



The Commission for Controlling
the Desert Locust in the
Central Region



Desert Locust Control
Organization for Eastern Africa



REPORT

The Fifth Regional Training Course On Aerial Control Of Desert Locust

17th - 21st July 2017
Moshi, Tanzania

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List of Acronyms

AgDGPS	Agricultural Differential Global Positioning System
CRC	Commission for Controlling the Desert Locust in the Central Region
DL	Desert Locust
DLIS	FAO Desert Information Services Locust
DLCO-EA	Desert Locust Control Organization for Eastern Africa
FAO	Food and Agriculture Organization
GPS	Global Positioning System
ha	Hectare
hr	hour
Km	kilometre
m	meter
MoA	Ministry of Agriculture
NMD	Number Median Diameter
PC	Personal Computer
R	Ratio
S	Speed
TS	Track Spacing
VAR	Volume Application Rate
VMD	Volume Median Diameter
VRU	Variable Restrictor Unit

1. INTRODUCTION

As per the recommendation of the Commission for Controlling the Desert Locust in the Central Region (CRC) and based on the benefit of the previous four courses to the participants, this training was conducted under the umbrella of the signed Memorandum of Understanding between (CRC) and the Desert Locust Organization for Eastern Africa (DLCO-EA). In order to allow wider participation, the training course was organized for the second time in Moshi (3rd Training Course was organized in Moshi on 2010), Tanzania. Moshi, about 50 Km from Kilimanjaro Airport, was chosen to be the venue for the training due to the fact that a close-by reliable airstrip was available for aircraft field exercises and most of the facilities for participants' accommodation and other field requirements were available and accessible for use in the training course.

The training course was held at the meeting room of the Salinero Hotel during the period 17th – 21st July 2017. Thirteen participants from Egypt (2, one acted as co-trainer), Eritrea (1), Ethiopia (1), Iraq (2), Jordan (2), Oman (1), Saudi Arabia (1), Sudan (1) and, Tanzania (2), attended the training course. Two of the trainees (from Jordan and Iraq) were pilots and the remaining trainees were either Plant Protection or Locust Officers (Appendix I, participants' names, countries and contacts). The trainers were CRC Secretary of the Commission, the former Secretary of the Commission, the DLCO-EA Senior Officers and the Technical Operator & Maintenance Manager, one Egyptian attended as participated and as a co-trainer. (Appendix II, names and addresses of trainers). The Former CRC Secretary was the coordinator of the course, and the current CRC Secretary played an important role in facilitating the training course and held the responsibility of undertaking Arabic interpretation of the presentations.

In view of the four previous training courses, the main objective was to train locust officers as well as pilots from the Central Region of the biology and behaviour of Desert Locust and on various aspects of its aerial survey and control, including AgDGPS for precise pesticide application and other safety measures.

The training course was jointly organized by FAO/CRC and the Desert Locust Organization for Eastern Africa (DLCO-EA).

DLCO-EA contributions:

- o Motor vehicle and bus as required for the course for transportation to the field and meeting and sending participants from and to the airport;
- o Assisting and facilitating the issuance of entry visas to Tanzania;
- o Assisting in providing certain equipment and support staff on standby bases;
- o A number of flying hours needed for the course including aviation fuel;
- o Trainers (Locust Officers a Technical Operation and & Maintenance Manager and a Pilot);
- o Airstrip prepared and allocated for the period of the training course.

FAO/CRC contributions:

- o DSA to the support staff for a period of the training course;
- o The cost of air tickets to the plant protection and locust officers from the Central Region member countries;
- o Operational cost of the training course, including stationary, conference room rent, breaks, etc;
- o Cost of the training course coordinator, including air ticket and DSA;
- o Sent invitation letters to all participants.

2. OPENING SESSION

• Welcome Address by DLCO-EA:

Mr Didas Joseph Moshi, Base Manager-Arusha welcomed all participants at Moshi and wished all the success for them in the training course, enjoyable stay in Moshi and safe journey back to their countries. And on behalf of the Director of DLCO-EA, Mr Mehari Tesfayohannes welcomed the participants to the 5th Regional Training Course on Aerial Survey and Control of Desert Locust at Moshi, Tanzania, being the second time to be held in Moshi and the fourth time with the participation of DLCO-EA. He mentioned that the interaction between the participants, pilots and Plant protection and Locust Officers, will enrich the discussion and exchange ideas in the training course atmosphere. He emphasized that participants should benefit from the training course and applies the knowledge in combating locusts successfully in our region. Finally he extended his thanks to FAO-CRC and all other partners wished all participants a peaceful and pleasant stay in Moshi.

