सत्यमेव जयते

Two days National Training Workshop On Desert Locust

25th& 26thNovember, 2021

Government of India

Ministry of Agriculture & Farmer's Welfare
Department of Agriculture & Farmer's Welfare
Directorate of Plant Protection Quarantine & Storage
Locust Warning Organization, Jodhpur-342001 Rajasthan (India)

Two days National Training Workshop

on Desert Locust and its control in

Scheduled/Non-scheduled Desert areas

During 25th& 26th November, 2021

at

Locust Warning Organization,
Jodhpur-342001 Rajasthan (India)

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Introduction:

During the 32nd Session of South West Asia Commission (SWAC) [A FAO Commission for Controlling the Desert Locust in South West Asia], it was decided that the trust fund will supplement national training workshops upon request by the member country that includes workshop date, participant, trainers, subjects and detailed budget. In order to implement the same and strengthening technical skill of officials involved in desert locust related activities, India planned two batches of two days National Training Workshop on Desert Locust. The LWO, Jodhpur organized two days National Training workshop on 25th& 26th November, 2021 (Batch-II) sponsored by FAO-SWAC at the office of LWO, Jodhpur. In this connection, a detailed program including training schedule, training date, List of participants, estimated budget etc. prepared and sent to the appropriate authorities for approval/sanction. After detailed deliberations between LWO, Jodhpur Directorate of Plant Protection Quarantine & Storage and FAO, a national training program was finalized. Various improvements suggested by FAO and the Directorate for organizing the national training program were incorporated and date were finalized i.e. 25th& 26th November, 2021.

Locust Warning Organization (LWO), Jodhpur is the prime office for locust control in India. There are eleven other offices i.e. Ten Locust Circle Offices (LCOs) and one Field Station for Investigations on Locust (FSIL) are governed by the LWO, Jodhpur under supervision of Directorate of Plant Protection, Quarantine and Storage, Faridabad (Haryana).

This National Training workshop was conducted under the chairmanship of Dr. N. Sathyanarayana, Joint Director (PP) LC & R, Directorate of Plant Protection, Quarantine and Storage, Faridabad. The National Program Officer Mr. Rajesh Dubey from FAO India also participated as an observer of this program. Social distance was also maintained due to COVID-19 in this workshop.

Resource Persons:

In consultation with SWAC and the Directorate a team of eight resource persons were identified as Trainers. The programme includes Classroom and field exercises, demonstrations, practice training session, Pre and Post evaluation tests.

The nominated resource persons were advised in advance for preparation of their respective lectures and other responsibilities assigned to them for smooth conducting of the national training workshop. They have been requested to report at the training venue one day before of the commencement of the training workshop to discuss preparation and effective training. They were also advised to use latest teaching methods *viz.* best use of Power Point Presentation, White board, Posters, field exercises besides the participatory approach amongst the participants during the course of training workshop. The List of resource persons is annexed in **Annexure-I.**

Participants:

The participants for this training cum workshop were identified from different LCOs, CIPMCs and nominations were approved by the Competent Authority. In addition the State Government of Rajasthan, Gujarat, Haryana and Punjab were requested to nominate district level officials for the training cum workshop. The list of participants in the programme is annexed in Annexure-II.

Training Program:

Keeping in view the locust active season in India which may probably commence from June month, It was decided to organize the National Training workshop during 25th& 26th November, 2021 on Biology, Behavior, Control Operation, Alternative control measures, eLocust3mpro, preparedness, field exercise, etc. Accordingly a detail schedule of training programme including date, time for each classroom and field activities was identified with respect to the training programme and got approved by the appropriate authorities. A copy of the programme is annexed (**Annexure- III**).

Day 1: 25/11/2021

Registration of the participants:

The National Training Workshop began with the registration of participants / resource persons. During the registration, the participants were advised to follow due precautions and guidelines of COVID-19 and provided folder, training literature, T-shirt, cap, notepad & a pen.

Inaugural Session:

1. Inaugural session started with welcome address by Dr. Virendra Kumar, Assistant Director (PP) Locust Warning Organization, Jodhpur. In his welcome address, he encouraged all the participants to adopt participatory approach during the course training workshop. It was also emphasized that the participants use their practical experience in order to improve their skill. Then the function has started by the lighting the lamps together with Dr. N. Sathyanarayana, JD (PP), Directorate of Plant Protection, Quarantine & Storage, Faridabad, Sh. Rajesh Dubey, National Program officer, FAO India, Sh. V.K. Pandey, JD (Agri.Ext.), State Agriculture Department Jodhpur, Dr. S.K. Verma, DD(E), FSIL, Bikaner, Dr. K.L. Gurjar, Deputy Director (PP), CIB & RC, Faridabad, Dr. Sunita Pandey, DD(E), IPM Div., Hqr., Faridabad and Dr. Virendra Kumar, AD (PP), LWO, Jodhpur.
2. Honorable Joint secretary (PP) Dr. Pramod Kumar Meharda was Chief Guest of this programme and he addressed the participants on virtual mode. He appreciated the efforts of all stakeholders in successful containment & mitigation of more than 103 swarms during difficult times of COVID lockdown restrictions in 2020-21. He advised all the stakeholders to be well prepared for any such eventuality in future, ensuring readiness of functional equipment's for survey and control operations. Acknowledging the role of

malathion 96 % ULV in high success of locust control, he cautioned that, use of chemical pesticide may be reduced by promoting sustainable control approaches such as bio-pesticides, IGR etc, in future.

3. Honorable Plant Protection Adviser Dr. Ravi Prakash also gave their exhortation by video conference from Directorate of Plant Protection, Quarantine & Storage, Faridabad and congratulate to all participants. He has also enumerated about the background of the national training programme and its usefulness to the participants in order to improve their skill in decision making on locust control activities.
4. Special address by Mr. Tomio Shichiri, FAO Representative India emphasized locust control activities conducted by LWO, Jodhpur, co-operation & Co-ordination by FAO in locust control. Considering the facts that many new comers have joined the locust scheme either their first entry into the Government system or transfer from other scheme, the national training programme will provide required knowledge and exposure to these new entrants in dealing with locust related work.

Pre-evaluation Test:

In order to evaluate the knowledge and skill of the participants, a pre-evaluation test was conducted. The test paper comprised of questions related to Biology, Behavior, Alternative control measures, preparedness & use of eLocust3. All trainee participants attempted the pre evaluation test. The comparative result of pre evaluation / post evaluation test is given at **Annexure-IV.**

Technical Session:

Classroom lectures / exercises:

During classroom technical session lecture was taken on "Desert Locust" by Dr. K.L. Gurjar, Deputy Director (PP), CIB & RC, Faridabad by using power point presentation.

After lunch, technical session resumed with the lecture on "Role of Wireless in Locust Control" by Sh. P.K. Bhulania, W/Operator, Locust Div., Hqr., Faridabad using all the means of training techniques followed by another lecture on "Advance Preparedness Plan of DPPQ&S" by Sh. Chandra Shekhar Sharma, APPO, Locust Div. Hqr., Faridabad, 'Locust Incursion / Upsurges 2019: A case study of successful locust control' by Sh. Sahi Ram Bishnoi, PPO (E), LCO, Jaisalmer.

The senior locust forecasting officer **Mr. Keith Cressman** from FAO, Rome has given presentation on international co- operation and current status of the locust through video conferencing.

After this, lecture, an another lecture taken on the topic "Ground Control" by Dr. S.K. Verma, DD (E), FSIL, Bikaner and Aerial Control by Dr. Pankaj Salunke, APPO, LWO, Jodhpur. During end of the session, a group discussion on locust situation as well as question answer session was held where all the trainee participants enthusiastically participated in the

session which made the atmosphere charged and interesting.

Day 2: 26/11/2021

Field exercise:

On second day of the training workshop, all the trainee participants along with Master trainers reached to the assigned field at 8.00 AM for mock drill at Uchiyarda village of Jodhpur. Demonstration on wireless activities & its importance was explained by Sh.
P.K. Bhulania, W/Operator, Locust Div., Hqr., Faridabad. After this demonstration Dr. Virendra Kumar AD (PP), LWO, Jodhpur conducted mock drill along with mechanic Sh. Dharma Ram, LWO, Jodhpur and field demonstration of desert locust survey were given by Dr. Pankaj Salunke, APPO (E), LWO, Jodhpur & demonstrated the use of eLocust3mpro in the field. This exercise lasted for three hours. After conducting field exercise all, the participants as well as Master Trainers came back to the training venue for the remaining technical session.

Classroom lectures / exercises:

During pre-lunch session Dr. Virendra Kumar Assistant Director (PP), LWO, Jodhpur explained in detail about "Safety measures" to be taken during locust control.

After lunch break another lecture taken by Dr. Shaloo Ayri, Deputy Director (E), Locust Div. Hqr., Faridabad on the topic of "Alternative approaches for locust control" followed by a group discussion organized amongst the all groups where each team leader of a group has presented a brief on the two days training workshop.

Post training evaluation Test:

After completion of the technical session, a post training evaluation test was undertaken to evaluate the difference in perception & knowledge of the participants. Result of pre & post evaluation test is shown in **Annexure-IV**.

Wrap up & Vote of Thanks: At the end of the National Training Workshop all the activities undertaken during the course of two days training were once again briefed to the participants and doubts were clarified on various topics related desert locust. Dr. S.K. Verma, DD (E), FSIL, Bikaner has taken an opportunity to vote of thanks to all dignitaries & participants.

Conclusion:

The following observations are made on the two days National training workshop on desert locust:

1. Classroom discussions & field exercises like demonstration on eLocust3mpro, wireless communication, locust survey and control provided excellent practice training session to the participants which not only improved the skill of the participants but also sensitized them to think beyond the box on all relevant issues.
2. Pre and Post evaluation tests result indicates that participants have acquired the fresh knowledge on the relevant topics covered during the training workshop.

3. At the end of the programme all group leaders briefed the house with improved skill and sense of satisfaction which reflects positivity of participatory approach of the training workshop.
4. The workshop offered an opportunity to improve technical skill by learning & doing method. Participants exchanged their knowledge and experience during the field exercise & group discussion session.
5. The participants expressed their keen interest more in practical session followed by classroom training and suggested to continue such training program frequently in future.
6. Entire workshop was conducted in Hindi and English languages. Keeping in view of positive feedback of the participants and success of this program, it has been decided to submit a proposal for next training on “Locust Control Techniques” and other important subject.

Annexure – I

List of Resource Person

Si .No.	Name of Resource Person	Designation	Headquarter
1.	Dr. S. K. Verma	DD (E)	FSIL, Bikaner
2.	Dr. K.L. Gurjar	DD (PP)	CIB&RC, Faridabad
3.	Dr. Shaloo Ayri	DD (E)	Locust Div., Hqr. Faridabad
4.	Dr. Virendra Kumar	AD (PP)	LWO, Jodhpur
5.	Sh. Sahi Ram Bishnoi	PPO (E)	LCO, Jaisalmer
6.	Dr. Pankaj Salunke	APPO (E)	LWO, Jodhpur
7.	Sh. Chandra Shekhar Sharma	APPO (PP)	Locust Div., Hqr. Faridabad
8.	Sh. P. K. Bhulania	W / Operator	Locust Div., Hqr. Faridabad

Annexure – II

List of Trainees

Si. No.	Name of participants	Designation	Headquarter
1.	Dr. Sunita Pandey	DD (E)	IPM Div. Hqr., Faridabad
2.	Sh. Bijendra Singh	AD (E)	RCIPMC, Lucknow
3.	Dr. R. K. Sharma	AD (WS)	CIPMC, Sriganganagar
4.	Sh. N. R. Meena	PPO (PP)	LWO, Jodhpur
5.	Dr. Pradeep Kumar	PPO (PP)	LCO, Barmer
6.	Sh. K. P. Pathak	PPO (E)	RCIPMC, Lucknow
7.	Sh. Vishal Gate	PPO (PP)	IPM Div. Hqr., Faridabad
8.	Sh. Guru Prasad G. R.	PPO (PP)	FSIL, Bikaner
9.	Sh. Anuj Sharma	APPO (E)	LCO, Jaisalmer
10.	Sh. Amit Mishra	APPO (WS)	LCO, Barmer
11.	Dr. Madhu G. K.	APPO (WS)	LCO, Churu
12.	Sh. Arnav Chattopadhyay	APPO (E)	IPM Div. Hqr., Faridabad
13.	Sh. Bolli Venubabu	APPO	IPM Div. Hqr., Faridabad
14.	Sh. Kuldeep Kumar	APPO (E)	CIPMC, Patna
15.	Dr. S. A. Jayaprakash	APPO	CIPMC, Indore
16.	Dr. Prashanta C.	APPO	RCIPMC, Faridabad
17.	Sh. Vinod Maitraya,	APPO (E)	Locust Div. Faridabad
18.	Sh. Roopesh Kumar	APPO (PP)	LCO, Suratgarh
19.	Sh. Sharvan Singh	SA	LWO, Jodhpur
20.	Sh. Virendra Godara	SA	LWO, Jodhpur

21.	Sh. Bhople Sangram Singh	SA	LCO, Bhuj
22.	Sh. Lijju AC	SA	FSIL, Bikaner
23.	Sh. Kishan Lal Panwar	TA	LWO, Jodhpur
24.	Sh. Arun Panwar	TA	LWO, Jodhpur
25.	Dr. J. R. Bhakar	DD (Agri.)	State Agri., Jodhpur
26.	Dr. R. B. Singh	DD (Agri.)	State Agri., Jalore
27.	Sh. V. S. Solanki	DD (Agri.)	State Agri., Barmer
28.	Sh. Kailash Chaudhary	DD (Agri.)	State Agri., Bikaner
29.	Sh. Radheshyam Narwal	DD (Agri.)	State Agri., Jaisalmer
30.	Sh. Satpal	ADO (PP)	State Agri., Bhiwani

Annexure - III

Two Days FAO Sponsored Training Programme on Desert Locust and its Control in SDA/Non - SDA

Training Schedule

Date	**Time**	**Events**
25/11/2021	09:00-10:00	Registration of participants
	10:00-11:00	Inaugural function
	11:00-11:30	Tea Break
	Technical Session	
	11:30-12.00	Pre-evaluation test
	12.00-13.00	Desert Locust by Dr. K.L. Gurjar DD (PP), CIB&RC, Faridabad.
	13:00–13.45	Lunch Break
	13.45-14.15	Role of Wireless in Locust Control by Sh. P.K. Bhulania W/Operator, Locust Div., Hqr., Faridabad.
	14.15-15.00	Advance Preparedness Plan of DPPQS by Sh. Shri Chandra Shekhar Sharma, APPO, (PP) Locust Division,HQ, Faridabad
	15.00-15.25	Locust Incursion/Upsurges 2019: A case study of successful Locust Control by Sh. Sahi Ram Bishnoi, PPO (E), LCO, Jaisalmer.
	15.30-16.00	Address by Mr. Keith Cressman FAO, Rome (on virtual mode)
	16.00-16.30	Tea Break
	16.30-17.00	Control operations- Ground Control by Dr. S.K. Verma, DD (E), FSIL, Bikaner.
	17.00-17.30	Control operations- Aerial Control Drones and helicopters(MI-17) by Dr. PankajSalunke, APPO (E), LWO, Jodhpur.
	08.00-12.00	Field exercises/Demonstration-Demonstration of tractor mounted sprayer, Micronair, Ulva Mast, Micro Ulva,

26/11/2021		eLocust3m mobile app. Dr. K. L. Gurjar, DD (PP), Dr. Virendra Kumar AD (PP) Dr. Pankaj Salunke APPO (E)
	12:00-12:30	Tea Break.
	12:30-13:00	Safety measures by Dr. Virendra Kumar AD (PP) LWO, Jodhpur
	13:00-14:00	Lunch Break
	14:00-15:00	Alternative approaches for locust control by Dr. Shaloo Ayri, Deputy Director (E), Locust Div. HQ. Faridabad
	15.00-15.30	Post evaluation test
	15.30-16.00	Tea break
	16.00-16.30	Group discussion and feedback
	16.30-17.30	Valedictory Programme: Certificate distribution, vote of thanks and wrap-up Vote of Thanks : Dr. S.K. Verma, DD (E), FSIL, Bikaner.

