine and database change from OpenJUMP Rv4.1 to QGIS in Rv5, which will take about one year. This was also agreed and recommended in the DLIO workshop in Sharm El Sheik, Egypt (May 2023).
RAMSESv5 maintenance. Once there is the first version of Rv5, training and maintenance are needed every year.
Desert Locust information officer MacBook laptop. The frontline countries should change to the latest Apple MacBook laptop every six years or so. The last ones were in 2017.

Any other matters

73. The delegates questioned the FAO about the plan for the replacement of the FAO Senior Locust Forecasting Officer who is also the SWAC Executive Secretary, considering the approaching retirement date. Mr Shoki Al-Dobai informed the delegates that plans are in progress to have a quick and smooth transition to ensure continuity of the Commission's Executive Secretary and the FAO DLIS.

74. The delegates and Mr Shoki Al-Dobai highly appreciated the work and valuable support that has been provided by Mr Keith Cressman for more than 36 years to the SWAC member countries and the global Desert Locust community.

Recommendation 15. Considering the approaching retirement of the FAO Senior Locust Forecasting Officer who is also the SWAC Executive Secretary, the Commission urges FAO to make possible smooth and quick transition to ensure the continuity of the DLIS service and SWAC Secretariat.

Date and place of the next session

75. Due to the constraints faced in organizing the session in one of the member countries, the Commission agreed to have the next session to be held during the first week of December 2025 in Dubai, United Arab Emirates, with alternatively in Rome, Italy.

Annex 1. List of participants

INDIA Locust Warning Organization, Ministry of Agriculture & Farmers Welfare

Shaloo Ayri Bhardwaj	Deputy Director (DD) Faridabad
Virendra Kumar	Assistant Director (PP) Jodhpur
J.P. Singh **(virtual)**	Plant Protection Advisor Faridabad

I.R. IRAN Plant Protection Organization, Ministry of jihad-e Agriculture

Ali Babalifashki	Head of Common Pest Group Tehran
Fariborz Shohraty	Pesticide and Spraying Expert Bandar Abbas

PAKISTAN Department of Plant Protection, Ministry of National Food Security and Research

Shahbaz	Asst. Entomologist (Locust) Karachi
Allah Ditta Abid **(virtual)**	Plant Protection Advisor and Director General, Karachi

FAO

Shoki Al-Dobai	Team Leader, NSPMD HQ
Keith Cressman	Senior Locust Forecasting Officer Executive Secretary SWAC HQ
Ludovica Tunetti	Office Assistant HQ
Safa Gritli	Programme Assistant HQ
Teopista Mutesi	Comm and Outreach Specialist HQ
Christian Pantenius	Desert Locust Expert Bruxelles, Belgium
Mehdi Ghaemian	Desert Locust Expert Tehran, I.R. Iran
Nasser Al-Harthy	Desert Locust Info Expert Muscat, Oman
Mohamed Lemine Hamouny (virtual)	Executive Secretary CLCPRO Algiers, Algeria
Hichem Dridi (virtual)	Programme Officer Algiers, Algeria
Mamoon Al-Alawi (virtual)	Executive Secretary CRC Cairo, Egypt
George Ongamo (virtual)	Locust Management Expert Nairobi, Kenya
Habibullah Safi (virtual)	Social/Environmental Assistant Kabul, Afghanistan
Shah Mahmood Sadeed (virtual)	Plant Protection Specialist Kabul, Afghanistan
Rajesh Dubey	Op/Programme Specialist New Delhi, India

Annex 2. Agenda

Opening

1. Opening of the session
2. Election of the Chairperson and Vice-Chairperson of the Commission
3. Adoption of the agenda
4. Election of the Drafting Committee

Technical issues

5. Desert Locust early warning
   a) Situation (January 2021 – December 2023) and forecast to spring/summer 2024
   b) Joint Surveys and Border Meetings (2021–2023)
   c) Information and reporting
6. The uptake of new innovations
   a) eLocust3mPRO
   b) RAMSESv5
   c) dLocust
   d) Biological control
7. Improving Desert Locust management

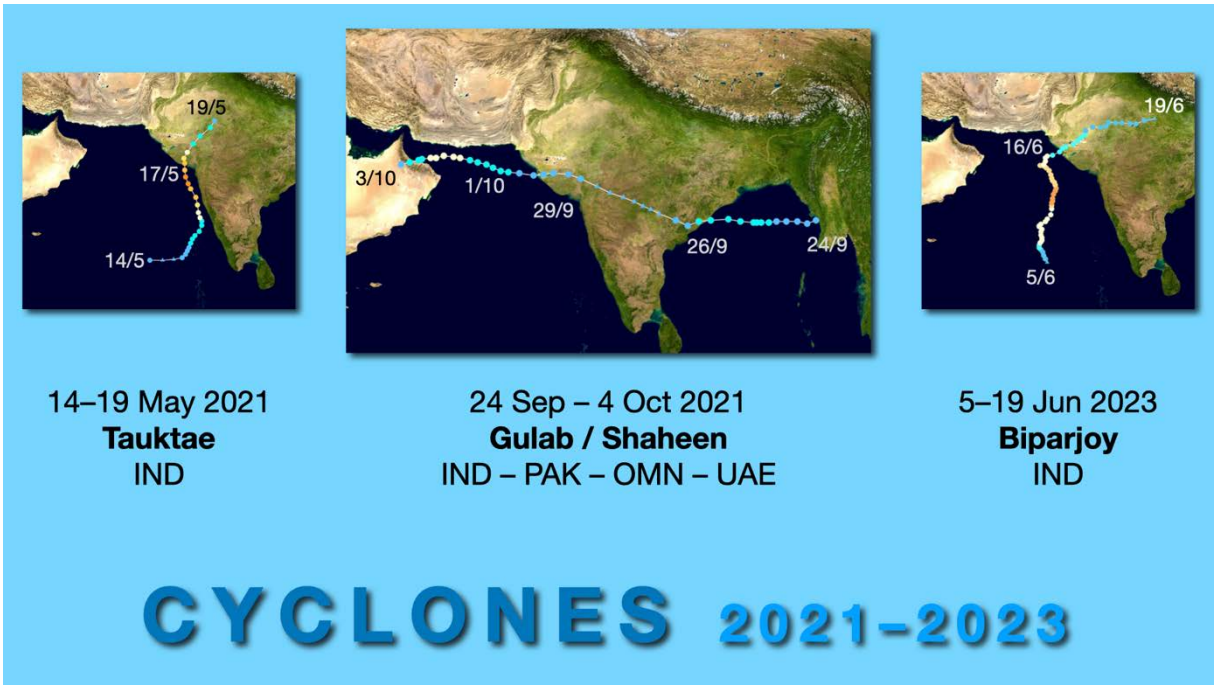
Administrative issues

8. Recommendations of the 32nd Session of the Commission for Controlling the Desert Locust in South-West Asia: review and progress made
9. Financial health of the Commission
10. Accounts for 2021–2023
11. Work plan for 2024–2025
12. Any other matters
13. Date and place of the next session

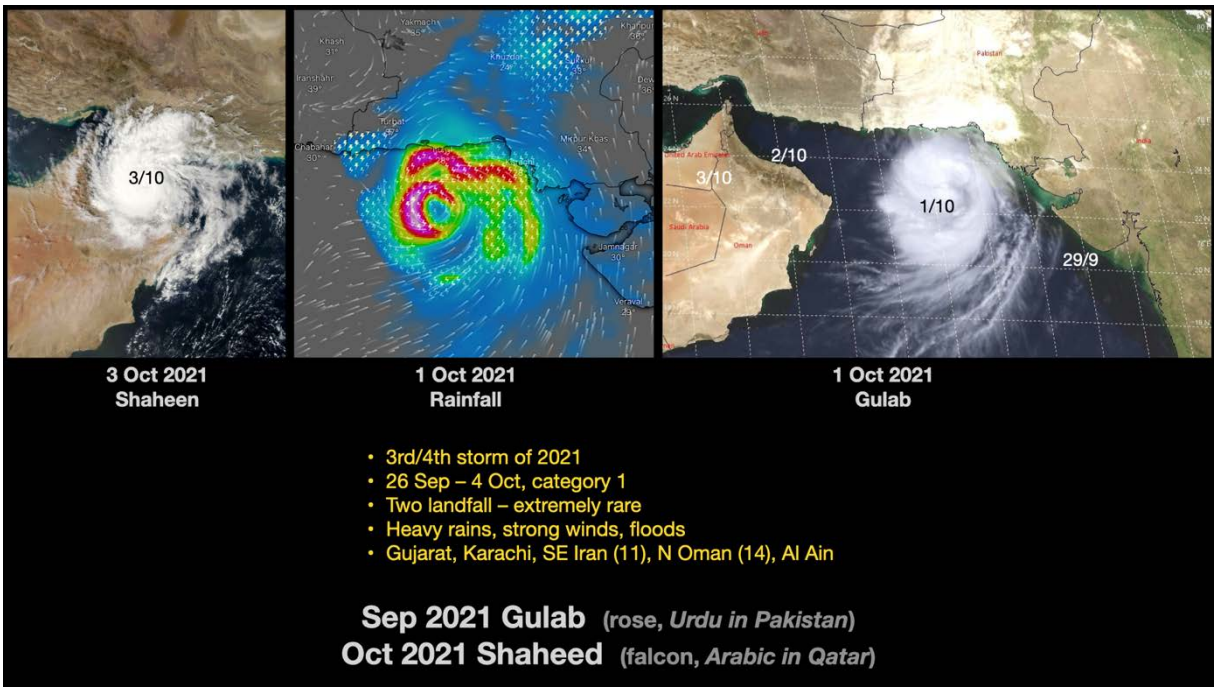
Closing

14. Adoption of the report
15. Closing

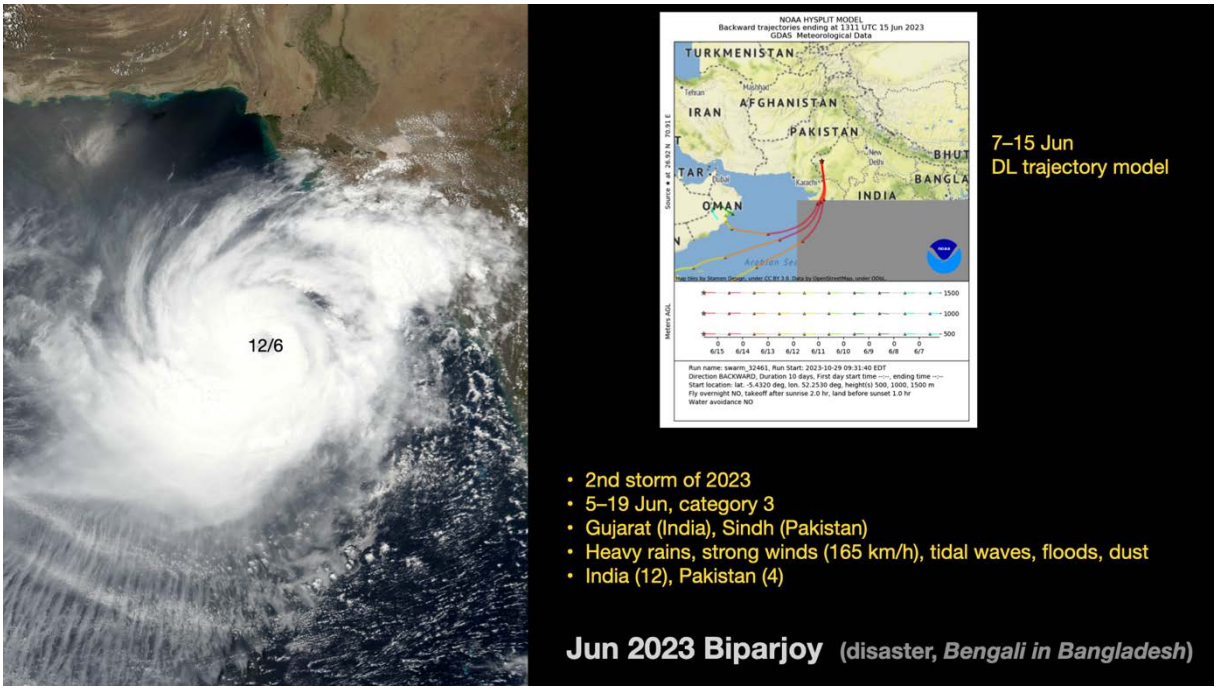
Annex 3. Desert Locust situation (2021–2023)



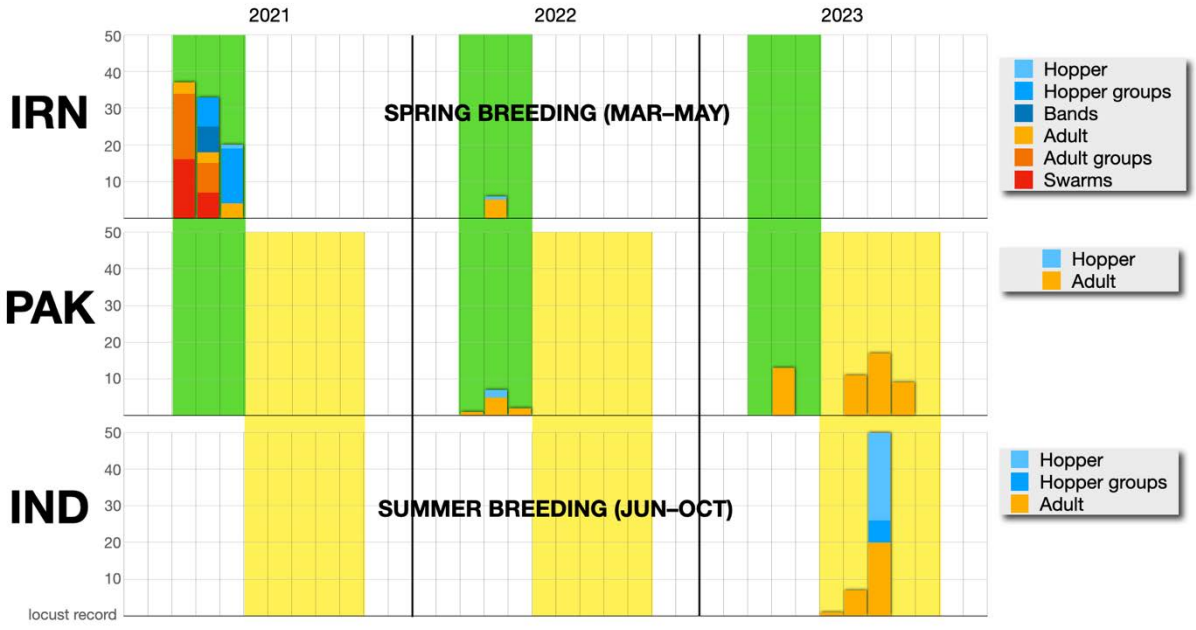
2021–2023. There were a few cyclones in southwest Asia during May 2021 (India), September/October 2021 (Pakistan), and June 2023 (India).



