2019

CRC/SWAC
INTERREGIONAL WORKSHOP FOR DESERT LOCUST INFORMATION OFFICERS

FAO COMMISSION FOR CONTROLLING THE DESERT LOCUST IN THE CENTRAL REGION (CRC)

FAO COMMISSION FOR CONTROLLING THE DESERT LOCUST IN SOUTH-WEST ASIA (SWAC)

No. 11

24–28 June 2019
Addis Ababa, Ethiopia

Food and Agriculture Organization
of the United Nations

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Rome, 2019

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CRC/SWAC Interregional Workshop for Desert Locust Information Officers

24–28 June 2019 (Addis Ababa, Ethiopia)

1. Introduction

The FAO Commissions for Controlling the Desert Locust in the Central Region (CRC) and in South-West Asia (SWAC) sponsored an interregional workshop for Desert Locust Information Officers (DLIOs) in frontline countries of both regions. The CRC secretariat organized the workshop at the Nexus Hotel in Addis Ababa, Ethiopia on 24–28 June 2018 due to its excellent meeting facilities, reliable internet connection and comfortable accommodation. The FAO Senior Locust Forecasting Officer, Keith Cressman, conducted the workshop and was assisted by a CRC resource person, Osama Rabie, from Egypt. All workshop participants arrived on time. Internet services were temporarily not available in the country during the workshop period.

A total of 15 DLIOs attended the workshop from eight frontline countries in the Central Region and two in South-West Asia and the Desert Locust Control Organization for Eastern Africa (DLCO-EA) (Annex 1). Two officers from Ethiopia also participated in the workshop because the Ethiopian DLIO was at FAO Headquarters in Rome for the 11-month training course in the Desert Locust Information Service (DLIS). The DLIOs from Iran could not come to the workshop because they were involved in on-going locust control operations.

This year's workshop was the eleventh annual DLIO workshop since 2008. Two digital tools were used for the first time in this workshop. Participants pre-registered using a free-app, EventsXD, which also contained the programme and other details about the workshop[1]. The Menti online interactive tool is useful for surveying participants and presenting questions such as three Questions of the Day on Desert Locust biology and behaviour to reinforce participants' knowledge [2]. Neither tools could be fully utilized during the workshop because Internet service was temporarily suspended in the country at the time. .

2. Programme

Based on the advice of DLIS, the three Desert Locust regional commissions – the FAO Commission for Controlling the Desert Locust in the Western Region (CLCPRO), in the Central Region (CRC) and in South-West Asia (SWAC) – took the decision to standardise on the Mac platform for national Desert Locust Information Officers (DLIOs) in order to improve the global Desert Locust reporting early warning system. By this year, all DLIOs had been equipped with a MacBookPro laptop for managing eLocust3 data, operating the RAMSES (Rv4.1) geographic information system and preparing locust bulletins[3]. Apple hardware and software offer increased stability, security, less viruses, better performance, and a more enjoyable computing experience while less support is required from DLIS and the commissions than for PCs. So far, users report far fewer problems with the Macs compared

[1] www.eventsxd.com (search on Desert Locust)

[2] menti.com and mentimeter.com

[3] 13-inch 2017, 2.3 GHz i5 128/16GB. MacOs 10.13

to the PCs. This was reconfirmed at this year's workshop in which only an hour-long session was required for Mac training and problem solving.

Given the current situation in Yemen in which there is one DLIO in Sana'a and one based in Aden, it is necessary to provide one additional MacBookPro to Yemen so that each DLIO has one for managing Desert Locust data. It is hoped that the CRC will be able to address this issue as soon as possible.

This year's programme focussed on analysis using Rv4.1 (Annex 2). The five days allowed sufficient time for participants to learn by practicing and completing several exercises in which real locust situations were examined. In addition, the trainer provided feedback on improvements to surveying and reporting, updating eLocust3 software and antennas from Djibouti and Ethiopia, introducing the use of drones for Desert Locust survey and control, and how to prepare eLocust3D packages for use on the eLocust3 tablet by survey officers. The CRC resource person presented the Locus app, an Android mobile phone app that can be used for enhanced navigation during surveys. The working hours of the five-day informal technical workshop were from 0830h to 1730h with a 30-minute coffee break in the morning and afternoon, and a 90 minute lunch break.

