

Biology and management of termites

in field and fruit crops

Suman Kumari^{1*}, Prabhjot Kaur² and Harinder Singh¹

¹KVK Kapurthala, Sheikhpur, Kapurthala, Punjab 144 601

²KVK Hoshiarpur, Bahawal, Hoshiarpur, Punjab 146 105

Termites are very significant pest of important field and fruit crops. These are found in a wide range of terrestrial environments and distributed throughout the tropical, subtropical and temperate regions of the world. It infests the plants in reproductive and vegetative stages. Termites usually are greyish-white creatures that belongs to order Isoptera, having cryptic habits and incomplete metamorphosis. Over 70% of all the termite species belongs to Termitidae family that seriously damages both agricultural and horticultural crops. Odontotermes obesus and Microtermes obesi are the two major species causing damage to plants in the vegetative or reproductive stages, especially wheat, maize, barley, pulses, oilseeds, vegetables, fruits, plantations, sugarcane, cotton, etc. Sometimes, crop yields are severely lowered due to the inability to make up losses incurred at or close to maturity. Such losses jeopardize marginal farmers' livelihoods and impair food security. Therefore, it is imperative to understand the biology as well as management of termites to save the financial and yield losses caused by them.

Keywords: Crop yield, Damage, Management, Significant, Termite, Yield losses

Termites are polyphagous pests of agricultural, horticultural, agroforestry and plantation crops. Termites are one of the most detritophagous insects that eat a broad range of decomposing plant matter, mostly in the form of wood, leaf litter, and soil humus. They are significant, when they consume, and frequently destroy, precious plant material or wooden structures and become destructive. Termites harm numerous crops across the globe, resulting in financial losses and can be found in a wide range of terrestrial environments, including tropical, subtropical, and temperate regions. Termitidae is the only family that contains over 70% of all termite species and severely harms horticultural and agricultural crops. In India, plants that are in the vegetative or reproductive stages particularly wheat, maize, barley, pulses, oilseeds, vegetables, fruits, plantations, sugarcane, cotton, etc.

are harmed by *Odontotermes obesus* (Rambur) and *Microtermes obesi* (Holmgren). The termites usually are greyish-white creatures having cryptic habits, typically feed on dead plant material, but when their supply of this type of food runs out and the main crop becomes available, they move through an erratic web of vast, interconnected mud galleries to the main field, where they begin to consume living plant material, including roots. They devour roots that are high in cellulose and burrow through plant stems resulting in stunted growth of the plants. These affected plants are easily removed. Termites are sometimes called 'white ants,' despite their distant ancestry from ants. The Greek terms iso (equal) and ptera (winged), which allude to the approximately equal size of the fore and hind wings, are the source of the infraorder name Isoptera. Termites go through an incomplete

metamorphosis that includes the egg, nymph, and adult phases, because of the individual actions that come together to form the colony, which is a self-governing entity, termite colonies are frequently referred to as super organisms.

Their colonies vary greatly in size, from small groups of a few hundred individuals to massive society consisting of several million individuals. Termitarium is another name for a termite colony.



Hive of termite - Termitarium

Colony organization

Termite society, often known as colony, is extremely well-organized and cohesive group. Based on the composition, roles, and behaviours of the colony's members, a caste system and division of labour exist. The worker, soldier, and reproductive castes are the three main castes in the colony. Workers and soldiers might be either male or female and are sterile. There are two types of functional reproductives: primary and secondary, or supplementary. Pheromones and hormones are examples of chemicals that are involved in the formation, differentiation, and maintenance of castes. A pheromone, or chemical signal, is secreted by both the soldier and reproductive castes. This signal is shared with other colony members through grooming and food sharing (trophallaxis), and it prevents the growth of soldiers or reproductives.

Certain undifferentiated nymphs do not get the 'pheromone message' and instead become soldiers or reproductives, which help to restore the colony's caste balance if it is upset. These forms include the king, the queen, and numerous wingless, juvenile male and female forms, as well as complimentary forms that start new colonies.



Queen, soldier and worker

Soldiers are in charge of defending the colony, as their name implies, and they will react right away to any attacks or breaches in the tunnel wall.

Reproductives

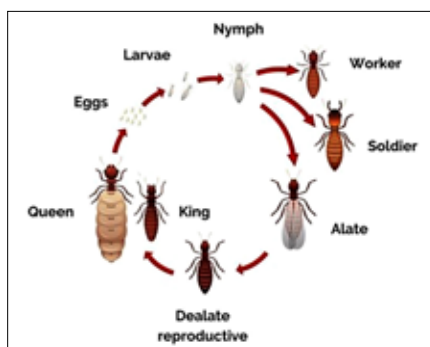
The queen and the king are the primary reproductives. In contrast to ants, bees, and wasps, male reproductive termites, referred to as

kings, help the female to establish the colony and stay inside it with the queen to reproduce over time. Termite swarms drop their wings and try to start a new colony once they have coupled up and fallen back to the ground. The lifespan of primary reproductive can reach up to 15 years, and in established colonies, queens can lay thousands of eggs per day.

Secondary and tertiary reproductives: Nymphs give rise to secondary reproductives, which have wing pads but immature wings. Without wing pads, tertiary reproductives grow from workers. In a mature, well-established colony, the combined egg-laying capacity of the secondary and tertiary reproductives may exceed that of the queen.

Life cycle of termites

A termite colony contains a queen, king, a large number of complementary or productive forms of true but immature potential males and females. Many workers develop from fertilized eggs as well as a large number of soldiers develop from unfertilized eggs.