October 2021. There was a cyclone but no locusts since it was the end of the summer in SWAC where there was no locust or breeding. Sometimes, cyclones do not cause problems for locusts.

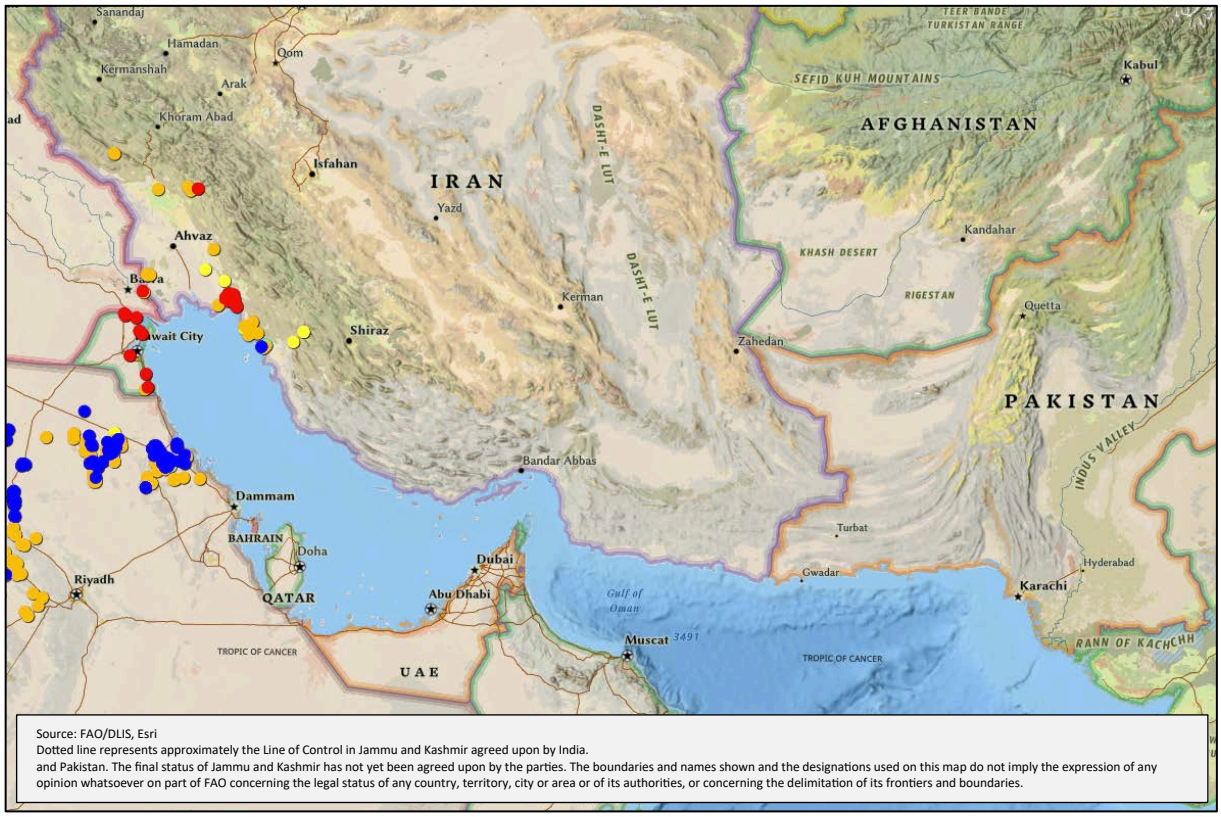


June 2023. Locust breeding started immediately in parts of Rajasthan, India which was about 500 km north of the cyclone landfall.



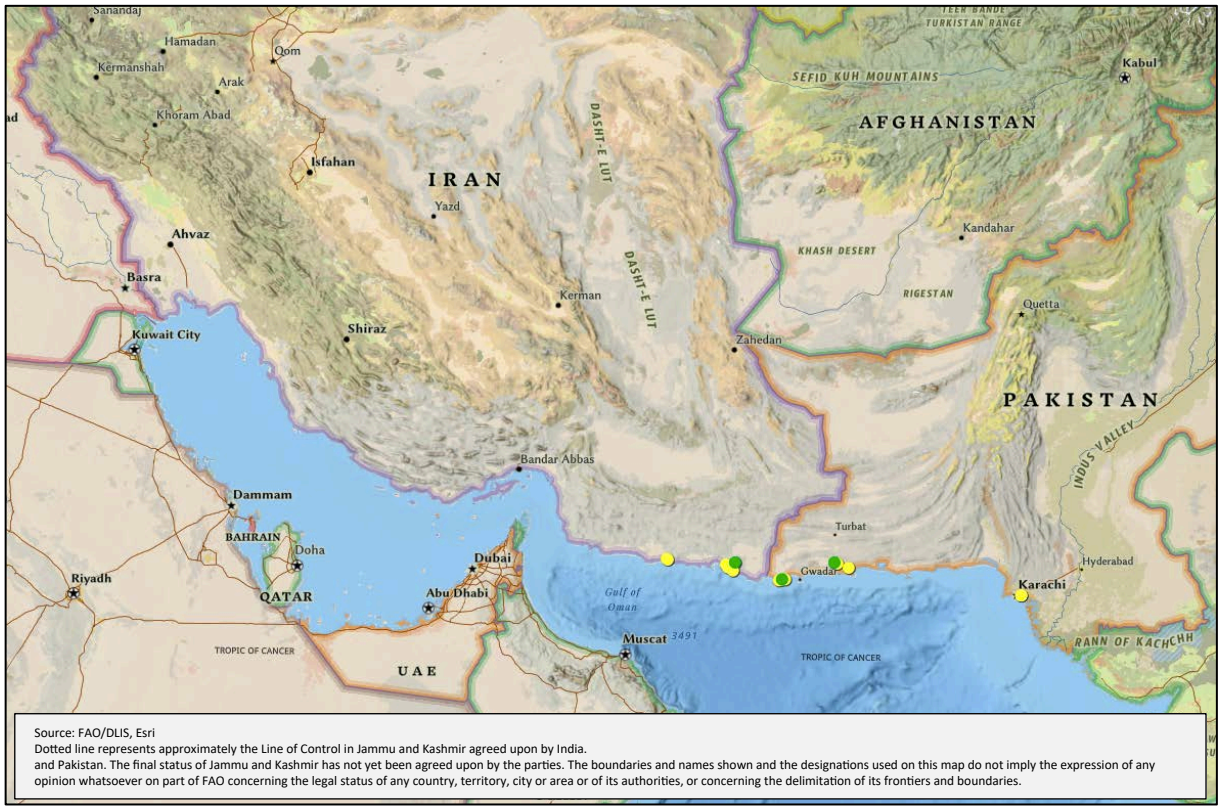
Desert Locust situation. The spring breeding occurred in some years in Iran and Pakistan and in the summer breeding in Pakistan and India from 2021 to 2023.

Since January 2021, the situation of the Desert Locust has been calm. A few mature groups and swarms invaded southwest Iran near the coast of Bushehr from Kuwait and Saudi Arabia during two days of very strong southwesterly and southerly winds on 25–26 March. Some of the swarms moved interior towards the foothills of the Zagros Mountains. Hatching and band formation occurred in April and May during the spring breeding area. Ground control was done from March to May. The situation remained calm during the summer season along the Indo-Pakistan border where no locusts were seen.



Adult (yellow), group (orange), swarm (red), band (blue)

In 2022, a few isolated solitarious adults were present on the coast of southeast Iran and southwest Pakistan in April. This resulted from one generation of spring breeding where laying occurred during the last week of February and the first half of March in Pakistan near Jiwani and Pasni and in early March near Chabahar, Iran. Consequently, some solitarious hoppers were seen in March and April. During May, there were a few isolated maturing adults in Pakistan. The situation remained calm during the summer season along the Indo-Pakistan border where no locusts were seen for the second consecutive year.

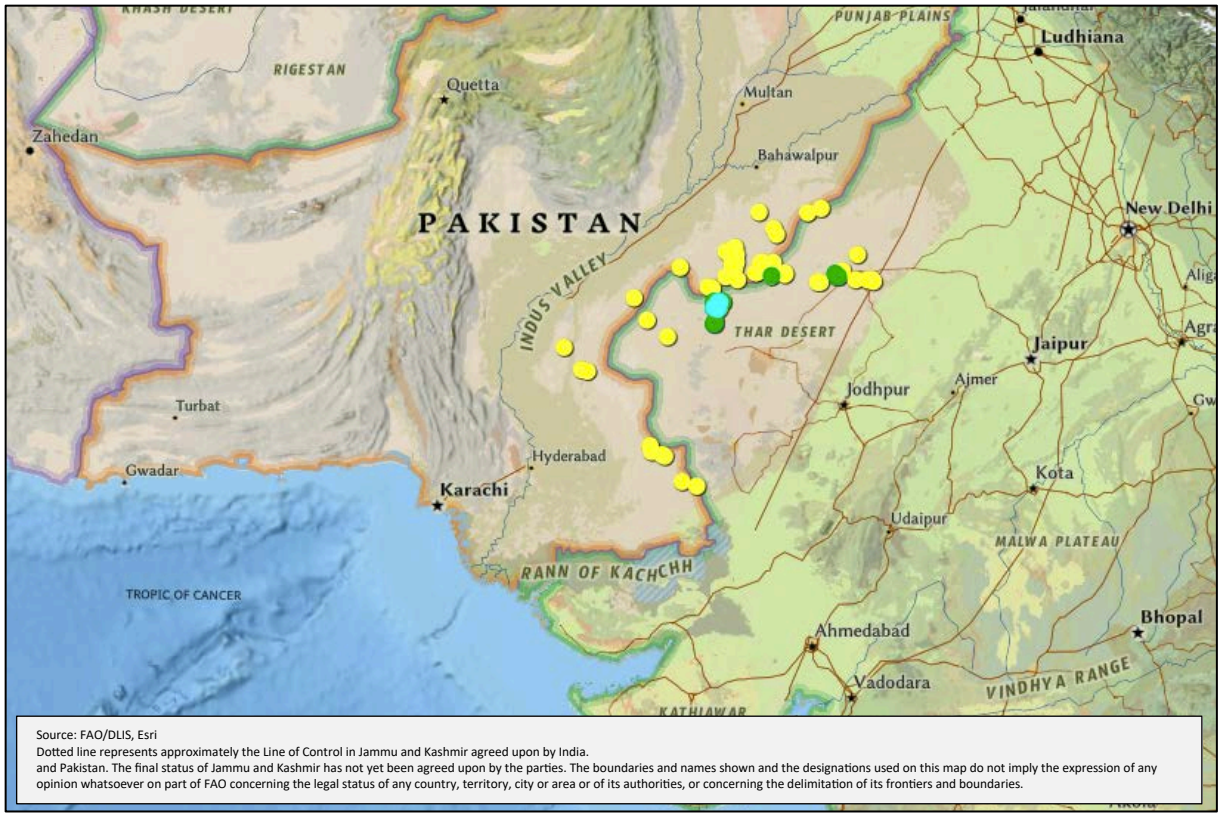


Adult (yellow), hopper (green)

During the spring of 2023, isolated solitarious adults were seen in a few places in the southwest subcoastal areas of Baluchistan south of Turbat and the interior near Kharan and Nushki during April. No locusts were seen in Iran.