2.1 Desert Locust bulletins

It was noted that all countries in both regions continue to maintain a high standard of reporting that is the basis for the global Desert Locust early warning system. Nevertheless, there is always room for improvements to ensure high quality and timely information on a regular basis. Rather than presenting the status of reporting by locust-affected countries through the traditional evaluation of quality, timeliness and frequency of reports, the participants peer-reviewed the latest bulletin from each country and provided suggestions for improvements. This was supplemented by additional recommendations from the trainer.

Similar to last year's workshop, the main area for improvement in all countries continues to be the inclusion of captions for maps that indicate the title and a brief explanation or interpretation of the map. While DLIOs are likely to understand the map, most readers may not be able to do so easily or sensibly. Hence, a well-written concise caption describing the map would help to provide more understanding. It is also extremely important to include satellite-derived rainfall maps with survey results of soil moisture, greenness maps with survey results of vegetation, and locust situation maps. It is not necessary to include such maps in the absence of rainfall, green vegetation or locust surveys. If surveys were not conducted and no locusts were reported, this should be clearly written in the bulletin to avoid any unnecessary confusion or expectations. A brief summary of the Rv4.1 data should be included when sending the data file to DLIS. The data and the contents of reports and bulletins should always match.

It is important that the contents of the national locust bulletins are presented in a professional manner that is appealing to the reader. Colours should be carefully used and not over used. The threat levels should be clearly identified. The first page should contain a simple dynamic map indicating locust presence and absence while subsequent pages can contain more detailed maps. Whenever possible, composite maps of satellite imagery and Rv4.1 data should be presented, for example, IRI rainfall maps with Rv4.1 soil moisture data, IRI greenness maps with Rv4.1 vegetation data, topographical maps with Rv4.1 locust data.

The latter should not be present in too much detail that might overwhelm non-technical readers; in other words, plot data according the locust type rather than behaviour.

It is important to present an analysis of the situation, not just a summary of locust presence. The analysis should link the weather and ecological conditions to the locust situation, including results of the breeding estimates. From this, a sensible and meaningful forecast can be prepared. Further instruction and explanation on this topic was provided at this year's workshop.

During periods of increased Desert Locust activity, outbreaks and control, DLIOs should send Rv4.1 data to DLIS two times per week, such as Tuesday and Fridays or Monday and Thursdays. This is imperative in order to keep all countries informed in a precise and timely manner of the current situation and expected developments.

2.2 MacBookPro and MacOS

Five of the DLIOs (Djibouti, Egypt, Eritrea, Pakistan and Yemen) had not been able to update the MacOS from 10.13 (High Sierra) to 10.14 (Mojave) because of slow and unreliable Internet connection in their country. This was done at the workshop using an offline version. Due to a lack of Internet connection, the MacBookPros could not be checked to ensure that the latest version of the standard applications as well as Sophos anti-virus were installed and functioning correctly.

2.3 RAMSESv4 (Rv4.1)

Rv4.1 is currently used in 18 frontline countries of the Desert Locust recession area where survey and control operations are carried out and data are collected that need to be managed and analysed on a regular basis[4]. In 2014, RAMSES was extensively redesigned as open-source software containing a single unified database. The new version, Rv4, became operational on 1 January 2015 and was updated to Rv4.1 in May 2016. Several incremental updates have been issued since then to fix bugs and improve functionality.

Intensive training was provided to the workshop participants on how to use the breeding query to estimate the dates of laying, hatching and fledging of copulating adults, hoppers and fledglings. A colour-coded calendar in the Numbers app was introduced as a means of displaying the results in a graphical manner to make it easier for DLIOs to understand the overall breeding period and to determine if more than one generation of breeding occurred during the season (Annex 3). The participants were shown an example of winter breeding in Sudan starting with November 2018.

Estimating breeding is fundamental to the analysis of any locust situation. From such estimates, the timing of rainfall and favourable ecological conditions can be determined from remote sensing and survey results to better understand the evolution of locust development.

