European Journal of Applied Sciences 5 (3): 80-83, 2013
ISSN 2079-2077

DOI: 10.5829/idosi.ejas.2013.5.3.7650

Nematicidal Activities of Leaf Extract of Magilam, *Mimusopselengi* against the Egg Hatchability and Larval Mortality of Root Knot Nematode *Meloidogyne incognita*

C. Azhagumurugan and M.K. Rajan

Post-Raduate and Research Department of Zoology,
AyyaNadarJanakiAmmal College (Autonomous), Sivakasi-626 124, India

Abstract: The present study was undertaken to identify the new actives from plant origin for their nematicidal activities to determine the egg hatchability and larval mortality of root knot nematode *Meloidogyne incognita*. The leaves of *Mimusopselengi*were studied for their egg hatchability and larval mortality invarious concentrations. The nematicidal activity of *M.elengi*leaves,decrease in larval hatch as the concentration of the extracts increases andthe increase in number of juveniles hatched, as concentration decrease may be due to decrease in the concentration of the active principles. Hence, they evaluated the nematicidal potential of plant species against *M. incognita*. They reported a reduction in hatching and an increase in nematode mortality. The increase in exposure period also increase larvae hatch as concentrations of the treatments decreases in treatments with aqueous leaf extracts of plant species *M. elengi*.

Key words:*Meloidogyne incognita* · *Mimusopselengi* · Nematicidal potential · Nematicidal activity · Egg hatchability and larval mortality

INTRODUCTION

Medicinal plants have a long-standing history in many indigenous communities and continue to provide useful tools for treating various diseases [1]. The practices of traditional medicine are based on hundreds of years of belief and observations, which predate the development and spread of modern medicine. *Mimusopselengi* Linn (Sapotaceae) commonly known as Bakul, is a small to large evergreen tree. It is cultivated in gardens as an ornamental tree *Mimusopselengi*possess several medicinal properties such as Anti-anxiety, Antihyperlipidemic, Antiulcer Anticonvulsant, Anti-inflammatory, analgesic, antipyretic, Antioxidant, Cytotoxic, Antidiabetic, Diuretic and Hypotensive activities of plant *Mimusopselengi* [2].

M. elengiis well documented for several medicinal properties like antinociceptive, diuretic effects, gastroprotective, antibacterial, antifungal, anticariogenic, free radical scavenging, antihyperglycemicetc [3]. And due to this since several decades it is being focused for its chemical composition. Chopara and Kapoor reported in preliminary chemical investigation about the presence of saponins in M.elengi. The ethanolic extract of the leaves yielded quercitol (1.7%), hentriacontane, β-carotene and glucose. D-mannitol, β-sitosterol, β-sitosterol-β-D-glucoside and quercetin were recovered from leaves [4].

Nematodes are found in a wide variety of habitats, freeliving nematodes live in the soil and in freshwater and marine sands and muds. In soil, they are important components of nutrient turnover. Other nematodes are parasites of almost every species of animal, including humans and plant and cause enormous social and economic damage. Phytoparasitic nematodes parasitize plants to seek suitable food. This food source is basically plant cell contents. Thus a plant response to parasitism is the reaction to cellular feeding of the nematode [5]. Most phytoparasitic nematodes infect plant roots and some species have evolved sophisticated interactive relationships with host cells to sustain a sedentary parasitic habit [6]. Plants carry a wide range of micro organisms in their phyllosphere and rhizosphere which not only cause large variety of diseases but also control of pathogens [7]. Nematodes have an important niche in agro-ecosystem, causing reduction in plant productivity

Corresponding Author: Azhagu Murugan, Department of Zoology, Ayya Nadar Janaki Ammal College (Autonomous), Sivakasi-626 124, India.

and growth. Especially Root-knot nematodes (*Meloidogyne*spp.) are very common and the most important nematode species of greenhouse-growing plants.Indiscriminate use of chemical pesticides causes great harm to human being,animal, vegetation and to environment as a whole due to their non-target effect,hazardous nature besides they are expensive. So with the increasing awareness ofpossible deleterious effects of the chemicals, biological controls of plants pathogenhave received considerable attention [8]. Hence, the present investigation the nematicidal activity of leaf extract of *M. elengi* against the root knot nematode *M. incognita*.