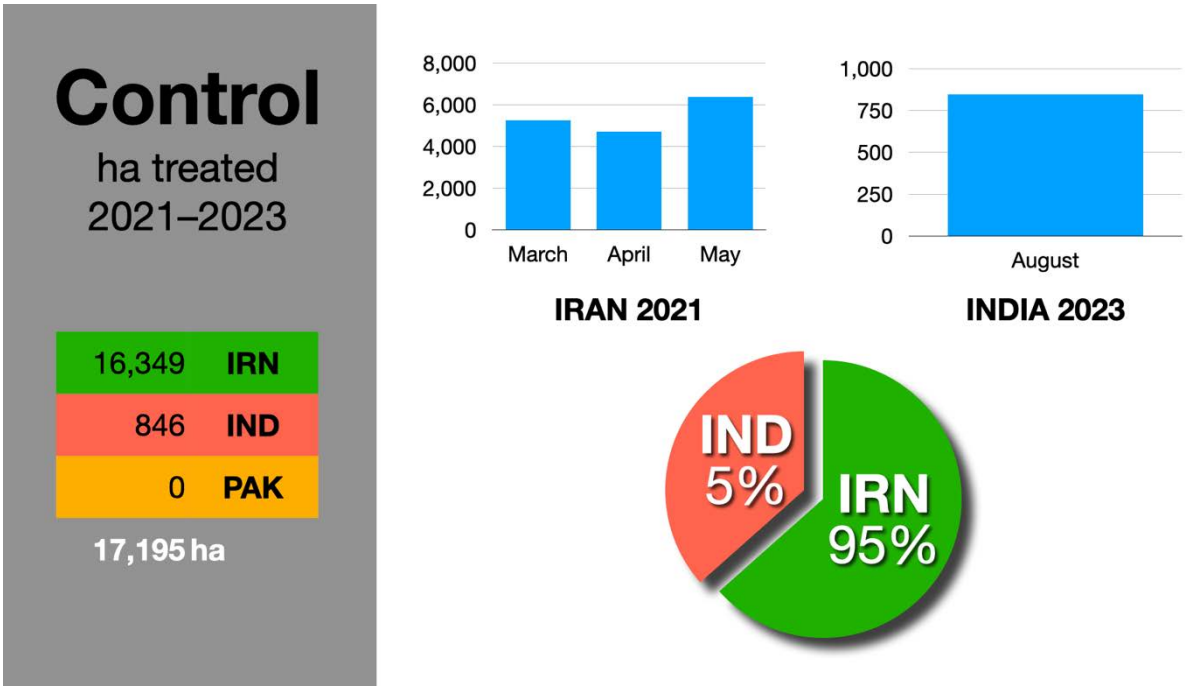
Adult (yellow)

During the summer area on both sides of the Indo-Pakistan border, moderate and heavy rain fell in the Tharparkar desert of southern Sindh of Pakistan and in Gujarat and southern Rajasthan of India where Cyclone Biparjoy with 160 kpm made landfall on 15 June near Rann of Kutch. As a result, laying started from the end of June to early August in Rajasthan north of Jaisalmer and west of Bikaner. Fledgling began in mid-August. Control operations were done in August. In Pakistan, isolated adults were seen in the Cholistan and Nara deserts in July as well as the Tharparkar desert in August where hatching probably occurred at the end of the month. In September, only a few isolated solitarious were seen in the Cholistan desert in Pakistan while no locusts were seen in India.



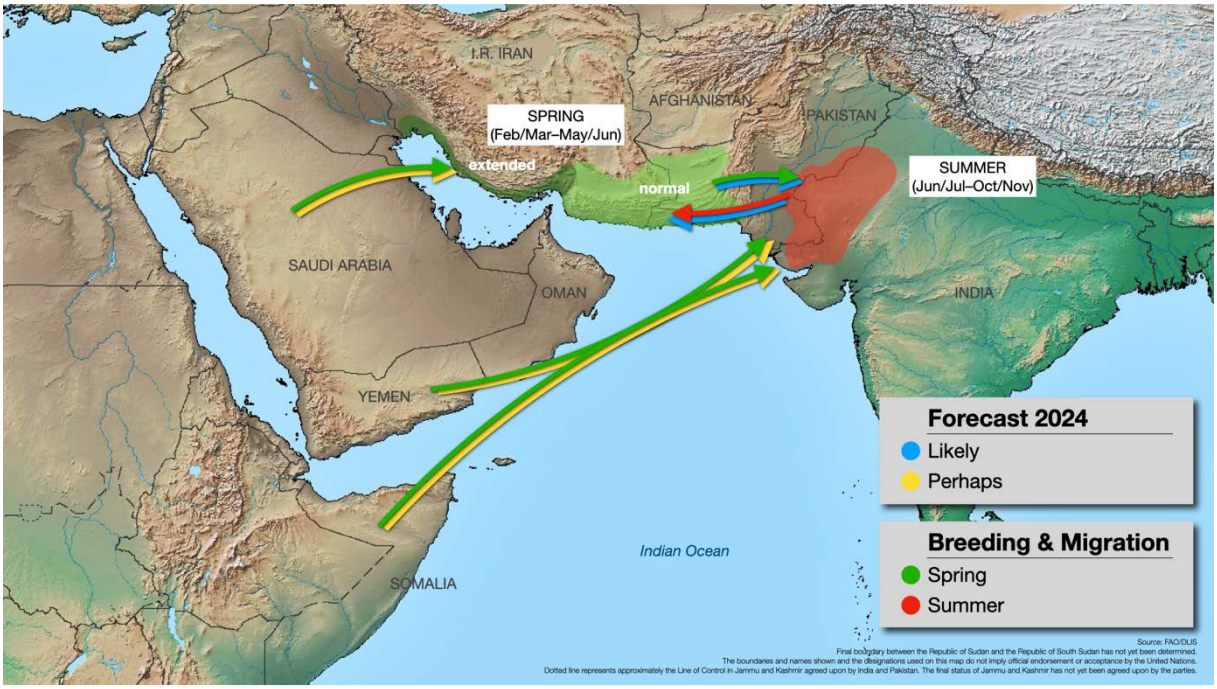
Adult (yellow), hopper (green), groups (lite blue)

Desert Locust control. Some ground control operations took place in the spring of 2021 in Iran and during the summer of India in 2023.

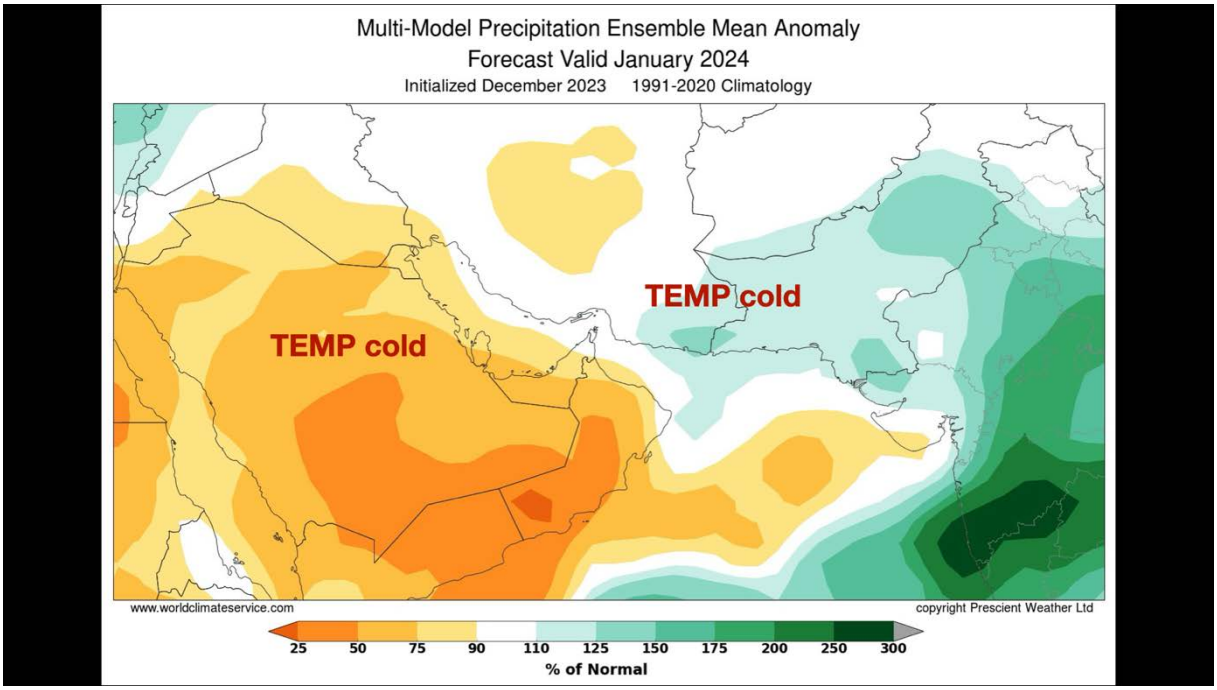


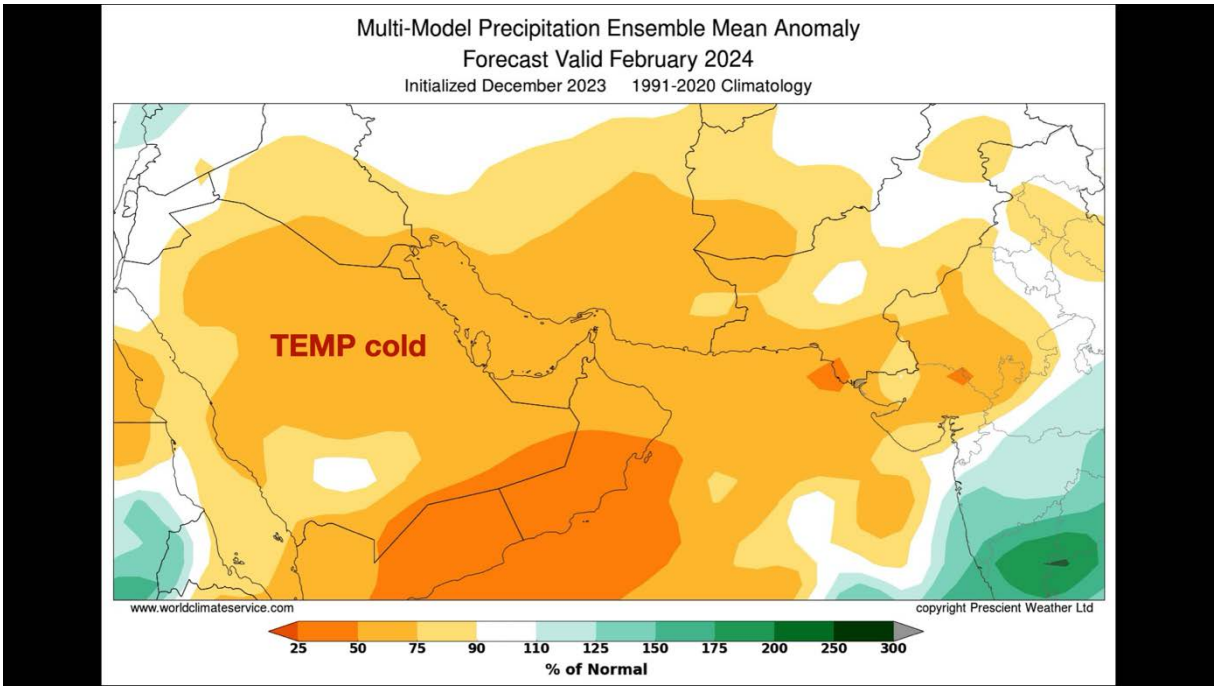
Annex 4. Forecast for spring/summer 2024

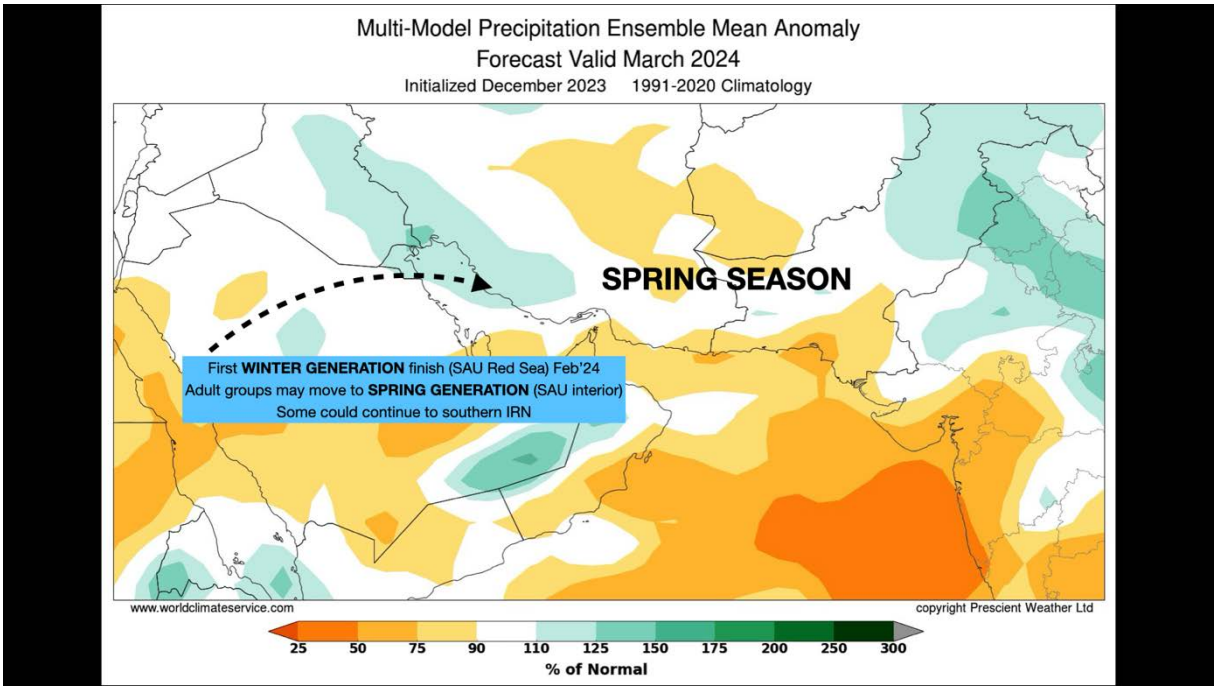
Desert Locust forecasting. The Senior Locust Forecast Officer gave the likely and perhaps forecast in the spring and summer of 2024. The latest seasonal precipitation predictions provided by the World Climate Service (WCS) cover the spring and summer breeding areas of the Desert Locust in SWAC. This is one of the most sophisticated products available, derived from eight models: CFSv2, ECMWF, and Copernicus (CMCC, DWD, ECCC, JMA, Météo-France, UKMO). The results of each model are presented below.

