

MANAGEMENT OF PLANT PARASITIC NEMATODES RELATED TO MULBERRY WITH ORGANIC AMENDMENTS

Nasira Ghafoor¹, Mian Sayed Khan², Nadia Saeed³, Iram Gul¹, Sundas Asghar⁴, Zobia Anwar³ and Mawra Nadeem⁵

¹Hazara University Mansehra, Pakistan

²University of Swabi, Khyber Pakhtunkhwa, Pakistan

³Government Post Graduate College, Mandian, Abbottabad, Pakistan

³Government Post Graduate College, Mandian, Abbottabad, Pakistan

⁴University of Lahore, Punjab-Pakistan

⁵University of Agriculture Faisalabad, Punjab-Pakistan

Abstract: Plant parasitic nematodes are the crucial pathogens that decrease high yield loss and health in different plants. Plant parasitic nematodes are the causative agents and parasitize economically many important crops and plants including mulberry. The plant parasitic nematodes management is very important for the cultivators and farmers to conquer the loss in yield production. The impact of organic manure is gradual and effective than that of inorganic manure which effect quickly on the nematodes population. Soil samples and sub soil samples were collected from both controlled group and treated group to observe influence of organic manures i.e. pigeon manure, cow dung and sawdust after 3, 6 and 12 months, correspondingly. . Every sample of soil was processed by the help of Baermann funnel technique (Southey, 1970) and was examined underneath the stereoscope at magnification power of 4X. After studying all the samples and sub samples of soil were was submitted for statistical analysis including histogram analysis as well as ANOVA. Cow dung was more effective as compared to pigeon manure and sawdust against the infestations in mulberry trees. While pigeon manure and sawdust were also effective against parasitic nematodes.

Keywords: Parasitic nematodes, managements, cow dung, pigeon manure, sawdust, Mansehra

INTRODUCTION

Plant parasitic nematodes are the crucial pathogens that decrease high yield loss and health in different plants. Parasitic nematodes frighten the strength of plants, animals and humans throughout the world (Niles and Freckman, 1998). Parasitic nematodes are very familiar for their aptitude to decrease crop growth (Evans *et al.*, 1993). Plant parasitic nematodes are well known as one of the menace to the crops and plants all over the world including Pakistan. In Pakistan

plant parasitic nematodes caused more severe and complex damages to the plants than in the other developed countries because the climate is appropriate for the reproduction and activity of parasitic nematodes throughout the year (Maqbool, 1988). Mulberry is extensively spread various regions of high altitude including Mansehra.

Plant parasitic nematodes are the causative agents and parasitize economically many important crops and plants including mulberry. Mulberry is harshly affected by root knot nematodes infestation (Khan *et al.*, 2015). The infection caused diseases i.e. yellowing of leaves, retarded growth, wilting and yield loss in production. The plant parasitic nematodes management is very important for the cultivators and farmers to conquer the loss in yield production. However the control over plant-parasitic nematodes is the most demanding more than other pests since nematodes mainly hinder the soil and usually immense influence on the underground plant sections. In addition to that in occurrence nematodes are cosmopolitan, with an extensive range of hosts as well as related to other pests and also pathogens making the recognition of the disease unclear (Akhtar, 1997).

An incorporated nematode management program frequently will assist to maintain nematode population under destructive levels, and augment efficacy of nematicides used to control the parasitic nematodes. Management of nematodes reduces the number of parasitic nematodes to point lower the damage threshold preferably than devastation. Organic manure squander in the form of livestock when engrossed in the soil raises the production of pathogens and predators that feed on plant parasitic nematodes. It also reduces the population of parasitic nematodes as a consequence plant growth yield production also improved (Muhammed and Mashkoo, 2003). The efficacy of pigeon fertilizer, sawdust along with poultry fertilizer was determined against the reduction in population density of parasitic nematodes i.e. *Merlinus brevidens*, *Helicotylenchus indicus* and *Haplolaimus seinhorsti* related to garlic. It was found in the research that poultry as well as pigeon fertilizers were most effectual as contrast to the sawdust against the population density of plant parasitic nematodes (Khan and Shaukat, 1998).

