

Locust – Massive Threat to Indian Agriculture

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ABSTRACT

The Desert Locusts (*Schistocerca gregaria*) are likely the best known species to its wide range of distribution all over the world mostly in North Africa, Middle East and Indian subcontinent. And these are well known for its ability to move over long distances. Locusts are considered to be the most dangerous pests known to humanity. They are omnivores in nature, devours everything on their way. They reproduce at a very fast pace (around 20 fold in 3 months). In a lifetime of a female Locust it can lay about 300 eggs under normal conditions while an adult can easily consume the fresh food equal to its own weight per a single day (about 2-3 grams per every day) and the fact is it has no control measure, even a widely used a chemical method, because a single female has a wide range of reproduction that it can produce 2-3% population of swamp in a single reproductive phase that can feed on largely grown tree on this aspect you can assume its effect in agriculture and can cause huge loss of yield which reflects on the food security of the nation, it simply like throwing a good cooked food into drainage. So there is a need to control it, due to this, Locust must be considered under the study to control it by enhancing knowledge on their biological, systematically, reproductive, environmental, their origin, control and factors complicating it and its recent outbreaks.

Key words: - Locusts, Plague, Outbreak and Upsurges.

INTRODUCTION:

Locusts are a group of species of short-horned grasshoppers in the family of Acrididae that of which has a swarming phase. Locusts differ from grasshoppers with the presence of Gregarious phase. These insects are usually alone, but under favourable conditions they form into a large group by changing their behaviour and physiological habits by becoming gregarious. They are usually innocuous and do not cause a major economic threat to agriculture. But under favourable conditions of drought followed by continuous rainfalls which creates enough food supply for their growth, Locusts behave gregarious and migratory in nature where, Serotonin (a monoamine neurotransmitter) in their brains triggers and an impressive set of changes where they start to breed rapidly in an uncontrollable manner. After a set of wide reproduction their population increases, then they start to form into a band of wingless nymphs which will later mature into a swarm of winged adults. Swarms move around and rapidly strip the fields (Simpson et al., 2008). The adults are powerful fliers; they can travel great distances they can migrate 50 to more than 100 km in a single day. These Locusts only move or migrate at morning and rest at night (FAO 2016).

Locust swarming phases

There are two types of swarming phases that appear in Locusts

1. Solitary phase:

It is a phase of grasshoppers where they do not behave as groups or swarms, they feed and move individually not as a group. Hoppers only move short distances and adults can fly as single individuals at night. Hoppers are normally green in colour, at the time of maturation the male ones change into pale yellow colour and females do not show any changes by maturing (fig.1&2).

2. Gregarious phase

These are the attacking Locusts where they form into a gregarious group of swarms and they move as a group while attacking the crops. These are very mobile they feed and move at morning and rest at night. Hoppers have black pattern on yellow background in colour males are normally brighter in colour compared to the females (fig.1&2).



Figure: - 1 Desert Locust

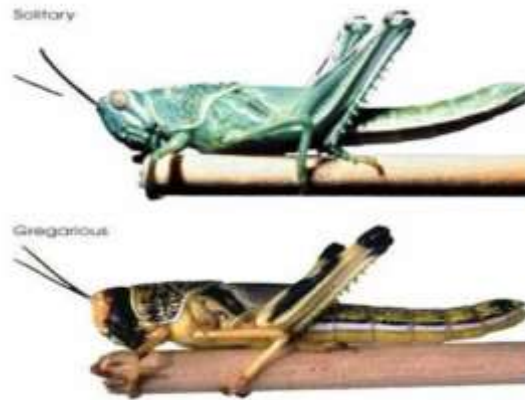


Figure: - 2 Solitary phase grasshopper and gregarious phase of the Desert Locust

Breeding season of Locusts

Locusts normally breeds in three seasons,

- (1) Spring season –from January to June
- (2) Summer season –from July to October
- (3) Winter season –from November to December

Locusts in India have only one season to breed which is at the time of summer from July to October.

