



Host Range of Grasshoppers and Locusts

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Grasshoppers and locusts are among the most destructive polyphagous insect pests of agricultural ecosystems worldwide. Belonging to the order *Orthoptera* and family *Acrididae*, they exhibit extensive adaptability and feeding plasticity, enabling them to consume a vast array of plant species, including cereals, legumes, vegetables, and grasses. The host range of these pests plays a pivotal role in their distribution, survival, and outbreak potential. Understanding their host preference and feeding ecology is essential for developing sustainable pest management strategies, predicting infestation zones, and ensuring food security.

Introduction

Grasshoppers and locusts are significant agricultural pests that have plagued human civilizations for centuries. Both belong to the same taxonomic group, yet differ primarily in behavior and population dynamics. Grasshoppers are typically solitary, while locusts can undergo a remarkable transformation from solitary to gregarious forms, forming massive swarms that migrate across regions.

Their feeding behavior is primarily phytophagous, meaning they feed on green vegetation. However, their **host range**—that is, the variety of plants they consume—is remarkably broad and includes numerous economically important crops. Because of this wide host range, grasshoppers and locusts can adapt to changing environments and sustain themselves even when specific crops are unavailable.

In India, Africa, and parts of Asia, locust outbreaks have caused devastation to crops such as wheat, maize, sorghum, and millet, while grasshoppers regularly damage field crops and pastures, reducing productivity and food availability for livestock.

Taxonomic Classification

Taxonomic Rank	Classification
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Orthoptera
Family	Acrididae
Common Names	Grasshoppers and Locusts

Major pest species include

- *Schistocerca gregaria* (Desert Locust)
- *Locusta migratoria* (Migratory Locust)
- *Patanga succincta* (Bombay Locust)
- *Hieroglyphus banian* (Rice Grasshopper)
- *Oxya fuscovittata* (Rice Grasshopper)
- *Acrida exaltata* (Common Green Grasshopper)

General Feeding Behavior

Grasshoppers and locusts feed primarily on foliage, young shoots, flowers, and sometimes even fruiting bodies. Their mandibulate (chewing) mouthparts enable them to consume large amounts of plant tissue rapidly. Feeding is generally diurnal (during the day) and increases with temperature and humidity. When population densities are low, individuals feed selectively; however, under high population conditions, especially in locusts, feeding becomes indiscriminate. The **gregarious phase** of locusts results in swarm formation, where millions of individuals consume all available vegetation along their migratory route.

Host Range of Grasshoppers

Grasshoppers are mostly **oligophagous** to **polyphagous**, meaning they feed on a few to many host plant species. Their host range varies by species, habitat type, and season.

1. Graminaceous (Grass) Hosts

Most grasshoppers prefer members of the **Poaceae (Gramineae)** family, which includes major cereal crops:

- *Oryza sativa* (Rice)
- *Triticum aestivum* (Wheat)
- *Zea mays* (Maize)
- *Sorghum bicolor* (Sorghum)
- *Pennisetum typhoides* (Pearl millet)
- *Hordeum vulgare* (Barley)

2. Leguminous Hosts

Grasshoppers also attack several legume crops that are rich in nitrogen and provide better nutrition:

- *Glycine max* (Soybean)
- *Cajanus cajan* (Pigeon pea)
- *Vigna radiata* (Green gram)
- *Vigna mungo* (Black gram)
- *Arachis hypogaea* (Groundnut)

3. Vegetable Crops

They feed on tender leaves and shoots of vegetable plants, especially during dry conditions when natural grasses are scarce:

1. *Solanum melongena* (Brinjal)
2. *Abelmoschus esculentus* (Okra)
3. *Cucurbita maxima* (Pumpkin)
4. *Brassica oleracea* (Cabbage, Cauliflower)

4. Wild and Weedy Hosts

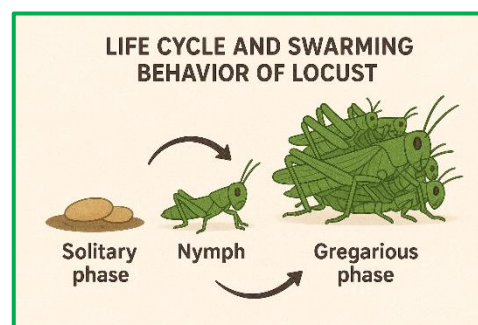
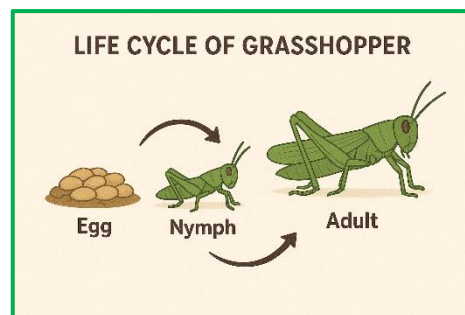
Grasshoppers often breed and feed on wild grasses and weeds such as:

- *Cynodon dactylon* (Doob grass)
- *Dichanthium annulatum*
- *Desmostachya bipinnata*
- *Cyperus rotundus* (Nut grass)

These wild hosts serve as breeding reservoirs from which the pest can move to cultivated crops.

