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Oil Cakes and its Effect on Plant Parasitic Nematodes

Nangki Tagi[1] Jisna George[1] Punam Bagang[2] and Ruthy Tabing[3]

[1]PhD Scholar, Department of Nematology, College of Agriculture, Assam Agricultural University, Jorhat, Assam

[2]PhD Scholar, Department of Agricultural Entomology, BCKV, Mohanpur, Nadia, West Bengal

[3]PhD Scholar, Department of Plant Pathology, College of Agriculture, Assam Agricultural University, Jorhat Assam

SUMMARY

The oil cakes have shown great promising qualities in nematode management strategies. Oil cakes change the physical and chemical properties of the soil which makes the soil atmosphere unfavourable for nematode activity and improves soil condition for greater root growth there by increasing the utilization of soil nutrients. The residues of oil and the limonoids present in the cake also cause insect repellence and solvents or water extracts make the product a good anti feedant and growth inhibitor. The seed cake is rich in plant nutrients (crude protein, carbohydrate, crude fiber, fat, ash and acid insoluble ash 1–17%, with nitrogen, phosphorous, calcium, and magnesium) and is used as manure for soil amendment and also for urea coating.

INTRODUCTION

Oilseed cakes is known as the by-products of the pressing process after the extraction of the liquids is obtained from various oilseeds and they are rich in major and minor components such as carbohydrates, proteins, minerals, fiber, and some lipids and it has unique qualities which contain pest control properties. It exert pronounced behavioral and physiological effects on nematodes and insect pests and have growth regulating effect. The effect varies with nematodes and other pest species and is dose dependent. oilcakes are safe to mammals with low toxicity on predators and parasitoids and used for biocontrol of nematode pests. Oilcakes combines well with chemical, botanical, and microbial pesticides and can be use for integrated pest management (IPM). Currently, oilcakes are used to control nematode, pests and fungal diseases on several crops and vegetables and are also use as a source of plant nutrients due to their fast to moderate release fertilizer and rich source of NPK. They are directly applied to the soil and allowed to decompose for some time and as the decomposition time increases their nematicidal effect increases. Oilcakes can be developed as a broad-spectrum biopesticide by combining with botanicals, microbial biopesticides, synergists, antagonists, and adjuvants to enhance its activity, longevity on plants for better compatible with other potent nematicides there by eliminating its overuse and reducing pest resistance.

Role of Oilcakes in Nematode Suppression:

Application of Organic manure like groundnut cake, vermicompost, or neem cake etc and any other organic manure enhances the organic carbon content of soil, leading to enhancement of soil productivity. In addition, applying organics have been found to have a positive effect on cation exchange capacity, increase water retention, and solubilize more of soil P. These have positively reflect on yields, and beneficial in controlling nematode in soil.

Goswami *et al*. (1993) have shown that decomposed products of groundnut, mahua, mustard, karanj and neem oil-cakes affected the mortality of *M incognita*. Mustard cake was found to be most nematoxic even from the first week. In an experiment conducted by Khan and Goswami (1995) resulted that the mortality of *M. incognita* juveniles increased with increasing decomposition period of neem cake up to 20 days, thereafter it was decrease. Gutpa and Kumar (1997) conducted a pot experiments and found that groundnut and mustard cakes decline the populations of *Tylenchorynchus* spp. and *Helicotylenchus* spp. Nagesh *et al*. (2001) studied that supplementing neem oil-cakes with inorganic fertilizers as nitrogen, phosphorus and potassium, had an additive effect on the mycelial growth and sporulation of *P. Lilacinus*.

Nematicidal Activity of Oilcakes

Several antimicrobial by-products (e.g. organic acids, hydrogen sulfide, phenols, tannins and nitrogenous compounds) are released during the decomposition of organic amendments, or synthesized by microorganisms involved in such degradation (Rodriguez-Kabana et al. 1995). Among a large variety of organic

amendments that have been use in soil for managing plant parasitic nematodes, are oil seed cakes. Oil seed cakes are by-products of plant seed oils processing industries, and may suppress plant parasitic nematodes in economically important crops (Hafez & Sundararaj 1999; Sasanelli et al. 2003; Jothi et al. 2004; Radwan et al. 2004; Tiyagi & Ajaz 2004) and are also found to be very effective against phytonematodes. Oil-cakes from certain seeds are toxic to various kinds of pest and other harmful microbes and are used as fertilizers. It is of common practice among food and vegetable growers to use oil-cakes as a source of plant nutrients and to control nematodes. Nematicidal properties of aqueous extracts of oil-cakes or soil amended with oil-cakes in the absence of plants have been proved to be challenging. Water soluble fractions of oil-cakes extracted from neem, mahua, groundnut and castor were toxic to nematodes and inhibits the larval hatching. Eggs of *M. incognita* were found to be more vulnerable to oil-cakes (neem, karanj, mahua, groundnut, cotton, linseed, sesamum and kokam) (Lanjeswar and Shukla, 1986). However, more the concentrations of oil-cake extract better the results due to the presence of higher nematoxic compounds. Oil seed cakes can be used as substitutes for inorganic fertilizer because they will increase the organic matter of the soil, reducing the bulk density and increasing the water-holding capacity. Both of these factors improve the fertility of the soil and increase the soil nutrients utilization. Oil cakes change the physical and chemical properties of the soil which makes the soil atmosphere unfavourable for nematode activity.

CONCLUSION

Most of the chemicals have adverse effects on environment and other living organisms and leaves a harmful residual activity behind. So, incorporating organic amendments such as oilcakes which could provide better option for farmers and as potential alternatives to the harmful chemical control means should be used against plant parasitic nematodes. Soil organic amendments have been use as a method of suppressing plant parasitic nematodes because of its certain biological management qualities and ecofriendly nature. It has also been shown that the efficacy of the oilcakes against nematodes depends on their chemical and physical properties and the type of microorganisms that develop during degradation process. This trend has received a great interest amongst the nematologists, due to its effective control against the target nematode and thereby reducing environmental pollution.

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