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Locusts: An Agriculture Menace

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Abstract
Locust, a small insect has the capacity to threaten agriculture produce when it is moving in a swarm. The famous 1986-89 plague caused because of these tiny insects in parts of Africa and South western parts of Asia stands as testimony to this. To combact these pests FAO has given high priority to a special programme, namely, Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES), based on their past experience to control these pests. The present article is a compilation of the general information about how experiments were designed by FAO to combact this menace, from the existing literatures available over the world wide web about these insects.
Keywords: *Desert Locust, Schistocerca gregaria, Remote Sensing, Modis, Landsat, Early Warning*

I. Introduction

"Locusts are members of the grasshopper family Acrididae, which includes most of the short-horned grasshoppers. Locusts differ from grasshoppers because they have the ability to change their behaviour and physiology, in particular their colour and shape (morphology) in response to changes in density (see Fig. 1). Adult locusts can form swarms which may contain thousands of millions of individuals and which behave as a unit. The non-flying nymphal or hopper stage can form bands. A band is a cohesive mass of hoppers that persists and moves as a unit. In general, most grasshoppers do not form bands or true swarms. However, the distinction between locusts and grasshoppers is not clear-cut since some of the latter do form bands (e.g. Melanoplus, Acridoderes, Hieroglyphus sp.) or small loose swarms (e.g. Oedaleus senegalensis). Locusts such as the Tree Locust have never been known to form bands." [11]

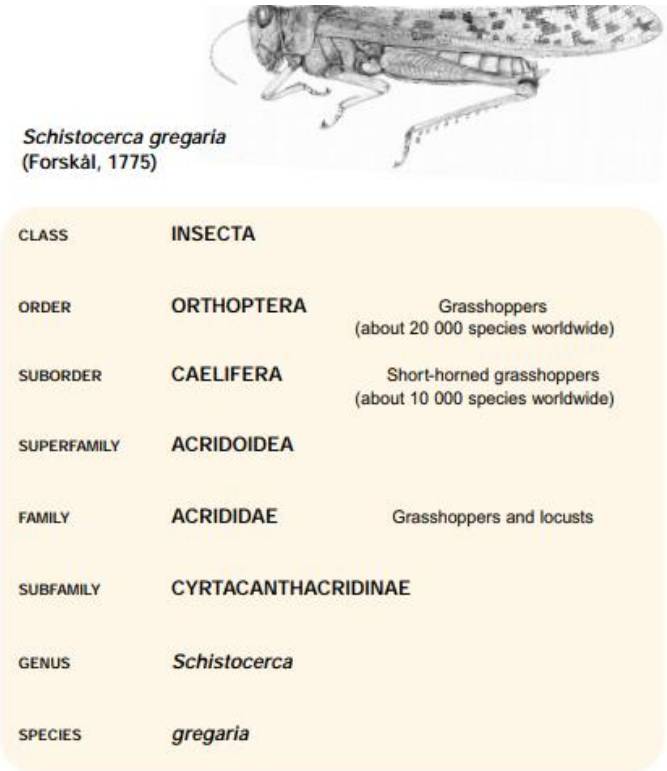

Figure 1. Modified after Encyclopedia of Pest Orthoptera of the World Publisher: China Agricultural University Press, Beijing

USE OF REMOTE SENSING

The use of remote sensing can give the guideline for use by field staff involved in locust survey and control operations, including pilots of survey and spray aircraft. Useful reference material for training can also be provided and imparted by experienced locust officers. The information and reference data can also be used for assessing technical needs. The guideline contains basic information on the biology and behavior of the Desert Locust but is not meant to be an exhaustive reference. Many web sites are useful to giving more information. Information, advice, procedures and explanations; illustrations and summaries as to how to use the remote The FAO website has a series of Frequently Asked Questions (FAQs) in this regard. These question and answer series deal with some of the common problems encountered by locust field staff. However, further research is needed in some areas, and FAO welcomes feedback on new information and solutions.

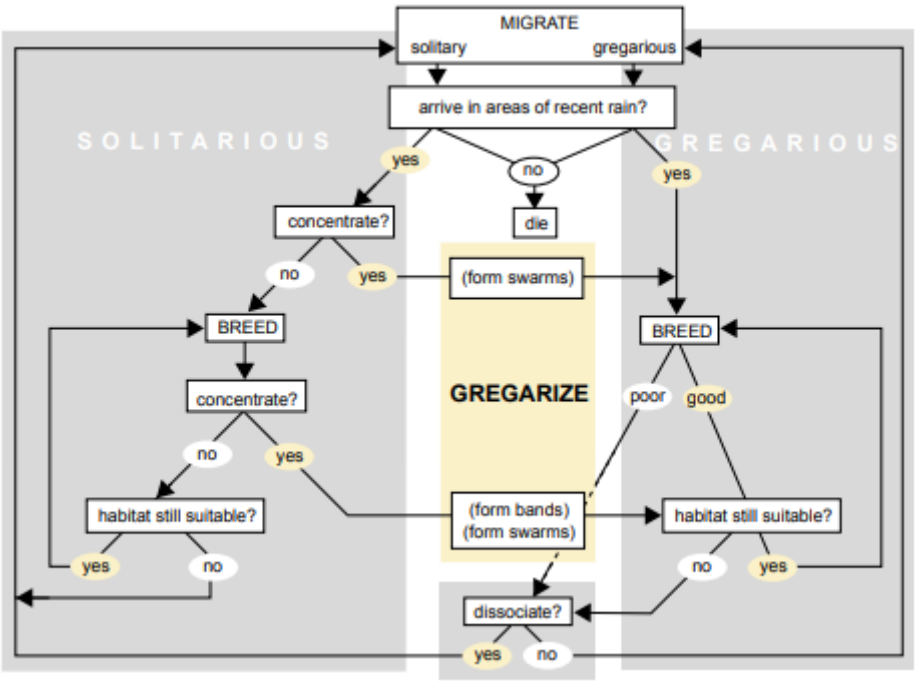

Figure 2. Summary of Desert Locust population dynamics, showing the influence of the environment on locust behaviour and phase.