MATERIALS AND METHODS

The leaves of the plant, *M. elengi* are collectedfrom Ayyanadarjanakiammal college campus in sivakasi, the leaves of the plants were removed andstored. The collected leaveswere shade dried and powder with the help of grinder. The powder was extracted by Soxhlet apparatus with 200 mL of acetone as a solvent. The extracted material was then dissolved in acetone (1:10) w/v to prepare stock solution. Different concentrations of plant extracts (5 to 25 ppm) were prepared from the stock solution using distilled water. For obtaining of egg masses and larvae pure culture of *M. incognita*maintained on tomato plants in sterilized soil. Effect on hatching was evaluated on five mature uniform size egg masses of *M. incognita* were suspended in the extracts and water (control), replicated three times in cavity blocks. The blocks were kept at room temperature. The total number of larvae hatched was recorded at 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44 and 48 hours intervals. Hatched larvae were counted under the inverted compound microscope. For effect of nemic mortality 30 freshly hatched J2 of *M. incognita* were placed in each dilutions and control, replicated three times in cavity blocks. The blocks were kept at room temperature. Mortality of larvae wascalculated as a percent of total larvae suspended and LC50and LC90 values were determined by using probit analysis [9].

RESULT AND DISCUSSION

Hatchability: The nematicidaleffects of leaf extract of *M. elengi*are shown in table 1. The results show that larval hatch commence within four hoursof exposure to water extracts of the Leaf and distilled water (Control). The results show a decrease in larval hatch as the concentration of the extracts increases. The increase in exposure period also increase larvae hatch as concentrations of the treatments decreases. The higher larvae hatch was recorded at the control than concentrations of plants extracts. However, morelarvae were observed with decrease in the concentration of the extracts especially from six hours of exposure. Inall treatments there was a progressive increase in larval hatch as the concentrations of extracts reduced. Abdalla *et al*., [10] reported that methanol and hexane extracts of the 27 samples were screened for nematicidal activity against second stage juveniles of *M. incognita* in the laboratory. The juveniles were exposed to 500 ppm of each plant extract for 24, 48 and 72 hrs. Five plant extracts exhibited highly promising mortality rates of 95-99% after 72 hrs of exposure ($P<0.05$). The present study revealed that plant extract *M. elengi* was found to be most effective in reducing egg hatching. Plant extracts of basil, marigold, pyrethrum, neem and china berry proved to be effective against *M. incognita* [11].

Table 1: Effect of different concentrations of leaf extracts on egg hatchability in the root knot nematode *Meloidogyne incognita*

Exposure Time (Hours)	Egg hatchability at different concentrations (ppm) of Magilam, *Mimusopselengi*						
	Control	5 ppm	10 ppm	15 ppm	20 ppm	25 ppm	Total
4	2	2	1	2	1	0	8
8	2	1	1	2	3	0	9
12	4	2	3	1	1	0	11
16	4	4	3	2	1	0	14
20	8	4	1	2	1	0	16
24	7	5	3	3	2	0	20
28	9	6	4	5	2	0	26
32	3	5	2	1	0	0	11
36	4	2	3	1	1	0	11
40	2	1	2	1	1	0	7
44	3	1	1	1	0	0	6
48	2	1	1	1	0	0	5

Table 2: Effect of different concentrations of leaf extracts on larval mortality in the root knot nematode *Meloidogyne incognita*

Exposure Time (Hours)	Larval mortality (%) at different concentrations (ppm) of Magilam, *Mimusopselengi*					
	Control	5 ppm	10 ppm	15 ppm	20 ppm	25 ppm
12	0	5.34	6.67	17.0	18.0	22.0
24	0	7.34	7.34	11.67	19.34	24.0
48	0	12.0	10.0	15.67	21.67	26.34

Table 3: Toxic effect of leaf extracts *Mimusopselengi* againstthe root knot nematode*Meloidogyne incognita*

Plant	Hours	LC50	LC90	Slope ± SE	Chi square (X^2)	Spontaneous response rate
Mimusopselengi	24	152.13	304.26	3.20 ± 0.49	0.87	0.00
	48	174.15	348.30	2.01 ± 0.50	0.76	0.00
	72	101.22	202.44	2.21 ± 0.61	1.67	0.05 ± 0.31

Mortality: Mimusopselengiexhibited more mortality (70-80%) after 48 hrs exposure (Table 2). Egg inhibition and larval mortality decreased with increase in dilution of all the extracts. Juvenile mortality increased corresponding to an increased time of exposure. The potential of using plant extracts in controlling plant parasitic nematodes [12]. The increase in number of juveniles hatched, as concentration decrease may be due to decrease in the concentration of the active principles. Similar observations were made byPadhi, Gunanidhe and Behera [13], when they evaluated the nematicidal potential of ten indigenous plant species against *M. incognita*. They reported a reduction in hatching and an increase in nematode mortality in treatments with aqueous leaf extracts of seven plant species. Cuadra *et al*. [14], evaluated the nematicidal properties of the by-products from pyroligneous acid, neem (*Azadirachtaindica*), Chinaberry (*Meliaazaderach*) and *Spirobolusmarginatus* and of the colloid compounds of inorganic salts. The greatest percentage of mortality was obtained with neem ceil, secretions of *S.marginatus* and the inorganic compound S-1. The nematicidal effect of the tested extract of *M.elengi* may possibly be attributed to higher contents of certain oxygenated compounds which are characterized by their lipophilic properties that enable them to dissolve the cytoplasmic membranes of nematode cells and their functional groups interfering with enzyme protein structure [15].