• Address by FAO/CRC Secretary:

On behalf of FAO, The CRC Secretary, Mr Mamoon Al Alawi thanked the Ministry of Agriculture of Tanzania, for the excellent preparation and warm welcome at the airport as well as at the hotel. He welcomed all the trainees in this regional training programme, who arrived from different countries in the Central Region, hoped that they benefit most of the subjects that will be presented and discussed. He also appreciated the role of Dr Munir Butrous as coordinator and DLCO-EA as Master trainers in the programme.

Mr Al Alawi reminded the participants that this is the 5th regional training programme after the CRC had held the first four programmes in Lake Zeway, 2007 and Nazerete, 2009 in Ethiopia and the third one in Mushi of Tanzania 2010, with full collaboration with DLCO-EA, and the fourth one in Jeddah of Saudi Arabia 2013. Assuring the participants that such training programme is a continuing activity of CRC.

Finally he hoped that this training will further contribute to the achievement and ultimately to the success of the locust control, wishing all pleasant stays and safe journey back to their home countries.

• Ethiopia Aerial Control of DL Film:

A Desert Locust Film on Desert Locust control operations at Konso, Ethiopia during 2007 was shown in the opening session of the training course to focus on the difficulties that can be encountered during the Desert Locust survey and control operations in remote and inaccessible areas. The Film also focused on the importance to have an operational contingency plan in place in order to coop positively with whatever situations. In the discussion it was stressed on the lesson that should be learnt from the film in order to be avoided in the future operations.

On the occasion of the 50th Anniversary of the Commission in the Central Region, the CRC Executive Secretary Mr Al Alawi presented a film on CRC role and activities.

3. SUBJECTS COVERED

The venue of the training programme was the meeting room at the Salinero Hotel and a nearby airstrip, about 5 km (10 minutes' drive), for field demonstrations

Most subjects' related to aerial survey and control of Desert Locust were intensively presented and discussed in the training programme; (refer to the details as shown on Appendix III).

3.1 Desert Locust biology and behaviour:

The presentation covered the following subjects:

- o Locusts are members of the grasshopper family Acrididae, which includes most of the short-horned grasshoppers;
- o The Desert Locust two phases, solitaries and gregarious, and what are the major features to distinguish between the two phases;
- o The invasion and recession areas, including the countries that are subjected to DL exposure during recession and invasion periods;
- o The Desert Locust life cycle, this comprises of three stages, egg, nymph and adult. Furthermore the major distinguishing features between the hopper instars. Eggs laying as well as metrological and ecological factors affecting the rate of egg development;
- o The breeding habitats including, summer breeding areas; winter breeding areas; spring breeding areas. Desert Locust swarming and their movements in the DL belt, and their shapes;

- o The economic importance and the damage caused by locusts and their effect on the food security.

3.2 Brief information on other types of locust and grasshoppers:

The presentation covered the following subjects:

- o A brief information on the difference between other locust species and grasshoppers, focusing on the main distinguishing features.

3.3 Desert Locust information collection and reporting:

The presentation covered the following subjects:

o Importance of information

Information is crucial for locust control and for all decisions and assessments. Based on the collected information, assessment and forecast could be drawn for further survey or control operations, even this information could be used for planning for external assistances and requests.

o Sources of information

Survey reports from qualified Locust Field Officer and supplementary local information from local scouts, extension agents as well as Satellite derived images, DLCO-EA & FAO-DLIS Desert Locust Bulletins and updates, situation reports from neighbouring countries and local meteorological office.

o Information to be collected

The information should include location and its ecology and coordinates, description of the locust found, also date of last rain and amount, accordingly the vegetation conditions and density and soil moisture. Information on control operations and pesticides used should be included in case control operations were carried out.

o Quality of information

How accurate, complete and relevance is crucial for the success of locust operations. When information is irregular, late or of poor quality, then proper and right decisions will not be possible to be taken by the authority.

o Recording and transmitting information

This was briefly presented and discussed, what equipment should be used for that purposes and how information could be stored and saved? The aircrew situation report should be consulted to select the most suitable crew for the job taking into account crew license renewal times, proficiency tests etc.