Annexure - IV

Test Result: Pre & Post training evaluation

Sl. No.	Name of Participants	Pre-evaluation	Post-evaluation	Difference (+)
1.	Dr. Sunita Pandey	40	80	40
2.	Sh. Bijendra Singh	45	58	13
3.	Dr. R. K. Sharma	50	80	30
4.	Sh. N. R. Meena	42	88	46
5.	Dr. Pradeep Kumar	34	74	40
6.	Sh. K. P. Pathak	25	55	30
7.	Sh. Vishal Gate	50	78	28
8.	Sh. Guru Prasad G. R.	34	78	44
9.	Sh. Anuj Sharma	40	82	42
10.	Sh. Amit Mishra	34	73	39
11.	Dr. Madhu G. K.	47	80	33
12.	Sh. Arnav Chattopadhyay	24	85	61
13.	Sh. Bolli Venubabu	24	68	44
14.	Sh. Kuldeep Kumar	25	84	59
15.	Dr. S. A. Jayaprakash	63	85	22
16.	Dr. Prashanta C.	40	87	47
17.	Sh. Vinod Maitraya,	45	78	33
18.	Sh. Roopesh Kumar	36	83	59
19.	Sh. Sharvan Singh	18	60	42
20.	Sh. Virendra Godara	34	78	44

21.	Sh. Bhople Sangram Singh	32	82	50
22.	Sh. Lijju AC	34	82	48
23.	Sh. Kishan Lal Panwar	34	76	42
24.	Sh. Arun Panwar	32	68	36
25.	Dr. J. R. Bhakar	41	82	41
26.	Dr. R. B. Singh	40	80	40
27.	Sh. V. S. Solanki	50	85	35
28.	Sh. Kailash Chaudhary	24	72	48
29.	Sh. Radheshyam Narwal	42	78	36
30.	Sh. Satpal	25	75	50

Annexure-V

Desert Locust

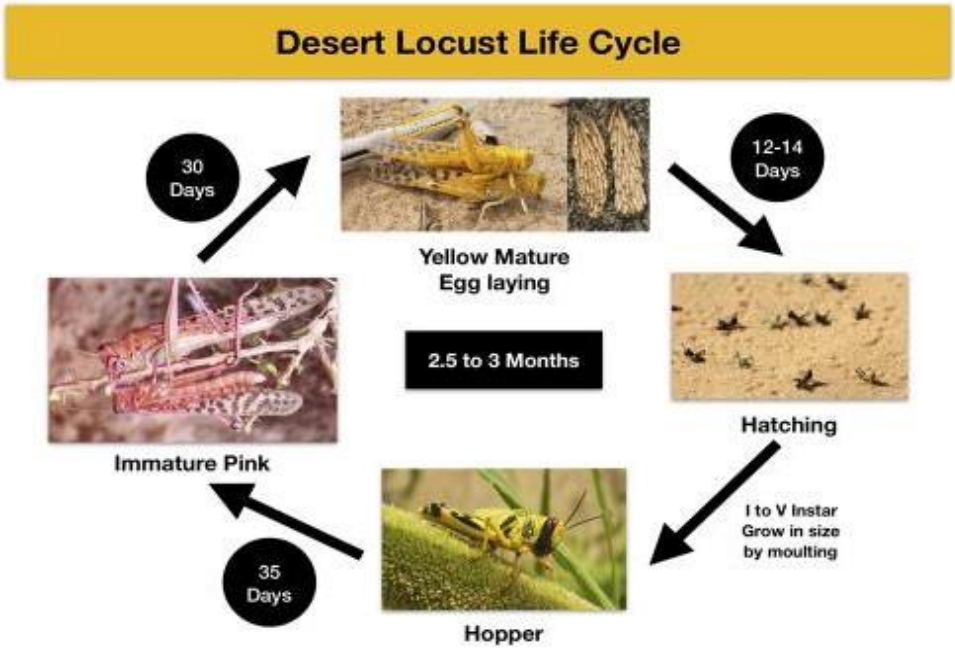
Dr.K.L.Gurjar
Deputy Director(PP)

Desert Locust

- Class: Insecta
- Order: Orthoptera
- Suborder: Caelifera
- Family: Acrididae
- Subfamily: Cyrtacanthacridinae
- Tribe: Cyrtacanthacridini
- Genus: Schistocerca
- Species: S. gregaria
- Binomial name:Schistocerca gregaria

Life Cycle

- Three stages: egg, nymph (hopper) and adult
- Eggs are laid by females, hatch into wingless nymphs called hoppers.
- Hoppers shed their skins five or six times called **moulting** and the stage between moults is referred to as an **instar**.
- The final moult from fifth (or sixth) instar hopper to adult is called **fledging** adult known as a **fledgling**.

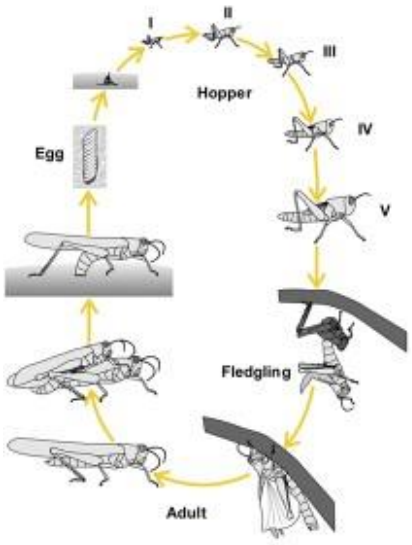


• Mating / Egg Laying / Eggs

• Hopper Stages

Immature adults(Pink Locust)

Mature Adults

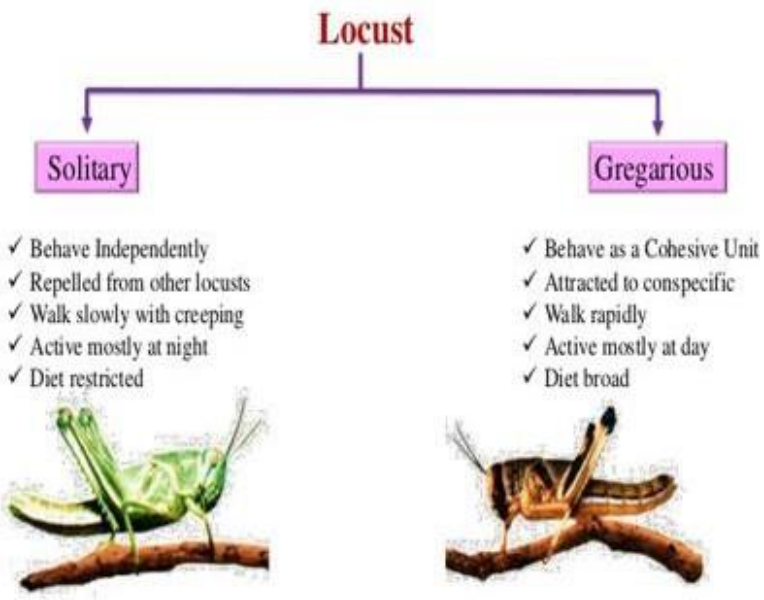


Life Cycle Parameters		
Stage	Egg, Hopper, Adult	
Duration	Egg	10-15 days
	Hopper	24-96 days (36 days average)
	Adult	2.5 - 5 months
	Adult maturation	3 weeks
Nymphal instars	5-6 (solitarious)	5 (gregarious)
Phases	solitarious, transient, gregarious	

Locust Phases

1. Solitarious- present in low densities, individual live separate from each other.

2. Gregarious – when large number of individual gather together.



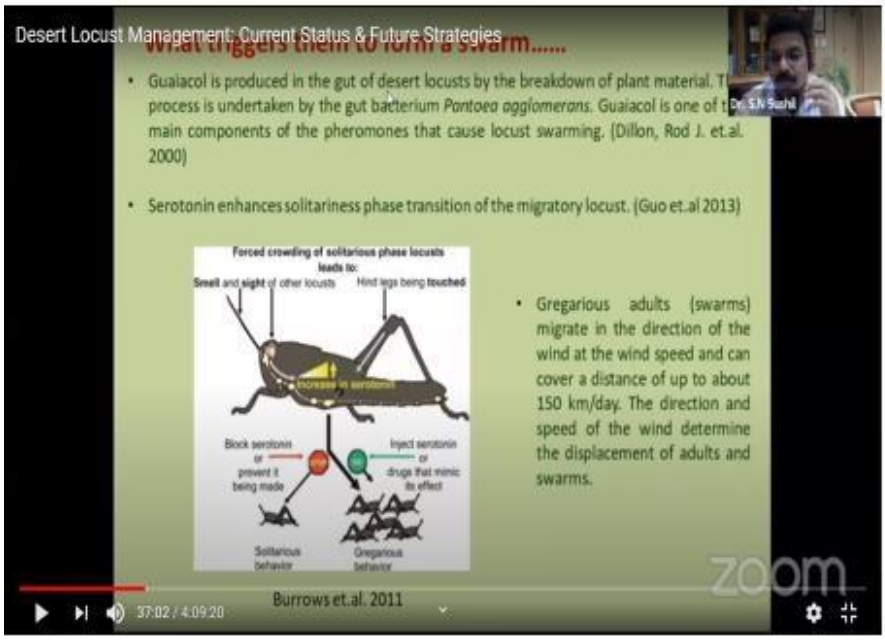
Desert Locust Phases

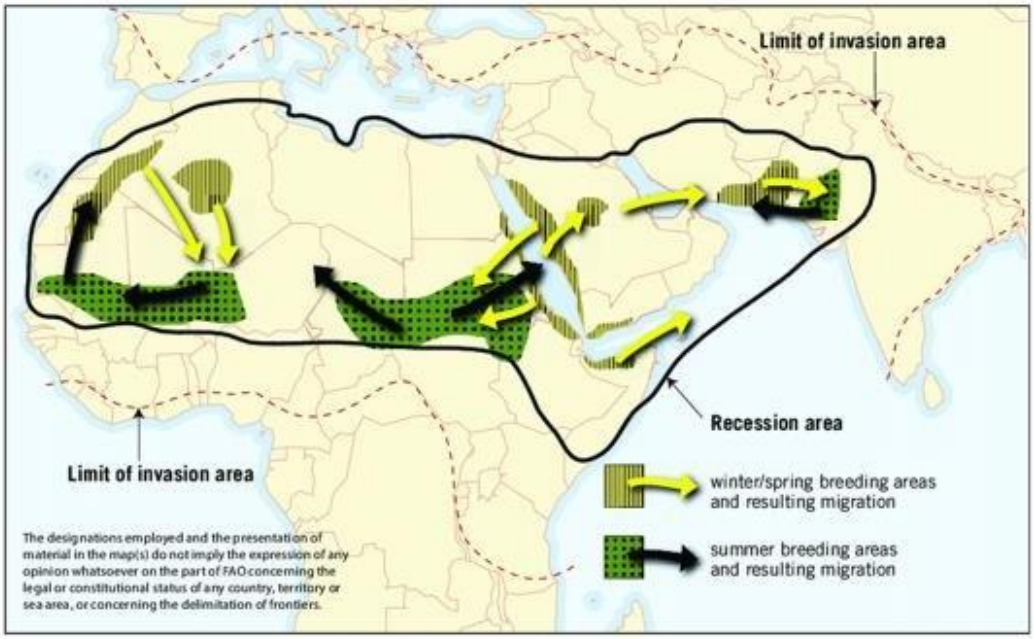
Difference between Desert Locust & Grasshopper

Desert Locust

Grass Hopper

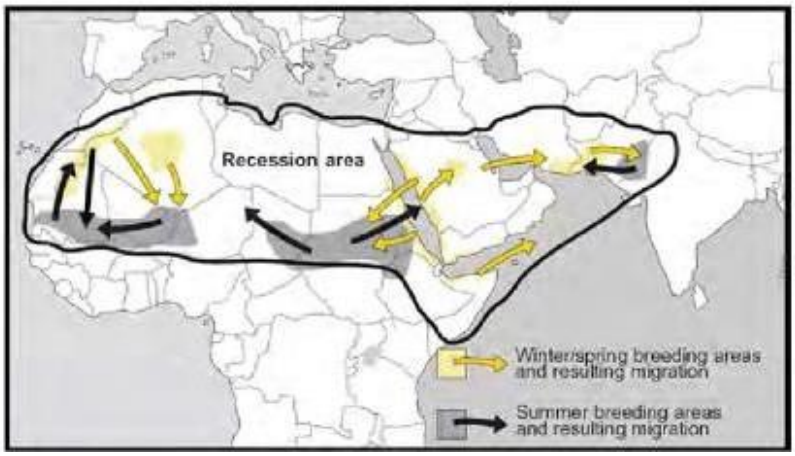
The desert locust has the ability to change its behaviour and habits and can travel long distances in the group stage.





Desert Locust exist throughout the 30 countries shown inside the black line. They can remain harmless in small numbers in one region, while increasing in numbers and swarming in another region, for example, in Northwest and West Africa during the 2003-2004 upsurge.

Within the recession area, locusts move with the winds. These bring them into particular zones during the summer (the Sahel and the Indo-Pakistan desert) and during the winter/spring (northwest Africa, along the Red Sea and Baluchistan).



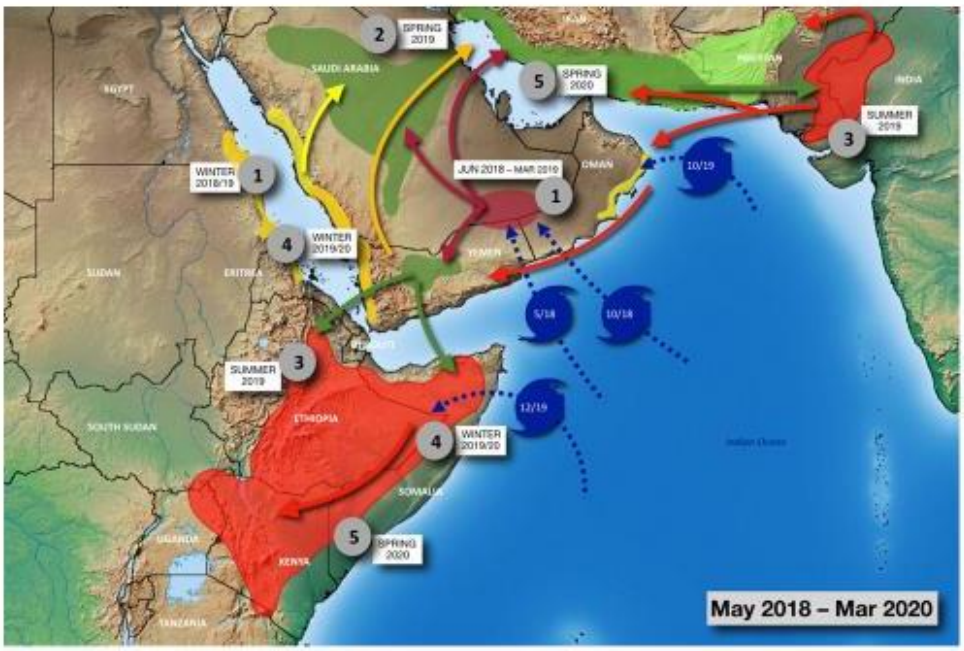
Locust season	Rainfall season	Hatching	Fledging
Spring (long rains)	February – May	March – June	May – August
Summer	June – September	July – September	August – October
Winter (short rains)	October – January	October – January	November – February

Spring breeding areas	Summer breeding areas	Winter breeding areas
• Northwest Africa • Iran, Pakistan • Interior of Saudi Arabia and Yemen • Somalia Peninsula and East Africa*	• Sudan, Eritrea, Ethiopia • East Africa* • Sahel, West Africa • Indo-Pakistan border	•Red Sea and Gulf of Aden coasts •Somali Peninsula and East Africa*

Upsurge

- Upsurges are a result of successful breeding over a number of generations by an initially small population. With successive generations, the proportion of the total population in bands and swarms increases until few scattered locusts remain; the total number of locusts increases as does the size and coherence of the bands and swarms. Several outbreaks that occur at the same time followed by two or more generations of transient-to-gregarious breeding can lead to an upsurge.