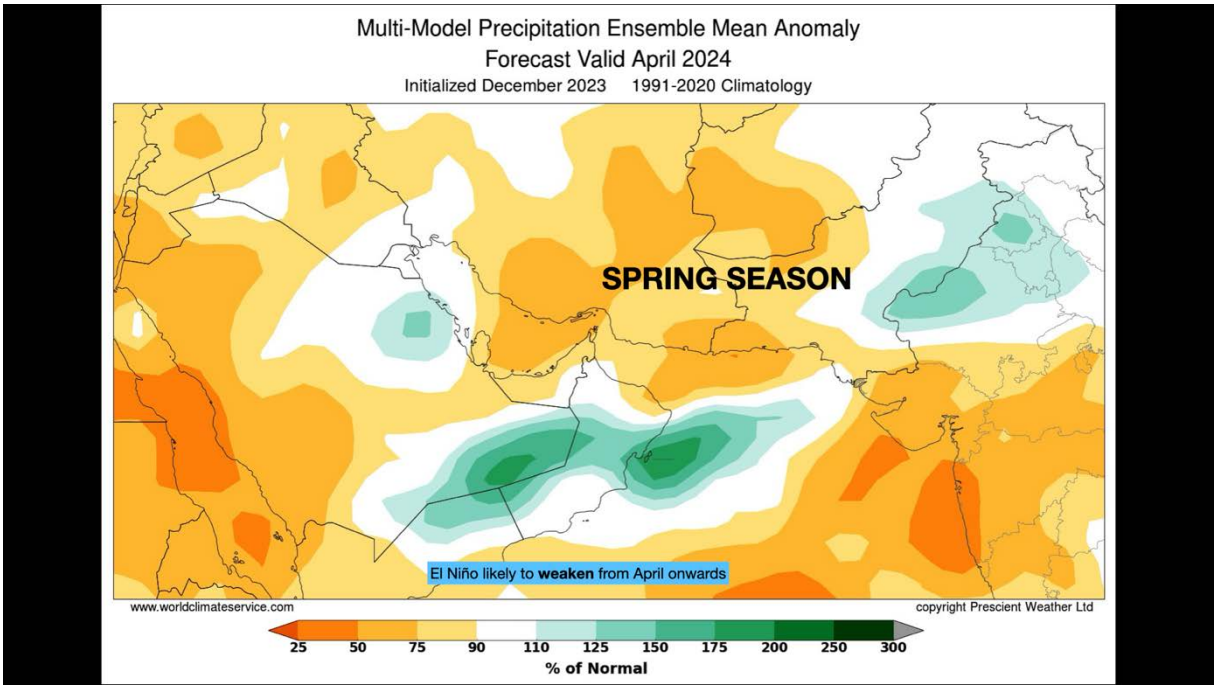


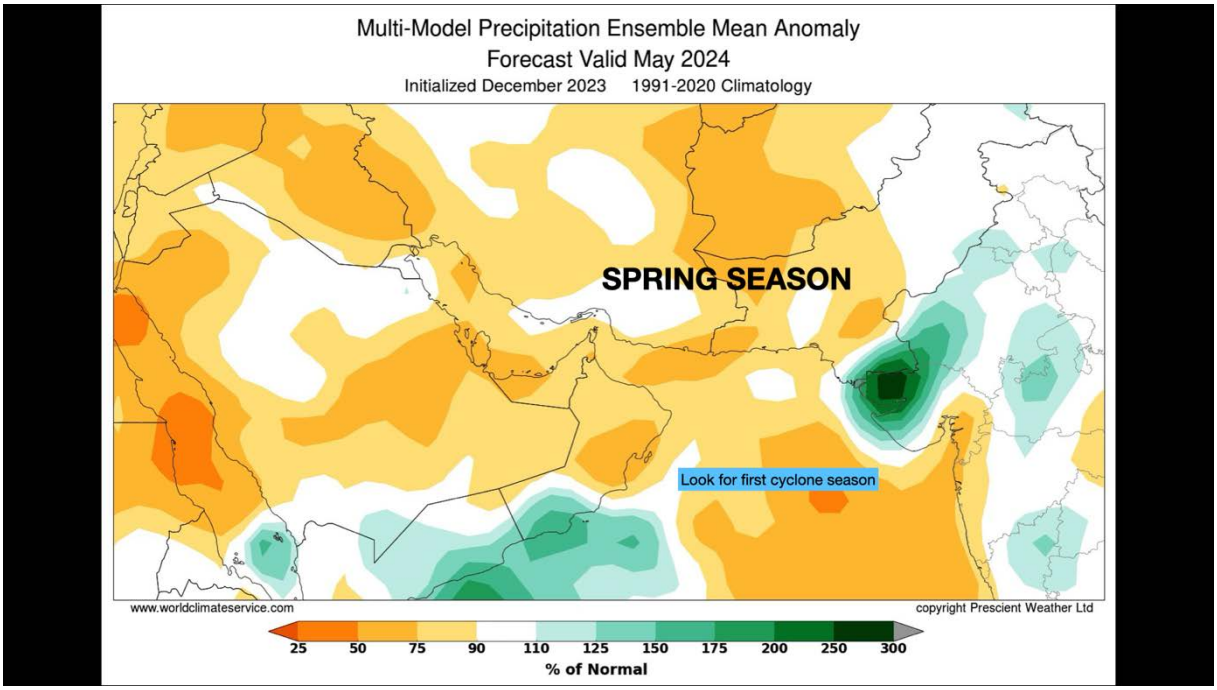
Likely and perhaps forecast in the spring and summer of 2024

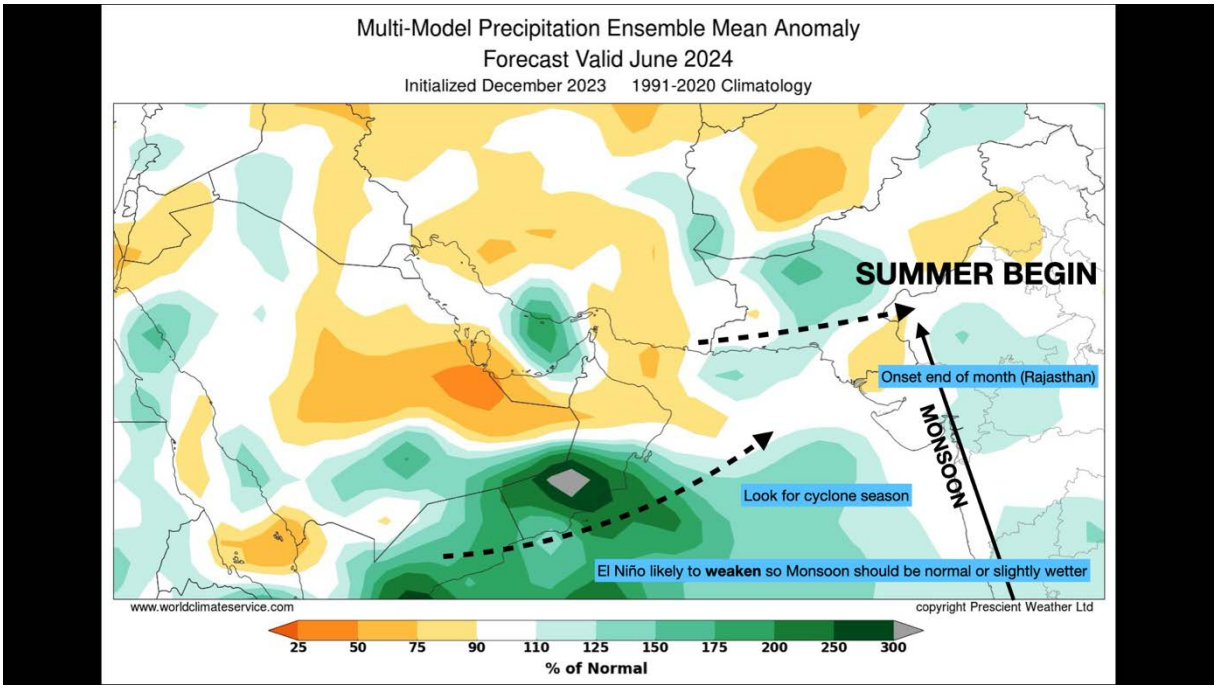

Multi-Model Precipitation Ensemble Mean Anomaly
Forecast Valid January 2024
Initialized December 2023 1991-2020 Climatology
TEMP cold
TEMP cold
www.worldclimateservice.com
copyright Prescient Weather Ltd
25 50 75 90 110 125 150 175 200 250 300
% of Normal


Multi-Model Precipitation Ensemble Mean Anomaly
Forecast Valid February 2024
Initialized December 2023 1991-2020 Climatology
TEMP cold
www.worldclimateservice.com
copyright Prescient Weather Ltd
25 50 75 90 110 125 150 175 200 250 300
% of Normal


Multi-Model Precipitation Ensemble Mean Anomaly
Forecast Valid March 2024
Initialized December 2023 1991-2020 Climatology
SPRING SEASON
First WINTER GENERATION finish (SAU Red Sea) Feb'24
Adult groups may move to SPRING GENERATION (SAU interior)
Some could continue to southern IRN
www.worldclimateservice.com
copyright Prescient Weather Ltd
25 50 75 90 110 125 150 175 200 250 300
% of Normal


Multi-Model Precipitation Ensemble Mean Anomaly
Forecast Valid April 2024
Initialized December 2023 1991-2020 Climatology
SPRING SEASON
El Niño likely to weaken from April onwards
www.worldclimateservice.com
copyright Prescient Weather Ltd
25 50 75 90 110 125 150 175 200 250 300
% of Normal


Multi-Model Precipitation Ensemble Mean Anomaly
Forecast Valid May 2024
Initialized December 2023 1991-2020 Climatology
SPRING SEASON
Look for first cyclone season
www.worldclimateservice.com
copyright Prescient Weather Ltd
25 50 75 90 110 125 150 175 200 250 300
% of Normal


Multi-Model Precipitation Ensemble Mean Anomaly
Forecast Valid June 2024
Initialized December 2023 1991-2020 Climatology
SUMMER BEGIN
Onset end of month (Rajasthan)
MONSOON
Look for cyclone season
El Niño likely to weaken so Monsoon should be normal or slightly wetter
www.worldclimateservice.com
copyright Prescient Weather Ltd
25 50 75 90 110 125 150 175 200 250 300
% of Normal

IRAN
- Spring one-generation (February/March – May/June)
- Low numbers of scattered solitarious
- Perhaps a few limited control end of season (preventive)

PAKISTAN
- Spring one-generation (February/March – May/June)
- Low numbers of scattered solitarious
- Summer one-generation (June/July – October/November)
- Low numbers of scattered solitarious
- Perhaps a few limited control end of season (preventive)

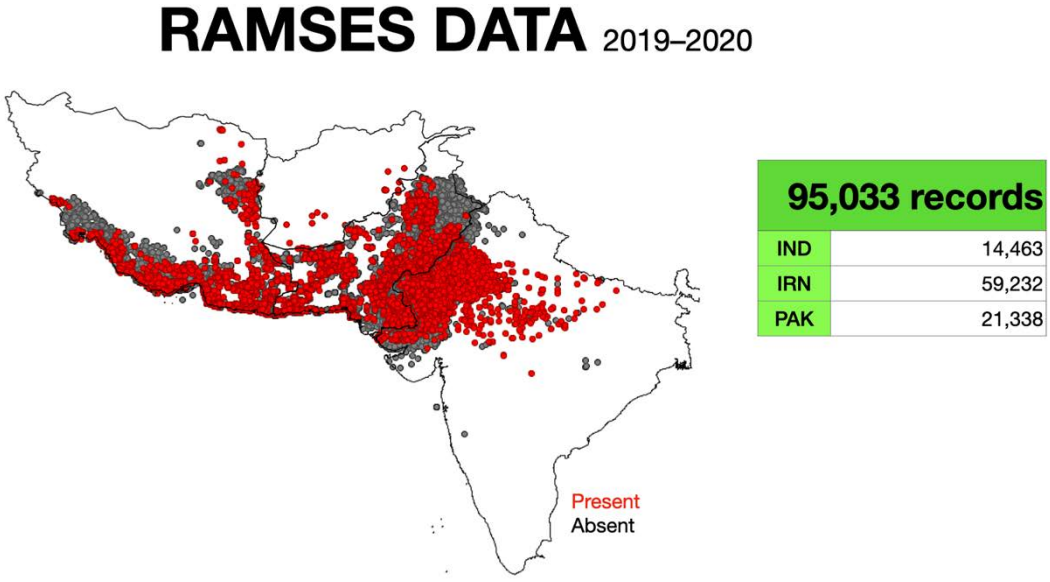
INDIA
- Summer one-generation (June/July – October/November)
- Low numbers of scattered solitarious
- Perhaps a few limited control end of season (preventive)