3.4 Organizing aerial survey and control:

The presentation covered the following subjects:

o Why Aerial Survey & control?

The main objective of the operation is to know the size of green vegetation in one location and to delimit area to be sprayed underinfestation.

o Choosing the right aircraft and crew:

The selected aircraft should be able to operate for at least one month after the anticipated period without having to return to base for maintenance. The most suitable aircrew for the job taking into account crew license renewal times, proficiency tests etc.

o Preparedness of ground logistic:

Ensure the serviceability of the airstrip and confirm dimensions are suitable for the type of aircraft which will be used for the operation. Also ensure that adequate supplies of the right formulations of chemicals for the pest and availability of data in terms of dosage and concentration. And adequate supplies of fuel in sealed drums, expiry dates are well within limits and drums are in good condition. Also ensure that ground personnel working with the aircraft must be well equipped with protective clothing which includes overalls, gum boots, gloves, eye-shields, masks etc. Adequate First Aid kits must be available with instructions, as well as fire extinguishers must be available in addition to the one in the aircraft with instructions on how to use them.

3.5 Aircraft guidance:

The presentation covered the following subjects:

o Primary guidance of aircraft:

This topic was discussed practically in the field, where it was presented that the aircraft bearing in degrees is established by the Pilot from departure point to destination and this is the bearing the Pilot has to maintain throughout the flight after making corrections for wind direction and magnitude.

o Secondary guidance:

Following the development of space satellites it has been possible to design the Global Positioning System (GPS) which can receive signals from these satellites and give a definitive ground position of any place provided the reception of the signals is good. Thus the GPS is able to give description of a spot on the ground through the co-ordinates of the place in terms of latitudes and longitudes. The accuracy of these GPS varies but normally it would be in terms of a few meters. Most aircraft are equipped with GPS which assist the Pilot to locate himself on the map and also navigate to destination through waypoints and also when flying through bad weather.

3.6 AgDGPS in aerial control:

This presentation covered the subjects specifying what is AgDGPS as well as Introduction of the components of the equipment and the system. Computer based demonstration of how to use the equipment and familiarization exercise. Presentation also included how to retrieve spray data from AgDGPS and reporting format. And some practical demonstrations of the use of the AgDGPS on Aircraft. This system uses the latest satellite navigation technology (Differential Global Positioning System) to give position on ground with an accuracy of less than a meter – thus the system can be used to:

1. Define and map a spray field;
2. Guide the Pilot to the defined field and also to a particular spot on the field – say where the last spray swath ended;
3. Guide the Pilot to follow a certain spray pattern having defined the swath width, direction of spray wind velocity and direction – without the use of ground markers;
4. Staff involved in observing the spraying in the field could be used for other activities e.g surveying additional areas.

All this information is stored on the Compact Flash data card of the AgDGPS computer and can be downloaded on an ordinary PC in the office and printed to give full details of the spray.

3.7 Desert Locust target demarcation:

The presentation covered the following subjects:

Locust targets:

- Individual locusts;
- Scattered hoppers or adults;
- Patches of hoppers or adults;
- Single hopper bands;
- Blocks of bands;
- Settled or milling swarms;
- Flying swarms.

Control options include the following:

o Mechanical control

Methods such as digging trenches for hoppers to fall into or beating hoppers with branches are sometimes used as a last resort to try to protect crops.

o Baiting

This method was popular up to the 1950s but has been used very little in recent years. It involved mixing insecticide dust with a carrier such as maize meal or wheat bran, and scattering the mixture among or in the path of the locusts.

o Dusting

Dusting involves mixing pesticide dust with a material such as powdered chalk or talc and scattering it on the locusts.

o Spraying

Spraying is the most commonly used method for locust control. It involves using a sprayer to atomize a liquid pesticide, i.e. to break it into droplets, which are then distributed over the target area. Spraying could be:

- **Water-based spraying:** this is common in conventional agricultural crop protection. It usually involves applying hundreds of litres of insecticide/water mixture per hectare.
- **Ultra low volume (ULV) spraying:** A technique using much smaller volumes of spray liquid, called ultra low volume (ULV) spraying with no water used for dilution, was initially developed in the 1950s for use against the Desert Locust, and is now the most efficient and commonly used method.