- Overview of the 2019-2020 **Desert Locust upsurge**
- An **upsurge** developed in 2019 as a result of two cyclones that brought heavy rains to the Empty Quarter on the Arabian Peninsula in May and October 2018 that was exacerbated by **Desert Locust** outbreaks along the Red Sea coast during the winter of 2018/2019.



Field Photographs

Hoppers

Immatures Adults (Pink Desert Locust)

THANKS

Roll of wireless in Locust Control

P.K.Bhulania
Wireless Operator
HQ, Faridabad

Type of wireless sets

Mobile wireless for vehicle

Fixed wireless for base station

VHF wireless for vehicle

VHF handy wireless

Roll of wireless in SDA and bordering areas

Wireless is useful where network of mobile phone and other communication is not accessible at bordering and remote areas of Scheduled Desert Areas.

Due to non availability of any mobile network the pilot of spraying helicopter/ aircraft can contact with ground team through VHF wireless only.

Ground team can contact each other during survey and control while working in remote and bordering areas by using HF wireless sets and VHF to VHF wireless set within 5 Kms area

Contact between base wireless station and mobile wireless sets.

Deployment of Helicopters - Bell 206-B3 (private) & Mi17 (IAF) for aerial control

Wireless contact during aerial control

Actual location during control

Late evening Location

Basic Radio/Wireless set operating procedure to use of RF unit

SWITCH ON the button in RF Unit

•SWITCH ON the button of Handset and adjust the volume.

Set the channel frequency by pressing button 5 as shown in below figure & press the side button for calling and sending messages.

•Keep the microphone about 10 cm from your mouth
•Know exactly beforehand what information needs to be communicated & to whom before going on-line.
•Speak as clearly and as precise as possible
•Always use proper calling terms such as standard phonetic alphabet and Prowords as follows :

Call sign

Call signs are used to identify the posts of locust survey and control teams participating in the radio network. Every mobile team should have its own unique call sign. Call signs are communicated by using the standard phonetic alphabet.

Standard Phonetic Alphabet:

The phonetic alphabet is an international standard and should always be used when communicating by HF/VHF radios. The words of this alphabet listed below have been found to be easy to understand even in case there is a lot of interference.

A	Alpha		N	November
B	Bravo		O	Oscar
C	Charlie		P	Papa
D	Delta		Q	Quebec
E	Echo		R	Romeo
F	Foxtrot		S	Sierra
G	Golf		T	Tango
H	Hotel		U	Uniform
I	India		V	Victor
J	Juliet		W	Whiskey
K	Kilo		X	X-ray
L	Lima		Y	Yankee
M	Mike		Z	Zulu

Directorate of Plant Protection, Quarantine & Storage
वनस्पति संरक्षण, संगरोध एवं संग्रह निदेशालय

Trainning programme on Wireless Communication for LWO Officers/Officials

Resource Person:-
P. K. Bhulania

Organised by:-

Directorate of Plant Protection, Quarantine & Storage
Dept. of Agriculture, Cooperation & Farmers Welfare
Ministry of Agriculture & Farmers Welfare, Government of India
NH-IV, Faridabad – 121001 (Haryana)
Web : www.ppqs.gov.in / locust@nic.in

Aim of the Course:

With the aim to facilitate and to improve communication of important field information to the locust Information Office of the national Locust Control Unit, and to allow the managers at the headquarters to stay in close contact with the survey and control teams in the field.

Scopes:- To familiar with some basic rules and standard procedures to ensure smooth communication to all radio/wireless operators when operating HF radio transceivers.

Purpose:- Effective Communication of Mobile teams in the field with the LWO/LCO's incharges/Wireless operator inorder to transmission of more important information regarding survey, emergency situation and control operations of Locusts.

Principles – To understand : how signals are transmitted, its operation, problem solving, how to understand Frequencies, Scanning, Selcalling, Voice Calling, Telcalls (Radio Telephone Calls).

Utility Training Programme:- The participants will be able to operate, maintainace and care of wireless sets alone both in field and control room.

Participants:- This training is recommended for a LWO/LCO's especially those who involved in wireless communications in respective stations viz., Officer Incharge with 2 Technical persons of all station.

Course Outline:

- ✓Introduction about Radio Communication
- ✓Importance of Wireless communication between stations
- ✓Basic Radio Operating procedures
- ✓Prowords and its explanation
- ✓How to make a call in field and control room
- ✓Call sign and its Standard Phonetic alphabets
- ✓Phonetic alphabet & numeral use on network
- ✓Responsibilities and Authority of Radio Operators
- ✓Functions and Operation of VHF radio and Codan NGT (HF)
- ✓ Radio checks and daily staff security radio checks
- ✓Radio discipline - Brevity, Rhythm, Speed, Volume and Preparation
- ✓VHF & HF radios and their specifications

Hands on skills that will be acquired:

- ✓ Practical exercises as required,
- ✓ Maintenance & care of VHF handheld radios,
- ✓ Emergency communications,
- ✓ Dangers of HF transmissions ,
- ✓Easy installation and smart monitoring of wireless set,
- ✓ Vehicle tracking procedures.

Duration of the programme: 2 days

Venue: The training programme will be held at Conference hall of LWO Jodhpur.

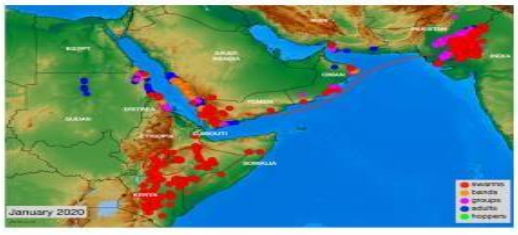
THANKS

टिड्डी आक्रमण से पूर्व की तैयारी

टिड्डी अनुभाग,मुख्यालय फरीदाबाद

रेगिस्तानी टिड्डी

सिर्फ एक वर्ग किलोमीटर के झुंड में 80 मिलियन वयस्क तक हो सकते हैं, जिसमें एक दिन में 35,000 लोगों के बराबर भोजन का उपभोग करने की क्षमता होती है।



बड़े झुंड खाद्य सुरक्षा और ग्रामीण आजीविका के लिए एक बड़ा खतरा हैं।
प्रशांत अवस्था मे 30 देशों एव आक्रमण की अवस्था मे 60 देशो तक टिड्डी का खतरा रहता हैं

पूर्व तैयारी क्यों एवं किसलिए?

- लक्ष्य प्राप्ति में सुगमता
- अंतिम समय की भागादोड से बचने के लिए
- विभागीय आकस्मिक योजना का आंकलन
- उपलब्ध संसाधनो का आंकलन
- समय पूर्व स्टाफ, उपकरण, वाहन इत्यादि आवश्यक सामग्री की कमी पूर्ति हेतु प्रयास

पूर्व तैयारी लक्ष्य प्राप्ति का मार्ग प्रसस्त करती हैं।

टिड्डी नियंत्रण हेतु पूर्व तैयारिया

- सूचना तंत्र एवं नियंत्रण कक्षो की स्थापना
- अस्थाई कैंप की रूपरेखा
- टीमों का गठन
- सर्वे उपकरणो का अंशाकन एवं रखरखाव
- नियंत्रण यंत्रो का अंशाकन एवं रखरखाव
- वाहनो की मरम्मत एवं रखरखाव
- कीटनाशी की उपलब्धता
- हवाई छिड़काव का प्रबंधन
- सुरक्षा उपकरणो की उपलब्धता
- भंडार सामग्री एवं अन्य आवश्यक वस्तुएँ
- आवश्यक बजट की उपलब्धता

उद्देश्य

खाद्य सुरक्षा एवं किसानो की आजीविका का सरंक्षण

टिड्डी नियंत्रण हेतु पूर्व तैयारिया

- सूचना तंत्र एवं नियंत्रण कक्षो की स्थापना
- अस्थाई कैंप की रूपरेखा
- टीमों का गठन
- सर्वे उपकरणो का अंशाकन एवं रखरखाव
- नियंत्रण यंत्रो का अंशाकन एवं रखरखाव
- वाहनो की मरम्मत एवं रखरखाव
- कीटनाशी की उपलब्धता
- हवाई छिड़काव का प्रबंधन
- सुरक्षा उपकरणो की उपलब्धता
- भंडार सामग्री एवं अन्य आवश्यक वस्तुएँ
- आवश्यक बजट की उपलब्धता

उद्देश्य

खाद्य सुरक्षा एवं किसानो की आजीविका का सरंक्षण

राष्ट्रीय एवं अंतराष्ट्रीय टिड्डी बुलेटिन एवं अपडेट

सूचना प्रणाली एवं नियंत्रण कक्ष की स्थापना

ग्रामीण,सीमा सुरक्षा बल, पुलिस, अध्यापक, कृषि विभाग के कर्मचारी, राजस्व विभाग,पोस्ट आफिस के कर्मचारी

महत्वपूर्ण संपर्को का सूचीकरण

टिड्डी प्रभावित जिलों के महत्वपूर्ण संपर्क जैसे जिला कलक्टर, तहसीलदार, ग्राम सेवक, पटवारी, सीमा सुरक्षा बल, जागरूक किसान, अध्यापक इत्यादि के नाम एवं फोन नंबर की सूचि बनाए

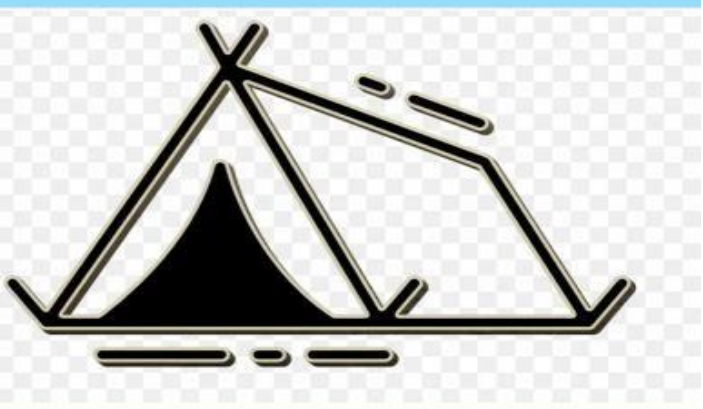
सूचनाओं के संकलन हेतु प्रभावी प्रारूप

सूचनाओं के आदान प्रदान हेतु सारगर्भित, सटीक, आवश्यक सूचनाओं से ओतप्रोत एव प्रभावी प्रारूप तैयार करें (वैज्ञानिक आधार पर दैनिक डेटा संकलन)

सूचनाओ का विश्लेषण

- सूचनाओं का वैज्ञानिक संकलन सुनिश्चित करें
- सूचनाओं की वैध्यता का आंकलन करें
- राज्य सरकार के स्थानीय कृषि अधिकारीयों एवं कर्मचारियों द्वारा.
- व्हाट्सएप पर फोटो मंगवाकर पहचान सुनिश्चित करना
- क्षेत्र के जागरूक कृषकों से फ़ोन या व्यक्तिगत संपर्क द्वारा.
- सत्यापित सूचनाओं का विश्लेषण कर नियंत्रण हेतु टीम का प्रबंधन.

अस्थाई केम्पों की रूपरेखा



- सरकारी विश्राम गृह
- आंगनबाड़ी केंद्र
- विद्यालय
- सामुदायिक भवन इत्यादि का चयन करें जहाँ रहने एवं खाने की मूलभूत सुविधाएँ उपलब्ध हो तथा टिड्डी प्रभावित क्षेत्रो में नियंत्रण कार्य सुगमता से किया जा सके

टीमों का गठन

सर्वे टीम

नियंत्रण टीम

आपूर्ति टीम

उपलब्ध स्टाफ एवं संसाधनों के आधार पर समय पर टीमो का गठन सुनिश्चित करें

सहयोगी विभागों से आपातकाल में स्टाफ, वाहन एवं अन्य संसाधनों की उपलब्धता का पूर्व आंकलन कर ले

सर्वे उपकरणों का अंशांकन एवं रखरखाव

समय पूर्व सर्वे उपकरणों का अंशांकन एवं रखरखाव, मोबाइल एप का इंस्टालेशन इत्यादि सुनिश्चित करें

नियंत्रण यंत्रों का अंशांकन एवं रखरखाव

अल्वामास्ट

माइक्रोअल्वा

टिड्डी के सीज़न के पूर्व समस्त छिडकाव यंत्रों की मरम्मत एवं रखरखाव प्रक्रिया संपन्न कर ले.सभी यंत्रो को चलाकर देख लेवे एवं माक ड्रिल द्वारा अभ्यास कर लेना चाहिए.

माइक्रोनेयर

समय पूर्व स्पेयर पार्ट्स की उपलब्धता हेतु समग्र प्रयास कर लेने चाहिए

अल्वामास्ट एवं माइक्रोनेयर

छिडकाव यंत्रो की मरम्मत एवं रखरखाव समय पर कर ले

ट्रेक्टर माउंटेड स्प्रयेर्स का अंशांकन एवं रखरखाव

उन ग्रामीणों की सूचि बनाए जिनके पास ट्रेक्टर माउंटेड स्प्रयेर सही रूप में उपलब्ध हैं.

ट्रेक्टर माउंटेड स्प्रयेर

ट्रेक्टर माउंटेड स्प्रयेर की उपलब्धता सुनिश्चित करें,राज्य सरकार द्वारा किसानो को ट्रेक्टर हेतु दिए जाने वाले अनुदान सम्बंधित पत्राचार संपन्न कर लिया जाना चाहिए. प्रशासनिक अनुमति एवं वित्तीय स्वीकृति प्राप्त कर ले

समस्त वाहनों का रखरखाव

सर्वे वाहन

टिड्डी के सीज़न के पूर्व समस्त वाहनों की मरम्मत एवं रखरखाव प्रक्रिया संपन्न कर लेनी चाहिए

नियंत्रण वाहन

आपूर्ति वाहन

वाहनों की मरम्मत हेतु समुचित पत्राचार, प्रक्रिया एव बजट की उपलब्धता इत्यादि का परिक्षण कर ले

हवाई छिडकाव का प्रबंधन

ड्रोन एवं हेलिकोप्टर की उपलब्धता हेतु सम्बंधित मत्रालय एवं कम्पनियों से समुचित पत्राचार कर ले

कीटनाशकों की खरीद,उपलब्धता,मात्रा,भण्डारण एवं वितरण की रूपरेखा बनाए

केन्द्रीय कीटनाशी बोर्ड द्वारा रेगास्तानी एवं गैर रेगास्तानी क्षेत्रों हेतु अनुमोदित कीटनाशकों का समुचित प्रबंधन

सुरक्षा उपकरणों की उपलब्धता एवं वितरण

समय पूर्व सुरक्षा उपकरणों की खरीद एवं वितरण की योजना सुनिश्चित करें

आवश्यक भंडार वस्तुएं एवं खाद्य सामग्री

भंडार वस्तुओं जैसे साबुन, डस्टर, गमछा, बोतल, गुड़, चना इत्यादि हेतु आवश्यक प्रशासनिक अनुमति एवं वित्तीय स्वीकृति के लिए पत्राचार संपन्न कर ले.

आकस्मिक एवं आवश्यक बजट का प्रबंधन

आपातकाल में अन्य स्कीमों से बजट की उपलब्धता सुनिश्चित कर ले.