Hot-spots of threatening locust activity

According to FAO and World Meteorological organization three hot-spots for Locust activity are

- (1) The first hot-spot include the Horn of Africa (the worst affected area) which consists of Ethiopia, Somalia, Kenya, Uganda and southeast South Sudan.
- (2) The second hot-spot includes the Red Sea area which consists of Sudan/Egypt border, Sudan/Eritrea border, the coast of Yemen and southwest Saudi Arabia.
- (3) The third hot-spot includes the southwest Asia which consists of Indo-Pakistan border (Dingle and Hugh 1996).

Desert Locust upsurges:

The deserts along Mauritania and India are the places where they lives at initial they do not attack the crops due to lack of vegetation when there is a rainfall after a long period of drought conditions where form to become gregarious and they forms into a band of wingless hoppers and winged adults this is called as an OUTBREAK. These types of outbreaks are normally seen in a small part of a country (World Meteorological Organization (WMO) 2016).

If an outbreak or continuous outbreaks are not controlled they may lead to continuous breeding of Locusts and forms into a swarm of adults. This is called UPSURGE and the affects maybe seen at an entire region.

If an outbreaks and upsurges are continued without any control they start to breed rapidly where the environmental conditions are already suitable and they cause a severe damage to the crops by devastating an entire area and migrates another with increasing their number then this are leads into a PLAGUE.

Occurrence of outbreaks is very common and only a few outbreaks leads into upsurges and out of these a very few leads into plagues. Outbreaks and upsurges can easily forms within a day but the formation or development of plague needs many months of continuous breeding of Locust at favourable conditions. The last major and severe plague was in 1987-89.

Plagues and upsurges

The plagues and upsurges are seen from very ancient times it is also mentioned in various books but the most affected areas includes of Egypt. During the last century, plagues are seen in 1926-1934, 1940-1948, 1949-1963, 1967-1969, 1986-1989 and 2003-2005. Recent major upsurges were reported in 1992-1994, 1996-1998, and 2003.

Outbreaks from 2006 to till now (present)

Affected regions		Years
Eritrea	:	December 2006 – March 2007
Yemen	:	May – September 2007
Western Sahara	:	September 2008
Yemen	:	March – June 2009
Northern Somalia	:	March – June 2009
Mauritania	:	October – December 2009
India/Pakistan	:	October – November 2010
Mauritania	:	October 2010 – May 2011
Sudan	:	October 2010 – May 2011
Libya/Algeria	:	January – May 2012
Sudan	:	September 2012 – April 2013
Sudan/Eritrea/Yemen/Saudi Arabia	:	August 2013 – March 2014
Northern Somalia	:	January – March 2014
Sudan/Eritrea/Saudi Arabia	:	October 2014 – March 2015
Mauritania/Southern Morocco	:	November 2015 – May 2016
Red coastal plains in Sudan and Eritrea	:	December 2018 – Going on till now
Yemen/Saudi Arabia/Oman	:	January 2018 – Going on till now