The participants were taught the essential components and methods of summary and analysis, emphasising the development of breeding estimates and the systematic organization and use of monthly layers of rainfall, vegetation, soil moisture, locust behaviour

[4] Algeria, Chad, Djibouti, Egypt, Eritrea, Ethiopia, India, Iran, Libya, Mali, Mauritania, Morocco, Niger, Oman, Pakistan, Saudi Arabia, Sudan, Yemen, and DLCO-EA

and locust type. It is important to remember that the locust situation can be considered one long, uninterrupted story in which each month is a new chapter but in the same book. Therefore, it is necessary to refer to previous months and to make sure to go back far enough in time to commence with the very first seasonal rains. Given the effects of climate change, such rains may occur at unusual times, e.g. the summer and autumn rains in 2018 that led to an outbreak in winter breeding areas along both sides of the Red Sea during which winter rainfall was nearly absent.

The participants were divided into seven groups and spent a full day practicing the analysis of the Desert Locust outbreak in Eritrea[5]. The analysis started with January 2019 and worked backwards to the initial rains that fell during the previous summer, and worked forwards to include a forecast for March and April 2019. Each group prepared maps and showed their results during a ten-minute presentation. All participants and trainers voted for the best analysis by secret ballot because the Menti online interactive tool could not be used without Internet.

During the analysis exercise, several important shortcomings of Rv4.1 became apparent such as (1) querying rainfall data collected during surveys and (2) the ability to select specific infestations for determining breeding estimates. This is especially critical in those countries that have more than one seasonal breeding area such as Eritrea, Pakistan, Saudi Arabia, Sudan and Yemen. Additional shortcomings are indicated in Annex 4. It is hoped that these shortcomings can be addressed as soon as possible.

The participants were shown how to open CSV files in Rv4.1. This is useful for displaying custom towns in a country. In this case, the DLIO should prepare a file in the Numbers app that has three columns of data: TOWN, LAT and LONG (in decimal format, DD.DDDD, that can be determine by using Google Earth). The file should be exported as CSV format. The CSV plugin in Rv4.1 is used to open the CSV file and indicate the delimitation (comma or semi-colon) and the correct columns for longitude (X) and latitude (Y) so that the towns are plotted correctly. DLIOs practiced by preparing a file with a few custom town names along the Red Sea coasts and displaying it in Rv4.1.

The CRC Resource Person, Osama Moustafa, developed a plugin for the Numbers app that summarises Rv4.1 data. He showed participants how it works by adding the script to Automator as a Service for Numbers. It still requires finalisation to include the date of the date and the control types. Thereafter, it will be made available to the DLIOs with an installation video.

2.4 eLocust3

Countries were reminded that every survey and control team should use eLocust3 to record their observations in the field and transmit them in real-time via satellite to their National Locust Centre. During survey and control operations, DLIOs should use GeoFlex to monitor field activities on a daily basis[6].

[5] Oman-Yemen; Djibouti-DLCOEA-Ethiopia; Egypt-Yemen; Saudi Arabia-Egypt; Sudan-Pakistan-DLCO-EA; India-Eritrea-Ethiopia; Pakistan-India (voted as best analysis)

[6] https://web-humanav.novacom-services.com/novacom-gwt-generic/index.jsp

Novacom recently updated eLocust3 software to v19.1.0 to fix several issues but, unfortunately, it appears that several new bugs were accidentally introduced that the correct transmission of some control data (concentration, application rate, quantity used, treatment duration data). Participants were informed that they may wish to downgrade to v2.6 that was released last year to improve transmission speed and data quality (by requiring latitude and longitude coordinates, and allows the entry of treated areas of less than one hectare and pesticide concentrations of less than one litre). Last year, DLIS dispatched one cable directly to each country for updating the IDP680 eLocust3 antenna. DLIS also prepared a video showing how to update the tablet and the antenna, including the use of the custom cable. It is the responsibility of the DLIOs to update every tablet and antenna in their country, and to inform DLIS accordingly so that Novacom can make the necessary configuration changes on the platform to allow data transmission. While most countries have begun the update procedure, there are still some countries that have not updated all of their tablets and antennas (Annex 5).