आकस्मिक बजट हेतु समस्त विकल्पों पर विचार कर ले

अन्य मंत्रालय एवं विभागों का योगदान

- गृह मंत्रालय
- रक्षा मंत्रालय
- विदेश मंत्रालय
- नागर विमानन मंत्रालय
- सूचना मंत्रालय
- राज्य सरकार के कृषि एवं अन्य विभाग

समय पर आवश्यक पत्राचार संपन्न कर ले

जागरूकता एवं प्रशिक्षण कार्यक्रमों का आयोजन करना

जिला एवं तहसील स्तर तक जागरूकता एवं प्रशिक्षण कार्यकर्मो का आयोजन कर मुख्य प्रशिक्षक तैयार करें.

टिड्डी सर्वे, नियंत्रण, सुरक्षा एवं पूर्व तैयारी से सम्बंधित जागरूता एवं प्रशिक्षण कार्यक्रमों का आयोजन करें.

जागरूकता अभियान / कृषि अधिकारियों एवं सीमा सुरक्षा बलों से सम्पर्क एवं प्रशिक्षण

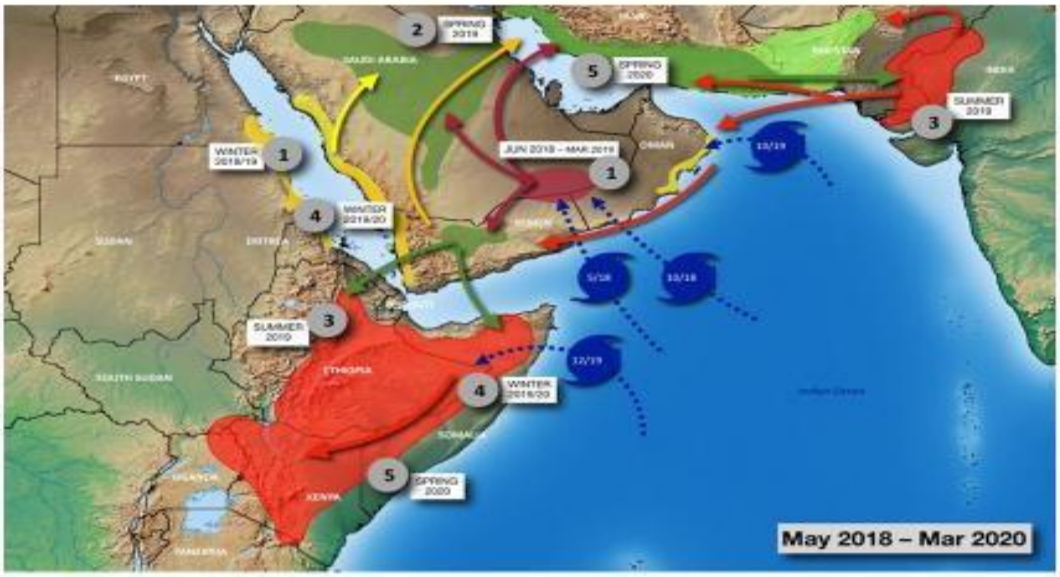
पूर्व तैयारी एक नज़र में

Locust Upsurge/ Incursion 2019

Presented By,

Sh. Sahi Ram Bishnoi,
Plant Protection Officer (E)
LCO, Jaisalmer

Current Upsurge 2019-2020



INCURSION-2019

- MAY-FEBRUARY: swarms invade the Indo-Pakistan border from Iran and up to three generations occur due to longer than normal monsoon, giving rise to large numbers of swarms.

INCURSION-2020

- MAY: Second-generation swarms form in Iran and Pakistan, and migrate to Indo-Pakistan, continuing to northern India.
- JUNE: Spring-bred swarms continue to move to Rajasthan and northern states of India.
- JULY: First-generation laying, hatching and band formation occurs along Indo-Pakistan border.
- AUGUST: Widespread hatching and band formation in SW Asia.
- SEPTEMBER: **SW Asia returns to calm**

Control Operation 2019

Total area surveyed	-	9,40,484 Ha
Area treated	-	4,03,488 Ha
Malathion used	-	3,14,645.5 ltr
Control against Adults	-	2,25,803 Ha
Control against Hoppers	-	1,77,685 Ha
Manpower engaged	-	200
Vehicle utilized	-	65

Control operation successfully conducted in 11district of Rajasthan, 2 district of Gujarat & 1 district in Punjab

Control Operation 2020

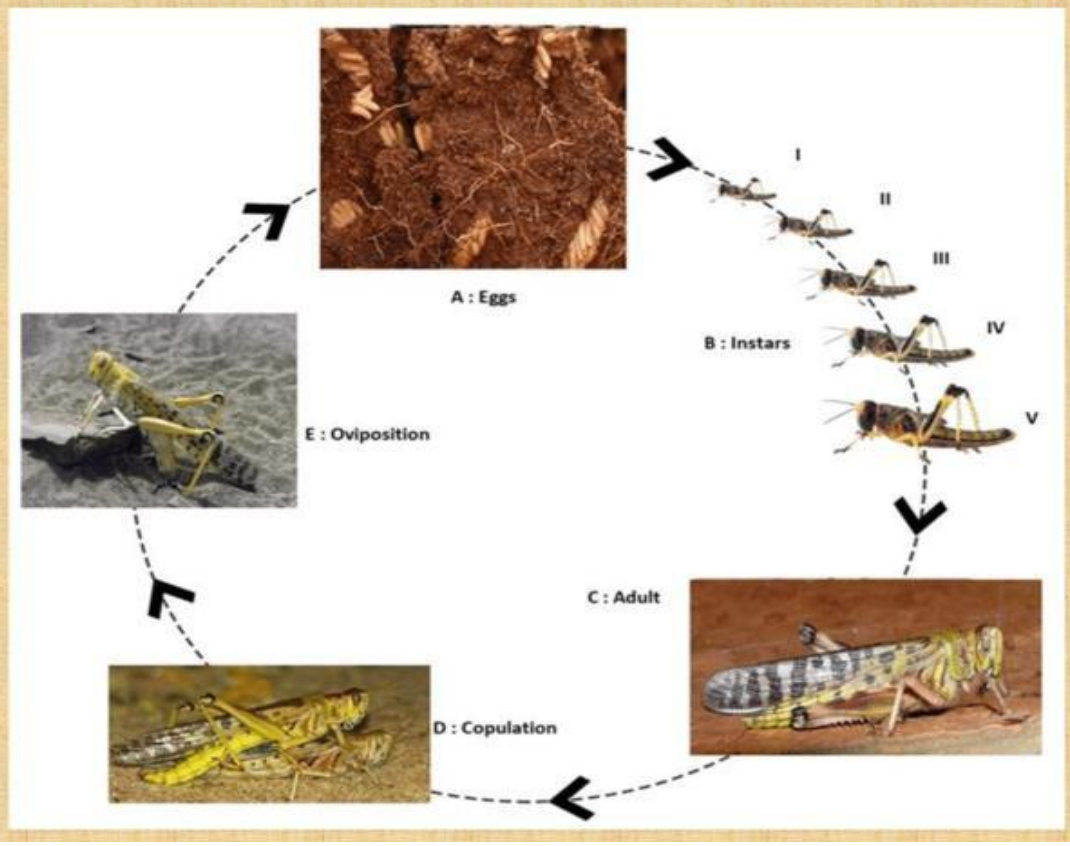
Total area surveyed	-	4,75,015 Ha
Area treated	-	2,87,986 Ha
Malathion used	-	2,45,590.5 ltr
Ground Control	-	2,79,166 Ha
Aerial Control	-	8,820 Ha
Manpower engaged	-	300
Vehicle utilized	-	120

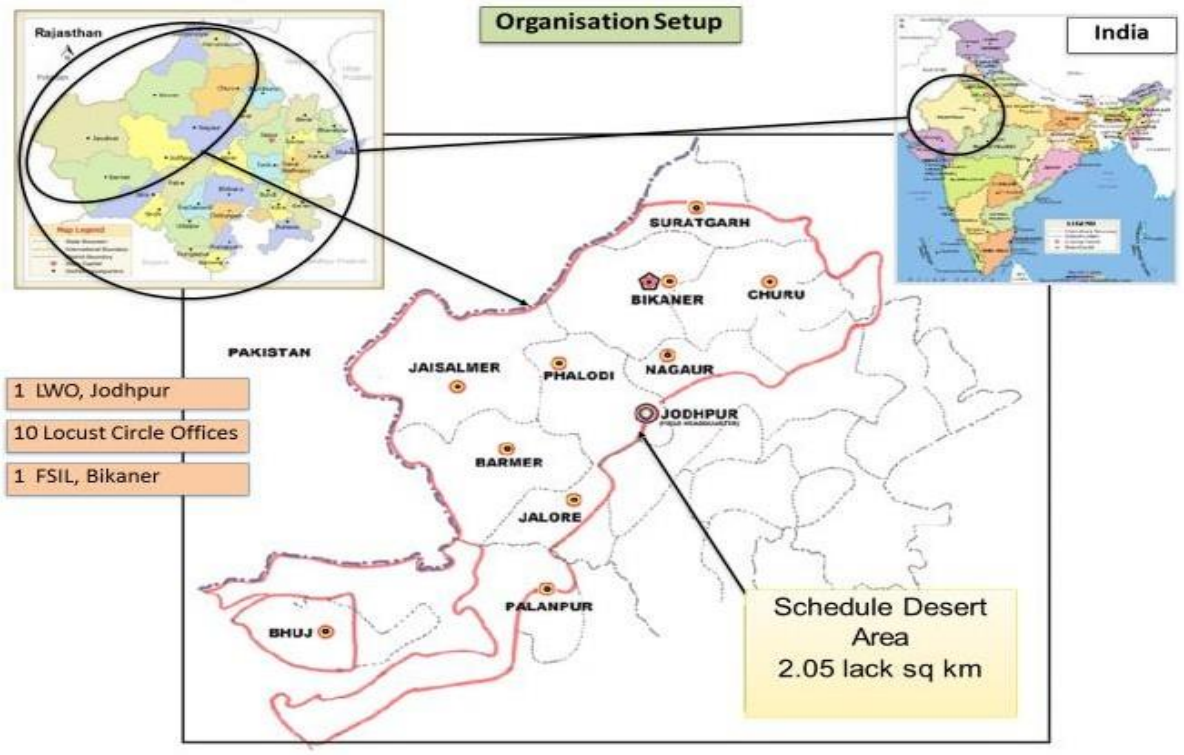
Control operation successfully conducted in 6 States viz., Rajasthan, Gujarat, Punjab, Haryana, MP & UP

THANK YOU

Standard Operating Procedures (SOP) for Desert Locust Ground Control

Presented By,
Dr. S.K. Verma
Deputy Director (E)
FSIL, Bikaner





Locust Swarm Invasion

- **LWO successfully organised locust control operations in the following years**

S.No	Year of Invasion
1	1970
2	1972, 1973 & 1974
3	1978
4	1983
5	1986
6	1988
7	1989
8	1990
9	1993
10	1997
11	2005
12	2007
13	2010
14	2019
15	2020

Standard Operating Procedures (SOP) for Desert Locust Ground Control

Objective

The objective of the Standard Operating Procedures (SOP) for Desert Locust Control is to give concise instructions for good insecticide application against the Desert Locust.

These instructions are intended for use by the field staff who are involved in Desert Locust operations (including Locust Officers and technicians) in order to help them to avoid dangerous, ineffective or wasteful control operations.

They are based on the FAO Desert Locust Guidelines where more detailed information and references are available. The instructions focus on: ULV insecticide spraying ULV spray equipment Techniques for safe and efficient operations

The instructions focus on:

- ULV insecticide spraying
- ULV spray equipment
- Techniques for safe and efficient operations

1. Control process

A series of steps needs to be followed before, during and after control operations.

PREPARATIONS three months before control operations

- Select competent control teams and provide them with training or refresher training
- Check and service the vehicles
- Check and test all spray equipment and check that commonly needed spare parts are available
- Distribute the required quantity and type of insecticides to the likely spray sites
- Make sure that operational funds are allocated for the proposed control period to cover field allowances, fuel, etc.
- Make sure that aircraft are available in the country and can be contracted by the MoA for control operations.
- Check that airstrips have been maintained Ensure that enough copies of the *FAO Spray Monitoring Form* are available

Maintenance of Control Vehicles

Before control operations

Step 1.
Choose appropriate control method (equipment, insecticide and technique), which depends on infestation size, urgency of action and work rate required.

Step 2.
Calibrate your spray equipment in order to assure the correct amount of insecticide is applied in the right way and in the right place.

Step 3.
Ensure that local inhabitants are informed about the date, time and location of control operations, so that they can move their livestock, beehives and families to safety.

Step 4.
Find the wind direction in order to establish a spray direction at right angles to it and demarcate the infested area.

Step 5.
Make sure that temperature, wind and rainfall conditions are suitable for the control operation.

During control operations

Step 6. Make sure that:

- All staff who are handling or applying insecticide use full protective clothing
- All spraying equipment and personnel are at the downwind edge of the area to start spraying (from downwind towards upwind)
- All other non-spraying personnel, vehicles and equipment are at the upwind edge of the target area to avoid contamination by the sprayed insecticide
- Start spraying cross-wind (at right angles to the wind direction), moving upwind after each spray pass, making sure to measure the correct track spacing using flagmen or other means
- Make an extra spray pass upwind of the target area to prevent under-dosing at the upwind edge
- 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
- Stop spraying if it starts to rain or seems likely to rain soon
- Stop spraying if the wind direction changes by more than 45 degrees, adjust your new spray line and spray the remaining area

After control operations

Step 7. Monitor and record all relevant details on the *FAO Spray Monitoring Form*.

Step 8. Empty any insecticide remaining in the sprayer back into the original insecticide container. Clean and maintain equipment, and store the sprayers, the insecticide and the empty containers in safe places.

Step 9. Wash yourself and the protective clothing as soon as possible.

2. Control team and field equipment

Control Team: two locust officers, two drivers and two vehicles, plus support staff such as assistants and skilled labourers.

Equipment: to be available in each vehicle:
Hand-held GPS *(1),* Maps
Compass, FAO forms *(2)*
Clipboard, paper and pen, Anemometer
Hygrometer
Oil sensitive paper to sample ULV droplets
Bucket and plastic, measuring cylinder or jug
Vibrating tachometer
Stop watch, Hand lens (x10), Sweep net
Tool kit, First aid kit, HF radio
Cages for mortality assessment
Water and soap for washing
Sets of protective clothing for all staff handling insecticides

(1) extra batteries, cigarette lighter adapter, remote antenna
(2) Survey & Control Forms and Spray Monitoring Forms

3. Principles of ULV application

Ultra low volume (ULV) spraying uses small amounts of concentrated insecticide. In locust control, about 0.5-1.0 litre/hectare is applied. The insecticide is not mixed with water or solvent. It is oil-based to prevent evaporation and is usually applied ready to spray.