Organic amendments enhance the soil aptitude to control water and nutrients, which augment plant vitality and results in improvement of the plant tolerance to parasitic nematodes. They stimulate activities of microbes in the soil (containing antagonists). Organic amendments such as poultry manure and cow dung, crop residues i.e. green manures, town wastes or waste material of industries i.e. oil seed cakes used to control the parasitic nematodes (Collange *et al.*,

2011). A few of them were used as mulches on the top layer of the soil while other residues were included into the soil like leaves of neem (i.e. *Azadirachta indica*) may be applied in soil by including the leaves as green manure or used as an extract for biological control of nematodes (Oka, 2010; Akhtar and Malik, 2000). Organic manures including cow dung was also found effective against the population of plant parasitic nematodes associated with walnut trees in Abbottabad. Parasitic phytonematodes were declined to a remarkable level after the application of cow dung (Saeed *et al.*, 2022).

MATERIALS AND METHODS

Soil samples were collected from the chosen host plant along with rootlets of a number of various localities from Mansehra District, KP-Pakistan. Infested mulberry trees were alienated into two groups i.e. one group is controlled group while the other group is named as treated group. In organic amendments pigeon compost, sawdust as well as cow dung were used. Therefore these amendments were applied to manage the plant parasitic nematodes related to mulberry. Cow dung and pigeon manure at the ratio of 8kg/tree and sawdust at the ratio of 10kg/tree were applied and combining with the soil at 20 cm deep with the help of trowel or spade on the infected mulberry trees of selected localities. In the organic amendments after poultry manure, cow dung is most effective followed by pigeon manure and then sawdust.

The impact of organic manure is gradual and effective than that of inorganic manure which effect quickly on the nematodes population. Soil samples and sub soil samples were collected from both controlled group and treated group to observe influence of organic manures i.e. pigeon manure, cow dung and sawdust after 3, 6 and 12 months, correspondingly. Almost 350 grams of samples had taken and place in air tight plastic bag and reserved in shady and cooler area. Every sample of soil was processed by the help of Baermann funnel technique (Southey, 1970) and was examined underneath the stereoscope at magnification power of 4X. After studying all the samples and sub samples of soil were submitted for statistical analysis including histogram analysis as well as ANOVA.

RESULTS AND DISCUSSION

By examine the soil samples of the treated trees after the control applications were used, it was cleared that organic manures i.e. pigeon manure, cow dung and sawdust were effectual against

the population of parasitic nematodes because their number was considerably declined. Cow dung, pigeon manure and saw dust application results were quantitatively analyzed under the stereoscope which clearly indicated the effectiveness of all manures but with different efficiency. Results subjected to the ANOVA of all the manures implementation in Mansehra District showed that p value of all manures used was found significant. While the effectiveness of cow dung, pigeon manure and sawdust against mulberry trees infestation showed by histogram. The bars in histogram analysis showed the declining of parasitic nematode population density in 3, 6 and 12 months among the initial, controlled and treated population of parasitic nematodes.

Cow dung was more effective as compared to pigeon manure and sawdust against the infestations in mulberry trees while pigeon manure and sawdust were also effective against parasitic nematodes.