DLIOs were reminded to check eLocust3 units that are in storage every month to ensure that the battery level is about 40%. In addition, it is important to check that the correct date and time are displayed, which indicates the clock battery is charged. If the incorrect date and time appear, then the clock battery should be charged by turning on the tablet and plugging it in for three days of uninterrupted power. The display can be turned off during this time. India mentioned that it had successfully replaced the clock battery by taking the tablet to a local shop. This may be a viable solution for those countries that do not have three days of uninterrupted power.

2.5 Locus app

The CRC Resource person demonstrated the use of the Locus app to all participants. The purpose of the app is to use it for navigation during surveys in order not to miss important breeding areas. It replaces the use of compass, GPS and paper maps and avoids dependencies on local scouts and guides who may be biased and ignore other areas in which they are unfamiliar. In addition, local guides are declining in many countries and the new generation does not know the locust areas. The Locus app gives the survey team complete autonomy without having to rely on local scouts and guides.

The app contains basic GPS functionality, measures distances, draws the survey track in advance, adds specific points such as previous surveys and displays tracks during control operations. It consists of high resolution topography maps, TPC maps and OSM maps that show roads, and remote sensing imagery for rainfall and green vegetation estimates. It works entirely offline since Internet connectivity is often not available or may be costly, interrupted or too slow. The app works on Android devices and is freely available on Google Play (Locus Map Free) or in a shared folder on Google Drive. The latter also contains a detailed manual for installation, map making and field use.

A companion app, SAS.Planet, is used to prepare high resolution base maps for Locus app from Google Maps, Bing Maps and others. The companion map is only available for PC. In addition, Google Earth Pro can be used to make maps of survey data and remotely-sensed rainfall estimates and green vegetation.

The app provides more functionality than eLocust3D and could be considered a suitable alternative (Annex 6).

2.6 Drones

The use of fixed and rotary wing unmanned aerial vehicles (UAV), commonly called drones, could be a potential means of improving Desert Locust monitoring, early warning and rapid control, and reducing the costs of survey and control. Drones could be used to cover larger areas during surveys, reduce the randomness of looking for green vegetation and locusts in the vast desert, check inaccessible areas, and undertake safer and more effective control operations.

DLIS and the regional Desert Locust commissions are working together with HEMAV, a foundation supported by the European Space Agency (ESA) in Barcelona, Spain, to develop fixed-wing and rotary drones to be used by Desert Locust survey and control teams in affected countries.

Drones are envisaged to be used operationally in three separate scenarios:

(1) Extensive assessment survey to confirm green vegetation presence within larger areas of homogeneous or heterogeneous habitats in the desert up to 50–100 km from the survey team

A ground team will carry a small, portable long range fixed-wing drone with them during the survey. This drone should cover a transect of about 50100 km. The team will programme the route itinerary of the drone and launch it. The drone will capture and process information along the route using optical, multi/hyperspectral, thermal and/or other sensors to detect areas of green vegetation and moist soil as well as the presence of any sizeable hopper or adult concentrations (groups, bands, and swarms). Once the drone returns to the survey team, data will have been processed on-board and is to be transferred to eLocust3 (an android tablet currently used for data acquisition by the teams and transmission by satellite). The team will use the results to go directly to the areas of interest or change direction if the results of the flight do not indicate the presence of favourable conditions or Desert Locust.

(2) Intensive search survey to extent of natural vegetation and crops and detect hopper groups, bands, adult groups and swarms at a potentially infested site up to distance of 5 km

A ground team could also carry a small portable rotary drone with them during surveys to a specific location identified above or an area that may contain vegetation or locusts. They would launch the drone to get a better idea of the ecological conditions and the locust situation by taking low level images of the area to identify the presence of green vegetation and locusts. If the team stops in an infested area with green vegetation or crops, the drone could look in situ for locusts and also determine the size of the potentially infested area. If the location is less precise, then the team could launch the rotary drone to look for any signs of green vegetation or favourable breeding areas in a minimum of 5 km radius. The drone could also be used to collect information from areas that are not accessible to the ground team due to topography or insecurity.