Droplets of spray are carried by the wind. In full coverage treatments, the insecticide is sprayed as overlapping swaths onto the control target so that a uniform deposit is achieved and the locusts receive enough insecticide. Remember:

- Do **not** spray during the hottest part of the day (1100-1600 hr) when convection may occur and carry the spray up into the sky instead of down onto the locusts
- Do **not** spray at low wind speeds less than 1 m/s
- Do **not** spray at high wind speeds more than 10 m/s

Maintenance of ULV Sprayers

Hand-held

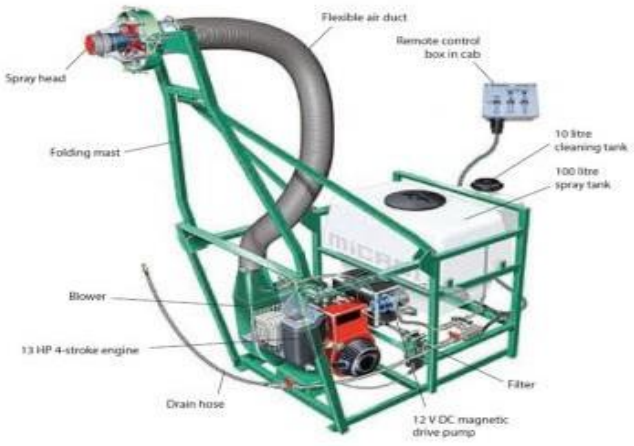
Ulva plus

Vehicle Mounted

Ulva mast

Micronair AU8115 MS

Micronair AU8115 MS



Benefits of the Micron AU8115MS include:

- Powerful airblast to propel spray over large horizontal distances and up to 15m high
- All controls operated from within vehicle cab for maximum operator safety
- Electric starter for engine operated from control box in cab with manual starter for back-up
- Electrically driven centrifugal pesticide pump with magnetic coupling to eliminate shaft seals
- Flow rate can be set by interchangeable in-line fixed orifice restrictor plates or by an adjustable flow control valve
- Rotary atomiser for precise control of droplet size
- Low Volume (LV) and Ultra Low Volume (ULV) capability
- Completely self-contained unit for reliability and ease of use
- Solid and durable construction field proven in the harshest environments
- All components compatible with aggressive formulations and solvents

Specification

Dimensions:	140 cm (L) x 76 cm (W) x 85 cm (H)
Spray head height:	180 cm (above bed of vehicle)
Weight (empty):	130 kg
Pesticide tank:	100 l capacity UV stabilised polyethylene
Flushing tank:	10 l capacity UV stabilised polyethylene
Spray band width:	10 – 100 metres (with wind dispersal)
Power source:	4-stroke petrol (gasoline) 13 HP engine with electric start
Fuel capacity:	5.0 l
Running time:	3 hours approx. (with full fuel tank)
Electrical supply:	12 V DC (from vehicle battery)
Current Consumption:	10 A maximum (spraying) 50 A during electric start
Spray droplet size:	Adjustable 40 – 100 µm VMD (depending upon formulation used)
Pump:	Magnetic drive centrifugal
Flow rate:	0.2 – 3.5 l/min

Ulva mast

Specification	V4E & V4M	
Weight:	65 kg	
Frame:	Strong 30mm and 40mm box section mild steel. Folding mast and support arm. Nylon coated.	
Tank:	UV stabilised HDPE	
Hoses:	Stainless steel braided PTFE	
Mast height:	2.5 m (approx)	
Tank capacity:	100 l (plus 10 l flushing tank)	
Atomiser:	Micron AU6449 (electric direct drive, single high speed 7200 rpm)	
Power supply:	12 V DC vehicle battery	
Current consumption:	8 Amps maximum	
	V4E	V4M
Pump:	Mag drive gear	Mag drive centrifugal
Flow rate:	0.2 – 1.5 l/min	0.2 – 2.0 l/min
Droplet size range:	50 – 100 µm	50 – 100 µm

Ulva Plus

It is suitable for use with both water-based mixtures applied at 10 – 20litres/hectare and oil-based sprays at only 1 – 3litres/ hectare of total spray volume.

The sprayer must ALWAYS be held downwind. Never spray without a crosswind.

Specification		ULV (oil sprays)	LV (water-based sprays)
Weight:	Empty: Ready to Spray:	0.8 kg (with 1L bottle) 2.6 kg (with 1L bottle)	1.6 kg (with 5L backpack) 7.5 kg (with 5L backpack)
Power supply:		9 – 12V DC (6 – 8 D-cell / R20 batteries)	6 – 7.5V DC (4 – 5 D-cell / R20 batteries)
Power consumption:		1.5 – 2.0 watts (up to 20 hours spraying with good quality batteries)	1.0 – 1.5 watts (up to 20 hours spraying with good quality batteries)
Disc speed:		7,500 – 10,000 rpm	4,000 – 6,000 rpm
Flow rate range:		25 – 100 ml/min	50 – 200 ml/min
Droplet size (VMD):		50 – 100 μm	100 – 150 μm

4. ULV spray equipment

A good ULV sprayer uses rotary atomizers (spinning discs or rotating cages) to produce droplets in a small size range (50-100 *u*m). If droplets are too large or too small, control will be poor and insecticide wasted.

ULV sprayers can be carried by an operator (portable) or mounted on 4x4 vehicle (vehicle-mounted sprayer), airplane or helicopter (aircraft-mounted sprayer). The principles of use are he same for all of them, but the scale and speed of operation are different.

Portable sprayers
For small areas (15 ha/day)
For situations where a slow work rate is acceptable
In rocks and hills
On soft sands
For single hopper bands only (not for swarm control)

Vehicle-mounted sprayers
For medium-sized areas (100 ha/day)
For situations where a medium work rate is required
For single bands
Not recommended in rocks and hills
Not recommended on soft sand
Difficult to spray swarms

Aircraft-mounted sprayers
For large areas (5,000 ha/day or more)
For situations where a fast work rate is required
In rocks and hills
On soft sand
To control swarms (settled and flying)
Not efficient for spraying single bands

5. Calibrating ULV spray equipment

Spray equipment must be calibrated before the actual spraying takes place.

What is calibration?

The sprayer needs to be adjusted in order to apply the recommended amount of insecticide, in the right size spray droplets, to the right place.

Calibration should always be carried out by using the actual insecticide that will be applied

When do you calibrate spray equipment?

- When the sprayer is new
- When the insecticide formulation or concentration is changed
- When the volume application rate (VAR), track spacing or forward speed is changed
- Before the beginning of the campaign and on a daily basis during it

How to calibrate a sprayer

Step 1. Find the recommended dose of the insecticide (g a.i./ha) from the drum label, FAO Guidelines, etc. If it is given as litres/hectare, go to step 3.

Step 2. Calculate the required Volume Application Rate (VAR).

$$\text{VAR (l/ha)} = \frac{\text{Recommended dose (g a.i./ha)}}{\text{Formulation concentration (g/l)}}$$

Example: If the recommended dose for chlorpyrifos is 250 g a.i./ha and its concentration is 450 g/l what is the VAR?

$$\text{VAR (l/ha)} = \frac{250}{450} = 0.55 \text{ l/ha}$$

If the formulation concentration is expressed as percentage of weight to volume (% w/v), convert the concentration to g a.i/l by using the formula:

$$\text{Concentration (g a.i./l)} = \frac{\text{Concentration given x 1000}}{100}$$

Example: If the concentration given for bendiocarb is 10%, then this must be converted by using the formula:

$$\text{Concentration in g a.i./l} = \frac{10 \times 1000}{100} = 100 \text{ g a.i/l}$$

In short, multiply the given percentage concentration by 10.

Step 3. Calculate the required Flow Rate (FR).

$$\text{FR (l/min)} = \frac{\text{VAR (l/ha) x speed (km/h) x track spacing (m)}}{600}$$

Example: What flow rate is required from a vehicle mounted sprayer moving at 10 km/h using a 30m track spacing in order to apply 100 g a.i./ha of bendiocarb 10% ULV?

$$\text{FR (l/min)} = \frac{1 \text{ (l/ha)} \times 10 \text{ (km/h)} \times 30 \text{ (m)}}{600} = 0.5 \text{ l/min}$$

It is important to remember that if one of the parameters (flow rate, track spacing or forward speed) is altered, then one or more of the others have to be changed in order to maintain the correct Volume Application Rate and Dose.

If flow rate increases VAR increases (and vice versa)
If track spacing increases VAR decreases (and vice versa)
If forward speed increases VAR decreases (and vice versa)

Example: If the wind becomes stronger, it might be possible to increase the track spacing to allow a faster work rate. In order to maintain the correct VAR and dose, either the spray forward speed must be decreased or the flow rate must be increased. In order to achieve a faster work rate from the wider track spacing, the flow rate must be increased, rather than the forward speed being decreased.

How to measure the flow rate

When measuring the flow rate from a ground-based sprayer, the collection technique can usually be used since the spray liquid can in most cases be collected easily as it is emitted:

Step 1. Calculate the required flow rate (see page 11).
Step 2. Make sure that the valves are in the correct position (refer to the sprayer manual).
Step 3. Fill the sprayer, place a bucket under the atomizer and make sure to get rid of the air and that the tubes are full of liquid. Return the emitted insecticide to the tank. For vehicle-mounted sprayers, the engine
should be running at normal operation speed to ensure that the correct voltage is being supplied to the battery and the sprayer.
Step 4. Place a measuring cylinder under the sprayer atomizer and allow the insecticide to flow via a funnel for one minute. **Only the pump should be switched on; never switch on the rotating atomizers.**
Step 5. Measure the volume of insecticide collected, then empty the cylinder back into the sprayer tank.
Step 6. Adjust the flow rate to bring it closer to the required rate calculated previously. Repeat steps 4 and 5 until this rate has been achieved to within about 5% error.
Step 7. When the required flow rate has been achieved, recheck it two more times to ensure that it is correct.

How to estimate work rate

A rough estimate of the work rate can be calculated from the formula:

$$\text{Work rate (ha/h)} = \frac{\text{Forward speed (km/h) x track spacing (m)}}{10}$$

Note: this formula does not take into account the time required for turning at the end of each spray pass, which can be considerable for aircraft.

Typical track spacings

handheld spinning disk sprayers	10 m
vehicle-mounted drift sprayers	30 m
vehicle-mounted airblast sprayers	50 m
aircraft-mounted sprayers	100 m

6. Recording and reporting

Monitoring is very important in order to document the activities and to allow later analysis of the successes and failures of any campaign. Most of the information concerning the control operations and their efficacy and the efficiency of the campaign are covered in the *FAO Spray Monitoring Form*.

The form should be completed together with the *FAO Locust Survey & Control Form* in order to include details on the location, rainfall, ecology and locusts. Both forms should be returned to the National Locust Unit headquarters as soon as possible for review. Any problems (lack of protective clothing, overdosing, poor efficacy, non-target effects, etc.) can be noted on the form so they can be addressed later.

Field staff recording the details of each control operation should use these forms

7. Cleaning, storing and disposal

Spray equipment should always be clean and ready to use. Properly dispose empty containers.

Always wear protective clothing while handling insecticides

Sprayers

- Drain unused insecticide back into the original containers To clean the sprayer, put some kerosene or diesel into it and spray it over the target area or waste ground, away from water bodies or supplies used by people or livestock; never dump this liquid in one place such as a pit
- Carry out any repair or required maintenance Wash the outside of the sprayer with a cloth soaked in diesel or kerosene
- Store the cleaned sprayer safely in a store

Insecticide storage

- Keep insecticide in original containers in a cool locked store to reduce deterioration caused by high temperatures
- Use older insecticides first (first-in-first-out system)

Disposal of empty insecticide containers

- Clean empty insecticide containers three times inside and out with diesel or kerosene
- Collect the small volume of washings and dispose of by adding them to the insecticide in sprayer tanks during the next control operations or, if it is the end of the season, pour them into insecticide containers that are
- not full
- Never use empty containers for any other purpose than insecticides
- If they are to be recycled, they should be transported back to manufacturer Containers for disposal should be punctured, crushed and sent back to national authorities for appropriate disposal

Locust Awareness training programme

Organised training programs for officers of State Agriculture Department, in the locust affected areas of Rajasthan district, block and village level for locust awareness

Locust Awareness training programme




Assistance to State Governments


Ministry of Home Affairs has included admissibility of hiring of vehicles, tractors with spray equipments, hiring of water tankers; and purchase of plant protection chemicals for locust control under new norms of assistance under SDRF and NDRF.

Locust Awareness training programme

Organised FAO sponsored National training workshop at LWO, Jodhpur for officers of 14 Central Integrated Pest Management Centers in 10 locust affected States.

Establishment of Locust Control Room

Pesticides approved for control of Desert Locust in Scheduled Desert Area only

S.No.	Chemical	Dosage	
		a.i.(gms)/ha	Formulations (gm/ml)/ha
1	Malathion 96% ULV	925	1000
2	Malathion 5%DP	925	20000
3	Fenvalrate 0.4%DP	80-100	20000-25000
4	Quinalphos 1.5%DP	375	25000

Pesticides approved for control of Desert Locust on crops, acacia & other trees

Sl. No.	Chemical Name	Dosage			ml/per Litre
		a.i.(gms)/ ha	Formulations (gm/ml)/ha	Dilution in Water (Litres)/ ha	
1	Chloropyriphos 20% EC	240	1200	500	2.4 ml
2	Chloropyriphos 50% EC	240	500	500	1 ml
3	Deltamethrin 2.8% EC	12.5	500	500	1 ml
4	Deltamethrin 1.25% ULV	12.5	1000	N/A	N/A
5	Diflubenzuron 25% WP	60*	240	Need base	-
6	Fipronil 5% SC	6.25	125	500	0.25 ml
7	Fipronil 2.92% EC	6.25	220	500	0.45 ml
8	Lamdacyhalothrin 5% EC	20	400	500	1 ml
9	Lamdacyhalothrin10% WP	20	200	500	0.5 gm
10	Malathion 50% EC	925	1850	500	3.7 ml
11	Malathion 25% WP	925	3700	500	7.4 gm

*Only for hoppers control

THANK YOU

Aerial Control

Presented By,
Dr. Pankaj Salunke,
Assistant Plant Protection Officer (E)
LWO, Jodhpur

Why ??

- To control large locust swarms/population in short time.
- To control locust population in inaccessible areas.

Equipments

Before control operation

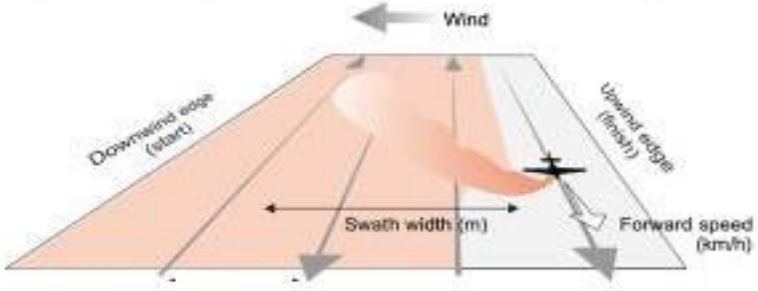
- Determine type & no. of drones/helicopter required.
- Take necessary permission from Ministries.
- Identify air stripes.
- Required resources made available at Spray sites.

Before aerial spraying

- Calibrate the spray system.
- Inform public 24 hrs before spraying through competent authority.
- Marking of the infested area.

During aerial spraying

- Use protective clothing.
- Stop spraying when wind speed <1 m/s & >10 m/s.
- Start from downwind edge of targeted area



After aerial spraying

- Empty any insecticide remaining in the aircraft spray tank back into the original insecticide container.
- Clean and maintain the spray system
- Store the insecticide and the empty containers in safe place.

Drones

- India becomes first country to use drones for locust control.
- DPPQS floated tender for hiring drones after getting necessary clearance from MoA&FW and DGCA.
- Finalise 5 companies with 25 drones.
- Working hours – 4 hrs/day @ Rs. 4000/hr

Control by Drones

Sl. No.	Name of District/ Month	June	July	August	Total
1	Jodhpur	653	631	53	1337
2	Barmer	948	1961.5	465.5	3375
3	Churu	0	135	284	419
4	Bikaner	216.5	358	108	682.5
5	Hanumangarh	0	100	40	140
6	Jaisalmer	262.6	404	0	666.6
7	Sikar	32	0	0	32
8	Ajmer	44	0	0	44
9	Nagaur	176	22.5	0	198.5
10	Agra	12	30	0	42
11	Farrukhabad	28	0	0	28
12	Bhiwani	0	53	0	53
		2372.1	**3695**	**950.5**	**7017.6**

Advantages of Drones

- Good for spot application.
- Easy to spray on tree top.

Disvantages of Drones

- High air pressure & noise disturb the swarm.
- Low battery backup.

Helicopters

- MoA&FW floated tender for hiring helicopter after getting necessary clearance from MoH and DGCA.
- SAR aviation provided bell helicopter
- Working hours – 100 hrs or 60 days @ Rs. 1.25 lakh/day
- IAF provided Mi17 helicopter

Helicopter mounted ULV spray system

To strengthen aerial control capabilities 5 nos of Helicopter mounted CDA atomiser AU 6539 with GPS trekker procured from M/s Micron Sprayer Limited, UK.

