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Introduction to Desert Locust *(Schistocerca gregaria)* and Their Management

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Locusts *(Schistocerca gregaria)* are the short-horned grasshoppers with highly migratory habit, marked polymorphism and voracious feeding behavior. They are capable of forming swarms (adult's congregation) and hopper bands (nymphal congregation). Their swarms can migrate hundreds of kilometers per day and invade areas covering millions of square kilometers, resulting in major economic, social, and environmental impacts on an international scale. They cause great devastation to natural and cultivated vegetation. They are indeed the sleeping giants that can flare up any time to inflict heavy damage to the crops leading to national emergency of food and fodder. Locust are those species of grasshoppers, which found certain favorable climatic conditions, multiply, congregate, move together in their nymphal stages as band. All locust are grasshoppers, but not all grasshoppers are Locust. Locust is a handful of grasshoppers when they enter a swarming phase. A series of factors that vary by geographical area weather and species force grasshoppers to crowd each other. These insects are usually solitary, but under certain circumstances they become more abundant and change their colour, behaviour and habits, becoming gregarious to form swarms.

The Desert Locust is considered to be one of the most dangerous migratory pests in the world. It can travel long distances up to 150 Km/day, due to their ability to travel such long distances they are also called as an International transboundary pest. Desert Locusts have the ability to change their behavior, physiology, color and shape in response to change in locust numbers. At low numbers, locusts behave as single individuals at high numbers, they behave as a single mass (gregarious phase). The swarms that form is dense and highly mobile. The Desert Locust is a major threat for food security, livelihoods, environment and economic development in a region. The recent Locust Outbreak caused major damage to standing crops and vegetables in the Central and Western states of India, including Rajasthan, Punjab, Haryana, and Madhya Pradesh, with Rajasthan being the most affected.

Keywords: Desert Locust, Congregation, Pest, Grasshoppers, Polymorphism

Locusts Impact on Economic and other

Four main factors contribute to its status as a major pest: the food intake per individual, the range of food plants and parts eaten, the frequency of occurrence of high-density populations and the mobility of the populations. Locusts can cause much damage because they eat the leaves, flowers, fruits, seeds, bark and growing points and also break down trees because of their weight when they settle in masses, and sometimes even by spoiling plants with their

excreta. It has been found that 8% of the damage is caused by hoppers, 69% by immature and maturing gregarious adults and 23% by mature swarms.

Locust behavior

- The marked increase in locust numbers on a local scale due to concentration, multiplication, and grangerization, which unless checked, can lead to the formation of hopper bands and swarms (Roffey and Popov, 1968). This is called an **outbreak**. If further rains fall, a very large increase in locust numbers and contemporaneous outbreaks can occur, followed by the production of two or more successive generations of transient-to-gregarious breeding in complimentary seasonal breeding areas. This is referred to an **upsurge.** A period of one or more years of widespread and heavy infestations, the majority of which occur as bands or swarms is called a plague. A major plague exists when two or more regions area affected simultaneously. During upsurges and plagues, locust swarms tend to migrate beyond the recession area, and invade an area of some 32 million square kilometers in size, equivalent to about 20% of the Earth's land surface. This is known as the **invasion area**.

Reasons of outbreak

In breeding regions there are regular showers of rainfall in both the rain fall belts, which brings about the required degree of soil moisture and vegetation. However, strong winds do not scatter the swarms.

Family and order: (Acrididae: Orthoptera)

1. Desert locust: *Schistocerca gregaria*

- Desert locust is found in 2 phases which differ in colour, morphology, physiology, which is easily mistaken for different species
- Solitary phase Nymphs: Colour varies according to surrounding vegetation Adults: Greenish grey throughout life
- Gregarious Phase Nymphs: Yellow or pink with distinct black markings

2. Migratory locust: *Locusta migratoria* (Important only in Maharastra, Gujarat, and Rajasthan)

3. Bombay locust: *Patanga succineta* of three species, desert locust is considered the most important pest all over India. It is regarded as an international pest.

Nature of Damage: - The locust is harmful in both the adult and hopper stages. These feed on almost all type of vegetation, except a few plat species such as *Calotropis procera*, *Azadiracta*, *Datura* etc.In addition to the damage to crops, orchadis, forests, etc. Locusts are voracious feeders, each adult, consuming its own weight of vegetation daily.

Schistocerca gregaria

Locusta migratoria

Patanga succineta

Life Cycle

Three developmental stages, egg, hopper and adult are found. Mature adults are yellowish, sluggish reluctant to fly and cluster on ground (which maturing male clings to female back), young adults bright pink, (mature turn bright yellow). Pink adults are very active, causing much damage. Yellow adults are not so destructive but lay eggs giving rise to nymphs ,Egg laying starts after 8-24 hours of mating in damp soil. About 500 eggs are laid per female in 5

pools. About 5000 eggs are found per one square yard area. Egg period is 3-4 weeks in February – March, 12-15 days in May- September. In very dry soil, eggs remain till showers of rain. Nymphs are called hoppers. The rate of egg development is dependent upon soil temperature and moisture. There is no development below 15 degrees centigrade. The period of incubation decreases from about 70 days at 19 degrees centigrade to 10-12 days at 32-35 degrees centigrade. In nymphal stage after completing the incubation period the eggs hatch and nymph (young ones) emerges. There are five instars in gregarious population and 5-6 in stars in solitarious individuals. Adult stage, fifth instar hopper moults into the adult state. This change is called fledging and young adult is called a fledgling. The period of sexual maturity of adults is variable. If conditions are suitable, the adults may mature in 3 weeks.

Breeding Season

- Breeding depends upon rainfall and subsequent vegetation.
- Eggs are laid in damp soil. Two breeding seasons are observed during the year in India.
  1. Summer breeding season 2. Monsoon breeding season

Management

- Destruction of eggs: Locating the egg laid areas is almost importance, then trench them around so as to entrap the young hoppers as they move out after hatching. Even actual destruction of eggs on organized scale may be carried out by ploughing, harrowing and hand digging.
- Management is most effective and practicable against hoppers through taken up against all stages.
- Ploughing, digging and harrowing of places where eggs are laid on large scale and destroying – laborious.
- When swarms settle on vegetation or ground, they are beaten to death, swept together, buried in heaps.
- They can be burnt with fire torches (flame throwers) at night or early morning when sluggish.
- Digging trenches (45 cm deep and 30 cm across) the front of marching hoppers, trapping and burying in ditch dusted with chlorpyripos.
- Dusting or spraying chlorpyriphos on top of flying locusts or on ground.
- Poision baits with wheat or rice bran plus an insecticide (chlorpyriphos) + attractant (molasses) + enough water scattered in morning or evening when hopper feed.
- Farmers should form groups and monitor the field at night. Between 7 and 9 in the evening, millions of these insects can land in the fields to rest.
- Dig large ditches around the field, and play loud instruments. In ditches apply insecticide dust.
- Spraying should be done late at night or early in the morning if possible. In this case,
- Locusts gather in large numbers on the bushes to rest. Spraying on them gives a lot of control.

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