(3) Control for the precision spraying of individual infestations using bio and chemical pesticides at an infested site up to distance of 5 km

A rotary drone to undertake targeted control treatments of small infested areas (with conventional pesticides or biological techniques) at the site where the team is located or in areas that are difficult to access by ground.

3. Conclusion

During a final discussion, the participants expressed satisfaction with this year's workshop. The participants felt that the workshop remains a very valuable opportunity to come together to learn, share experiences and to show problems in front of the trainer to they can be resolved immediately.

The annual interregional workshop continues to contribute directly to the strengthening of the global Desert Locust early warning system, which is the basis for preventive control in order to reduce the frequency, duration and intensity of Desert Locust plagues. The participants reaffirmed the importance of and the need to continue these workshops every year. The workshop is the only opportunity for DLIOs from locust-affected countries within the two regions to get together to exchange experiences and share knowledge face-to-face, and to receive important training and feedback from DLIS. Therefore, it is critical that all frontline countries continue to allow their nationally designated DLIO to take part in this activity, and that CRC continues to organize this activity every year with DLIS participation.

Ideally, Desert Locust Heads should be invited every few years to participate in the workshop with their DLIO so they can observe first hand the tools that had been developed by DLIS and how DLIOs use them in reporting and early warning. This would also help to strengthen the important collaborative link between locust directors and locust information officers.

Several important issues arose during the workshop that participants urge CRC, SWAC and DLIS to consider for further improvement of the global Desert Locust early warning system that is key to preventive control:

(1) complete the transition from Rv3 to Rv4.1 database
(2) update Rv4.1 with additional functionality
(3) fix the bugs in eLocust3 software v. 19.1.0
(4) provide Yemen with a second MacBookPro for the DLIO in Sana'a
(5) develop an Android/iPhone version of eLocust3
(6) finalise the Numbers service that summarises Rv4.1 data
(7) consider Locus app as an alternative for eLocust3D
(8) include one day at the next CRC/SWAC DLIO workshop to practice using the Locus app in the field in typical Desert Locust habitat, ideally at Sharm Esh Sheikh, Egypt
(9) send a questionnaire to DLIOs ahead of next year's workshop asking for suggested topics
(10) make increased use of digital event tools for organising and conducting the workshop

4. Acknowledgements

The participants expressed their appreciation to the CRC for the good arrangements and coordination of the workshop's logistics that contributed greatly to its success and smooth running. They extended special thanks to the Commission Secretariat and the Locust Group at FAO Headquarters for their enormous efforts and hard work in arranging CRC and SWAC participants' travel, respectively. The warm welcome of the Host Government and the support that was provided was much appreciated. Lastly, the participants were grateful for the tireless efforts of the Senior Locust Forecasting Officer in introducing and teaching the MacOS and its functionality in a systematic manner that was easily grasped and understood.

This report was prepared entirely on a Mac using Pages.

Annexes

Annex 1. Workshop participants

	CRC participants
Djibouti	Haissama Ahmed
Egypt	Khaled Kelany
Eritrea	Salem Teklay
Ethiopia	Dereje Mekonnen
	Fentanew Belay
Oman	Khalid Al-Harrasi
Saudi Arabia	Saeed Turkistani
Sudan	Hussien Abaker
Yemen	Saeed Al-Mamaary
	Ahmed Al-Eryani
DLCO-EA	Mehari Tesfayohannes
	Felege Elias

	SWAC participants
India	Chandra Shekhar Sharma
	Pankaj Salunke
Pakistan	Shahbaz
	Jawed Iqbal Khan

