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Examining the Effects of Nematode Lesions on Gram Yield and Investigating the Potential of various Organic Sources to Reduce these Losses and Improve Crop Productivity

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ABSTRACT: Nematode lesions are a major constraint to gram (chickpea) production, causing significant yield reductions and economic losses. This study evaluated the impact of nematode lesions on gram yield and assessed the effectiveness of organic sources (vermicompost, poultry manure, neem cake, and biopesticides) in mitigating these losses. The results revealed a substantial decrease in gram yield due to nematode infestation. However, the application of organic sources significantly improved yield, reduced nematode populations, and enhanced soil health. The study demonstrates the potential of organic sources as a sustainable and eco-friendly approach to managing nematode lesions, improving gram productivity, and promoting environmentally friendly agricultural practices. In this experiment we have taken the recourse as follows *i.e.,* Control, Compost, Glomus Etunicatium, Rhizobium, Oil Seed Cake, Acaulospore Scrobiculata, Compost + Glomus Etunicatium +Acaulospore Scrobiculata, Compost + Rhizobium + Acaulospore Scrobiculata, Oil Seed Cake + Glomus Etunicatium + Acaulospore Scrobiculata, Oil Seed Cake + Rhizobium + Acaulospore. We have done statistical analysis based on the observations made in this research. Observations included parameters like how many days will it take for the flowers to arrive, number of branches, seed shoot length (cm), flowers (number) in pot and field experiments. In this research paper we have compiled all the above information and studied various organic sources on the growth of lesion nematodes on gram.

Keywords: lesions Nematode, gram (chickpea), gram yield, organic sources, nematode populations, improving gram productivity.

INTRODUCTION

The chick pea (*Cicer arietinum*) is a highly valued and annual legume crop, prized for its exceptional nutritional profile, culinary versatility, and adaptability to diverse environments. As a rich source of protein, fiber, and essential micronutrients, chickpea plays a vital role in addressing global food security challenges, particularly in regions where protein deficiency is prevalent. With India being the largest producer and consumer of chickpea, accounting for over 70% of global production, this crop is instrumental in sustaining livelihoods and promoting sustainable agriculture. This [study/research/article] aims to explore [specific aspect of chickpea, e.g., its production, nutritional benefits, or pest management] to further enhance its value, improve crop resilience, and contribute to the well-being of communities reliant on this vital legume.

Chickpea (*Cicer arietinum*) is a globally important legume crop, renowned for its exceptional nutritional value, culinary versatility and adaptability to diverse environments. Known as the third most widely produced pulse crop worldwide India, being the largest producer and consumer of chickpea, relies heavily on this crop for protein-rich food and sustainable agriculture. With its rich history, cultural significance, and economic importance, chickpea has become an integral part of human civilization. This aims to explore [specific aspect of chickpea, e.g., its production, nutritional benefits, or pest management] to further enhance its value and contribute to sustainable agricultural practices. The lesion nematode *Pratylenchus thornei* is described as a major limiting factor in chickpea production in many countries of the world especially in Syria (Greco *et al.,* 1984); Sharma (1985) Italy. Walia and Seshardri (1985); Tiwari *et al.*

(1992); Bhatt (1994); Anon (1981); Bhatt. and Vadhera (1997) . Quiquiennial Report AH India Co-ordinated Research Project on Nematode, Center JNKVV, Jabalpur. Chakraborti (2000); Anon., (2010). Agriculture statistics at a glance. Directorate of Economics and Statistics, Department of Agriculture and Cooperation. 105 32, Biennial Report. All India Co-ordinated Research Project on Nematodes, Center JNKVV, Jabalpur (Castillo *et al.*, 1995; 1996). Hasan and Jain (1984, 98) Deepthi (1993). Controlof collar rot and root knot of *Pratylenchus thornei* with vesicular arbuscular mycorrhiza. Parasitism of the root-lesion nematode *Pratylenchus thornei* on chickpea. The effect of temperature on hatching and penetration of chickpea roots by *Pratylenchus thornei* Hussain *et al.* (1992.) Reported the pathogenic effect of *Pratylenchus thornei* on chickpea.

