



Farmer Friendly Ways to Control Termites

Kalyani Kumari^{1*}, Kalyanrao Patil² and Shikha Sharma³

¹Ph. D. Scholar (Seed Sc. & Tech.), B. A. College of Agriculture, AAU, Anand-388110, Gujarat

²Assistant Professor, (Seed Tech.), B. A. College of Agriculture, AAU, Anand-388110, Gujarat

³Ph. D. Scholar, (Pl. Patho.), Rajasthan College of Agriculture, MPUAT, Udaipur- 313001, Rajasthan

*Email of corresponding author: kalyani.kumari7@gmail.com

Termite is one of the most damaging insects of agriculture, forestry and housing. Colonized living of this insect with all together makes its life more protected than other social insects. Owing to this quality, it has been very difficult to prevent our agriculture from damage by this insect. Though many measures have been suggested to control termites, integration of all cultural, physical and biological methods would be more effective. Adding organic material to the soil, crop rotation, physical barriers, encouraging predators, plant parts and plant extracts can be used effectively for control of this insect.

Introduction

Termites are a group of insects belonging to class Isoptera consisting of 2,500 species of which 300 are considered as pests. Termites are one of the most damaging pests in the tropics and can cause considerable problems in agriculture, forestry and housing. The most troublesome type of termites in agriculture is the fungus-growing termites. They feed on dead organic material such as crop residues, mulches and soil organic matter (humus). However when this type of food is not available they will eat live plant material including crops such as groundnuts, millets and maize. Termites can attack plants at any stage of development from the seed to the mature plant.

They are social insects that live together as a colony in a nest. Colony

members belong to one of three interdependent groups with specialized form and function known as castes. The three basic castes present in the colony are workers, soldiers and reproductive forms. Workers and soldiers are wingless, sterile and blind. Workers construct the distinctive shelter tubes and collect food to feed the young and other members of the colony. The primary function of the soldiers is to defend the colony, usually against ants, which are their main enemies. The reproductive caste is usually referred to as the king and queen. They are responsible for the production of fertilized eggs for the colony and of specialized chemicals (hormones) important for managing the inhabitants of the colony. Mature colonies produce winged reproductive forms or alates at certain times of the year. After the dispersal flight, the alates

attempt to find mates and found new colonies. Utilizing cellulose as their food source and living in colonized form, termites are the most successful and long lived of all the social insects. They depend entirely on wood, either living or dead, or the woody tissue of plants, intact or partially decayed and also in the form of humus and dried animal dung.

Control Measures

A) Cultural method

- **Adding organic material to the soil:** Termites prefer to eat dead plant material. Their attacks are thought to be related to soils with low organic matter content. This is because such soils do not contain enough food for termites to live and they resort to feeding on living plant material. Adding compost or well-rotted manure to the soil and growing green manures helps to increase the organic matter in the soil. Where possible, green manure crops can be ploughed into the soil. Moisture plus organic matter attract the termites and prevent them from attacking the target crop. Castor press cake can be incorporated into the soil in order to control the termite infestation. It is suggested to add it into the opened furrow before sowing the crop.
- **Cultivating on ridges:** Ridges are usually made along contours and the soil is finally shaped into a ridge form. In these operations, termite colonies are destroyed or exposed to predators such as birds.
- **Healthy plants for transplanting:** Plants which are suffering from disease or lack of water are generally more susceptible to termites than healthy plants. It is therefore

important that plants are kept healthy and watered. In dry areas it is recommended that seeds should be sown at the beginning of the wet season to give the plants a chance to establish themselves and remain healthy in the field. Only healthy plants should be transplanted into the field. Great care should be taken during transplanting and pruning (leaves and roots) as termites may enter plants through scar tissues. If there is a polythene bag around the root of a tree seedling, it is recommended that it should not be completely removed when transplanting as it can act as a barrier against termites.