Control by Helicopters

Sl. No.	Name of District/ Month	July		August		Total	
		SAR	Mi17	SAR	Mi17	SAR	Mi17
1	Jodhpur	195	300	0	0	195	300
2	Jaisalmer	155	0	0	0	155	0
3	Barmer	0	280	0	0	0	280
4	Churu	0	140	220	0	220	140
5	Bikaner	0	180	0	0	0	180
6	Hanumangarh	0	180	0	0	0	180
7	Sriganganagar	0	150	0	0	0	150
		350	**1230**	**220**	**0**	**570**	**1230**

Advantages of Helicopter

- No need of airstrip.
- Can fly slower than fixed wing aircraft.
- More coverage

Disvantages of Helicopter

- High air pressure & noise disturb the swarm.

Locust Control Operation 20-21

1,800 Ha

7,020 Ha

Website

s

Safety measures

Presented By,
Dr. Virendra Kumar,
Assistant Director (PP)
Locust Warning Organisation, Jodhpur

Need For Safe And Judicious Use of Pesticides

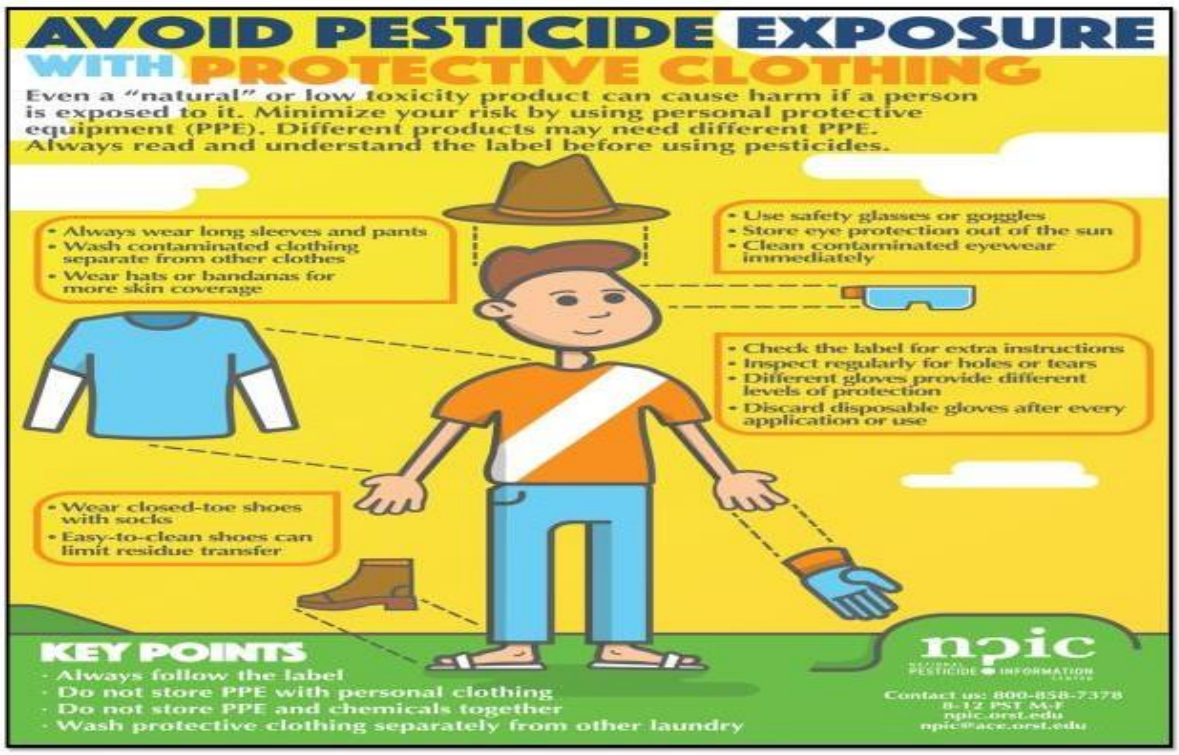
Pesticides are toxicants, capable of affecting all taxonomic groups of biota, including non-target organisms. **So, it is important to ensure the use of right pesticide at right time and in right doses.**

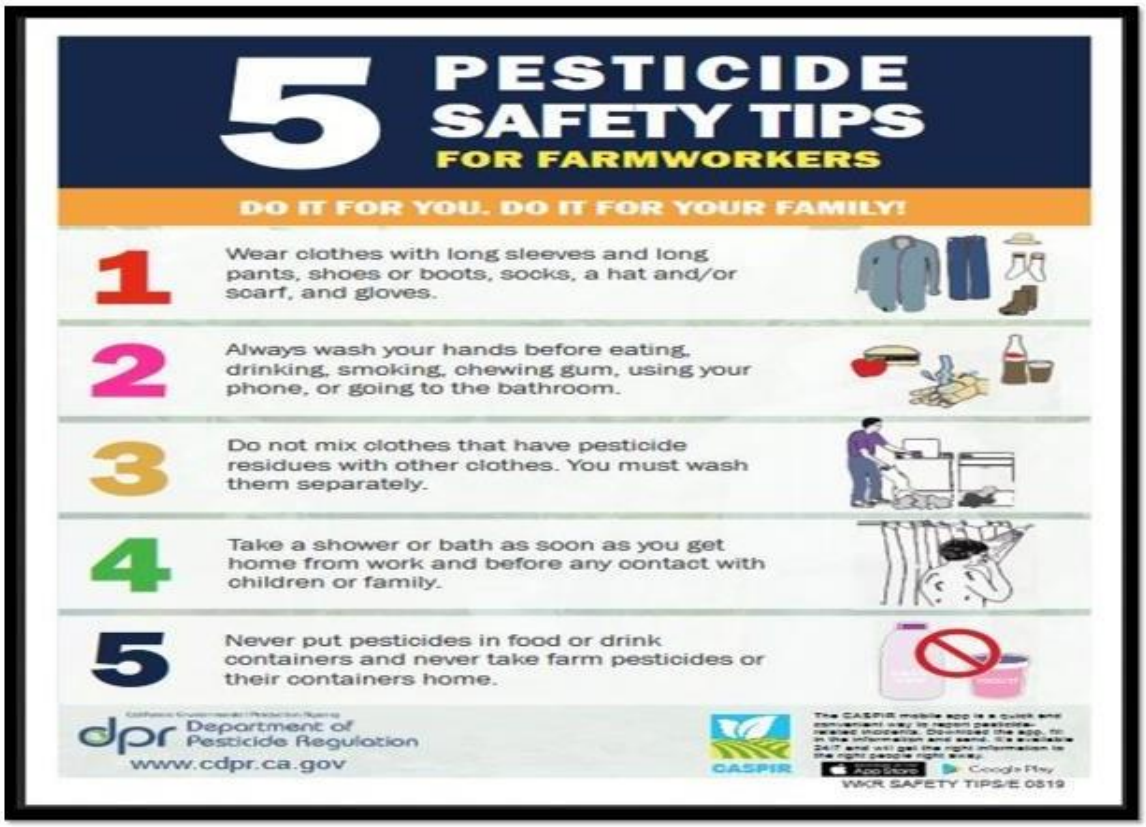
The under dose of pesticides may give poor results along with increasing the immunity of the insects whereas their overdose may cause harmful effects to the environment and other forms of life.

Therefore, the insecticide use should be optimized in order to reduce the environmental contamination while maximizing its effectiveness against the targetinsect

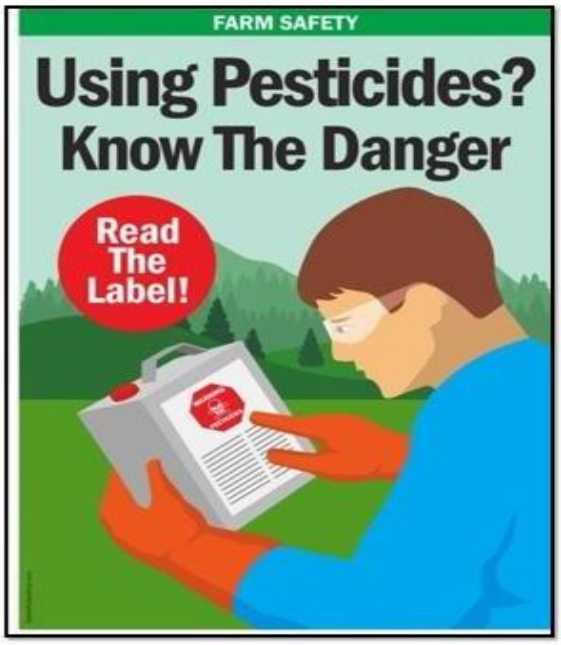
CLASSIFICATION OF PESTICIDES BASED ON TOXICITY

Label	Name	Level of toxicity	Oral lethal dose (mg/kg)	Listed chemicals
	Red label	Extremely toxic	1–50	Monocrotophos, zinc phosphide, ethyl mercury acetate, and others.
	Yellow label	Highly toxic	51–500	Endosulfan, carbaryl,[2] quinalphos,[2] and others.
	Blue label	Moderately toxic	501–5000	Malathion, thiram, glyphosate,[2] and others.
	Green label	Slightly toxic	> 5000	Mancozeb, oxyfluorfen, mosquito repellant oils and liquids, and most other household insecticides.


AVOID PESTICIDE EXPOSURE
WITH PROTECTIVE CLOTHING
Even a "natural" or low toxicity product can cause harm if a person is exposed to it. Minimize your risk by using personal protective equipment (PPE). Different products may need different PPE. Always read and understand the label before using pesticides.
• Always wear long sleeves and pants
• Wash contaminated clothing separate from other clothes
• Wear hats or bandanas for more skin coverage
• Use safety glasses or goggles
• Store eye protection out of the sun
• Clean contaminated eyewear immediately
• Check the label for extra instructions
• Inspect regularly for holes or tears
• Different gloves provide different levels of protection
• Discard disposable gloves after every application or use
• Wear closed-toe shoes with socks
• Easy-to-clean shoes can limit residue transfer
KEY POINTS
· Always follow the label
· Do not store PPE with personal clothing
· Do not store PPE and chemicals together
· Wash protective clothing separately from other laundry
npic
Contact us: 800-858-7378
8-12 PST M-F
npic.orst.edu
npic@ace.orst.edu


5 PESTICIDE SAFETY TIPS
FOR FARMWORKERS
DO IT FOR YOU. DO IT FOR YOUR FAMILY!
1 Wear clothes with long sleeves and long pants, shoes or boots, socks, a hat and/or scarf, and gloves.
2 Always wash your hands before eating, drinking, smoking, chewing gum, using your phone, or going to the bathroom.
3 Do not mix clothes that have pesticide residues with other clothes. You must wash them separately.
4 Take a shower or bath as soon as you get home from work and before any contact with children or family.
5 Never put pesticides in food or drink containers and never take farm pesticides or their containers home.
dpr Department of Pesticide Regulation
www.cdpr.ca.gov
CASPIR
App Store
Google Play
WKR SAFETY TIPS-E 0519

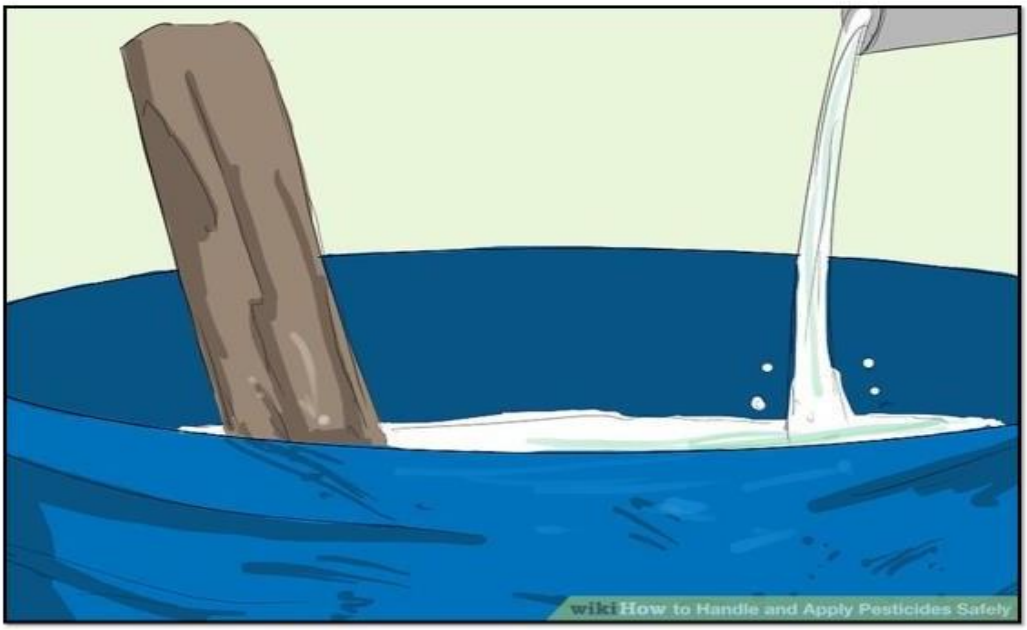
Read and follow all label instructions.



Read the warning label

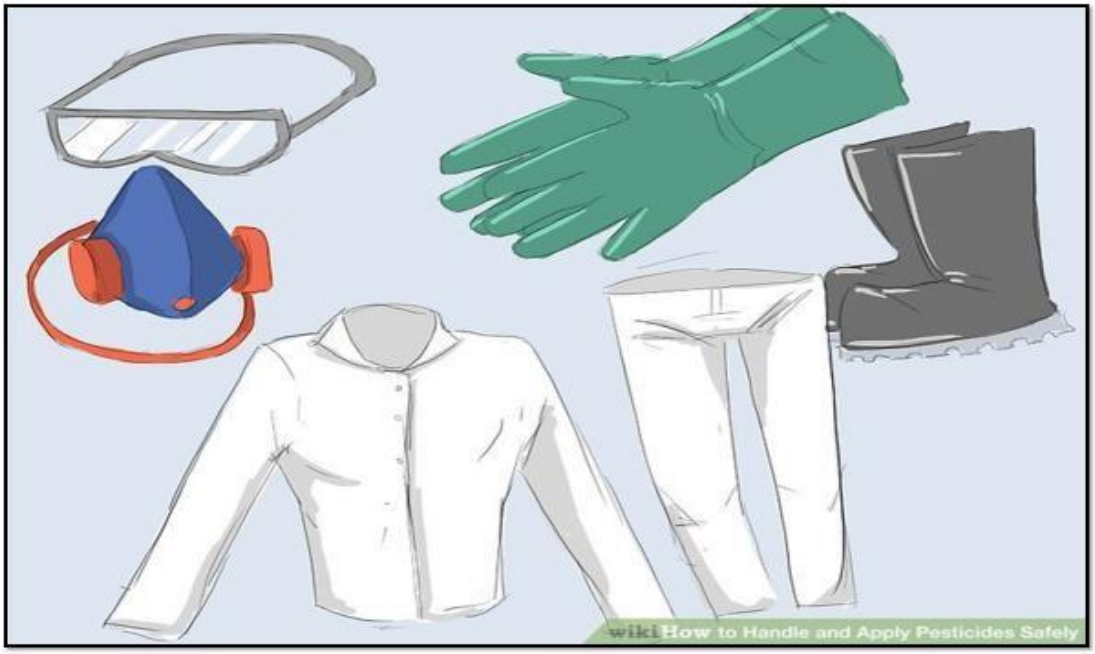
Use only appropriate containers for measuring, mixing, and applying pesticides.

Mix only the amount of the product you intend to use.



Wash all equipment after each use

Use appropriate safety equipment.



Never smoke, drink, or eat while applying pesticides.

Keep people and animals out of areas treated with insecticides and other chemicals for the period recommended on the product label.

Do not use pesticides after any expiration dates on the package.