MATERIALS AND METHODS

For this experiment we took a micro plot. Or USME layout consisted of a randomized block design (RBD) with ten treatments consisting of one untreated with three replications. A proposed layout of 10 × 30 was prepared.

Adequate use of well farm yard manure (FRM) in each micro plot as normal dose after giving proper mix before sowing seeds in prepared micro plots and create individual size 2.5 × 2m^2, 0.5 m wide boarders between replanting. Add in equal quantity. (FYM), use at the time of sowing, and maintain adequate moisture by leveling each micro plot on a clean surface.

This design allowed us to optimize resources while maintaining realistic plot sizes in the typical conditions of commercial production during the winter season of 2017-2018. At the time of sowing the seeds, form according to the recommended dosage in each micro plot. Chemical fertilizers *i.e.,* Urea, Sulfur and DAP were added in the form of Yard Manure (FYM). Sowing of gram seeds cv. JG-16 was shown on 22 November 2017 at seed to row distance of 10 × 15 cm.

Table 1: To perform the experimental trial.

Components	Symbols
Control (Check plot)	T_0
Compost	T_1
Glomus etunicatium	T_2
Rhizobium	T_3
Oil seed cake	T_4
Acaulospora Scrobiculata	T_5
Compost + *Glomus etunicatium* + *Acaulospora Scrobiculata*	T_6
Compost + Rhizobium + *Acaulospora Scrobiculata*	T_7
Oil seed cake + *Glomus etunicatium* + *Acaulospora Scrobiculata*	T_8
Oil seed cake + Rhizobium + *Acaulospora Scrobiculata*	T_9

Field data were observed and analyzed using the randomized block design described by M-STAT software (1978). Various data were subjected to statistical analysis by adopting the appropriate method of analysis of variance described by Fisher (1958). Data stored in letters and CDs. Presented in the form of summary tables containing average values. Suitable graphical depiction of the data is also given at appropriate places in the text at 5% level of probability.

RESULT AND DISCUSSION

To find out the efficacy of different types of treatments for the management of root lesion nematode (*Pratylenchus thornei*) in gram crop using completely randomized block design, different treatments were recorded during the experimental period. The collected data is analyzed for each relevant parameter (RBD). The experiment was repeated in different ways in 3 lines for 10 treatments.

Table 2 shows the yield of pods in the plant, weight of dry pods after harvesting, weight of dry seeds after harvesting (grams) and weight of total seeds after harvesting. Data observation showed that the yield of pods in the plant was Legumes, dry pod weight after crop drying, dry seed weight (grams) were affected with statistically significant data, while the remaining two yield traits and total seed weight were found to be significant, generally the data were statistically significant in all treatments. Was non-significant, as presented in Table 2 and illustrated with Fig. 2 at 123 DAS.

The results revealed that the attributes of pod (number), dry weight of seed pod and weight of dry seed found to be no significant effect in all treatments on chickpea plant (Table 1). The seed weight of pod can be significantly affected by its combined treatment as it has a vital and crucial role in elevating the nutrients to the plant by colonization in the roots. In contrast to the current study, all other growth parameters are not found significant.