- **Crop rotation:** Planting the same crop on the same land year after year reduces soil fertility and structure. Crops growing in such conditions will be weaker and susceptible to termites. Crop rotation can play an important role in reducing termite attack. This can prevent pest and disease buildup and also help the soil to recover nutrients. In some parts of India, farmers cultivate castor (*Ricinus communis*) crop in severely termites infested field and doing so they found that the termite infestation has substantially been decreased in the next cropping season. (HDRA Report, 2001)
- **Irrigation:** Irrigation is also used to minimize the effect of the termites. When the farm is regularly irrigated, the activities or damages of termites are reduced.
- **Timing of harvesting:** Crops are more seriously damaged towards harvest than earlier period of the season. Therefore prompt harvest is recommended.

- **Avoiding plants from termite attack:** In general indigenous crops are more resistant to termites than exotic crops. Annual crops are attacked towards harvest time while perennial crops are attacked most destructively during dry seasons or in early stages of growth. It may be advisable to establish small plantations in the field prior to larger scale plantations in order to discover if the crop is attacked to termites in local conditions.

Furthermore, some organic agriculture practitioners spread dry leaves, farm litter and other waste in the field and spray water on it. By doing so they are in opinion that termites will then eat these materials and thus prevent it from spreading to the crops.

B) Physical Control

- **Mechanical Destruction:** It consists of breaking the mounds of the termites and removing the queen and the king. Sometimes termite mounds are destroyed manually in order to get rid of these pests. This method is labour intensive, as the building material of the mounds is very hard and many mounds have considerable dimensions. The success of this measure depends on eliminating the queen, who may be hidden deep inside and is not easily found. Mechanical destruction of termite mounds can be recommended if they appear close to storage structures. (Akutse et al., 2012)
- **Physical barriers:** Physical barriers are substances (e.g., sand or gravel aggregates, metal mesh or sheeting) that exclude termites through the impenetrable material

act as a physical/mechanical barrier to prevent termite penetration and damage to building and creation of a zone of poisoned soil under and around the structure to prevent termites entering from the ground. (Nyeko et al., 2005)

- **Magnets:** Placing strong bar magnets in the soil next to a new termite mound can prevent a mound from growing. This disturbs those species of termite which build their mounds in a north-south direction along magnetic lines.

C) Biological control

Biological control measures against termites are generally difficult because of their social nature and secure enclosed environments that protect them against most antagonists. Entomo-pathogenic fungi, nematodes and bacteria are some of the biological control methods of termite.

- **Fungi & Nematodes:** Preparations based on insect-attacking nematodes and the fungi *Beauveria bassiana* and two species of *Metarhizium*, however, are effective, especially when introduced into mounds. Fungi spores can act as repellents. A fungus *Metarhizium anisopliae* (Bio Blast) is another biological termiticide. Nematodes caused high mortality of *Reticulitermes flavipes* (Kollar) termites in laboratory tests.
- **Encouraging predators:** Termites have many predators because they provide a source of protein. Insects that eat termites include spiders, beetles, flies, wasps and especially ants. Other predators including frogs, reptiles, birds and mammals such as bats and monkeys. Encouraging this kind of

wildlife will help to reduce the number of termites.

D) Use of botanicals

Botanical pesticides possess an array of properties including insecticidal activity, repellency to pests, antifeedency, insect growth regulation, toxicity to agricultural pests. Plant parts and plant extracts can be used effectively. These can be removed from the plant and used as a natural insecticide by grinding up the relevant parts, placing in boiling water, stirring and leaving to soak. The mixture is then sprayed onto the infested crop.

- **Plant materials:** Leafy extract of following plants can be used to control termite: *Azadirachta indica* (Neem), *Allium sativum* (Garlic), *Ocimum canum* (Green basil), *Carica papaya* (Papaya), *Jatropha curcas* (Ratanjot), *Argemone mexicana* (Mexican poppy), *Camellia sinensis* (Tea), *Santalum album* (Sandalwood) *Tagetes minuta* (Mexican marigold), *Tectona grandis* (Teak), *Tagetes erecta* (Marigold), *Ricinus communis* (Castor), *Calotropis gigantean* (Madar), *Cannabis sativus* (Hemp), *Curcuma amada* (Mango Ginger), *Datura alba* (Datura), *Eucalyptus globules* (Blue gum), *Lantana camara* (Lantana), *Musa paradisiacal* (Banana), *Pongamia pinnata* (Poongam), *Parthenium hysterophorus* (Carrot grass). (Verma et al., 2010)