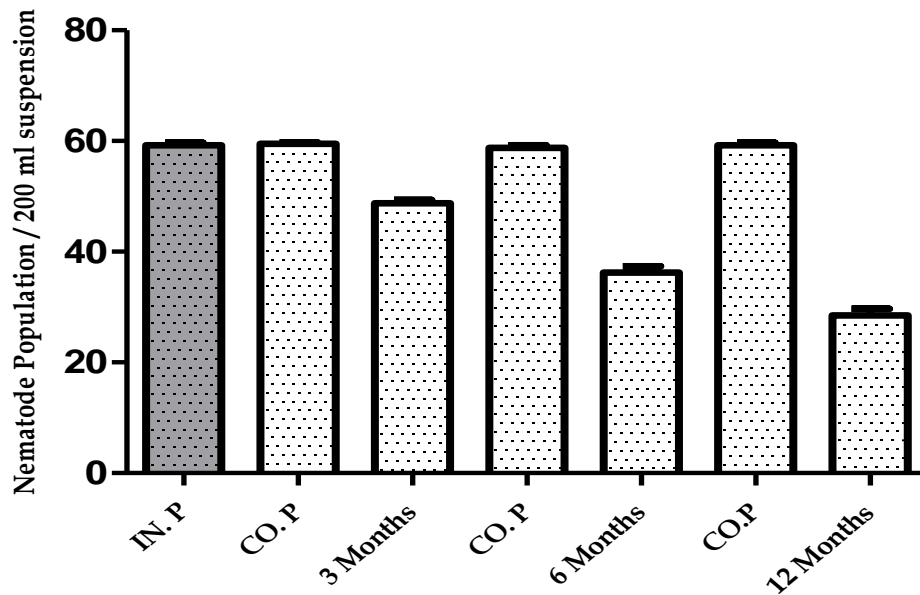


Fig.1. Showing cow dung (CD) effect on the population of parasitic nematodes is shown in histogram

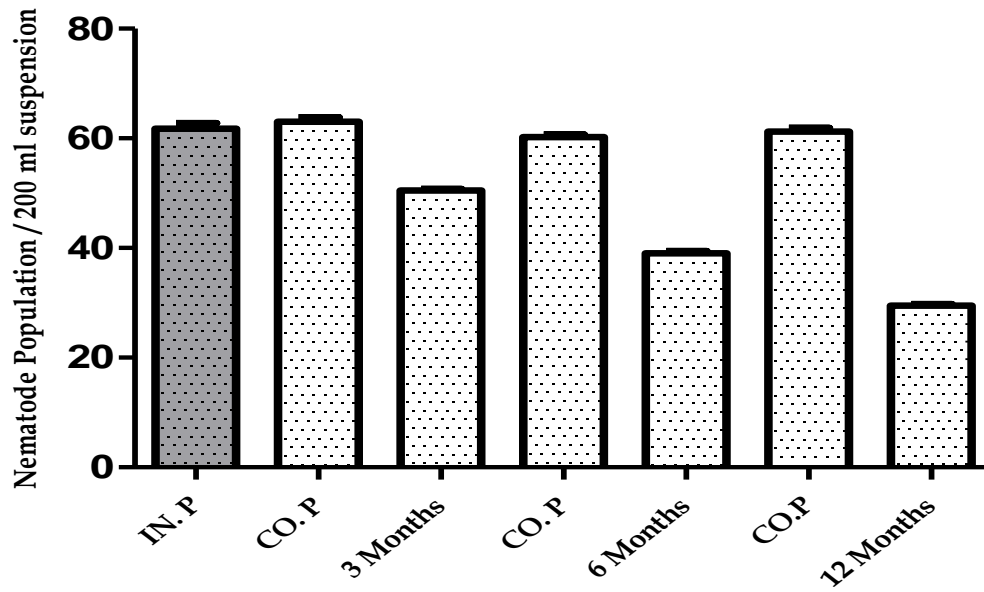


Fig.2. Showing pigeon manure effect on the population of parasitic nematodes is shown in histogram