Country locust and generation from January to June 2024

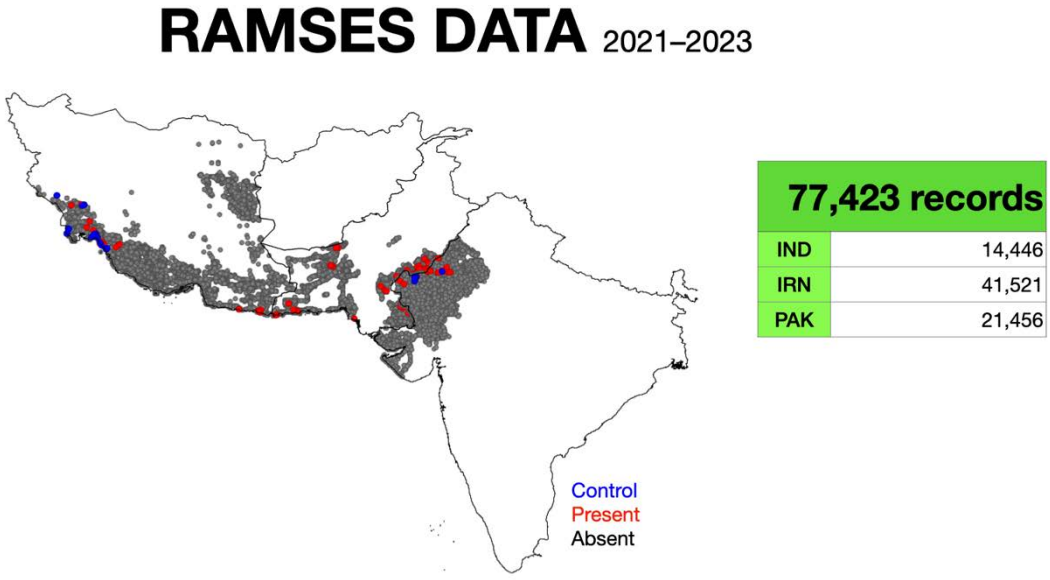
IRAN	• Continuous survey February/March – May/June (SE coast and interior) • High-quality and timely field data must be done by all teams regularly • DLIO send to DLIS every three day • JS April with Pakistan
PAKISTAN	• Continuous survey February/March – May/June (SW coast and interior) • Continuous survey June/July – October/November (SE Thar–Cholistan) • High-quality and timely field data must be done by all teams regularly • DLIO send to DLIS every three day • JS April with Iran; Monsoon; Border meetings in summer with India
INDIA	• Continuous survey June/July – October/November (Rajasthan/Gujarat) • High-quality and timely field data must be done by all teams regularly • DLIO send to DLIS every three day • Monsoon; Border meetings in summer with Pakistan

Country action from January to June 2024

Annex 5. Information and reporting

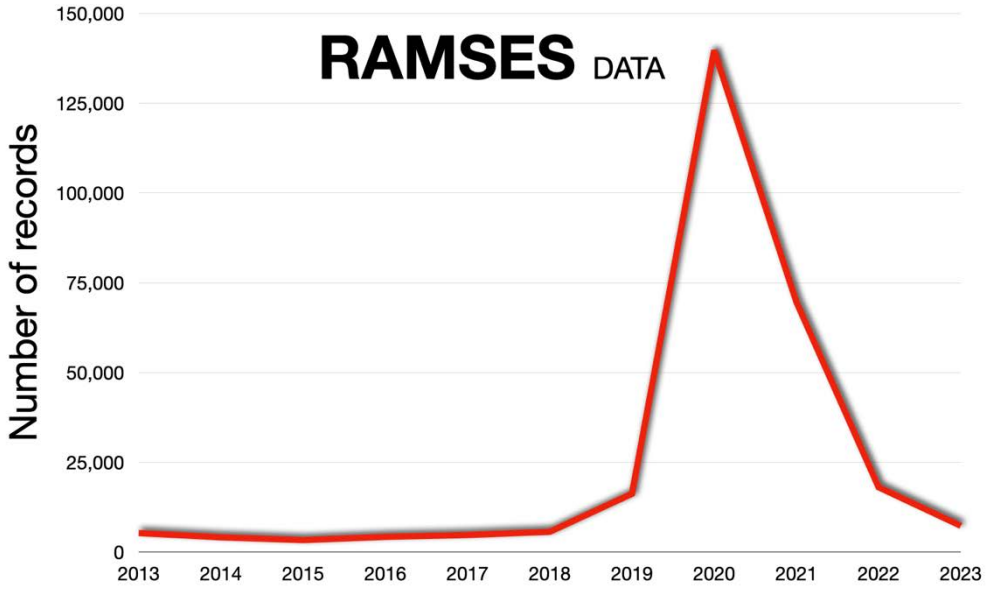


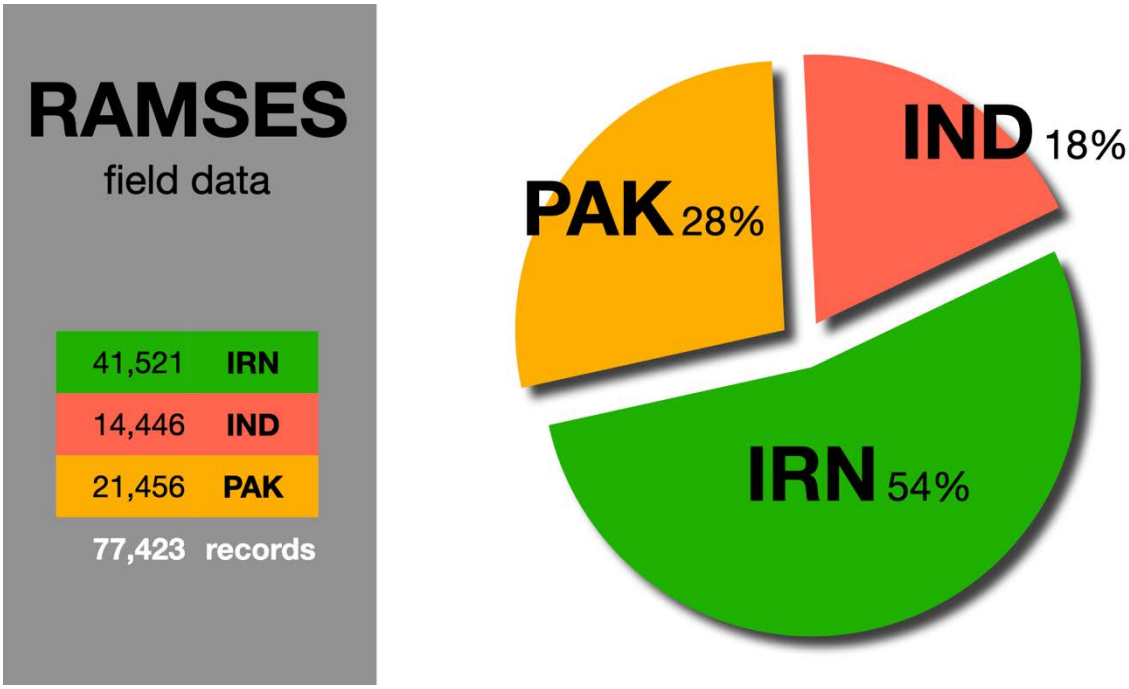
95,033 records	
IND	14,463
IRN	59,232
PAK	21,338



77,423 records	
IND	14,446
IRN	41,521
PAK	21,456

Source: FAO/DLIS, Esri
Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India.
and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers and boundaries.

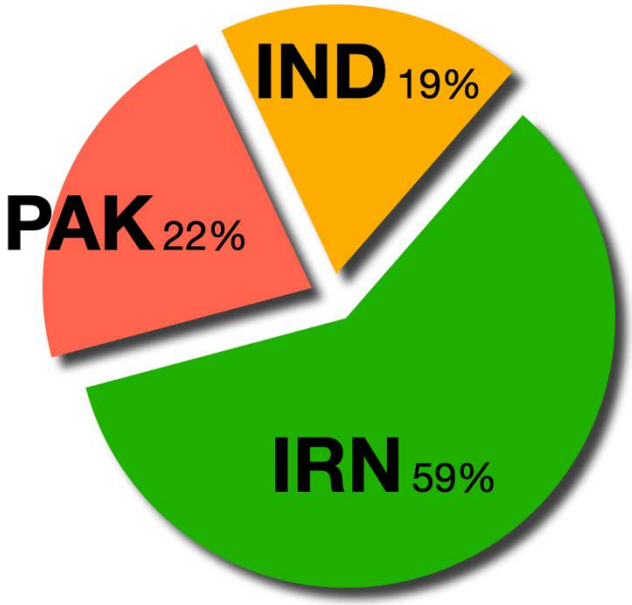




RAMSES field data for three years (January 2021 to December 2023)

