

# Biopesticides

## Sustainable Approach for Nematodes Management

### 1. Diksha Mathpal

Department of Plant Pathology, CoAg., GBPUA&T, Pantnagar, Uttarakhand

### 2. Shilpi Rawat

Department of Plant Pathology, CoAg., GBPUA&T, Pantnagar, Uttarakhand

### 3. Ankita Tiwari

Department of Plant Pathology, CoAg., GBPUA&T, Pantnagar, Uttarakhand

### 4. Rashika Tamta

Department of Plant Pathology, CoAg., GBPUA&T, Pantnagar, Uttarakhand

### 5. Akanksha Arya

Department of Plant Pathology, CoAg., GBPUA&T, Pantnagar, Uttarakhand

*Received: August, 2024; Accepted: September, 2024; Published: October, 2024*

### Introduction

Nematodes are a significant category of microorganisms that live in the soil surrounding plant roots, severely harming both agricultural and horticulture crops. Phytonematodes are tiny, commonplace organisms. They cause more than \$100 billion in crop losses globally each year, making them silent enemies of

humanity (Khan, 2008). They often live in the soil and attack the subsurface portions of plants; the harm they inflict is difficult to identify from the symptoms alone, and occasionally it seems like a nutrient shortage (Khan, 2008). To manage nematodes, different chemicals, or botanicals, are utilized nowadays.

### Botanicals from plant extracts

Natural plant products, botanicals leave no trace in the field and are environmentally beneficial when used. Some extracts from plants release volatile chemicals that repel nematodes, lowering their attraction to plant roots and minimizing harm; others contain substances that kill nematodes instantly upon touch or ingestion, impairing their cellular function and resulting in mortality. Azadirachta, Eucalyptus, and Tagetes are currently the most widely utilized plants for management; in the past, leaf extracts, oil cakes, and plant latex were also employed. Azadirachtin, a powerful substance with insecticidal and nematicidal effects, is present in neem (*Azadirachta indica*) extracts. It stops

nematodes from molting and hinders their ability to reproduce, which slows down population growth.

*Tagetes spp.*, or marigold, yields thiophenes and other chemicals with nematicidal qualities. Soil health can be enhanced and nematode populations suppressed by adding marigold leftovers to the soil.

The plant *Chrysanthemum (Chrysanthemum spp.)* has pyrethrin chemicals that have both nematicidal and broad-spectrum insecticidal properties. Nematodes experience nervous system disruption, which results in paralysis and death.

Alliin, one of the potent nematicidal chemicals released by garlic (*Allium sativum*) is one of the

organosulfur compounds. Nematodes are prevented from moving, eating, and reproducing by these substances.

Application of these plant extracts are sprayed on the ground as foliar sprays, seed treatments, and soil drenches, among other applications. Applying neem cake or using other techniques to chop datura, eucalyptus, tulsi, or mint inhibits the growth of juvenile second-stage nematodes and decreases the growth of root-knot worms.

Additionally beneficial for reducing nematode populations and boosting rice yield is water hyacinth, which grows at a rate of 60 kg N/ha. There have also been reports of the use of green manure to suppress the population of *Meloidogyne spp.* There is a wealth of evidence supporting the use of dried leaves added to soil to suppress parasitic nematodes. The effectiveness of certain leaf powders has also

been well documented against root-knot nematodes.

The implementation of botanical extracts either induces resistance in plants against the nematode attack or directly activates the plant defense system. Exploration of the nematicidal efficacy of botanicals against egg hatchability and juvenile mortality is increasing day by day.

It was discovered that flavonoids and alkaloids have ovicidal effects on *Meloidogyne* eggs. According to Jourand *et al.* (2004), using *Crotalaria virgulata* leaf extract considerably decreased root galls in tomato plants that were brought on by root-knot worms (*Meloidogyne incognita*). The hatching activity was decreased by plant extracts of thyme (*Thymus vulgaris*), Eucalyptus spp., sweet wormwood (*Artemisia absinthium*), fennel (*Foeniculum vulgare*), and peppermint (*Mentha spicata*) (Ibrahim *et al.*, 2006).

### Conclusion

Botanicals are an economical feasible, environmentally beneficial substitute for chemicals that can meet farmers' needs because they are profitable for them. Because they are safe and favorable to the environment, botanicals are becoming more and more

common in today's society. These represent the most potential sources of plant-derived bioactive compounds. Their use will provide nutritious fruits and vegetables devoid of dangerous chemicals, benefiting future generations of people.