Apply pesticides in the early morning or late evening to avoid excessive drift (wind is normally lower during these time periods), and to prevent exposing beneficial insects like bees and ladybugs to the effects of them.

Alternate suitable pesticides to obtain the best results in pest control.

Keep / store of pesticides away from the reach of children

Do's	Don'ts
While Purchasing	**While Purchasing**
▪ Purchase pesticides/biopesticides only from Registered pesticide dealers having valid Licence. ▪ Purchase only just required quantity of pesticides for single operation in a specified area. ▪ See approved labels on the containers/packets of pesticides. ▪ See Batch No., Registration Number, Date of Manufacture/ Expiry on the labels. ▪ Purchase pesticides well packed in containers.	▪ Do not purchase pesticides from foot path dealers or from un-licenced person. ▪ Do not purchase pesticide in bulk for whole season. ▪ Do not purchase pesticides without approved label on the containers. ▪ Never purchase expired pesticide. ▪ Do not purchase pesticides whose containers are leaking/loose/ unsealed.

During Storage

▪Store the pesticides away from house premises.

▪Keep pesticides in original containers.

▪Pesticides must be stored separately and that area should be marked with warning signs.

▪Pesticides be stored away from the reach of the children and live stocks.

▪Storage place should be well protected from direct sunlight and rain.

Selection of Equipments

- Select right kind of equipments.
- Select right sized nozzles.
- Use separate sprayer for insecticides and weedicides.
- Do not use leaky or defective equipments.
- Do not use defective/non-recommended nozzles.
- Do not blow/clean clogged nozzles with mouth.

Cleaning & Maintenance of PP Equipments

Ulva mast V4

Micronair AU8115 MS

Safety measures

Load and unload carefully

Safety measures

Do not transport together with food

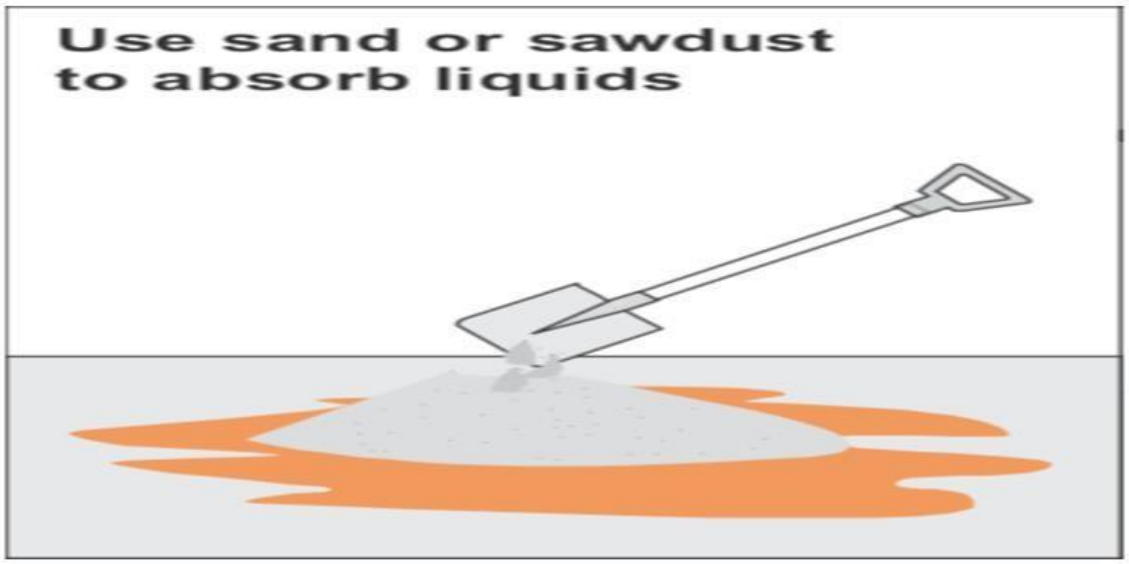
Avoid bad stacking of containers

Safety measures

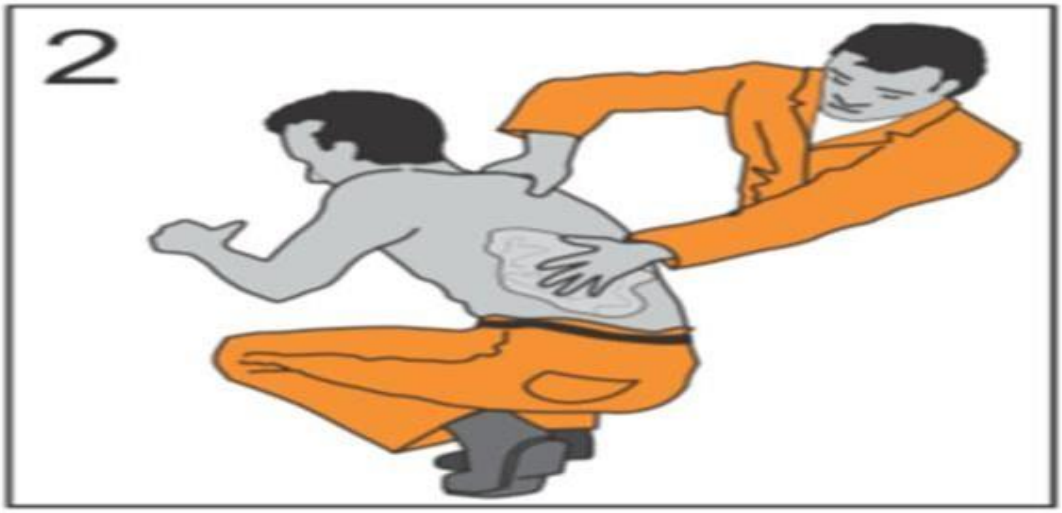
Safety measures

Safety measures

Safety measures



First aid measures to be taken in case of insecticide exposure and poisoning

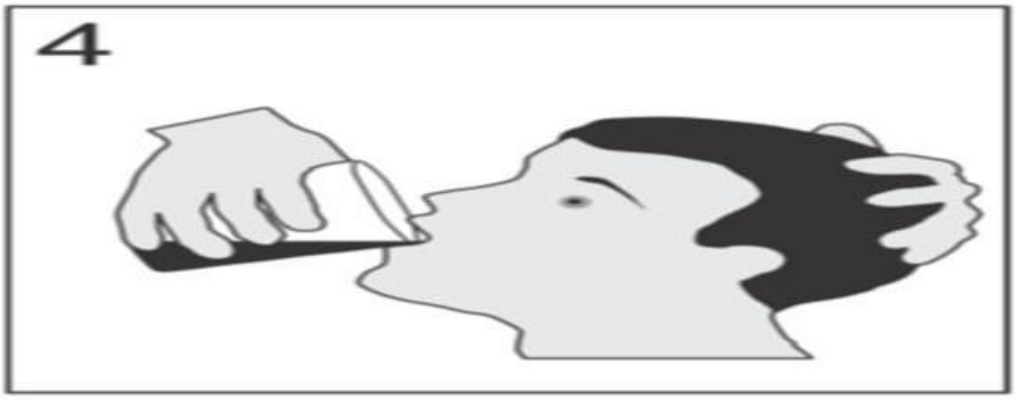


If insecticide on SKIN – wash thoroughly with clean water and soap

First aid measures to be taken in case of insecticide exposure and poisoning

If insecticide on CLOTHING – take off clothing and wash skin with water and soap

First aid measures to be taken in case of insecticide exposure and poisoning



If insecticide INGESTED – do not induce vomiting – give active charcoal solution

First aid measures to be taken in case of insecticide exposure and poisoning

If person is UNCONSCIOUS – check that breathing passages are clear – place person on the side with head down and tongue drawn forward

First aid measures to be taken in case of insecticide exposure and poisoning

If person STOPS BREATHING – start artificial respiration (make sure you do not get contaminated yourself)

First aid measures to be taken in case of insecticide exposure and poisoning

ALWAYS – keep person calm and cool

First aid measures to be taken in case of insecticide exposure and poisoning

ALWAYS – take person to nearest medical facility

ANTIDOTE

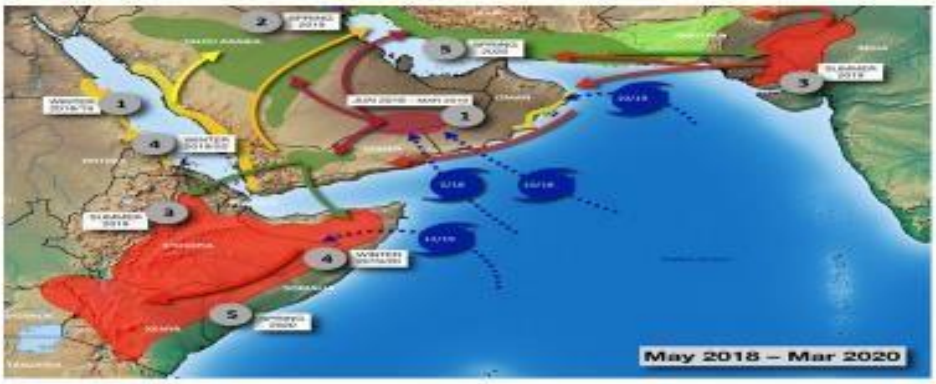
An antidote is a substance which can counteract a form poisoining.

Antidote or Treatment	Pesticides Group
Atropine with 2-PAM (2-Pralidoxime aldoxime methyl chloride) in symptomatic dosage, artificial respiration may be required	Organophasphates
Atropine , artificial respiration may be required	Carbamates
Barbiturates , if convolsions occurs	Chrorinated Hydrocarbons
Intravenous Sodium Nitrile followed by Sodium Thiosulfate	Fumigants

Alternative Approaches for Desert Locust-Control and Management

Dr. Shaloo Ayri Bhardwaj
Deputy Director (Entomology),
Locust Division, HQR., Faridabad

Upsurge 2019-2021 INDIA



Cyclones in May and October,2018
Heavy rains
Gave rise to favourable breeding conditions in the Empty Quarter of the southern Arabian Peninsula for at least nine months since June.
As a result, three generations of breeding occurred that was undetected and not controlled.

Successful control (2019-2021)
Desert locust, India

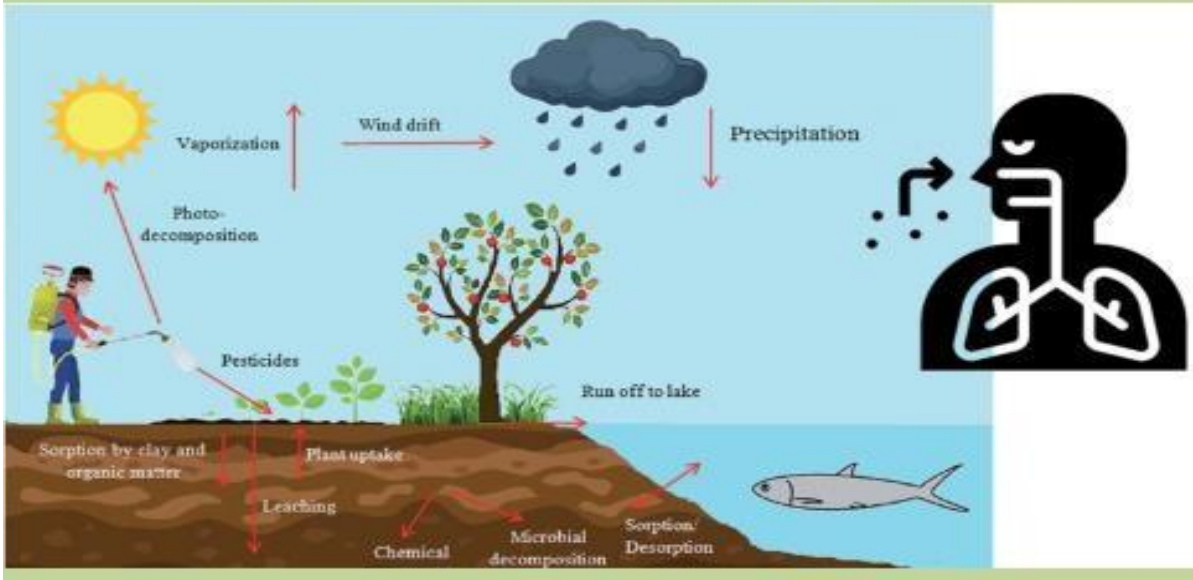
Rapid control measure for Desert locust
Malathion 96% ULV
Huge quantity of chemical i.e 5,60,235 litres

Chemical Control

Year	Area treated (Ha)	Malathion 96% Used (Lit)
2019-20	403488	314645
2020-21	279916	245590
Total	683404	**560235**

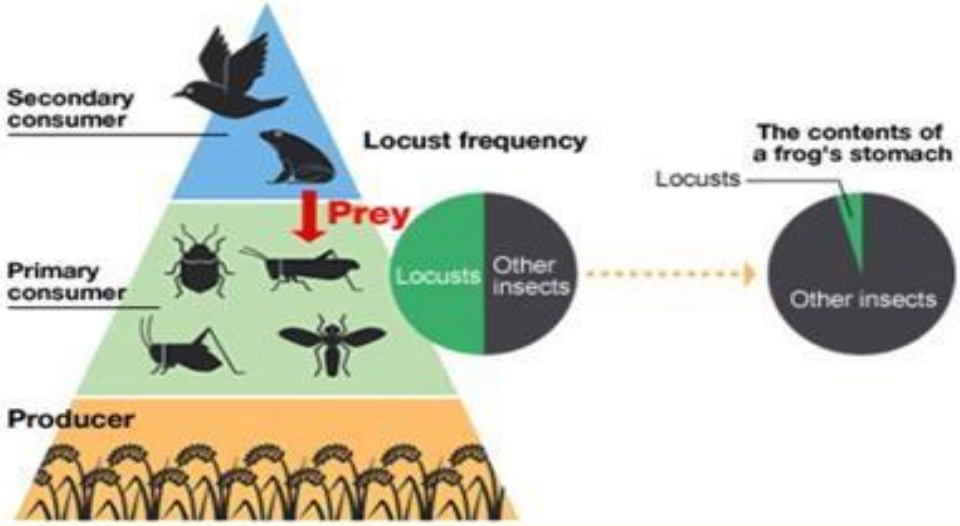
5,60,235 Litres

Hazardous for ecosystem



Living, Non living things, Human health

Chemical insecticides/pesticides are hazardous for predators and parasites of locust



Adverse effect on fauna and flora of desert

Hazardous for desert biodiversity

Reptiles , Birds, insects, Scavangers etc.

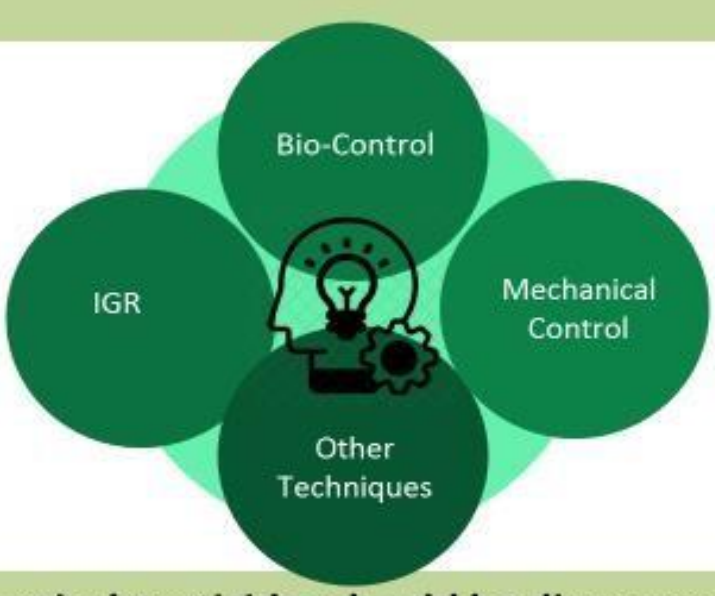
Expenses towards safety measures

Awareness campaign, Warning posters, Pamphlet distribution, Manpower

Disadvantages - Chemical control

- Non biodegradable
- Hazardous to human health (users)
- Disturbing ecosystem
- Hazardous to desert fauna
- Expensive

Need to switch over alternative techniques.