In order to spread such small volumes over the target, the liquid must be broken up into small droplets light enough to be carried easily by the wind. To prevent these small droplets evaporating in the hot conditions that are typical during locust control operations, ULV formulations are based on oil rather than other solvents such as water or petrol fractions which may be too volatile, i.e. evaporate too quickly.

Special sprayers are required for ULV spraying if the insecticide is to be used safely and efficiently. Several important factors must be considered:

- Droplet size (depends on the atomizer);
- Droplet spectrum (depends on the atomizer);
- Work rate (depends on the sprayer platform and flow rate);
- Operator safety (depends on various design features);
- Ease of use (depends on various design features);
- Reliability (depends on construction materials and design).

3.8 Aircraft calibration and swath width:

The presentation covered the following subjects:

Calibration and measurement of flow rate of the spray system of the aircraft were covered extensively and explained in details in the classroom and also practiced in the field. Whichever ULV sprayer, platform and insecticide have been chosen, calibration is required, i.e. the measurement and adjustment of various parts of the sprayer in order to apply the correct amount of insecticide, in the right size spray droplets, to the right place. If calibration is not carried out, spraying may be ineffective or insecticide may be wasted. Three factors need to be calibrated to achieve an efficient result:

- 1- Droplet size (if it is adjustable);
- 2- Emission height;
- 3- Dose of insecticide.

o Two steps for calibration of atomizers, including adjustment of the rate of flow and the speed of each atomizer. The flow rate can be measured by the equation:

$$\text{Flow Rate from the aircraft (l/min)} = \frac{\text{Volume Application Rate (VAR l/ha)} \times \text{Track Spacing (TS m)} \times \text{Speed (S km/hr)}}{600}$$

o Droplet size was intensively discussed which can be adjusted by the rotational speed of the atomizer, which is controlled by the angle of the fan atomizer blade.

When do we calibrate spray equipment?

- o When a new sprayer is being used;
- o When the insecticide formulation or concentration is changed;
- o When the volume application rate (VAR), track spacing or forward speed is changed;
- o Before the beginning of the campaign and on a daily basis during it;
- o If the spray cloud looks denser or less visible than usual;
- o If results are poor or if more insecticide than expected is being used.

3.9 Swath width and droplet size behaviour

The subject was extensively presented and discussed in the classroom. Relationship between swath width and track spacing and the number of droplets required killing the pest and the characteristics of large and small droplets were discussed. Factors affecting the droplet behaviour were also presented. A field exercise by spray aircraft used to measure the swath width and hence the track spacing.

Every sprayer produces a range of droplet sizes called a droplet spectrum. A wide droplet spectrum contains many different droplet sizes and there is a large difference in size between the smallest and largest droplets. A narrow droplet spectrum contains droplets of approximately the same size with little size difference between the smallest and the largest droplets. A narrow droplet spectrum is best for ULV spraying.

Droplet spectra are usually described using the values of volume median diameter (VMD) and number median diameter (NMD).

The ratio (R) of VMD and NMD values gives a rough measure of the width of the droplet spectrum – the nearer it is to 1, the more similar the droplet sizes, the larger it is, the greater the range of droplet sizes.

3.10 Aerial control strategy:

The presentation covered the following subjects:

- o What are the locust targets & is control necessary? If so how?;
- o Factors affect the decision to control or not;
- o Different spraying strategies to deal with different types of locust targets:
 - Spraying single hopper band (Spot treatment);
(Not advisable for aircraft at least 100 ha is needed);
 - Spraying blocks of hopper bands (Blanket spraying);
 - Barrier spraying to control hopper bands;
 - Spraying settled swarms;
 - Spraying flying swarms.
- o How to spray all targets are also covered with conditions that affect the control operations.

3.11 Pesticides Safety in aerial applications:

The presentation covered the following subjects:

It is important to take the necessary safety measures before, during and after aerial applications.

Problems Associated with Aerial applications: The problems can be grouped into four broad categories: Overdose, Under Dose, Human Poisoning and Environmental Contamination.