DATA
2021–2023
All types

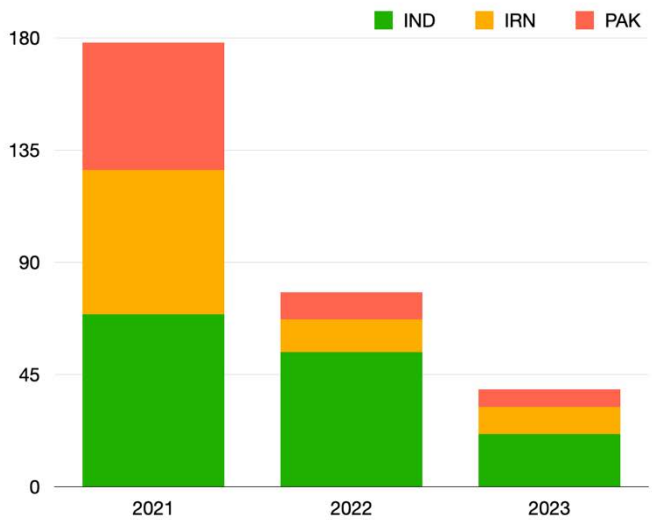
35,541	IRN
11,026	IND
13,226	PAK
59,793	

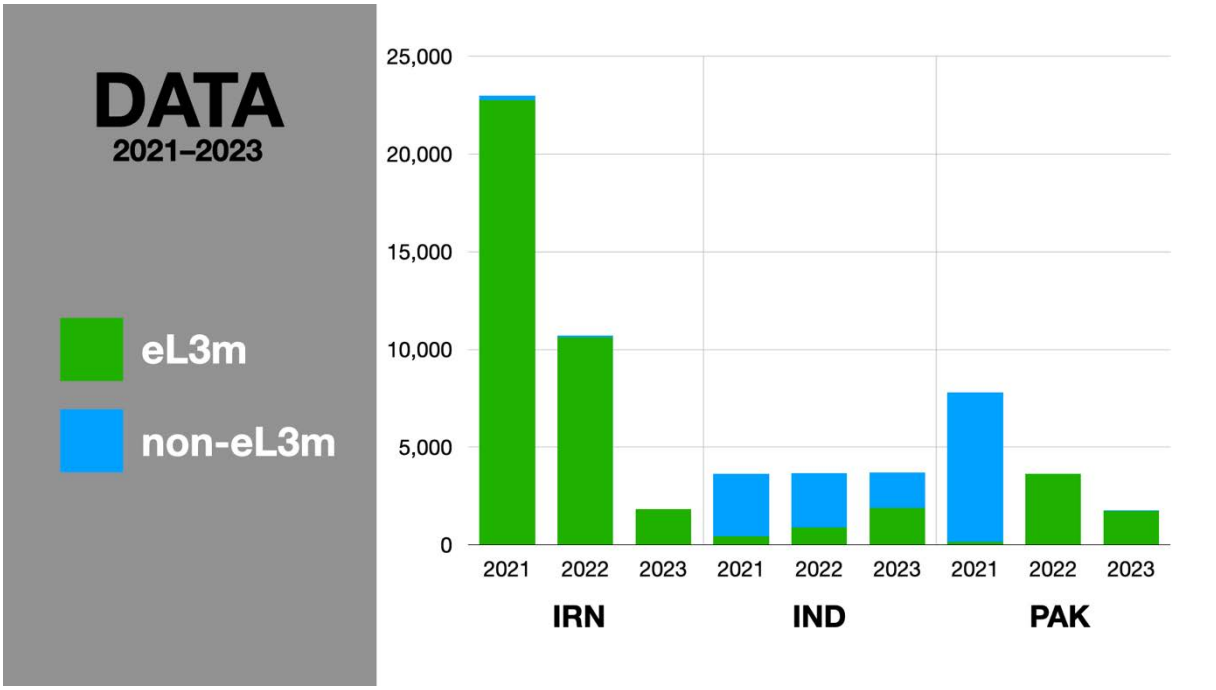


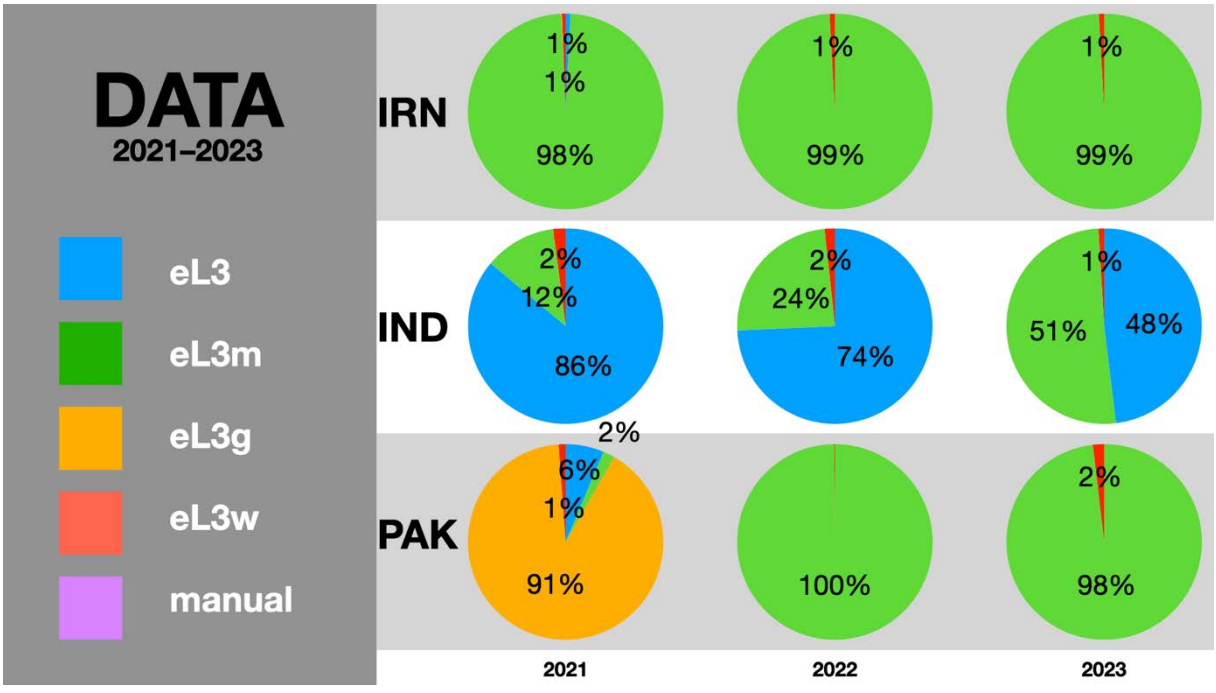
REPORTS
to DLIS

2021–2023

144	IND
82	IRN
69	PAK
295	reports

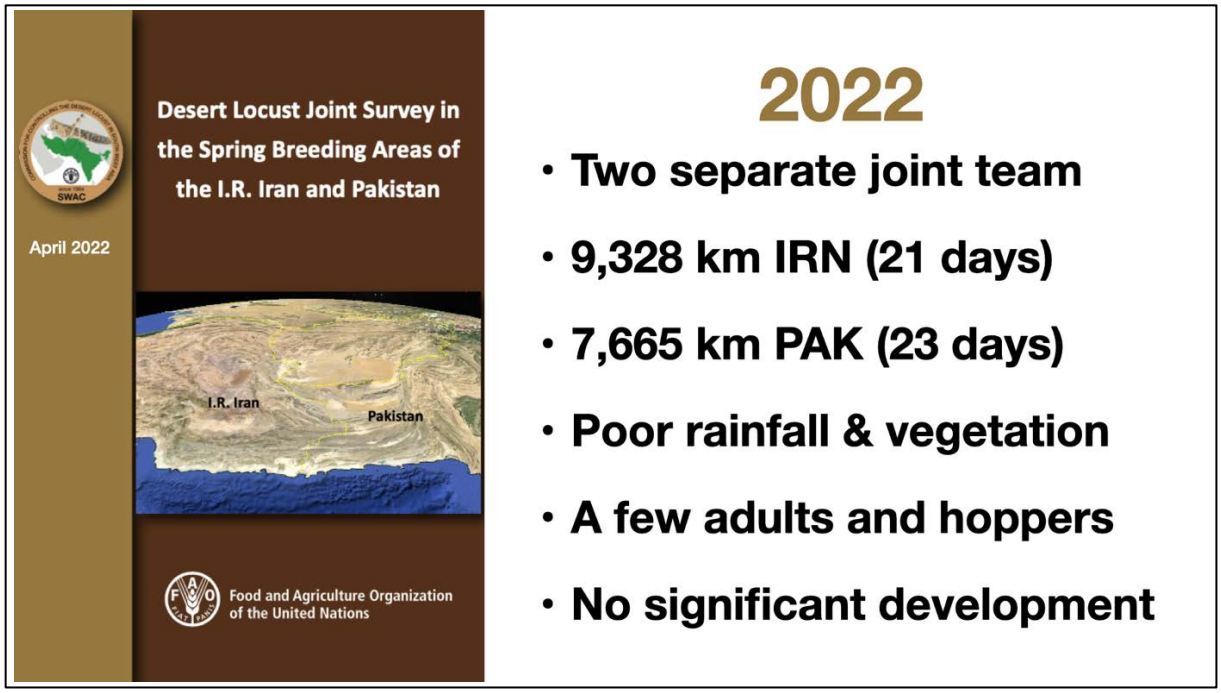


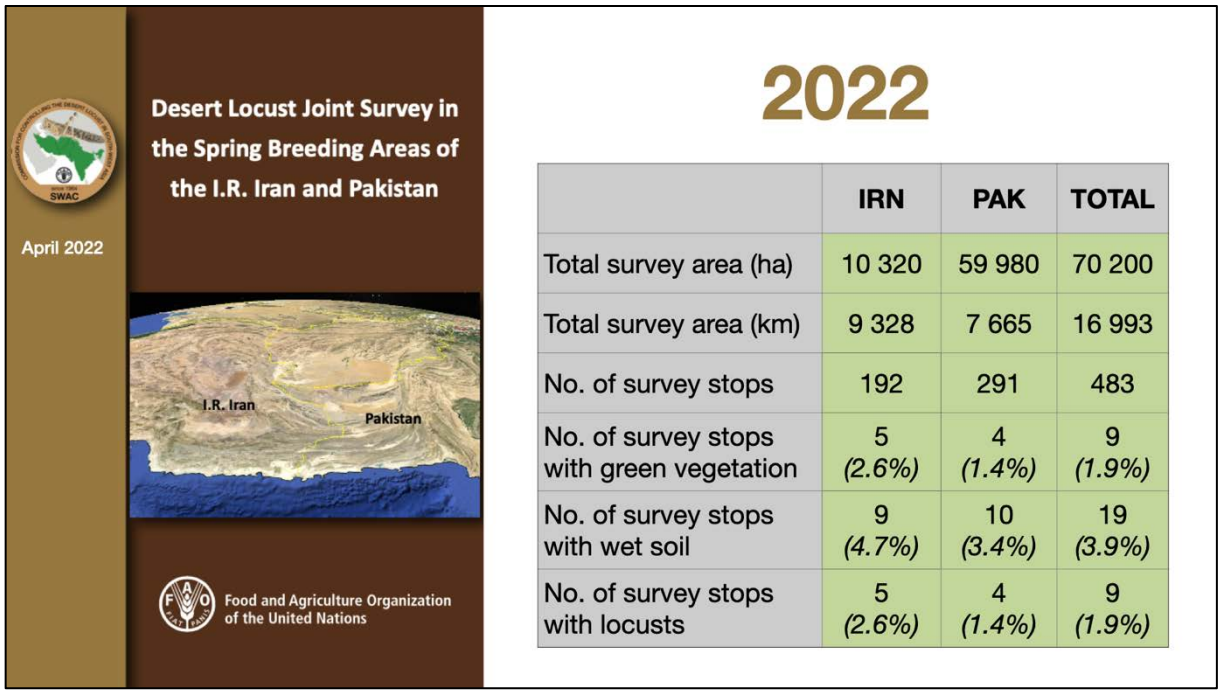

DATA
2021–2023
eL3m
non-eL3m
25,000
20,000
15,000
10,000
5,000
0
2021
2022
2023
2021
2022
2023
2021
2022
2023
IRN
IND
PAK


DATA
2021–2023
eL3
eL3m
eL3g
eL3w
manual
IRN
IND
PAK
1%
1%
98%
1%
99%
1%
99%
2%
12%
86%
2%
24%
74%
1%
51%
48%
2%
6%
1%
91%
100%
2%
98%
2021
2022
2023

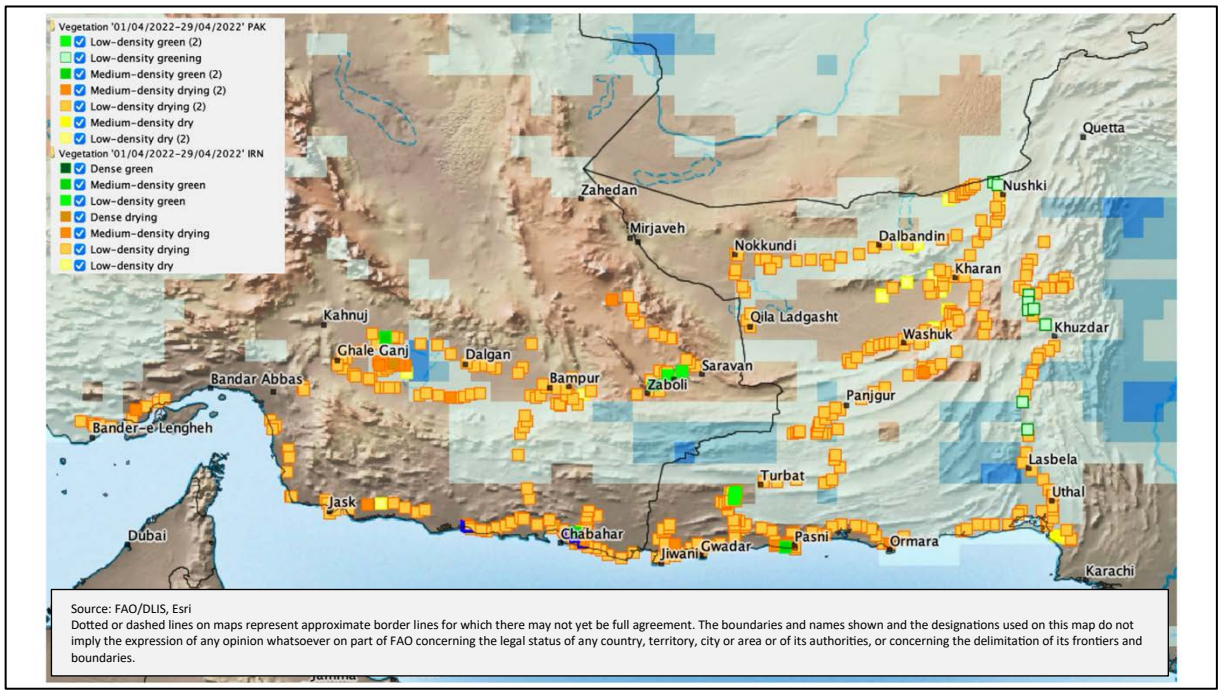
Annex 6. Joint survey (2021–2023)

Joint Survey. The Desert Locust joint survey in the spring breeding areas of the I.R. Iran and Pakistan occurred only in 2022.

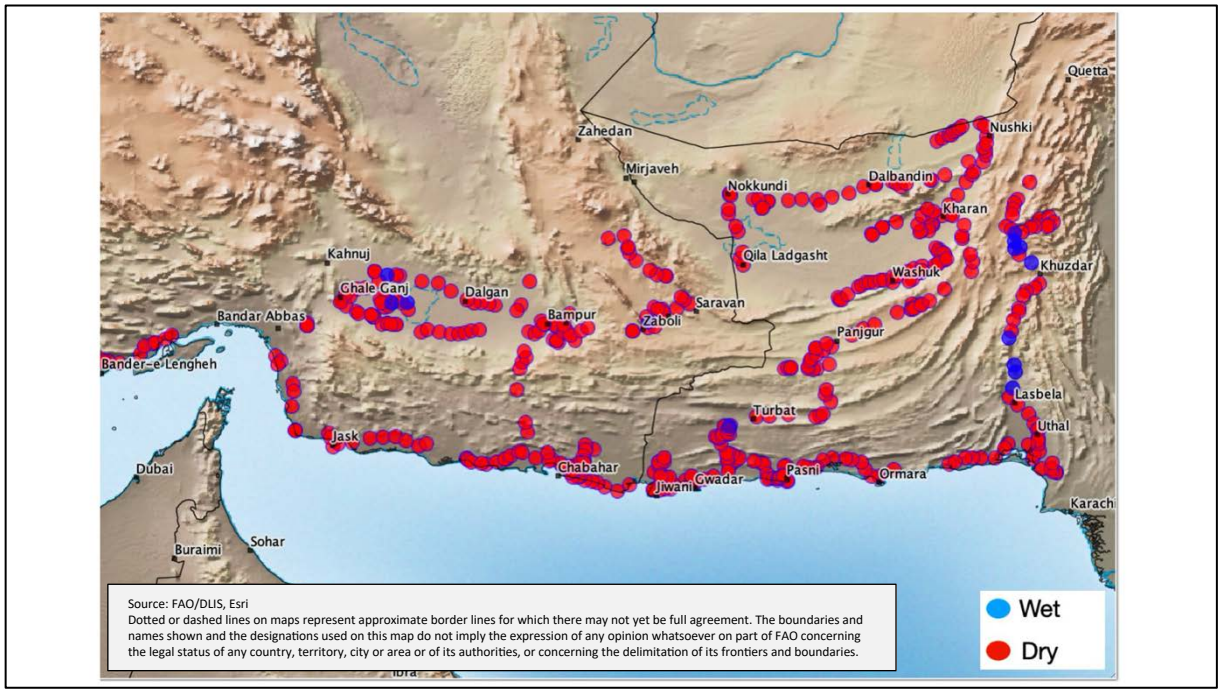




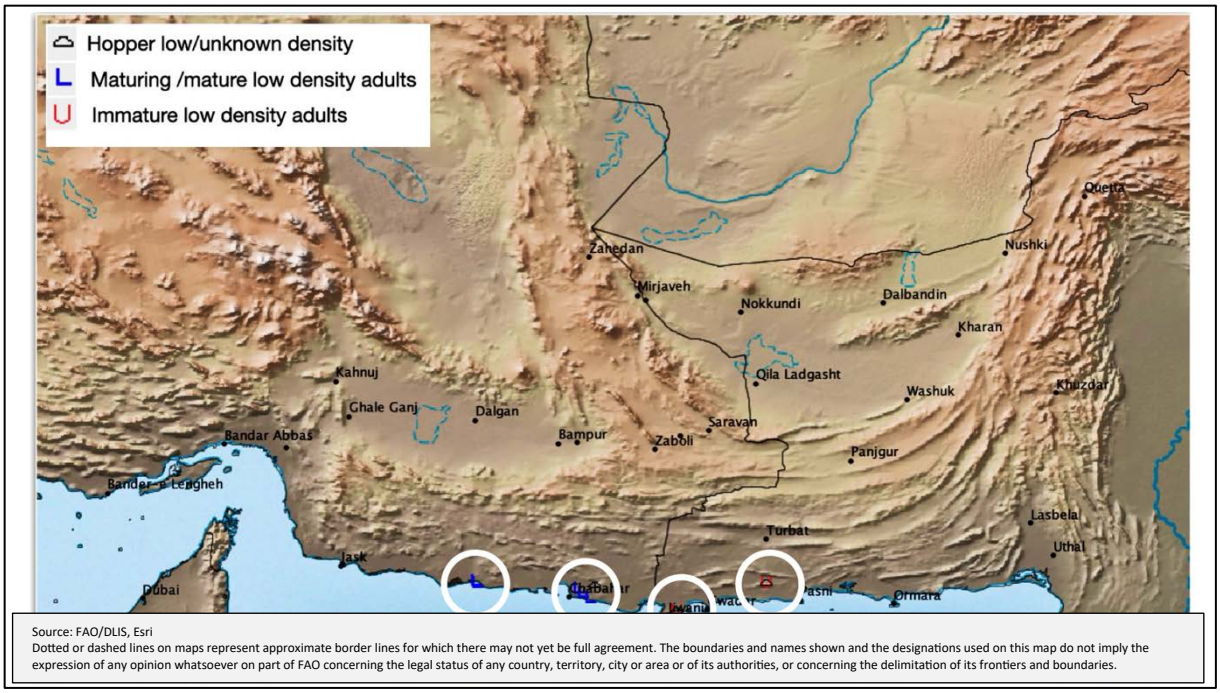
	IRN	PAK	TOTAL
Total survey area (ha)	10 320	59 980	70 200
Total survey area (km)	9 328	7 665	16 993
No. of survey stops	192	291	483
No. of survey stops with green vegetation	5 *(2.6%)*	4 *(1.4%)*	9 *(1.9%)*
No. of survey stops with wet soil	9 *(4.7%)*	10 *(3.4%)*	19 *(3.9%)*
No. of survey stops with locusts	5 *(2.6%)*	4 *(1.4%)*	9 *(1.9%)*



