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Original Research Paper

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EVALUATION OF PETROLEUM ETHER EXTRACTS OF SOME MEDICINAL PLANTS AGAINST ROOT KNOT NEMATODE ON SOYBEAN.

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ABSTRACT The petroleum ether extracts of some medicinal plants ***Tectona grandis, Mussendra globra, Xylosoma longifolia, Ocimum sanctum and Melia azedarach*** were tested as seed soaking on soyabean for pot experiment. The seeds were soaked in 100 ppm concentration for 24 hours and dry in sun light and seedling was done in sterilized soil. After proper inoculation of J_2 of root knot nematode ***Meloidogyne incognita,*** different observation were taken after 75 days of inoculation and found that plants treated with petroleum ether extracts of ***M. azedarach*** were shown much improvement in plant growth rate and reduction in disease incidence when compared with other treated plants. Petroleum ether extracts of ***Tectona grandis*** was found least effective when compared with untreated but inoculated one.

KEYWORDS : Infestation, Meloidogyne incognita, Tectona grandis, Mussendra globra, Xylosoma longifolia, Ocimum sanctum and Melia azedarach

INTRODUCTION

Root knot nematodes are important and cosmopolitan group of pest on different crops throughout the country. The first record of injury of root knot nematode to tea plant was given by Barber, 1901. The sites for infestation and disease incidence for this pest occur in root system and spend most of their lives in roots or soils. The objective of nematode control was to improve plant growth and yield. Use of essential oils obtain from locally growing plants for nematode control is the effective method under native condition due to prohibitive cost of nematicides (Joymati, 2010). Thus the present investigation was taken up to evaluate the effect of petroleum ether extracts from different medicinal plants against root knot nematode on soybean.

MATERIALS AND METHOD

Plant extract preparation: Healthy leaves of ***T. grandis, M. globra, X. longifolia, O. sanctum and M. azedarach*** were collected. The collected plant parts were washed with water and the clean plant parts were oven dry at 58 ± 2°C for 48 hours. The dry materials were made into powder with the help of a clean grinder. For extraction of oil 20gm dry weight each plant products were taken and the alcoholic extract was done with the help of Clevenger apparatus (Carvatho et.al. 1981). The solvent was distilled off and the contained was transfer into a separate beaker. The solvent was completely evaporated from the extract in oven till it become a semi solid materials. A stock solution of 1000 ppm was prepared in distilled water with 1% of Triton X100 as emulsifier. The seed of soybean (***Glycine max***) were soaked in stock solution of different oil extract mention above for 24 hours. Then the seed were spread and allow to dry under sun light before sowing. The seed soaking in distilled water was served as control. Five seeds from each treatment were sown in 15 cm clay pot congaing 1 Kg auto claved. Two weeks old seedling plants were thinned to one plant pot. Three weeks old treatment plants were inoculated with freshly hatched 1000 second stage juveniles (J_2) of ***M. incognita***. The control set was also inoculated. All the sets were replicated five times. Seventy five days after inoculation of nematodes the plants were taken out carefully, their roots were washed with water and the plants growth parameters (shoot and root length and number of leaves) were recorded. Number of galls root knot index (0.5 scale) and final nematode population (both in soil and root) were also counted.

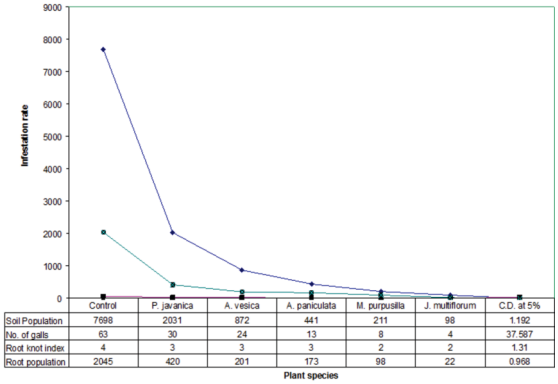
Table 1: Effect of Petroleum ether extracts of some medicinal plants showing plant growth parameters against ***M. incognita*** infecting Soybean