E) Termite control in storage

- **Hygiene:** Termite problems cannot be solved by the application of hygiene measures alone, but the prevention of damage starts from clearing the building site of a granary from all organic material

that might attract termites, such as wood and straw. Dig out roots of chopped trees and shrubs that have been left in the ground close to the storage structure. Keep the ground around the building free from any plant growth. This prevents at the same time the penetration by rodents. Avoid construction sites that are infested with termites or that are close to such areas.

- **Protection of the Stored Produce with Traditional Methods:** In some regions, farmers use traditional preventive measures against termites that include the application of a layer of wood ash to the base of the granary and the admixture of toxic or repellent materials of plant origin to the grain.
- **Termite Proofing of the Granary:** Termite barriers are the most effective way of protecting the storage structures. Some tropical timbers like teak resist to termite attack and can be recommended as poles. The other parts of the construction may be erected from cheaper wood. Used engine oil, wood ash or neem leaves or bitter seeds can also be poured into the pole holes in order to repel termites.

Concrete or stone platforms resting on poles made of the same materials provide a solid basement for grain stores. The protection can still be improved by fixing metal termite shields at the junctions between the poles and the platform. Use metal that does not corrode easily, for example aluminium or galvanised iron.

In areas where termites occur regularly, granaries that are placed directly on the

ground and made of mixtures of clay with straw should be avoided because termites are encouraged to tunnel through the walls. Use pure mud walls instead of mixing straw. Underground pits are easily invaded by termites and should be lined with clay or soil from termite mounds which is then fired to harden sufficiently.

- **Protection of Warehouses:** Choose building sites that are free from any signs of termite infestation and far from any termite mounds. Clear the site thoroughly from all materials of plant origin including roots. The protection of warehouses against termite attack must be based on a solid termite-proof construction.

The ground and the hard-core below the future warehouse must be properly tamped down to prevent later cracking of the floor. A solid concrete base and a floor cast as a single slab provide the best protection against the penetration of subterranean termites. If the floor cannot be cast as one piece, the joints must be sealed carefully with pitch. Pipes and cables should be brought in through the walls and also sealed with pitch. Termite shields fitted on top of the foundations effectively prevent termite penetration.

Conclusion

Termites are the most troublesome pest of agricultural crops and wooden structures. Although, chemical control is an effective measure of protection by termites but their excessive use is harmful for our environment and the results are not sustainable and also costlier for farmers. Prevention is the best

feasible and effective option to termite control. Field especially during crop production period must be kept in good hygienic condition by removal of dead plant material like wood, stalks and any trash.

The extracts of many plants were found to be effective against termites. Although some botanicals were not as effective as chemical but they are nontoxic and safe for the environment, biodegradable and renewable source. The use of botanicals and biocontrol agents are a promising alternative to chemical control. In order to achieve sustainable solutions, the protection of storage structures should be given preference over the destruction of termite mounds. In order to prevent damage or curative treatments, regular inspections of the storage structures are required for both, traditional granaries and warehouses.

References

- Akutse KS, Owusu EO and Afreh-Nuamah K. 2012. Perception of farmers' management strategies for termites control in Ghana. *Journal of Applied Biosciences*, **49**: 3394– 3405.
- Nyeko P and Olubayo FM. 2005. Participatory assessment of farmers' experiences of termite problems in Agroforestry in Tororo district, Uganda. Agricultural Research and Extension Network Paper No. 143.
- HDRA report, 2001. Termite Control: Accessed online at <http://www.gardenorganic.org.uk>.
- Verma M, Sharma S and Prasad R. 2010. Plant based, eco-friendly wood preservatives for termite control. Indian Institute of Technology, Delhi. (The Sixteenth Annual International Sustainable Development Research Conference. 30 May-1 June, 2010, Hong Kong)