CONCLUSIONS

Our study provides valuable data onmedicinal plants provide a wide support for nematicidal activity and can be used as a possible basis in agriculture as pesticide. Inclusion of plant botanicals into soil alone or with biocontrol agents has been recommended as a substitute, safe and effective control method for management of plant parasitic nematodes. There is need for further work to elucidate the specific active substances for onward transfer topeasant farmers to manage nematodes on their arable lands to increase crop yield.

REFERENCES

1. Jeyaprakash, K., M Ayyanar, K.N. Geetha and T. Sekar, 2011.Constituents of leaves, hard wood and root of *Mimusopselengi*. Asian Pacific Journal of Tropical Biomedicine, pp: 20-25.
2. Kadam, P.V., N.Y. Kavita, S.D. Ramesh, S.S. Rakesh and M.J. Patil, 2012. *Mimusopselengi*: A Review on Ethnobotany, Phytochemical and Pharmacological Profile. Journal of Pharmacognosy and Phytochemistry, 1: 71-78.
3. Gami, B., 2007. Evaluation of pharmacognostic and antihemorrhoidal properties of Mimusopselengi Linn. Ph.D. Thesis. Veer Narmad South Gujarat University,Gujarat, pp: 64-72.
4. Manjeshwar, S.B., J.P. Ramakrishna, P.B. Harshith, L.P. Princy and B. Rekha, 2011. Chemistry and medicinal properties of the Bakul (*Mimusopselengi Linn*): A review. Food Res. Int., 44: 1823-1829.
5. Ahmad, S., M. Akhter, Z.M. Mehjabeen and S. Ahmed, 2010. Antifungal and nematicidal activity of selected legumes of Pakistan. Pakistan. J. Bot., 42: 1327-1331.
6. Davis, E.L., R.S. Hussey and T.J. Baum, 2004. Getting to the roots of parasitism by nematodes, Trends in Parasitology, 20: 134-142.
7. Elekcioglu, I.H., B. Ohnesorge, G. Lung and N. Uygun, 1994. Plant parasitic nematodes in the Mediterranean Region of Turkey. Nematol. Medit., 22: 59-63.
8. Garima, G., A. Singh and P.C. Trivedi, 2005. Bacteria: A Potential bioagent against Root-knot nematode, *Meloidogyne incognita*. National Symposium on Recent Advances and Research Priorities in Indian Nematology, 9-10th December 2005, IARI, New Delhi, pp: 14-20.

9. Finney, J.C., 1971. Probit analysis, Cambridge University Press, London, pp: 33-37.
10. Abdalla, E.M., L.D. Woon, P.J. Chan, Y.H. Bin and C.H. Yul, 2008. Evaluation of various plant extracts for their nematicidal efficacies against juveniles of *Meloidogyneincognita*. J. Asia-Pasific Entomology, 11: 99-102.
11. Susan, A.H. and E.M.A. Noweer, 2005. Management of root knot nematode *Meloidogyne incognita* on egg plant with some plant extracts. Egyption Journal of Phytopathology, 33: 393-397.
12. Abbasi, W.M., N. Ahmed, J.M. Zaki and S.S. Shaukat, 2008. Effect of *Barleriaacanthoides* Vahl. on root-knot nematode infection and growth of infected okra and brinjal plants. Pakistan. J. Bot., 40: 2193-2198.
13. Padhi, N.N., B. Gunanidhe and G. Behera, 2000. Evaluation of nematicidal potential in ten indigenous plant species against *M. incorgnita*. India Phytopathology, 53: 28-31.
14. Cuadra, R., X. Cruz, E. Perera, E. Martin and A. Diaz, 2000. Some Natural Compound with Nematicidal effect. *Revista-de-Proteccion-Vegetal*, 15(1): 31-37.
15. Knoblock, K., K. Weis and R. Wergent, 1989. Mechanism of antimicrobial activity of essential oils. Proceedings of 37th Annual Congress Medicine Plant Research (ACMPR'89), Braunisweig, pp: 5-9.