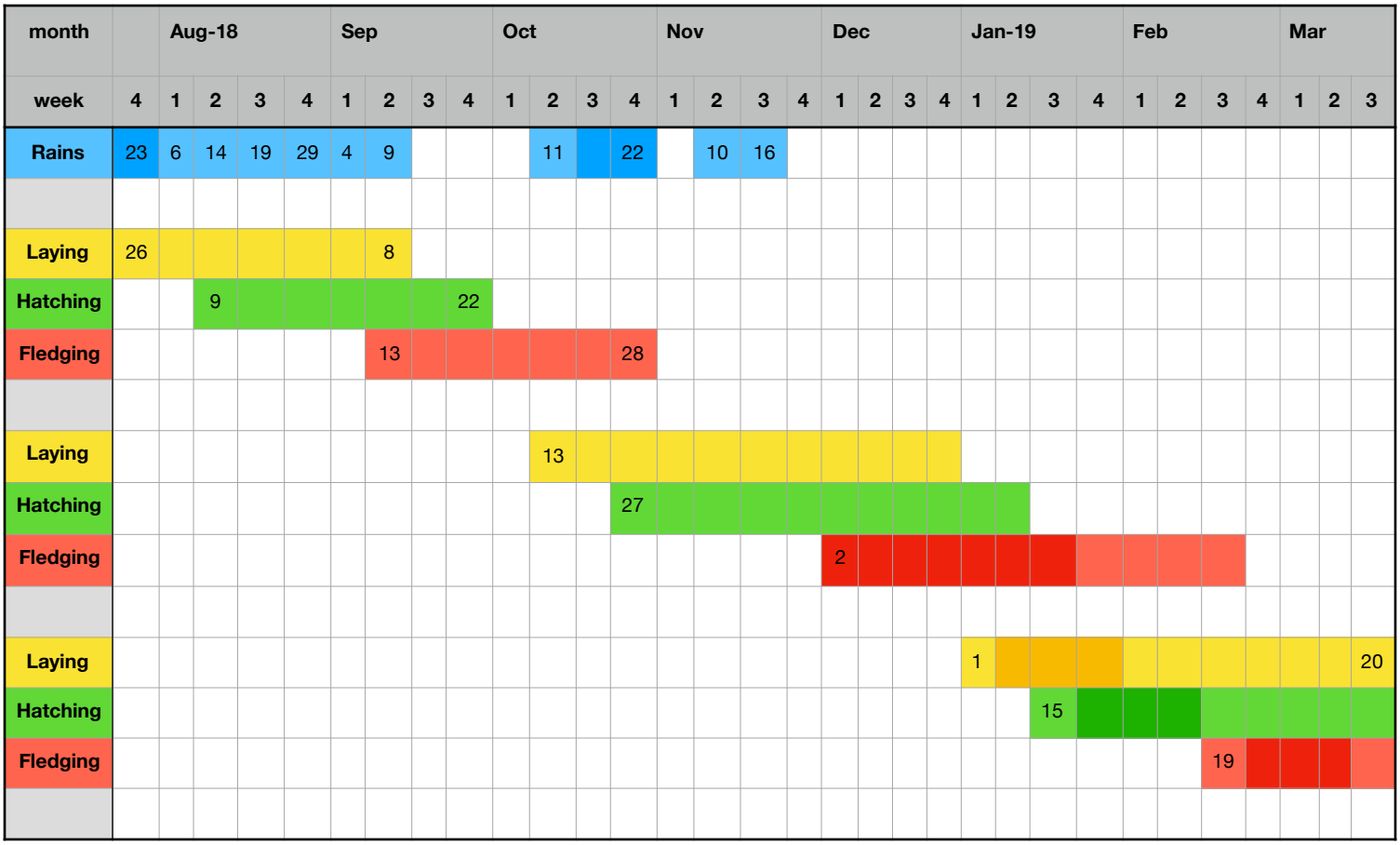
	Trainer & resource person
FAO	Keith Cressman
CRC	Osama Moustafa