Plant species	Root length (cm)	Shoot length (cm)	Fresh shoot wt.(g)	Fresh root wt.(g)	Dry shoot wt.(g)	Dry root wt.(g)	No. of leaves
Control	6.5	42	6	1.5	0.72	0.16	16
T. grandis	8	50	8	1.1	2.1	0.37	27
M. globra	12	53	10	1.8	2.44	0.80	28
X. longifolia	16	57	18	2.8	3.95	0.92	39
O. sanctum	17	59	19.5	3.2	4.1	1.10	41
M. azedarach	18	61	21.4	4.1	4.8	1.96	43
C.D. at 5%	8.460	12.138	11.465	2.006	2.671	1.103	18.205

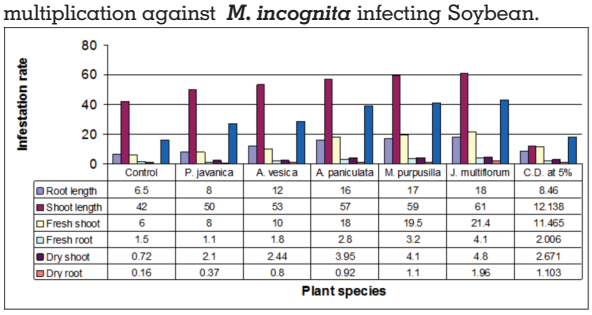
Table 2: Effect of petroleum ether extracts of some medicinal plants of nematode multiplication against ***M. incognita*** infecting Soybean.

Plant species	Soil population	No. of galls	Root knot index	Root popula-tion	Total popula-tion	Rf
Control	7698	63	4	2045	9743	9.74
T. grandis	2031	30	3	420	2451	2.45
M. globra	872	24	3	201	1073	1.07
X. longifolia	441	13	3	173	714	.71
O. sanctum	211	8	2	98	3.9	.31
M. azedarach	98	4	2	22	120	.12
C.D. at 5%	1.192	37.587	1.310	0.968	2.082	6.420

Graph 1: Showing effect of plant products on growth parameters of Soybean against *M. incognita*



Graph 2: Showing effect of plant products on nematode multiplication against ***M. incognita*** infecting Soybean.



RESULT AND DISCUSSION:

Table 1 & 2 shows effect of petroleum ether extracts of some medicinal plants viz ***T. grandis, M. globra, X. longifolia, O. sanctum and M. azedarach***. Treatment of seeds by soaking in different petroleum ether extracts not only reduced the damage from root knot infestation but also improved plant growth parameters. Petroleum ether extracts of ***M. azedarach*** shown maximum root length (20cm), shoot length (64cm) fresh shoot wt. (23.5cm), fresh root weight (5.3 g) and number of leaves was 50, the petroleum ether extracts of ***T. grandis*** was least effecting among 5 tested plants having root length 7 cm, shoot length 48 cm, fresh shoot 9.5 g and root weight 0.9 g whereas in untreated plant it was only 7.3 cm in root length 45 cm in shoot length 7 g in fresh shoot weight and 1.8 g in fresh root weight, In disease incidence also, there was much reduction in infestation rate in ***M. azedarach*** oil extracts treated plants have only 3 galls and total population only 112, 7.9 times reduction from initial inoculums level whereas in untreated one it was 65 galls with nematode population 10215 having 10 times increased in population level. ***M. azedarach*** oil extracts although least effective but more reduction in nematode infestation rate than untreated one having 35 galls and 3024 nematode population i.e. 3 times larger than initial population. From the above observation it can be suggested that treated plants have law infestation rate and improved in overall plants growth parameters.

According to Chopra et al (1956) all the test plants contain alkaloid principles and several compounds which act as inhibitory substances to the nematodes. Bitter glucid in ***T. grandis***, plumeric acid in ***M. globra*** salycyclic acid in ***X. longifolia***, bitter resin, saccharine and margosine in ***M. azedarach***, nyctanthin and alkaloid in ***O. sanctum*** .

The present investigation is in an adjustable conformity with the results of Gokte et al (1991) who reported seven different oil extracts against root knot and cyst nematode and expressed their view in oil extracts of Indian basil and sacred basil to be most effective among other extracts.