II. Locust Phases

Locusts have two different states called phases: solitarious and gregarious. When locusts are present at low densities, the individuals are solitarious. As locust numbers increase, they cluster into dense groups and they become gregarious (see Fig. 2). The transition from the solitarious phase to the gregarious and vice versa is called the transient phase, and the locusts are referred to as transiens. If locusts are on the increase, they are referred to as congregans and, if they are on the decrease, they are called dissocians. Behavioural changes can take place rapidly. For example, Desert Locusts that have been reared in isolation in the laboratory try to avoid each other when first put into a cage, but in trying to avoid one locust they come into contact with another. Being touched by others, especially on the outer surfaces of the hind femora (thighs), results in locusts being attracted rather than repelled by others, and so they form groups. This switch from repulsion (the solitarious state) to attaction (the gregarious state) only takes an hour or so. If crowded insects become isolated they revert to behaving solitariously. The longer they are kept in a crowd before being isolated, the slower the reversion to the solitarious state. It may take several generations to complete the transition from gregarious to solitarious behaviour. Females can influence the phase of their offspring by adding a gregarizing chemical to the egg pod foam if they have recently experienced crowding, including at the oviposition site. In the field, it can take several generations before crowding occurs and solitary individuals behave fully gregariously. This is often seen during upsurges when bands and swarms become progressively larger and more cohesive. Morphological changes (changes in colour and shape) take more time. The full gregarious colour takes one crowded generation to develop and shape takes two or more. The differing rates of colour and shape change associated with phase changes often lead to confusion. For example, it is possible to find swarms of solitary (colour) locusts. In these guidelines, the terms gregarious and solitary (or solitarious) refer to behaviour, gregaricolour (and solitaricolour) are used to indicate coloration, and gregariform (and solitariform) indicate shape.

The following are the Phase terminologies for the Locusts:

Solitarious Phase : It is when individuals live mostly separate from each other. Gregarious Phase when large numbers of individuals gather together. Transiens Intermediate phase when locusts are grouping and starting to act as a single mass and are either changing from solitarious to gregarious (gregarization) or from gregarious to solitarious (dissociation). Congregans Part of the transiens phase during which locusts are congregating and are in transition from the solitarious to the gregarious phase. Often used for nymphs. Dissocians Part of the transiens phase during which locusts are in transition from the gregarious to the solitarious phase. Often used for nymphs. Solitaricolour Showing types of colour associated with solitarious behaviour. Gregaricolour Showing types of colour associated with gregarious behaviour

Locust plagues, upsurges & incursions:

The attack of the desert locust used to occur earlier in) phases of plague cycles. India witnessed several locust plagues, upsurges and incursions in the past. About 12 locust plagues were observed in India till 1962.Since than no locust plagues occurred. Similarly, 13 locust upsurges were recorded since 1964 till 1997. Small scale localized locust breeding have also been reported and controlled during the period 1998, 2002, 2005 , 2007 and 2010. Since 2010 till now, situation remained calm and no large scale breeding and swarms have been reported. However, solitary phase of Desert locust has been reported from time to time at some locations in the State of Rajasthan and Gujarat.

Organizations of Locust Control Campaign:

With the onset of locust season an alert should be issued to the Agriculture authorities of Rajasthan, Gujarat, Haryana and Punjab States and other stake holders viz; Ministry of Home Affairs, Defence, Science and Technology, Civil Aviation, Communication, Aircraft Companies and Pesticides Manufacturing Firms etc. be sounded for providing needful assistance, if required, during locust emergency.

Daily Activity Chart during Locust incursion/upsurge: (as recommended by FAO)

1. Report of swarm movement/ hopper bands
2. Deployment of ground/ aerial control teams.
3. Earmarking of infested area/ site on map.
4. Positioning of control teams/ pesticides/ aircrafts/ POL at control sites.
5. Issue of pesticides, control equipments, protective b clothing, POL and other items for control operation.
6. Reporting/ receiving of control data from field.
7. Compilation of field data like area treated and mortality achieved.
8. Compilation of control data, pesticides consumption and balance, position of additional requirement in respect of vehicles/ pesticides/ POL.
9. Transmission of field data to LWO /LCO's/FSIL Preparation of daily locust situation report & appraising the locust situation to the competent authorities .
10. Briefing to Pilot/ ground crew/ aerial parties/ ground control teams.
11. Daily review of progress of campaign and planning for next day operation.

III. Conclusions

This paper aimed at introducing the behavioral pattern of the Locusts and the activity suggested by FAO in assessing the relevance of of the desert locust habitat. The major benefit will be in arid areas associated with winter breeding areas. These guidelines help to control the Locust control more efficient and cost effective.

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