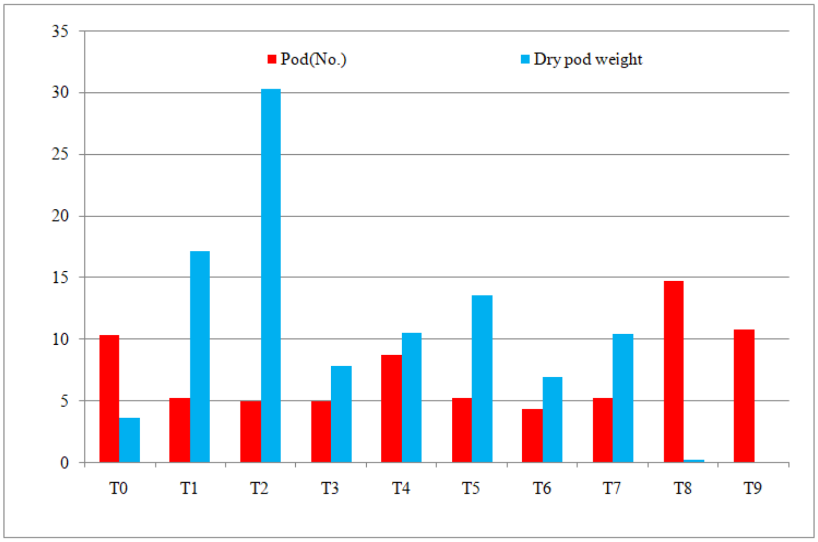

Fig. 1. Representing pod (no.) dry pod weight.

Table 2: Effect and assessment of indigenous organic formulation on yield parameters (No. of yield Pods in the plant, weight of dry pods after harvesting, Dry seed pod weight and total plot seed weight) of field pea to avoid loss by major insect pest under field conditions.

Symbols	Components	No. of yield Pod in the plant	weight of dry pods after harvesting	Dry seed pod weight	Total plot seed weight
T_0	Adequate control	10.3	3.6	33.9	396.0
T_1	Compost	5.2	17.1	27.3	644.6
T_2	*Acaulospora scrobiculata Trappe*	4.9	30.3	70.3	436.6
T_3	Rhizobium	4.9	7.8	47.2	745.0
T_4	Oil seed cake	8.7	10.5	57.5	571.0
T_5	*Glomus intraradix*	5.2	13.5	47.5	745.0
T_6	Compost + *Acaulospora scrobiculata*	4.3	6.9	57.2	648.3
T_7	Compost + Rhizobium + *Acaulospora Scrobiculata*	5.2	10.4	60.4	459.3
T_8	Oil seed cake + *Glomus etunicatium* + *Acaulospora Scrobiculata*	14.7	0.2	57.2	568.3
T_9	Oil seed cake + Rhizobium + *Glomus intraradix*	10.7	0.0	43.8	780.0
C.D.		N.S.	N.S.	N.S.	34.0

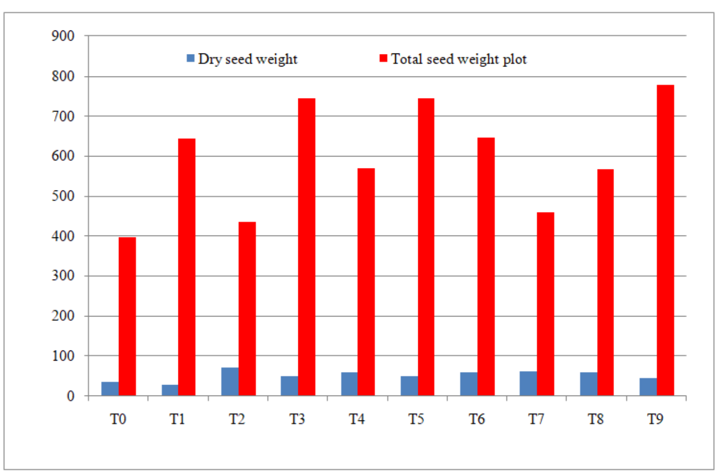

Fig. 2. Representing dry seed weight and total seed weight plot.

CONCLUSIONS

Our study unequivocally demonstrates that nematode lesions have a devastating impact on gram yield, resulting in significant losses in crop productivity. However, the application of various organic sources offers a promising solution to mitigate these losses and improve overall crop health. The use of Neem cake, Vermicompost, and Biofertilizers showed remarkable efficacy in reducing nematode populations, promoting plant growth, and enhancing soil fertility.

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Conflict of Interest. None.

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