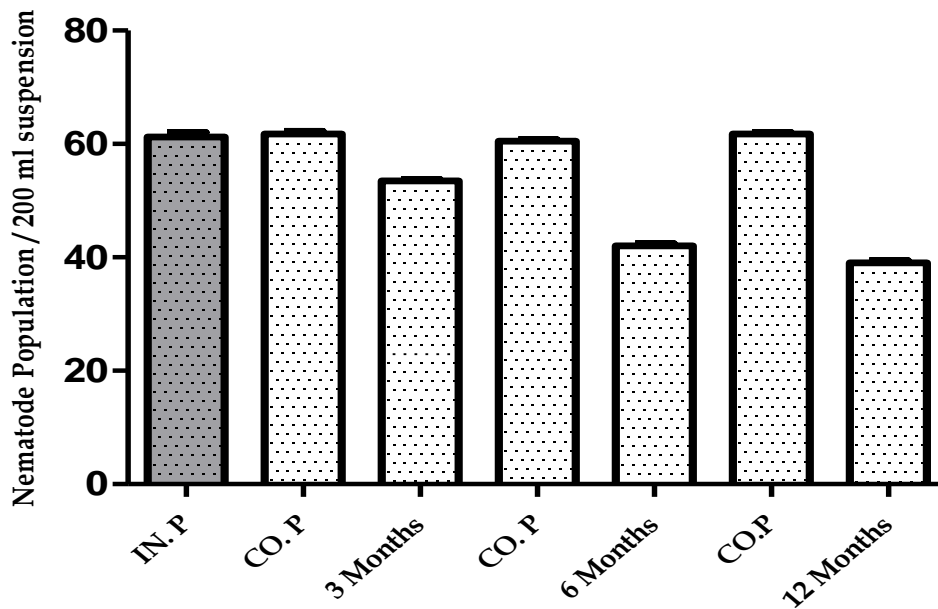


Fig.3. Showing sawdust (SD) effect on the population of parasitic nematodes is shown in histogram

Parasitic Phytonematodes were declined in number with the passage of time after the application of cow dung. Our results were same as discussed by Saeed *et al.*, 2022. It was also found effective in the control of phytonematodes associated with walnut in Abbottabad. Cow dung is organic in nature therefore its application for the management is also environment friendly as

well as beneficial for the plant health. Results after 3, 6 and 12 month clearly indicated that with the passage of time although parasitic phytonematodes were not totally eradicated but were decreased in population to a remarkable number. Cow dung also provides nutrition to the plant which is beneficial for the good health and yield of the plant.

Pigeon manure application also resulted in the decline of the phytonematodes associated with mulberry trees and it is clear after the quantitative analysis of the soil samples after 3, 6 and 12 months respectively. Our results were similar to the results of the research conducted by Saeed *et al.*, 2018. They also observed decline in the number of phytonematodes associated with walnut trees in Abbottabad after the application of pigeon manure at the recommended rate of 8kg/tree. Although study showed that pigeon manure is not that much effective as cow dung for the management of phytonematodes. Histogram bars also clearly indicated the decline in the population of parasitic phytonematodes associated with Mulberry with the passage of time. In this case as well phytonematodes were not completely eradicated but they were controlled and managed to certain limit. Management of phytonematodes have positive impact on the health and yield of the host plant which brings benefits to the farmers economically.

Saw dust results also manage the nematode population but not as effectively as cow dung and pigeon manure. Saw dust was applied at the recommended rate 10kg/tree but decline in nematode population was not up to the mark. In the study conducted by Saeed *et al.*, 2018, results of saw dust against nematodes show same results. Histogram bars and ANOVA results clearly indicate the study outcomes. Although saw dust is also eco friendly and good for plant health but not as effective against nematodes as other organic manures.

Cow dung was found most effective organic amendment in the management as compare to the pigeon manure and saw dust. Cow dung is easily available and most importantly it is freely available to the local farmers as cattle are also source of income in the studied area. By using cow dung, plant health and yield is also improved. In this way cow dung is also managed by the local farmers in a productive way.

CONCLUSION

It is concluded that for the management and extermination of parasitic nematode population which are harmful for the plants, the organic amendments i.e. cow dung, pigeon manure as well as sawdust can be applied to the soil. Cow dung is suitable as compared to pigeon manure and sawdust and all are non toxic and natural. By applying to soil these amendments augment the plant health, increase growth which in turn enhances the fruit yield production. Cow dung is easily available anytime at low of cost and is eco-friendly in nature. For the better yield and health of plants apply these amendments in a proper amount should be encouraged.

Conflict of interest

The authors declare no conflict of interest.

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