- o **Over Dose:** Application of more pesticide than what is normally required to kill the locust. This results in wastage of pesticides and more contamination of the environment.
- o **Under Dose:** Application of lesser pesticide than the optimum amount required killing the locust. In this case, the locust cannot be killed and continue to cause damage.
- o **Human Poisoning:** Human poisoning can occur to persons involved in locust control operations (occupational exposure) and to people that are not involved in locust control operations (local populations).

o **Environmental Contamination:** All the insecticides that are currently used for locust control are not entirely specific to locusts. They may adversely affect other organisms in the environment.

Safety During Application:

- o Make sure that all non – spraying personnel, vehicles and equipment are away from the target area;
- o Make sure to spray crosswind;
- o Start spraying downwind side of the plot, and move upwind;
- o Stop spraying if the wind drops (less than 1 m/s) or becomes very strong (more than 10 m/s) and wait for the right conditions;
- o Stop spraying if the wind direction changes by more than 45 degrees, adjust your new spray line and spray the remaining area;
- o Stop the sprayer when turning from one spray pass to the other;
- o Avoid spraying under convective conditions since hot air results in convection and unstable wind direction.

Safety After Application:

- o Monitor and record all relevant details on spray monitoring form;
- o Empty any insecticide remaining in the aircraft spray tank back into the original insecticide container;
- o Clean and maintain the spray system on the aircraft and store the insecticide and the empty containers in safe places;
- o Wash yourself and the protective clothing as soon as possible;
- o Most of the safety measures that should be taken are on the pesticide label. It is very important that you read the pesticide label and follow the instructions.

Safety Around Aircraft:

The pilot is responsible for his/her aircraft and any related safety issues. The pilot always has the final say with respect to aircraft safety.

Approaching Fixed-Wing Aircraft:

- o Do not approach a fixed – wing aircraft with its propeller(s) turning; wait until both the aircraft and propeller(s) have come to a complete stand still;
- o Only approach when signalled to do so by a flight crew member;
- o Do not approach the aircraft from the front;
- o Never pass underneath the wing of the aircraft; walk around them;
- o Keep bystanders at a safe distance (at least 100m) from the aircraft parking site.

Approaching Helicopter Aircraft:

- o Only approach the helicopter after the pilot has signaled that it is safe to do so;
- o Always approach the helicopter from the front so the pilot can see you. The safest places from which to approach a helicopter are the front left and front right sides;
- o Never approach from the rear around the tail rotor area;
- o If the helicopter's rotors are already turning or about to turn, approach the aircraft with caution. If you are approaching the helicopter on level ground, walk toward the aircraft in a low crouch to allow for extra space between your body and the rotors;
- o When approaching the helicopter on a slope, never approach from the uphill side;
- o Be careful when exiting the helicopter. Follow the pilot's instructions and exit only when told that it is safe to do so.

3.12 Good and bad weather conditions for spraying:

- o Subjects such as effect of wind, convection and rain were covered intensively;
- o Guideline on ULV spraying conditions were also presented.

3.13 First Aid in case of poisonous:

An intensive presentation was presented focusing on what measurements to be taken in case of poisoning, including washing with water, moving the subject to an open area for better ventilation, enhance vomiting, kiss of life and finally recording all information regarding the poisoning till taking the subject to a nearer clinic or hospital.