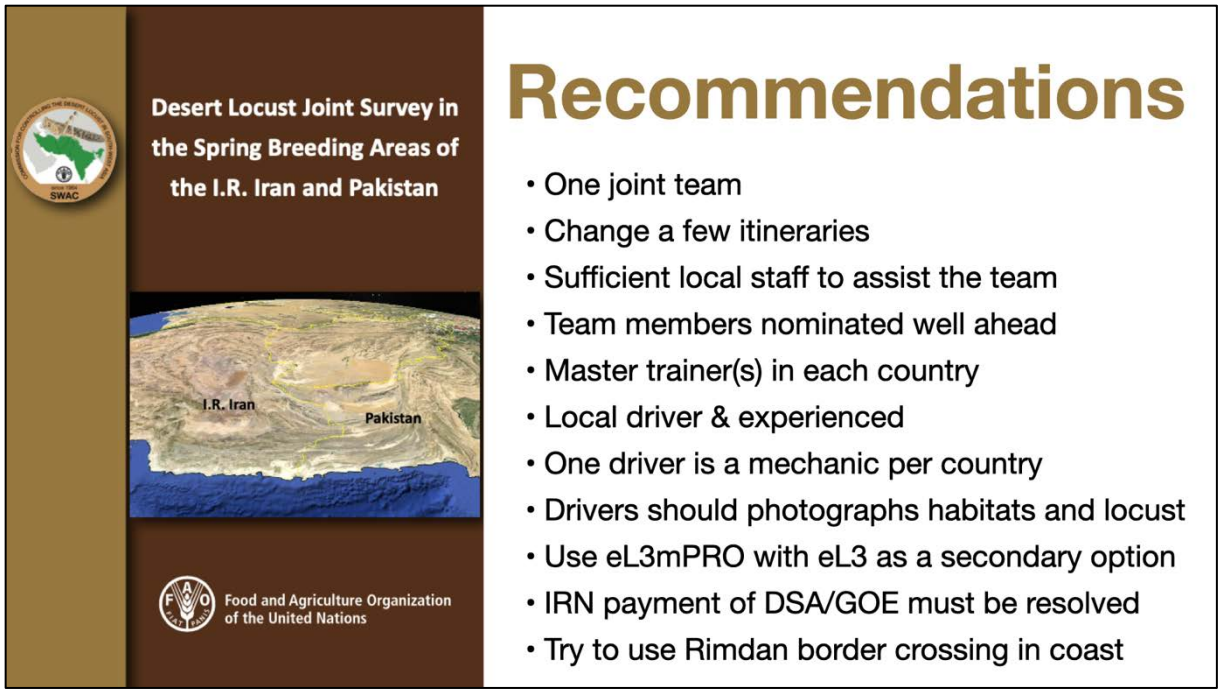
Vegetation data (April 2022)



Soil moisture data (April 2022)



Locust data (April 2022)



Annex 7. RAMSES v5

RAMSES 4.1 (Rv4.1)

- Started in 2015
- Developer: Mehdi Ghaemian
- Database engine: PostgreSQL® (https://www.postgresql.org) (version 9.3) and PostGIS
- GIS engine: OpenJUMP® (http://openjump.org) (version 1.5)
- Develop language: Java®

RAMSESv4.x has been developed, deployed, and used by locust-affected countries for eight years. During these 8 years, it upgraded based on user feedback and new technologies. As RAMSES is an essential tool for Desert Locust Management, it should always, be kept up to date, maintained and trained. Application Lifecycle Management of RAMSESv4.x reached its end as new technologies, a faster and more accurate GIS engine, and updated PostgreSQL and PostGIS databases were introduced. This application should be migrated to current computer science to make more functionality available for locust-affected countries.

RAMSES 5 (Rv5)

- Database engine: PostgreSQL® (https://www.postgresql.org) (version 15.2) and PostGIS
- GIS engine: QGIS® (https://qgis.org) (latest version) with support by many companies and full documentation
- Develop language: Python®

- Better background map display
- Possible to have printable reports
- Users can create custom reports/queries/plugins
- Faster performances (C++)
- More meet end users' needs (users just need to input parameters one time, then parameters will used in a series of related queries)
- Better user-friendly interface
- Better managing layers by using sublayers
- Plugins repository for updates
- Administrator/observatory reports (locust unit can check survey/control officers' activities, and the system can suggest locations to survey/control by finding the relation of locust reports with each other and with other raster/vector layers)

Annex 8. Biocontrol

Chemical pesticides

Chemical pesticides remain our first line of defence against locusts (organophosphates, pyrethroids, neonicotinoids and benzoylureas).

Pro:

- Efficacious (usually >95% mortality)
- Quick-acting (usually within 48 hrs.)
- Easy-to-use
- Cheap

Under correct application, the risks to human health and the environment are low.

Con:

(1) Health and environment-related
- Chemical pesticides are not selective: they kill locusts, but also other important beneficial insects – honeybees, pollinators, natural enemies of locusts
- They can be harmful to birds, reptiles, amphibians and fish
- Toxic pesticide residues can remain on vegetation – and then appear in the meat and milk of livestock
- Some pesticides produce severe adverse short or long-term effects on human health (e.g., carcinogenic)

(2) Legislative and logistics-related
- Many well-known chemical-based locust insecticides have been banned, restricted or under further review in many countries
- Country donors no longer support some chemical agents. The EU and US have banned the use of chlorpyriphos and fipronil is unlikely to be available in the future. Some IGRs are also under investigation.
- The EU Commission's Implementing Regulation 2022/801 of 20 May 2022 did not approve fipronil, diflubenzuron, teflubenzuron and triflumuron for use in the EU market.
- Due to the sporadic nature of locust upsurges, and the costs of developing new pesticides, chemical companies are not investing in new chemical-based options.
- Every year there are fewer available chemical pesticides for locust control on the market

Biopesticides

Biopesticides use naturally occurring pathogenic microorganisms – viruses, bacteria, fungi – which provoke an epidemic disease among locusts and eventually kill them in a "natural" way. Biopesticide is a product of a long selection of the best, most virulent, fast-acting, fast-reproducing strain of a naturally occurring microorganism.

(1) *Beauveria bassiana*: commercial formulations available (Mycotrol®, BotaniGard®)
- Kills not only locusts but also many non-target arthropods (similar to broad-spectrum insecticides)
- Temperature optimum: 26–30°C (too low for Desert Locust)
- Not registered for Desert Locust control (but used for other locusts)

(2) *Nosema locustae*: commercial formulations available in bait (NoloBait, SemaSpore) or spray form (several in China)
   - Can be transmitted trans ovo, from mothers to the next generation
   - Very low and inconsistent mortality
   - Very slow action (3–4 weeks)
   - Requires high humidity
   - Not registered for Desert Locust control (but used for other locusts)

(3) *Metarhizium acridum*: commercial formulations available (Green Muscle® isolate IMI 330189, Novacrid® isolate EVCH077)
   - Both isolates (strains) are tropical and can withstand temperatures >30°C
   - Registered for Desert Locust and other locust control in several countries; manufactured by Eléphant Vert
   - Formulation: dry powder of spores in vacuum-sealed 500-g bags; each gram of the powder contains 5x1010 spores
   - Before application, the spores should be mixed with oil (usually, diesel)
   - Applied with ULV sprayers, similar to chemical insecticides

HOW DOES *METARHIZIUM ACRIDUM* WORK?

- When *Metarhizium acridum* comes into contact with the locust exoskeleton, it germinates on the cuticle and penetrates inside by pressure and enzymatic action
- The fungus multiplies and competes with the host for water and nutrients
- The locusts are weakened in three to four days, they reduce feeding and die from seven days onwards
- The fungus continues to produce spores on the dead locusts, which thus becomes a new source of contamination
- Maximum mortality occurs two to three weeks after treatment
- Both hoppers and adult locusts are susceptible to the biopesticide

DISADVANTAGES OF *METARHIZIUM ACRIDUM*

- Acts slower than most chemical pesticides (peak mortality occurs 10–20 days after treatment)
- High influence of weather factors on efficacy, particularly temperature
- Spore viability should be checked before the campaign or delivery
- Spore viability checks require laboratory facilities
- Requires a thorough mixing to avoid clogging sprayers
- Mortality assessment: special procedures needed – once the biopesticide is applied, the targets continue to move, and monitoring of mortality is difficult

Training is key to the proper use of biopesticides and their adoption.

WHY USE *METARHIZIUM ACRIDUM* BIOPESTICIDES?

- Highly specific to locusts and grasshoppers; kills only these insects and does not kill honeybees and other beneficial
- Not toxic to humans, birds, fish, reptiles, amphibians, etc
- Remains efficacious for 3 to 6 weeks
- Requires standard Personal Protective Equipment (PPE), usually a face mask is sufficient
- Applied with ULV spraying equipment
- Can be applied to ecologically sensitive areas and near water
- Suited for use in most Desert Locust habitats

This is the best tool for preventive Desert Locust control.

Status of the biopesticide use
Widely used in many countries (Somalia, Madagascar, Australia, etc).

Status of registration
- Western Region – Novacrid® is registered in eight CLCPRO member countries (Algeria, Burkina Faso, Chad, Mali, Morocco, Mauritania, Niger, and Senegal)
- Central Region – it is used in Somalia and Yemen under a temporary permit. Efforts are ongoing to advance with the registration in Ethiopia and other CRCs.
- SWAC Region – not yet
- Central Asia – the biopesticide is registered in Kazakhstan and Uzbekistan
- Other countries – Australia, Madagascar, and Mexico

Challenges and limitations of the registration and use
- Registration challenges in many countries (non-existent or too long registration process)
- Complex and expensive registration for manufacturers, without commitment to buy, especially in countries where locust upsurges and outbreaks are sporadic
- Limited experience and lack of conditions conducive to the use of biopesticides as well as the absence of Desert Locust
- *Metarhizium* global production capacity is limited and cannot cope with the high demand during upsurges
- The cold chain must be maintained to preserve its effectiveness, germination tests are required prior to each application to ensure spore viability and effectiveness.
- Handling and mixing the powder with fuel should be done by well-trained people to avoid lump formation and clogging of the spray systems

Efforts to promote the registration and use
- Workshop on the use of *Metarhizium* for Desert Locust control in the Western Region, Rabat, Morocco, 26–28 November 2019 (CLCPRO)
- Interregional training on the use of biopesticides for locust control, Agadir, Morocco, 16–20 May 2022 (by FAO, CLCPRO, CRC, NEPPO, and CNLA Morocco) where 17 recommendations were made on operations, registration, training, communication, awareness raising, and research and development

Annex 9. Preparedness

India

Items	Number	Details or comment
Vehicles available (survey/control)	67	11 for survey 56 for control
Locust survey and control teams/officers	67	12 for survey team 55 control team
DLIOs	3	3 in different schemes
Spraying equipment by type	120	30 Ulva 13 Ulva+ 3 Ulvamast MKII 2 Ulvamast V3E 26 Ulvamast V4M 16 Micron AU8115 30 Micron AU8115MS
PPEs	55	
Campaign equipment	20	
Pesticides available by type	14 685 L	4 185 L ULV malathion 96% 10 000 L ULV malathion 96% (supplied) 500 L ULV deltamethrin 1.25% (supplied)
Any obsolete stocks of pesticide	–	
Number of elocust3 tablets (functional and non-functional)	35	4 functional 31 non-functional
Any locust control bases/centres in the field	12	

I.R. Iran

Items	Number	Details or comment
Vehicles available (survey/control)	550	300 for survey 250 for control
Locust survey and control teams/officers	700	400 for survey team 300 control team
DLIOs	50	2 in PPO and 48 in locust areas
Spraying equipment by type	755	250 ULV sprayers – handheld 200 ULV sprayers – backpack 300 ULV sprayers – vehicle-mounted 5 ULV sprayer – aerial
PPEs	–	
Campaign equipment	1 600	Drivers 300 Assistants 300 Local people 1000
Pesticides available by type	500 000 L	200 000 L ULV deltamethrin 300 000 L EC deltamethrin
Any obsolete stocks of pesticide	> 50 000 L	They have expired
Number of elocust3 tablets (functional and non-functional)	11	4 functional 7 non-functional
Any locust control bases/centres in the field	5	Desert Locust control institute (camps)

