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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 soybean 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.

Key words: 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 vegetables was reported by Barber in 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. Used 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. The results of the present study are reported in this communication.

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 ± 2^0 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 Petroleum ether 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 slaved. 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 scales) and final nematode population (both in soil and root) were also counted.

Result and Discussion

Table 1 & 2 shows the 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. (23.5g), fresh root weight (5.3 g) and number of leaves (50). The petroleum ether extracts of *T. grandis* was found to be least effected among the 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 the case of the incidence of diseases, there were much reduction in infestation rate in *M. azedarach* oil extracts treated plants by recording 3 galls and total population of only 112 indicating 7.9 times reduction from initial inoculums level whereas in the case of untreated one, 65 galls with 10215 nematode population were recorded indicating 10 times increased in population level. Although *M. azedarach* oil extracts was found to be least effective, there were more reduction in nematode infestation rate than untreated one by having 35 galls and 3024 nematode population thus revealing 3 times larger than initial population. From the above observations, it can be concluded that treated plants have low infestation rate and improvement in overall parameters for plants growth.

According to Chopra et al. 1956, all the test plants contain alkaloid and several compounds which act as inhibitory substances to the nematodes such as 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.*

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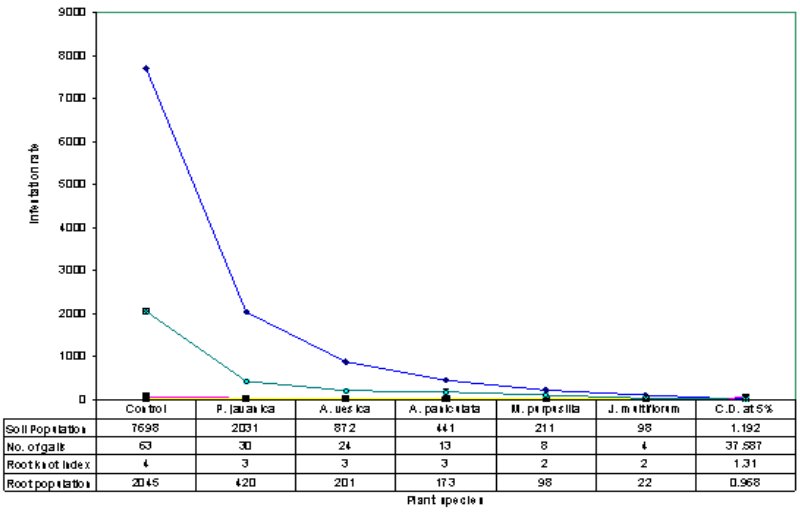
Table 1: Effect of Petroleum ether extracts of some medicinal plants showing plant growth parameters against *M. incognita* infecting Soybean

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

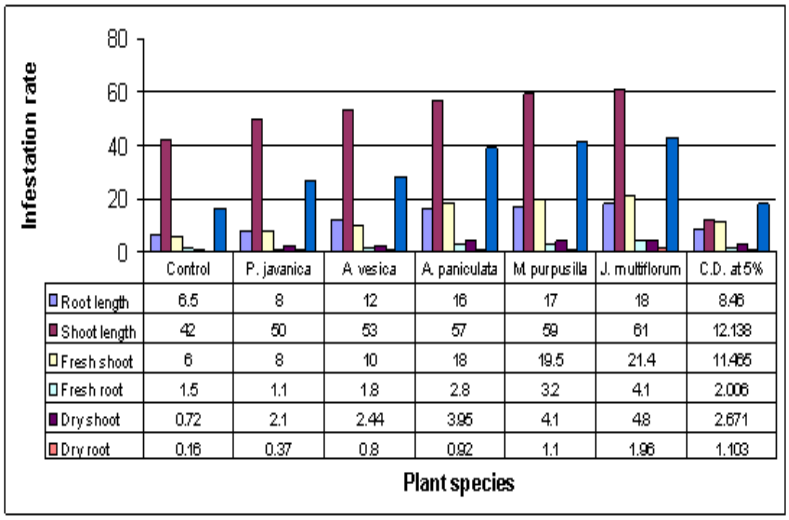
Table 2: Effect of petroleum ether extracts of some medicinal plants on nematode multiplication against *M. incognita* infecting Soybean

Plant species	Soil population	No. of galls	Root knot index	Root population	Total population	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	0.71
O. sanctum	211	8	2	98	3.9	0.31
M. azedarach	98	4	2	22	120	0.12
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



	Control	P. javanica	A. vesica	A. paniculata	M. purpusilla	J. multiflorum	C.D. at 5%
Root length	6.5	8	12	16	17	18	8.46
Shoot length	42	50	53	57	59	61	12.138
Fresh shoot	6	8	10	18	19.5	21.4	11.465
Fresh root	1.5	1.1	1.8	2.8	3.2	4.1	2.006
Dry shoot	0.72	2.1	2.44	3.95	4.1	4.8	2.671
Dry root	0.16	0.37	0.8	0.92	1.1	1.96	1.103

The present investigations is in conformity with those reported by Gokte et al. 1991, who studied 7 different oil extracts against root knot and cyst nematode and suggested the effectiveness of the oil extracts of Indian basil and sacred basil than the other extracts.
These results are also in agreement with those reported by Ononuju and Okoye, 2003, who studied with *Tectona grandis, Mussendra globra, Xylosoma longifolia, Ocimum sanctum* and *Melia azedarach*. Ononuju and Kalu in 2004, reported similar observations with *Vernonia armygdaina* and *Rauwolfia vomitoria* on *Meloidogyne* spp. It has also been reported that the chloroform methanol abstracts of different medicinal plants was found to be effective on egg hatching and larval mortality of *M. incognita* (Joymati, 2009) thus supporting the results of the present investigations.

Thus, the significant increase in the plant growth parameters and seed weight recorded in treated plants as compared to the untreated one could be attributed to the beneficial effect of essential oil extracts which help in the reduction of root knot infestation of the test plant.

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