3.14 Group presentations:

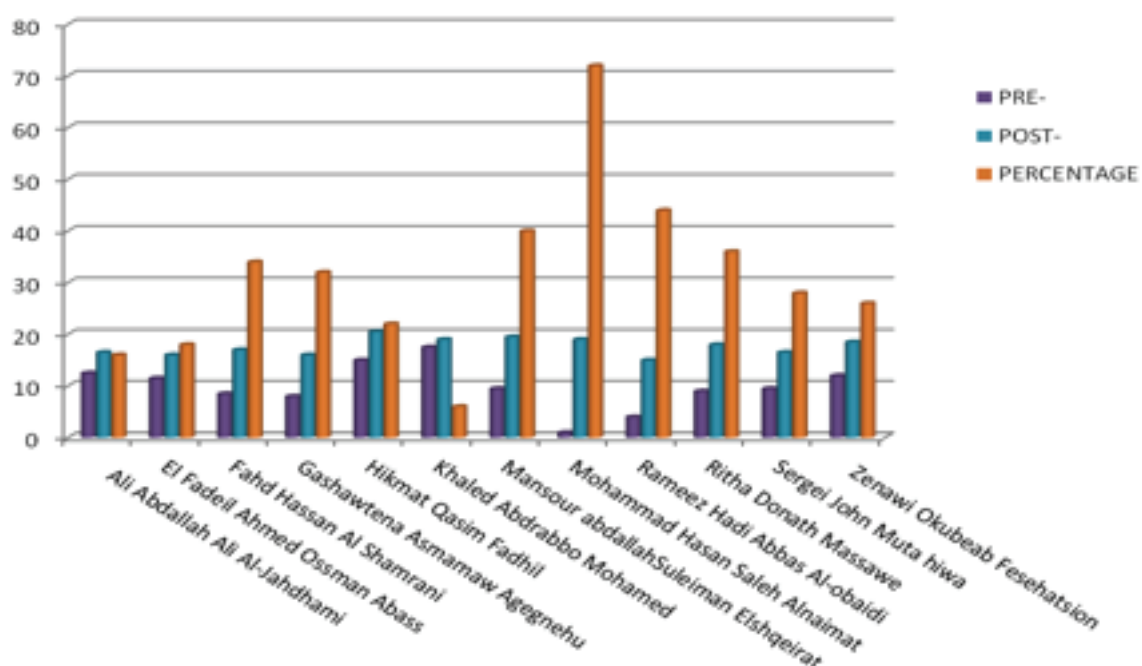
One participant from each of the four groups was selected to give a presentation of a selective subject prepared by the group. The coordinator assessed the presentations and provided his advices on the performance of the presenters.

The objective of these presentations was to assist the participants and encourage them to be qualified as master trainers in order to handle national or local training courses without the need to have external technical assistants.

Multiple choice type of evaluation sheets were given to the trainees at the beginning and at the end of the training course.

The purpose of these evaluation sheets was to evaluate the knowledge of the trainees before and after the training course in order to evaluate their benefit from such a course. The questions of the evaluations included all topics covered in the training programme. The results as shown on the below table and figure, where the trainees showed a significant improvement in their results which indicated that all trainees benefited from the selected topics of the course and that they were able to capture most of the subjects delivered both in theory and practice. It was evident that the improvement percentages after attending the training ranged between 6 - 72%.

Name	Evaluation		
	Pre-	Post-	% Improvement
Ali Abdullallah AL- Jahdami	12.5	16.5	16
El Fadeil Ahmed Ossman Abass	11.5	16	18
Fahd Hassan Al Shamrani	8.5	17	34
Gashawtena Asmamaw Agegnehu	8	16	32
Hikmat Qasim Fadhil	15	20.5	22
Khaled Abdrabbo Mohamed	17.5	19	6
Mansour abdallahSuleiman Elshqeirat	9.5	19.5	40
Mohammad Hasan Saleh Alnaimat	1	19	72
Rameez Hadi Abbas Al-obaidi	4	15	44
Ritha Donath Massawe	9	18	32
Sergei John Muta Hiwa	9.5	16.5	28
Zenawi Okubeab Fesehatsion	12	18.5	26



5.0 PARTICIPANTS ASSESSMENT OF THE TRAINING COURSE

Feedback and assessment of the training course was made by the trainees through the use of an evaluation form, and this could be summarized in the following:

- 1- The trainees were accommodated at Salinero Hotel, Moshi, 42% indicated that the venue and the accommodation were excellent and 42% rated the accommodation as very good, however 16% rated the accommodation as good;
- 2- While 25% of the trainees mentioned that food and drinks were excellent 33% rated it as very good and 42 % indicated it as good;
- 3- Fifty eight percent rated the daily programme as too long, 25% as long and 17% as acceptable;
- 4- Forty one percent rated the duration of the course as suitable while 41% rated it as short and 18% rated it as too short;
- 5- The trainees rated their opinion regarding the knowledge and the ability of instructors to present materials between excellent 59%, very good 33% and 8% as good;
- 6- Fifty nine percent of the trainees rated the course field practical as excellent and 33% rated it as very good and 8% as good;
- 7- Handouts of the training rated as excellent, 58%, 42% as very good;
- 8- The opinion of 75% of the trainees rated the usefulness of the course as excellent and 25% rated it as very good.

In view of the trainees' presentations and the above evaluation, it should be concluded that the training course was very useful; the results would of course be reflected in future successful locust operations.