Pakistan

Items	Number	Details or comment
Vehicles available (survey/control)	47	23 for survey 24 for control
Locust survey and control teams/officers	26	26 for survey/control team
DLIOs	1	
Spraying equipment by type	233	220 vehicle-mounted 10 tractor-mounted 3 ULV sprayer – aerial
PPEs	1 105	
Campaign equipment	–	
Pesticides available by type	690 000 L	ULV malathion ULV lambda-cyhalothrin
Any obsolete stocks of pesticide	130 986 L	
Number of elocust3 tablets (functional and non-functional)	30	Most of them not working
Any locust control bases/centres in the field	–	

Annex 10. SWAC Trust Fund (2019–2023)

Status of the contribution to the SWAC Trust Fund from 2019-2023

Country	Annual contribution	Contributions received					Outstanding
		2019	2020	2021	2022	2023	
Afghanistan	4 125	4 125.00	0.00	0.00	0.00	0.00	16 500.00
India	40 500	0.00	37 105.00	84 394.34	40 500.00	40 500.00	0.00
Iran	37 500	0.00	0.00	0.00	0.00	0.00	494 971.03
Pakistan	25 050	25 050.00	25 050.00	17 884.45	14 033.00	15 434.00	27 798.55
Total	107 175	29 175.00	62 155.66	102 278.79	54 533.00	55 934.00	539 269.58

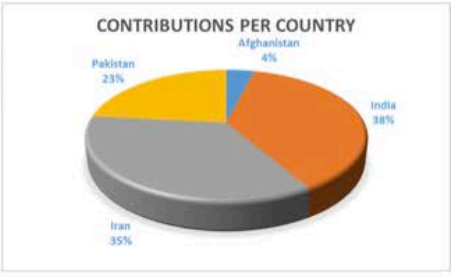
Financial Health of the SWAC Trust Fund 2019-2023

	2019	2020	2021	2022	2023
Income	29 175.00	62 155.66	102 278.79	54 533.00	55 934.00
Expenditure	101 929.00	5 979.00	16 270.00	27 535.84	31 186.00
Balance	**160 963.19**	**218 546.17**	**475 871.70**	**507 464.47**	**532 212.47**

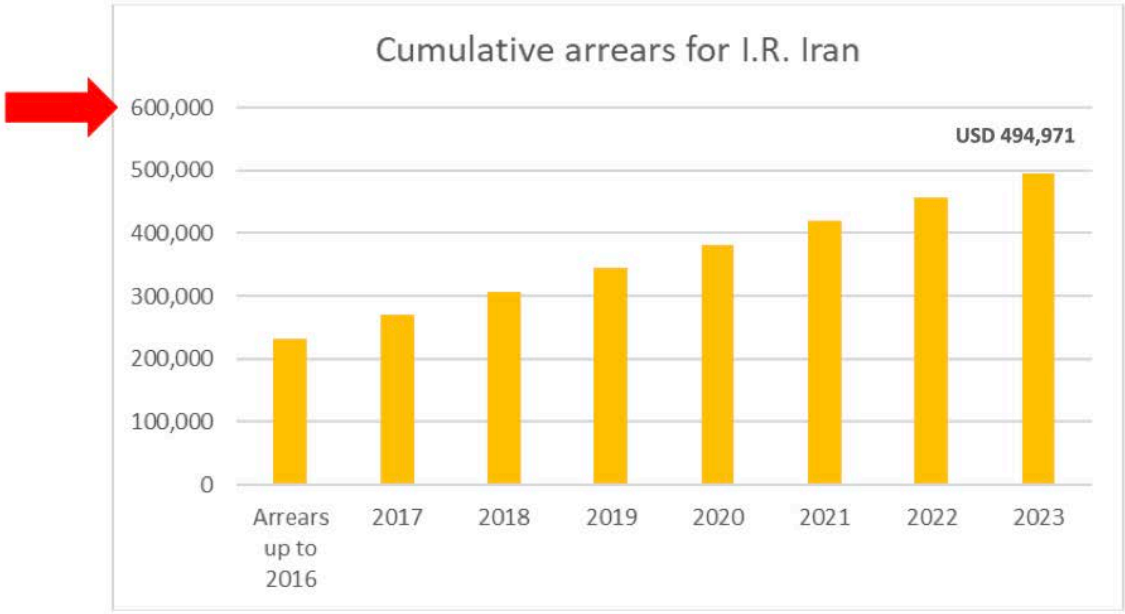
SWAC TF: Contributions per country per year from 2013 to 2023

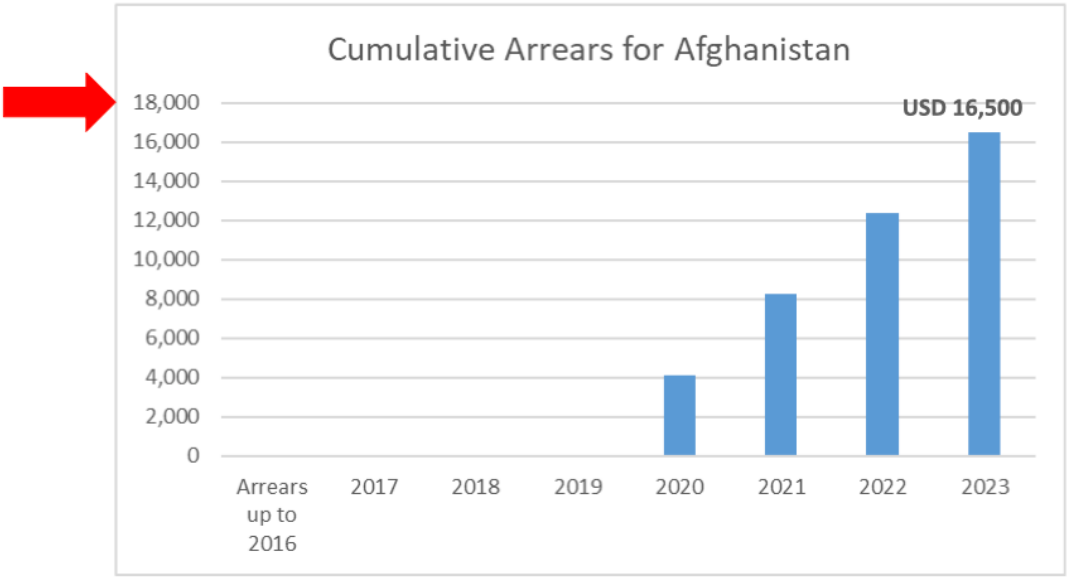
Country / Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Afghanistan	2,750	0	2,750	4,125		0	4,125	0	0	0	0
India	27,000	610	27,516	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500
Iran	50,000	26,484	50,000	25,000	100,000	0	0	0	0	0	0
Pakistan	0	0	16,700	66,800		20,500	25,050	25,050	17,884	14,033	11,967
Contributions/year in USD	**79,750**	**27,094**	**96,966**	**136,425**	**140,500**	**61,000**	**69,675**	**65,550**	**58,384**	**54,533**	**52,467**

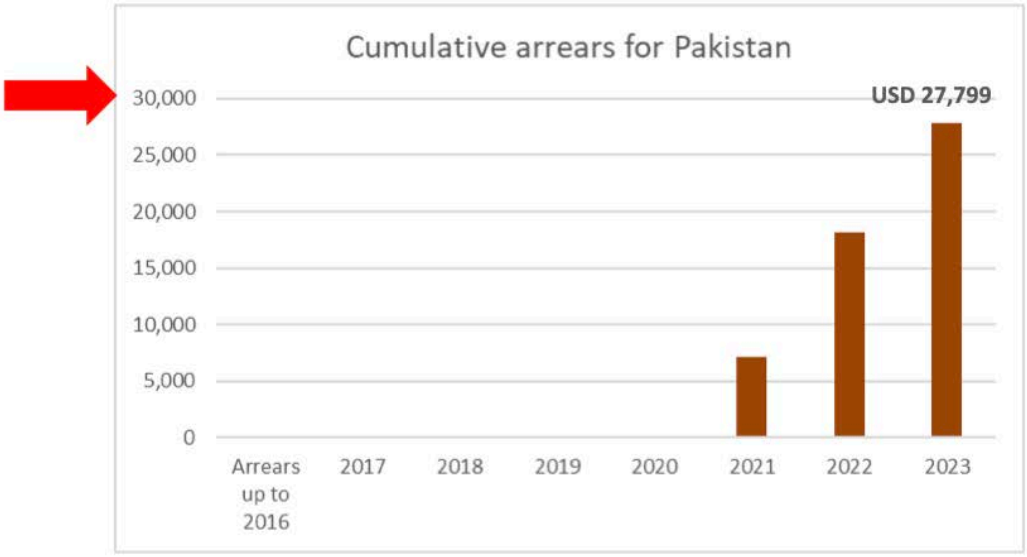
Country	Contributions due up to 2015	Contributions due from 2016
Afghanistan	$2,750	$4,125
India	$27,000	$40,500
Iran	$25,000	$37,500
Pakistan	$16,700	$25,050
Total due/year	**$71,450**	**$107,175**



Outstanding payments per country per year in USD									
Country	Cumulative arrears up to 2016	2017	2018	2019	2020	2021	2022	2023	Arrears
Afghanistan	0	0	0	0	4,125	4,125	4,125	4,125	16,500
India	0	0	0	0	0	0	0	0	0
Iran	232,471	37,500	37,500	37,500	37,500	37,500	37,500	37,500	494,971
Pakistan	0	0	0	0	0	7,166	11,017	9,616	27,799







No arrears for India

DLCC Contributions and Outstanding payment per country per year in USD

Contributions	Contribution due/year	Outstanding by 2017	2018	2019	2020	2021	2022	2023	TOTAL	Outstanding Dec 2023
Afghanistan	**3 480**	18 840	0	0	0	0	0	0	0	**39 720**
India	**20 000**	20 000	40 000	0	0	60 000	20 000	20 000	140 000	**0**
I.R.Iran	**20 000**	581 495	0	0	0	0	0	0	0	**701 495**
Pakistan	**6 520**	13 040	6 520	6 520	0	6 520	13 040	6 520	39 120	**13 040**
Total	**50 000**	633 375	46 520	6 520	0	66 520	33 040	26 520	179 120	**754 255**

Annex 11. SWAC Trust Fund work plan (2024–2025)

GCP/GLO/897/MUL SWAC WORKPLAN 2024–2025											
	2024					2025					
Activities planned for 2024–2025	**BUDGET**	**AFG**	**IND**	**IRN**	**PAK**	**BUDGET**	**AFG**	**IND**	**IRN**	**PAK**	**TOTAL 2024–2025**
Standard Expenditures											
IRN/PAK Joint Survey (2024, 2025)	**34,000**	1,500	2,500	16,000	14,000	**34,000**	1,500	2,500	16,000	14,000	**68,000**
SWAC 34 session travel/ops costs (2025)	**0**	0	0	0	0	**20,000**	5,000	5,000	5,000	5,000	**20,000**
eLocust3 transmission (2024)	**2,400**	0	800	800	800	**0**	0	0	0	0	**2,400**
National training two per year (2024, 2025)	**12,500**	2,000	3,500	3,500	3,500	**12,500**	2,000	3,500	3,500	3,500	**25,000**
CLCPRO/CRC/SWAC DLIO workshop (2025)	**0**	0	0	0	0	**18,000**	0	6,000	6,000	6,000	**18,000**
SWAC DLIO workshop (2024, 2025)	**18,000**	0	6,000	6,000	6,000	**18,000**	0	6,000	6,000	6,000	**36,000**
DLCC43 (2025)	**0**	0	0	0	0	**16,000**	4,000	4,000	4,000	4,000	**16,000**
New technology support	**5,000**	500	1,500	1,500	1,500	**5,000**	500	1,500	1,500	1,500	**10,000**
subtotal	***71,900***	***4,000***	***14,300***	***27,800***	***25,800***	***123,500***	***13,000***	***28,500***	***42,000***	***40,000***	***195,400***
New Expenditures											
National mock exercice for preparedness	**15,000**	0	5,000	5,000	5,000	**15,000**	0	5,000	5,000	5,000	**30,000**
Promotion of biopesticides	**9,000**	0	3,000	3,000	3,000	**0**	0	0	0		**9,000**
Capacation building of biopesticide lab for PAK	**5,000**	0	0	0	5,000	**0**	0	0	0	0	**5,000**
eL3mPRO tasking module	**50,000**	0	0	0	0	**0**	0	0	0		**50,000**
Training: contingency plans with CRC support	**18,000**	0	6,000	6,000	6,000	**0**	0	0	0		**18,000**
Training: drone use for locust survey	**18000**	0	6000	6000	6000	**0**	0	0	0		**18,000**
Training: environment, health and safety standards	**12,000**	0	0	6,000	6,000	**0**	0	0	0		**12,000**
Training: sprayer maintenance for IND	**3,000**		3,000			**0**	0	0	0		**3,000**
Rv5 development	**30,000**	0	10,000	10,000	10,000	**0**	0	0	0	0	**30,000**
Rv5 training and maintenance	**8,000**	0	0	0	0	**15,000**	0	5,000	5,000	5,000	**23,000**
DL Information Officer MacBook	**4,500**	0	0	1,500	1,500	**1,500**	0	1,500	0	0	**6,000**
subtotal	***172,500***	***0***	***33,000***	***37,500***	***42,500***	***31,500***	***0***	***11,500***	***10,000***	***5,000***	***204,000***
Total	**244,400**	**4,000**	**47,300**	**65,300**	**68,300**	**155,000**	**13,000**	**40,000**	**52,000**	**45,000**	**399,400**
Project servicing costs (13%)	31,772	520	6,149	8,489	8,879	20,150	1,690	5,200	6,760	5,850	51,922
Budget total 2024–2025	**276,172**	**4,520**	**53,449**	**73,789**	**77,179**	**175,150**	**14,690**	**45,200**	**58,760**	**50,850**	**451,322**