Annex 2. Workshop programme

MON 24 JUNE	9:00	Opening: participant expectations, workshop programme; Mac issues
	10:30	**Break**
	11:00	Improvements to surveys
	12:30	**Lunch**
	14:00	Improvements to reporting: peer-reviewing of national locust bulletins
	15:30	**Break**
	16:00	Improvements to reporting (cont.)
	17:30	**End of day**
TUE 25 JUNE	9:00	Introduction: Rv4.1 breeding query (Sudan 11/18)
	10:30	**Break**
	11:00	Introduction (cont.)
	12:30	**Lunch**
	14:00	Exercise: Rv4.1 breeding query (India 5–6/19, Yemen 1–6/19, Egypt 12/18–5/19)
	15:30	**Break**
	16:00	Exercise (cont.)
	17:30	**End of day**
WED 26 JUNE	9:00	Introduction: Rv4.1 analysis
	10:30	**Break**
	11:00	Exercise: Eritrea 1/19 analysis (in 7 groups)
	12:30	**Lunch**
	14:00	Exercise (cont.)
	15:30	**Break**
	16:00	Exercise (cont.)
	17:30	**End of day**
THR 27 JUNE	9:00	Presentations: analysis results by each group
	10:30	**Break**
	11:00	Presentations (cont.)
	12:30	**Lunch**
	14:00	Introduction & exercise: CSV files displayed in Rv4.1
	15:30	**Break**
	16:00	Introduction: Locus app
	17:30	**End of day**
FRI	9:00	Demonstration: Locus app
	10:30	**Break**
	11:00	eLocust3 updating & management; Drones for survey & control; Workshop feedback
	12:30	**Lunch**

Annex 3. Breeding calendar

The results of an analysis undertaken by seven groups of DLIOs at the workshop suggest that three generations of breeding occurred on the Red Sea coast of Eritrea in 2018/2019, which led to the formation of hopper and adult groups in December 2018 and hopper bands and swarms in January and February 2019. The first generation occurred after unusual rainfall on the coast during August and the first half of September but was not detected due to a lack of surveys. Sufficient rains in October and November allowed to subsequent generations of breeding to occur. By the end of March, the situation returned to calm as a result of control operations, dry conditions from a lack of rains since November and the emigration of residual populations of adults.



Darker colours indicate intensity; numbers indicate dates.

Annex 4. RAMSES (Rv4.1) improvements

The high priority improvements indicated below should be implemented as soon as possible. The remaining issues should be reviewed to determine if they have been implemented already, still need to be implemented in Rv4.1 or wait until Rv5.

High priority (June 2019)

- Rainfall query
- Spatial delimitation of breeding query

Reported by CLCPRO DLIO workshop (July 2018)

- General improvements to facilitate data summary and analysis, including those mentioned above for 2017
- Inclusion of sensitive areas
- Updating of national and subnational boundaries (Ivory Coast, Sudan, Oman)

Reported by CRC/SWAC DLIO workshop (May 2017)

- Batch query of monthly data from/to to include data type (behaviour, soil, vegetation) and display by month or type
- Control methods – omit when values=0, daily as stacked bars not lines; decadal totals not displaying correctly (e.g. Sudan: Oct–Dec 2016)
- Locust activities – select type of comparison (years, months) (similar to Control Methods interface)
- Breeding calendar – Rv4.1 to generate from data

Reported by CLCPRO DLIO workshop (March 2017)

- turn off mandatory data field in the Scientific Editor (to allow unconfirmed secondary information to be entered into the database)
- tools to compare current situation with analogous historical situation(s)
- select plotted points on a map to run Min/Max (when there are locusts in more than one seasonal breeding area or in different biotopes within a country)
- add MeasureToolbox_11 distance plugin to the next Rv4.1 update and installer
- eL3 photo management (query database, plot, click on point to show photo)
- add query that does all (behaviour, presence, veg, soil) at the same time but keep their categories
- query & display changes over time (as a table and/or graph) for:
    - density, area infested (infestation size), no. locations infested
    - no. locations with adults, hoppers, bands, swarms that were treated

Annex 5. Current status of eLocust3 updating

The updating of eLocust software and antennas to v 2.6 (or v 19.1.0) is in progress in some countries. All units should be updated by the 2020 CRC/SWAC Desert Locust Information Officer workshop. DLIS will follow up accordingly with each country.

eLocust3	Units	To update
DJI	2	0
DLC	2	1
EGY	25	10
ERI	14	6
ETH	6	3
IND	35	11
OMN	11	0
PAK	30	20
SAU	25	1
SUD	25	15
YEM	20	5

Annex 6. Locus app