6.0 CERTIFICATES OF MERITS

At the end of the training programme, all trainees were given a certificate of merits (Sample of certificate on Appendix IV). Also a flash containing all power point presentations and handouts, references (Standing Operating Procedures and Desert Locust Guidelines) and photos of the training course were distributed together with the 50th Anniversary of CRC film.

7. CONCLUSION AND RECOMMENDATIONS

- 1- The participatory manner of the training was very much appreciated by the trainees, as well as trainers;
- 2- Follow up on the field performance of Locust Officers and pilots during locust campaigns;
- 3- For wider interest and benefit of both Locust Officers and Pilots, this regional training course should be organized and conducted every other year.

8. ACKNOWLEDGEMENT

Thanks are due to the Government of Tanzania for hosting the fifth training course and to DLCO-EA for organizing and supporting, as partners, the training course. Acknowledgement extended to the efforts of all DLCO-EA staff in following up all details for organizing the course. Acknowledgement is also extended to all instructors who were actively engaged with the activities of the training course. Special thanks are due to Mr Didas Joseph Moshi, DLCO-EA Base Manager in Arusha and his staff for all the support they provided to this training. At last but not least the Commission would like to express its appreciation to Mr Munir Butrous for his excellent efforts during the training course session and for drafting this report.

APPENDICES

Appendix I: Names and Addresses of Trainees on Regional Aerial Desert Locust Survey and Control Operations

Name / Job Title	Organization	Contacts
Ali Abdulllah AL-Jahdami Agriculture Engineer	Muscat – Alkhoud, Oman	Tel.: 00968 99374188 Email: Entomologistali96@gmail.com
El Fadeil Ahmed Ossman Abass Locust Officer	Porto Sudan, Red sea st., Sudan	Tel.: 00249 127004402 Email: aelfadeil@yahoo.com
Fahd Hassan Al Shamrani Locust Officer	P.O. Box 30403, Saudi Arabia	Tel.: 00966 550455454 Email: alhamedf@gmail.com
Gashawtena Asmamaw Agegnehu Locust Officer	Ministry of Agriculture and Natural Resource, Ethiopia	Tel.: 00251 911097345 00251 116461147 Email: Gashawt139@gmail.com
Hikmat Qasim Fadhil Agriculture Engineer	Ministry of Agriculture Baghdad, Iraq	Tel.: 00964 7802138513 Email: HikmatFahl@yahoo.com
Khaled Abdrabbo Mohamed Locust Officer	Alexandria, Egypt	Tel.: 002 01201415524 Email: Shgerat.n@yahoo.com Saged1975@gmail.com
Mansour AbdallahSuleiman Elshqeirat Agriculture Engineer	Ministry of Agriculture Amman, Jordan	Tel.: 00962 0795419662 Email: Q80_va@yahoo.com
Mohammad Hasan Saleh Alnaimat Pilot	Amman, Um alsumaq, Jordan	Tel.: 00962 799999626 Email: Mohammad_AL_n3emat@hotmail.com
Rameez Hadi Abbas Al-obaidi Pilot	Ministry of Agriculture Baghdad, Iraq	Tel.: 000964 7804836673 Email: nalabi1956@yahoo.com
Ritha Donath Massawe Ministry of Agriculture Officer	P.O. Box 9091 Dar- Es-Salaam, Tanzania	Tel.: 00255 755223971 Email: imrithadonath@yahoo.com
Sergei John Muta Hiwa Ministry of Agriculture Officer	P.O. Box 4071, Tanzania	Tel.: 00255 222865642 Email: smutahiwa@yahoo.com
Zenawi Okubeab Fesehatsion Locust Officer	Ministry of Agriculture Keren, Eritrea	Tel.: 00291 7306483 Email: Zenaokuba2015@gmail.com

Appendix II:

Names and Addresses of Trainers on Regional Aerial Desert Locust Survey and Control Operations