Life cycle of termite

After the rainy season, when the temperature and humidity levels are ideal, the complementing forms that lack wings undergo sexual maturation and acquire wings for nuptial flight. After a rainstorm, generally in the evening, they come out of their nests in large groups and hover around the street lamps on a wet day. The fruitful forms of one swarm mingle with those of other swarms belonging to the same species during this nuptial trip. The majority of them become food for lizards, frogs, snakes, and

other predators. A small number of fruitful male and females that make it to the ground meet either prior to or following their wing-shedding, and both of these mated forms begin constructing their new nest. In order to build a small tunnel or earthen gallery (nuptial chamber), the male usually leads and the female follows. After that, the pair becomes the termite queen and king for the rest of their lives.

A few eggs laid by the female termite (queen) develop into larvae or nymphs. The royal couple themselves tends to and feed the initial brood (larvae/nymphs), all of whom grow up to be labourers. The worker termites then assume responsibility for brooding. There are no reproductive castes created in the first season. Within a week after the eggs hatch, the larvae, or nymphs, transform into labourers and soldiers. The queen progressively increases in size and speeds up egg laying rate. She is known as an egg laying machine because she lays one egg every two seconds, or 70,000 to 80,000 eggs a day.

Families of economic importance

- **Hodotermitidae:** As they collect and gather grasses and stored wheat grains to transport them to their underground nests, these desert zone termites are actually harvester termites. Even though they mate and live underground, they forage in the open above ground. Additionally, several species in this genus constructed tiny granular mounds of dug earth.
- **Kalotermitidae:** This family of termites only lives in woods. They typically have no connection to soil and attack living, dead, or dying wood. They have the potential to be pests of rubber, cocoa, cashew, teak fig, mango, Accacia, Zizyphus, building fittings, lumber, and tea and coffee, among other things. They do not build termitaria or earthen mounds.
- **Rhinotermitidae:** This family of termites is subterranean in nature and also infests building

woodwork. In addition, tea, rubber, cocoa, coconut, palm, wood works, etc. are infested by these termites. Certain species can also damage electrical wire sheathings, leading to short circuits.

- **Termitidae:** With more than half of all known termite species, this is the largest termite family. Certain species, such as *Macrotermes gilvus*, can grow earthen termitaria up to 3.5 meters high. This family of termites also causes problems for sugarcane, eucalyptus, camphur bush (*Ocimum* sp.), and building wood.

Management of termites in different field and fruit crops

Wheat: Termites damage the crop soon after sowing and near maturity. The damaged plants dry up completely and are easily pulled out. The plants damaged at later stages give rise to white ears.



Plants of wheat attacked by termite

Treat the seed by diluting 40 g Cruiser 70 WS (thiamethoxam) or 160 mL Dursban/Ruban/Durmet 20 EC (chlorpyrifos) or 80 mL Neonix 20 FS (imidacloprid+hexaconazole) in one litre of water and spray the same on 40 kg seed spread as a thin layer on the pucca ground or tarpaulin or polythene. Generally, termites cause more damage in sandy soil and irrigating the affected

fields result in some control of termite damage. In case of severe infestation, broadcast 7 kg Mortel 0.3 G (fipronil) or 1.2 litre Dursban 20 EC (chlorpyrifos) per acre mixed with 20 kg of moist sand before first irrigation.

Gram: Termites attack the crop especially at seedling stage and also near maturity. The pest can generally be observed feeding on roots or near the root zone of the damaged plants. The affected plants dry up and can be pulled out easily. The incidence of pest is more in light soils.

Orchards and Nurseries: Farmers apply insecticides for management of termites in their nurseries and orchards but these remain effective only for few days and re-infestation occurs few days after insecticidal treatment. So, an eco-friendly technology has been devised by Entomologists of the Department of Fruit Science, Punjab Agricultural University, Ludhiana to manage the termites using earthen pots based traps having maize cobs without grains (gul) in pear, ber, peach, grape and amla.



Termite trap

These special traps consist of earthen pots on which 24 holes are made for entry of termites. Fill the traps with maize cobs without grains (gul) which are cut into 3-4 pieces. Bury 14 traps per acre in soil up to 1.5-2.0 feet deep, in termite infested orchards placed at equidistance during first week of April and again during first week of September. Check these traps after 3 days for the

termite occurrence. After about 20 days, thousands to lakhs of termite workers get trapped in a single trap, depending upon the infestation and soil type. These earthen pots (containing termite and maize cobs without grains) should be dipped in water having few drops of diesel for killing of collected termites.

SUMMARY

Termites are a highly destructive insect that can harm a wide range of crops, including horticulture and agriculture, forest trees, and storage materials. When damage happens to a crop during its early growth phases, it can result in production losses of up to 100%. Seventy percent of the termites belong to family termitidae which is solely responsible for huge economic losses of field and fruit crops. Their colonies vary greatly in size, from small groups of a few hundred individuals to massive society consisting of several million individuals and it is also called termitarium. It consists of workers, soldiers, reproductive casts and they have incomplete metamorphosis. Management of termites in different field and fruit crops can be done with chemicals, which is sometimes more expensive and not suitable for every farmer. So, an eco-friendly technology devised by Punjab Agricultural University, Ludhiana to manage the termites using earthen pots based traps having maize cobs without grains (gul) in pear, ber, peach, grape and amla is an excellent approach in management strategies. In near future, the synergistic combinations of different practices in an integrated manner will provide a sustainable solution to the termite control. With the complete information of biology and management options, farmers can manage this devastating pest and can also elevate their livelihood.

*Corresponding author email :
suman60@pau.edu

! Attention !

Want to try your hands at the ICAR textbooks released recently! No Worries! We got you covered. Now shop the latest textbook collection of ICAR online from the convenience of your home.

SCAN QR Code to
Purchase Online