Host Range of Locusts

Locusts, especially the Desert Locust (*Schistocerca gregaria*), exhibit the widest host range among all Acridids. During swarming, they can feed on over 400 species of plants belonging to more than 60 families.



1. Major Host Crops

- **Cereal crops:** *Zea mays*, *Triticum aestivum*, *Oryza sativa*, *Sorghum bicolor*, *Hordeum vulgare*, *Panicum miliaceum*
- **Leguminous crops:** *Arachis hypogaea*, *Cajanus cajan*, *Vigna unguiculata*, *Glycine max*
- **Oilseed crops:** *Sesamum indicum*, *Brassica campestris*
- **Vegetable crops:** *Solanum lycopersicum* (Tomato), *Capsicum annuum* (Chili), *Cucurbita pepo* (Squash), *Citrullus lanatus* (Watermelon), *Allium cepa* (Onion)

2. Pasture and Wild Vegetation

- *Cynodon dactylon*, *Aristida setacea*, *Chloris gayana*, *Eragrostis tremula*, *Dactyloctenium aegyptium*

Locusts feed voraciously on green leaves, flowers, tender stems, and even bark of plants. During severe infestations, fields are completely stripped of vegetation, leaving bare soil.

Factors Influencing Host Selection

1. **Nutritional Value:** Locusts and grasshoppers prefer plants with higher nitrogen and moisture content.
2. **Secondary Metabolites:** Plants rich in alkaloids or terpenoids (like tobacco or neem) are often avoided.
3. **Environmental Conditions:** Temperature, humidity, and rainfall influence vegetation availability and pest movement.
4. **Population Phase:** Solitary locusts are selective, but gregarious ones feed on almost any green vegetation.
5. **Habitat and Geography:** Desert species prefer xerophytic (dry) plants, while migratory species feed on field crops and grasses.

Economic Importance

Both grasshoppers and locusts are capable of causing catastrophic crop losses.

- A single **Desert Locust swarm** may contain 50–100 million insects per km² and can consume **as much food as 35,000 humans in one day**.
- Pasture destruction leads to livestock starvation.
- Infested areas face long-term ecological imbalance due to vegetation loss and soil erosion.

In India, locust plagues have historically affected Rajasthan, Gujarat, and parts of Madhya Pradesh, while grasshopper outbreaks frequently occur in dryland farming regions.

Host Range and Outbreak Ecology

The host diversity directly influences breeding and population build-up. During rainy seasons, when grasses flourish, populations multiply rapidly. In dry conditions, scarcity of natural vegetation forces locusts to migrate in search of food, initiating swarm formation. The transition from **solitary** to **gregarious phase** in locusts is induced by increased density and tactile stimulation of the hind legs. Once in the gregarious phase, they exhibit synchronized movement, collective feeding, and long-distance migration—devastating wide areas of farmland.

Management Implications

Understanding the host range is crucial for effective management and early warning systems.

1. Cultural Practices

- Crop rotation and timely sowing to avoid peak pest periods.
- Removal of weeds and alternate host plants.
- Deep ploughing to destroy egg pods in soil.

2. Biological Control

- Fungal pathogens like *Metarhizium anisopliae* and *Beauveria bassiana* are effective biocontrol agents.
- Natural predators: birds (starlings, mynas), frogs, and wasps.

3. Chemical Control

- Spraying of insecticides like malathion, fenitrothion, or chlorpyrifos in breeding and hopper bands.
- Barrier and aerial sprays during outbreaks.

4. Ecological and Forecasting Measures

- Use of **FAO Locust Watch** systems and remote sensing for vegetation monitoring.
- Weather data analysis to predict outbreak-prone areas.
- Community-based early warning and control systems.

Conclusion

Grasshoppers and locusts, due to their vast host range and adaptive feeding behavior, remain among the most serious threats to global agriculture. Their ability to consume hundreds of plant species, coupled with high reproductive potential and migratory behavior, makes them highly destructive pests. Sustainable management requires integrated approaches combining cultural, biological, and chemical control with continuous monitoring and forecasting. Understanding the host range and ecological dynamics of these insects is a key step toward minimizing their impact on food production and ecosystem stability.

References

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