Name / Job Title	Address	Contacts
Mamoon Al Sarai Al Alawi Chief Engineer Executive Secretary of the CRC	FAO/UN P.O.Box: 2223 Cairo Postal code:11511 Cairo – Egypt	Tel.: 0020 2 33316018 Email: mamoon.alsaraialalawi@fao.org Web.: http://desertlocust-crc.org/
Munir Gabra Butrous FAO Coordinator (CRC former Secretary)	Falcon Shipping Co. P.O. Box 17 Khartoum, Sudan	Tel.: 00249922334444 Email: Munir.Butrous@gmail.com
Mehari Tesfayohannes Chief Information & Forecasting officer	DLCO-EA – Nairobi P.O.Box 30023 (00100) GPO, Nairobi, Kenya	Tel.: 00254 6002305/6001488 Mobile: 00254722752849 Email: meharitg@dlcoea.org
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George Mwangi Spray Pilot	DLCO-EA P.O. Box: 30023-00100 Nairobi- Kenya	Tel.: 00254 722972455 Email: gmwangi.dlco@gmail.com
Didas Joseph Moshi Base manager- Arusha	DLCO-EA P.O.Box: 593 Arusha	Email: moshididas@yahoo.com dlcoearusha@gmail.com
Emad Kameel Abdel Sayed Locust Officer (acted as co-trainer)	Ministry of Agriculture Cairo, Egypt	Email: e.kameeel@yahoo.com

Appendix III:**Programme of Regional Aerial Training Course on Desert Locust Survey and Control Operations
Moshi, Tanzania 17-21/07/2017**

Day/Date	Time	Topic	Presenter	Activity/Location/ presentations
Mon 17/07	09:00-09:30	Registration	Coordinator	Registration, distribution of training materials
	09:30-10:00	Opening ceremony, introduction to the course	MoA/FAO	Formal opening
	10:00-10:30	Trainees pre-course evaluation	All participants	
	10:30-11:00	Refreshments	All trainees	Multiple choice paper
	11:00-11:30	Ethiopia Movie		
	11:30-12:30	Desert Locust Biology and behavior. Breeding areas and distribution.	Munir	Classroom presentation + discussions
	13:30-14:00	Brief information on other types of locust and grasshoppers	Munir	Classroom presentation + discussions
	14:30-16:30	Information collection and reporting	Felege	Classroom presentation + discussions
	16:30-17:00	General discussion	All	Classroom discussions
End of day one				
Tue 18/07	08:00-09:30	Organizing aerial survey and control (including ground support at airstrip)	Pilot	Classroom presentation + discussions
	09:30-10:30	Aircraft guidance	Engineer	Classroom presentation + discussions
	11:00-12:30	Calibration	Mamoon/Munir	Classroom presentation + discussions
	13:30-17:00	Field exercise on aircraft calibration	Pilot/Engineer/ Mamoon/Munir	Field Demo
	17:00-17:30	General discussion	All	Classroom discussions
End of day two				
Wed 19/07	08:00-09:30	Swath width droplet size behavior	Munir/Mamoon/ Pilot/Engineer	Classroom presentation + discussion
	09:30-10:30	AgDGPS for aerial control	Mehari/Munir	Classroom presentation + discussion
	11:00-13:00	Swath width exercise	Mamoon/Munir/ Pilot	Feld Demo
	17:00-14:00	Field Exercise AgDGPS	Mehari/Pilot	Feld Demo
End of day three				
Thurs 20/07	08:00-09:00	Retrieving data from AgDGPS	Mehari	Classroom presentation & discussions
	09:00-10:00	Desert Locust Target and demarcation	Munir	Classroom presentation & discussions
	10:30-11:30	Aerial Control Strategy	Mehari	Classroom presentations + discussions
	11:30-12:00	Bad and good weather conditions for spraying	Munir	Classroom presentation & discussions
	12:00-13:00	Pesticides safety in aerial application - Safety before and after aerial application and airstrip arrangements	Munir	Classroom presentation & discussions
	14:00-14:30	First aid	Munir	Presentation & discussions
	15:00-17:00	Group presentations	All	Presentation & discussions
End of day four				

Day/Date	Time	Topic	Presenter	Activity/Location/ presentations
Fri 21/07	08:00-10:00	Open subject/experience presentation		Presentation & Discussions
	10:00-10:30	Trainees post-course evaluation	All trainees	Multiple choice paper
	11:00-11:30	Course evaluation	All trainees	Evaluation form
	11:30-12:00	Closing and handing certificates	CRC/DLCO-EA	

End of day one

Breaks: One tea break in the morning and another one in the afternoon for 30 minutes each at 10:30 and 15:30, or when we are ready, noon pray and lunch break for one and half hour at 12:00.

**Appendix IV:
Sample of Certificate Issued to Participants**



Appendix V:
Photos from the training course





The Commission for Controlling
the Desert Locust in the
Central Region

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