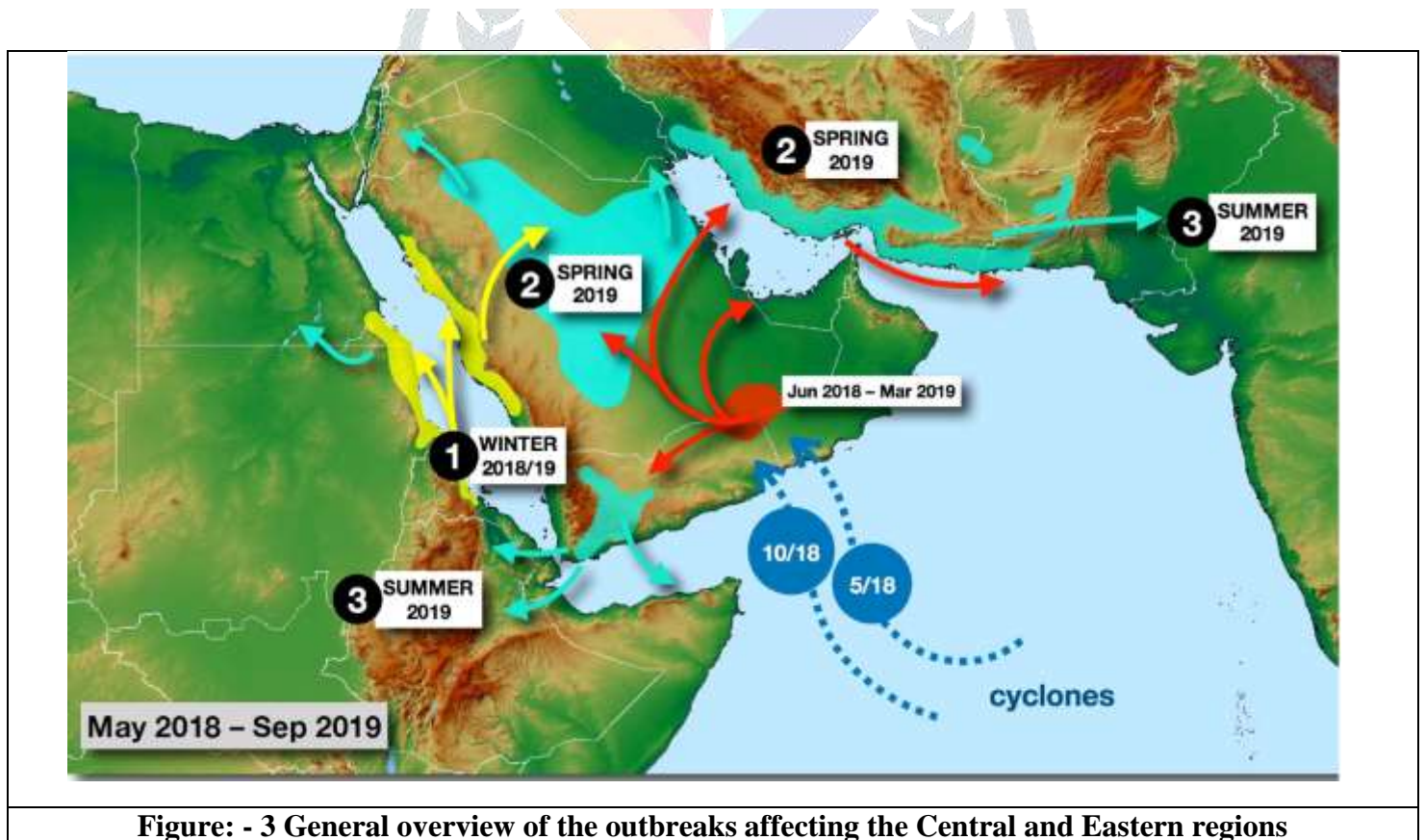


Figure: - 3 General overview of the outbreaks affecting the Central and Eastern regions

Recent outbreak in 2018

An outbreak developed in late 2018 on the Red Sea coast of Eritrea and Sudan that spread to the Arabian Peninsula and was supplemented by cyclones and undetected breeding in the empty quarter, causing a further

spread to spring breeding areas in Central and Eastern regions, and summer breeding areas along Indo-Pakistan border and in the horn of Africa.

Locusts in India

Only four species of Locust are found in India.

- Desert Locust (*Schistocera gregaria*)
- Migratory Locust (*Locusta migratoria*)
- Bombay Locust (*Nomadacris succincta*)
- Tree Locust (*Anacridium sp.*)

The Desert Locusts are the most common pest in India. During day times these Locusts can travel many miles along with the wind currents and they rests at night (Michael et al., 2009).