The present findings supported works of Papadoulou et.al. 2016, Mendoza et.al. 2008, Nyaku et.al. 2017, Ozdemir and Gozel 2017 and Taye and Sakhuza 2013. These results are also in agreement with Ononuju & Okoye (2003) with ***Tectona grandis, Mussendra globra, Xylosoma longifolia, Ocimum sanctum and Melia azedarach***. Ononuju & Kalu (2004) made similar observations with ***Vernonia armygdaina and Rauwolfia vomitoria on Meloidogyne*** spp. Joymati (2009) also reported about the effect of chloroform methanol abstracts of different medicinal plants on egg hatching and larval mortality of ***M. incognita*** which support this result.

The significant increase in the plant growth parameters and seed weight recorded in treated plants when compare with untreated one, could be attributed in the reduction of root knot infestation by the essential oil extracts of the test plant.

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REFERENCE:

1. Barber,C.A. (1901), A tea eelworm disease in south India. ***Department of land Records & Agriculture Madras Agril Br. 2.*** Bull:45.
2. Carvatho, J.M.F.C.: Ferraz, S.; Cardosa,A.A. and Dhingra, O.D.(1981). Treatment of ***Phaseolus vulgaris*** seeds with examyl dissolved in acetone or ethanol for the control of phytonematodes. ***Revista Ceris***. 28: 580-587.
3. Chopra, R.N., Nayar, S.L. and Chopra, I.C. (1956) Glossary of Indian Medicinal plants. C.S.I.R. New Delhi. 330 pp.
4. Gokte, N; Maheshwari, M.L. and Mathur, U.K (1991). Activity of few essential oils against root knot and cyst nematode species. ***Indian J. Nematol.21(2):*** 123-127
5. **Joymati, L.** (2009). Effect of Chloroform methanol extracts of different medicinal plants on egg hatching and larval mortality of *M. incognita*. ***Annals. Pl. protect. Sci. 17(2)***: 434-436 (September 2009)
6. **Joymati, L.** (2010). Evaluation of Chloroform methanol extracts of medicinal plants on egg hatching and larval mortality of *M. incognita* ***Indian J. Nematol.40(1):*** 103-106 (June 2010)
7. Mendoza, A.R., Kiewnick,S; Sikora, R.A. 2008. In vitro activity of Bacillus firmus against the burrowing nematode Radopholus similis, the root knot nematode M. incognita and the stem nematode Ditylenchus dipasci, Biocontrol Sci. Technol, 18, 377-389.
8. Nyaku, S.T.; Affokpon, A. Danquah, A., Brentu, F.C/ Harnesing 2017. Useful Rhizosphere micro organism for nematode control. Nematology concept Dignosis & control, Intech open, 8,153-182.
9. Ononuju,C.C.& Okoye, C.D.(2003). Nematotoxic activity of some common weed extracts against root-knot nematode in soybean. ***African Journal of Applied Zoology and Environmental Biology*** 5: 64-66
10. Ononuju,C.C.& Kalu, U.A. (2004). Preliminary assessment of some plant extracts as inhibitors of egg-hatch in ***Meloidogyne*** spp. B. Agric., Report Department of Crop Protection. MOUAU, Abia State, Nigeria.
11. Ozdemir, E., Gozel, U (2017). Efficiency of some plant essential oils on root knot nematode M. incognita. Jounal of Agricultural Science & Tchnology A. 7(3), 178-183.
12. Papadopoulou, E.S Logos, S; Spntza, F; Vidiadakis, E; Karas, P.A.; Klitsinaris, T; Karpouzas, D.G. (2016). Th dissipation of fipronil, chlorphyrifos, fosthiazate and ethoproprophos in soils from potato monoculture areas. First vidence for the enhanced biodegradation of Fosthiazate. Pest Manag Sci. 721040-1050.
13. Taye, W., Sakhuja, P.K. (2013). Root knot nematode (M.incognita) management using botanicals in tomato (ycopersicon esculentum). Academia journal of Agricultural Research 1,9-16.