Use of chemical pesticides should be discouraged with replacement of eco-friendly techniques

Solutions / Alternatives to chemical control

- Biocontrol
  - Biopesticide
  - Insect Growth regulators/inhibitors
- Mechanical control
  - Economic use of locust

Bio-Pesticides

Metarhizium acridum (Green Muscle)

Isolate of M. acridum	
Scientific classification	
Kingdom:	Fungi
Division:	Ascomycota
Class:	Sordariomycetes
Order:	Hypocreales
Family:	Clavicipitaceae
Genus:	Metarhizium
Species:	M. acridum
Binomial Name	
Metarhizium acridum	
(Driver & Milner) J.F. Bisch., Rehner & Humber (2009)	

Metarhizium acridum (Green Muscle)

Microscopic structure

***Metacridum/Novacrid* as brand name in the market**

- Bio-pesticide product for Locust are available commercially.
- Bio-pesticide products are commercialised as dry powder of spores of Metarhizium acridum in vacuum sealed bags

Metarhizium acridum (Green Muscle)

- ★ The active ingredient is a micro-organism entomopathogenic fungus Metarhizium acridum.
- ★ It provokes an epidemic disease among the treated insects.

Recommended dose against Desert locust:

Aerial Application	50 gm of Green muscle or Novacrid powder mixed with 1 litre of diesel oil per hectare
Ground Application: ***Vehicle mounted, knapsack or handheld ULV sprayers***	Volume of oil is 2 litres per hectare This dose rate equals to 2.5 gms into 10^{12} spores of Metarhizium acridum per hectare
High and Dense Vegitation	Dose rate can be increased to 100 gm per hectare

Mode of Action

How does bio-pesticide work?

Spores of M. acridum

Spores Germinate & penetrate inside Cuticle with pressure & enzymatic action

The fungus multiplies inside the body

Locust start dying 7th day onwards

Spray Equipment used for Bio-pesticide

- Ultra low volume sprayers
- Aircraft, vehicle mounted,

  Knapsack or handheld sprayers

Advantages of Bio-pesticide

- Highly specific to Locust
- No negative effect on honey bees and other beneficial arthropods; non polluting
- Not toxic to humans or animals such as birds, fish, reptiles, amphibians etc.
- It requires standard personal protective equipment (usually a facemask and long sleeved shirt) and can be applied with same ULV spraying equipment as for chemical pesticides
- Contrary to chemical pesticides, bio-pesticides can be applied in areas with water bodies

Disadvantage of Bio-pesticide

Non rapid action

(Minimum 01 WEEK)

Best strategy to apply Bio-pesticide

- Treating locust in ecologically sensitive zones, such as nature reserves, wetlands or other areas with water bodies
- Most effective to treat initial small groups of hoppers and prevent them from forming dense and huge hopper bands

Metarhizium acridum (Green Muscle) trials at FSIL


- Post approval by CIB&RC, FAO facilitated the import of 3 Kg of *M.acridum* for trial and evaluation purpose
- Successful bio-efficacy trials have been conducted at FSIL on *M.acridum* with mortality rate of 95-100%
- *M.acridum* have been shared with RCIPMCs for maintaining and multiplication purpose

Metarhizium acridum treated locust


Eco-friendly

Somalia : Achieved success in Desert Locust control with Bio-pesticide using aerial methods



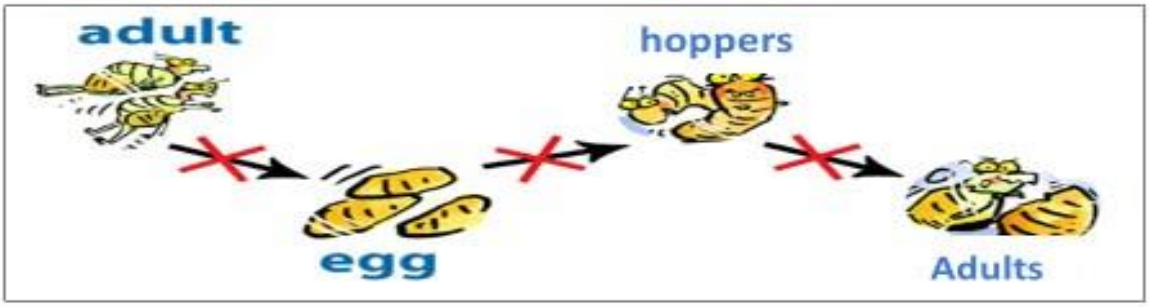

Spraying was funded by the U.S. Agency for International Development

Insect Growth Regulators (IGRs)

INSECT GROWTH REGULATORS (IGR)

- IGRs are compounds which interfere with:
  - Growth,
  - Development
  - Metamorphosis
- IGRs include synthetic analogues of insect hormones such as
  - ecdysoids
  - juvenoids
- Non-hormonal compounds such as
  - precocenes (Anti JH)
  - chitin synthesis inhibitors

Mode of Action



- Disruption of chitin formation and deposition
- Disrupts molting process
- Physical abnormalities
- Lethargy
- Cessation of feeding
- Death

Availability of commercial IGRs

- Diflubenzuron (Dimilin)
- Benzoylphenyl Ureas (BPUs)
- Chlorofluazuron (Atabron)
- Novaluron (Rimon)

Advantages and Disadvantages of IGR

Advantages	Disadvantages
Effective in minute quantities hence, economical	Pest stage specific
Target specific, safe to natural enemies	Slow mode of action
Biodegradable, non-persistent and	possibility to build-up of resistance
Non-polluting	Unstable in the environment

Mechanical Control

Mechanical Control

- Use of Neem Extract
- Killing/collection by trenching and burying hoppers
- Locust as Food

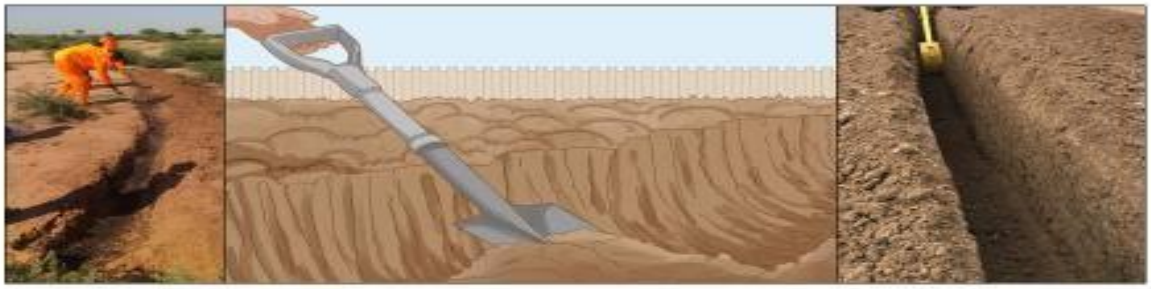
Neem Extract

- Acts as anti-feedant
- Blocks the action of insect molting hormone ecdysone
- Azadirachtin acts as growth regulators (limonoids)

Neem extracts commercial availability

It acts as a repellant and inhibits feeding in the locust

Trenching and burying hoppers



2 feet wide and 2 feet deeper trenching for mechanical control of hoppers

Locust as Food

Locust are edible insects

Locusts are considered a delicacy and eaten in many African, Middle Eastern, and Asian countries.
They have been used as food throughout history.

Locust as Pet(fish/birds) food

Media Coverage

Nutrition

Background Jun 19, 2020

Swarms of locusts to become chicken feed

Enormous swarms of locusts – about 60 million insects – have caused major devastation to crops and livelihoods in countries in East Africa, Asia and the Middle East. Scientists in Pakistan have come up with a way to turn these critters into chicken feed.

The locusts, combined with the impacts of Covid-19, could have catastrophic consequences on livelihoods and food security." – FAO

A simple but clever solution

Muhammad Khurshid, a civil servant in the Ministry of National Food Security and Research, together with Johar Ali, a biotechnologist from the Pakistan Agricultural Research Council, came up with an innovative pilot project which encourages farmers to trap the locusts that are then turned into chicken feed.

https://www.poultryworld.net/Nutrition/Articles/2020/6/Swarms-of-locusts-to-become-chicken-feed-600449E/

Media Coverage

Catch locusts. Earn money. Save crops

They identified Pakistan's Okara district as the most suitable area to carry out a 3-day pilot project due to it being heavily populated and where the locusts were less likely to be contaminated by insecticides. Using the slogan, "Catch locusts. Earn money. Save crops", the project offered to pay farmers 20 Pakistani rupees (US$ 0.12) per kg of locusts caught, reports The Third Pole. Locusts only fly in daylight. During the night they cluster on trees and on the open ground in sandy areas where they remain almost motionless until dawn.

If we can capture the locusts without spraying on them, their biological value is high and they have good potential for use in fish, poultry and even dairy feed."

7 tonnes of locusts per night

The community catches an average of 7 tonnes of locusts a night, which are weighed and sold to nearby chicken feed plants. Farmers earned up to 20,000 Pakistani rupees (US$ 125) each for one night's work. The Third Pole adds that Muhammad Athar, GM of Hi-Tech Feeds, says his firm fed the locust feed to its broiler chickens in a 5-week study: "All nutritional aspects came out positive. If we can capture the locusts without spraying on them, their biological value is high and they have good potential for use in fish, poultry and even dairy feed," he said.

Media Coverage

Locusts contain more protein than soy

"We currently import tonnes of soybean and after extracting the oil for sale, we use the soya bean crush to use in animal feed.
Soybean has 45% protein whereas locusts have 70% protein.

Soybean meal is purchased whereas locusts are free – the only cost is capturing them and drying them,"

The most challenging part of this project, says Ali, is confirming if the locusts are free of pesticides, which is not suitable for feeding. The most exciting part, he says, is seeing people earn money. Despite interest from large-scale commercial operators, scaling up the project had to be put on hold due to the coronavirus pandemic. The lockdown is easing in Pakistan and so they can start again. All that is needed is for the local community to collect the locusts and sell them.

Media Coverage

https://www.aljazeera.com/news/2020/6/10/pakistan-turns-locusts-into-chicken-feed-to-tackle-the-invasion

For a reward of 20 rupees (12 cents) per kilogramme (roughly two pounds) of locusts, locals worked all night to collect them.

Locust as Green Manure

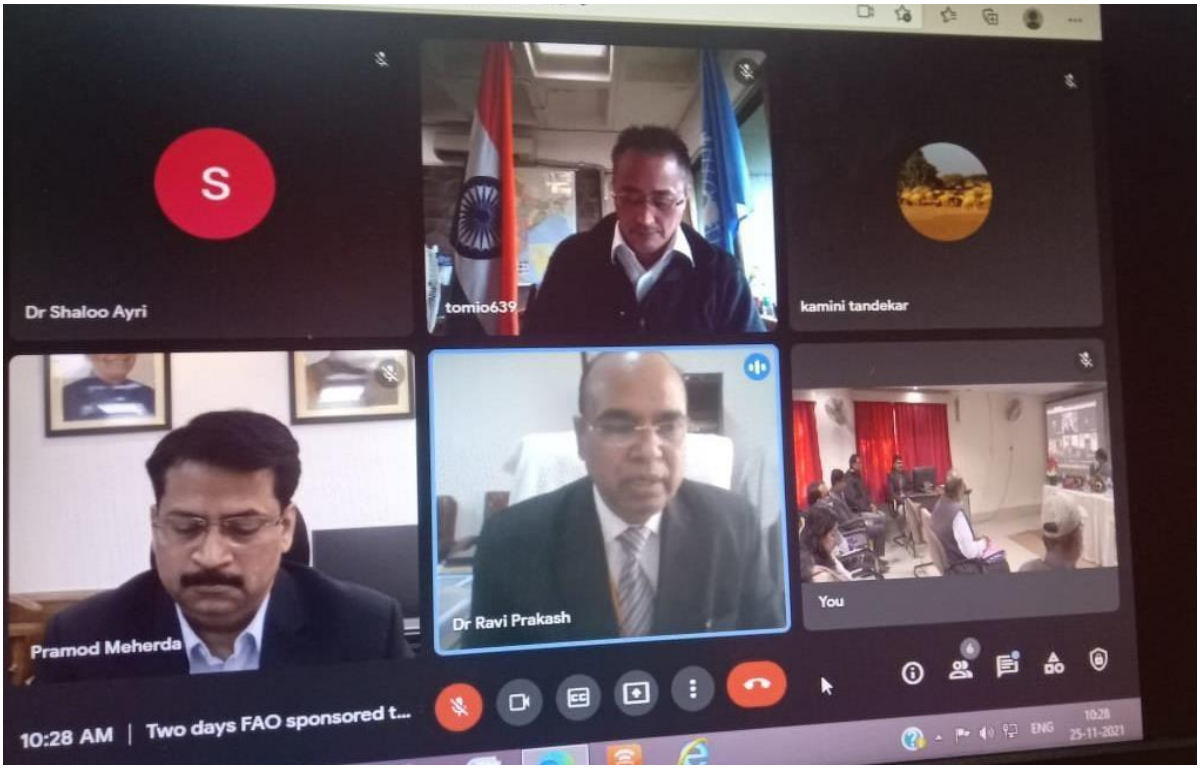
Green manure can be made by treating these collected dead locust and it could be a best economic use of of this pest

Inaugural Session

Annexure - VI

Annexure – VII

Exhortation of JS (PP), PPA, Tomio Shichiri & Keith Cressman, FAO



Annexure – VIII

Mock drill of Wireless set, Ulva-mast, Micronair and tractor mounted sprayer at the Uchiyarda village of Jodhpur

Group Discussion

Annexure - IX

Annexure - X

Distribution of training Certificate

Annexure - XI

News Publication

पत्रिका जोधपुर 07 राजस्थान पत्रिका patrika.com
जोधपुर, शनिवार, 27 नवम्बर, 2021

टिड्डी नियंत्रण पर दो दिवसीय राष्ट्रीय प्रशिक्षण कार्यशाला

टिड्डी से निपटने की तैयारी शुरू, 40 अधिकारी-कर्मचारी को दिया प्रशिक्षण

पत्रिका न्यूज नेटवर्क
patrika.com

जोधपुर. टिड्डी चेतावनी संगठन की ओर से से टिड्डी नियंत्रण पर दो राष्ट्रीय प्रशिक्षण कार्यशाला का समापन शुक्रवार को हुआ। दक्षिण पश्चिम एशिया संगठन की ओर से प्रायोजित कार्यशाला में केंद्रीय कृषि मंत्रालय के अलावा राज्य कृषि विभाग के विभिन्न 40 अधिकारियों व कर्मचारियों ने भाग लिया।

संगठन के सहायक निदेशक डॉ वीरेंद्र कुमार ने बताया कि मुख्य अतिथि कृषि मंत्रालय के संयुक्त सचिव डॉ प्रमोद कुमार मेहड़ा, वनस्पति संरक्षण सलाहकार डॉ रवि प्रकाश, संयुक्त राष्ट्र संघ के कृषि एवं खाद्य संगठन के प्रतिनिधि टोमिओ स्चीरी, राजेश दुबे और क्रीथ क्रेसमन ने वीडियो कॉन्फ्रेंस के माध्यम से कार्यशाला को संबोधित किया। पादप संगरोध एवं संग्रह निदेशालय फ़रीदाबाद के संयुक्त निदेशक डॉ एन सत्यनारायण ने भी व्याख्यान दिया। कार्यक्रम के अंतर्गत उचियारड़ा गांव में माइक्रोनियर, अल्वामास्ट, ट्रैक्टर माउंटेड स्प्रेयर, ई-लोकस्ट3 एप और बेतार यंत्र का सजीव प्रदर्शन करके दिखाया गया।

टिड्डी नियंत्रण पर दो दिवसीय राष्ट्रीय प्रशिक्षण कार्यशाला