Due to the occurrence of cyclones in the Arabian Sea, which lead to the attack of Locusts in India. Two cyclones namely Cyclone Mekunu in May 2018 and Cyclone Luban in October 2018 are the most responsible ones for the Outbreak of Locusts. Where Cyclone Mekunu caused the irregular rainfalls in deserts of Oman, Yemen and Saudi Arabia, which created a suitable breeding condition for Locusts and the Cyclone Luban in October 2018 hit the Arabian Peninsula which created more favourable breeding conditions for Locusts.

These conditions made Locusts to breed in large numbers and formations to of swarms. And when they didn't find enough food for their survival then they started to migrate with the help of wind currents which was a best for their migration.

The irregular rainfall at Thar desert lead to breeding of Locusts and the rainfall in July gave the Locusts to have a enough food supply where these conditions are very suitable for their growth in number.

Generally Locusts leaves India in November after their completion of their breeding activity at summer season. However, this is not happened as there was nine days of continues irregular rainfall lead them to stay and feed on the crop areas for their survival, the Locusts are changing their behaviour and adapting to the changing climate and spent entire winter in India which makes them very dangerous.

The effect of Locust have been seen by the farmers in areas of Rajasthan where they are the most affected ones – Barmer, Jodhpur, Churu, Nagaur, Jhunjhunu, Jaisalmer, Jalore, Bikaner, Sikar, and Sriganganagar. The swarms are now spreading towards east and north into Punjab, Haryana and western Uttar Pradesh (Bateman et al., 1993).

India has established 10 Locust circle offices at Jaisalmer, Barmer, Churu, Nagaur, Bikaner, Phalodi, Suratgarh, and Jalore in Rajasthan and Palanpur and Bhuj in Gujarat.



Figure: - 4 The impacts of climate change on Locusts

Control

Traditional method of controlling Locust mainly includes of mechanical methods like, killing the Locusts with fire, catching them in the trenches, killing them by crushing and many other mechanical methods but most common suggested method is Saucepan method. This is the method which is being used as a traditional method to distract the Locusts with noises made by the Saucepan (Krall et al., 1997). As for insecticide for the control of Locusts some insect growth regulators are used like diflubenzuron, teflubenzuron and triflumuron. And as for a biological pesticide, mycoinsecticide is used where *Metarhizium acridum* fungal spores are been sprayed on Locusts. This is a best method where the Locusts will get killed by fungus where it is an environmentally friendly means of biological control. In 2009 at Tanzania, this approach of killing Locusts to control was used to prevent the plant and animal life in the national park where any other animals doesn't show any residue effects and only the Locusts were killed (Directorate of Plant Protection, Quarantine & Storage 2016).

Factors complicate the Locust control:

- a. Easily swarms can travel utmost 50 to 100 km a day.
- b. The size of swarms varies, which makes them hard to track their locations of its next attack
- c. A swarm can invade an area in a short period of time which lies about a month and in rare cases it may extend to three months.
- d. The large swarms can attack a large area in a short period of time which doesn't give the time to control them
- e. The swarm migrates only when the total attack is completed and they migrate along with the direction of wind currents.
- f. The lack of knowledge and precaution measures of locust attacks makes them more dangerous (Lomer et al., 2001).

Conclusion:

Locusts attack can be devastating it can be a quite loss for an entire nation. Normally a single insect may not show a very threatening effect but when they forms into a group of gregarious swarm of locusts they can be very dangerous they are the type of insect which can consume any type of food in a large quantity. A swarm of Locusts can consume a food equal to their own size in a single day. Normally there are biological controls are been present nowadays for control but in many countries there are no precautions for the locusts. Normally a swarm of Locusts can only lead into an outbreak or upsurge but it may take months to form into a plague. If an area has certain measures of precautions for the locusts then those areas can prevent the upsurge to evolve into plague. Nowadays every countries are been developing the precaution measures to control the locusts by establishing Locust circle offices to watch the activities of Locust. With the help of Meteorological departments in every country they need to estimate the outbreaks. By such these measures we can not only control the outbreaks but also we can prevent the attacks due to these climatic changes.

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