International Journal of Plant Pathology and Microbiology

E-ISSN: 2789-3073
P-ISSN: 2789-3065
IJPPM 2023; 3(1): 45-48
Received: 10-03-2023
Accepted: 15-04-2023

Sweta Kumari
Research Scholar, BRA Bihar University, Muzaffarpur, Bihar, India

Dr. Shivanand Singh
H.O.D., University, Department of Zoology, BRABU, Muzaffarpur, Bihar, India

Correspondence
Sweta Kumari
Research Scholar, BRA Bihar University, Muzaffarpur, Bihar, India

Control of citrus nematode (*Tylenchulus semipenetrans*) by some plant species

Sweta Kumari and Dr. Shivanand Singh

Abstract
The effect of *Datura stramonium*, *Nerium oleander*, Rosemary, *Brassica campestris* species on severity of *Tylenchulus semipenetrans* on citrus rootstocks (*Citrus sinensis, C. reticulate* grafted on *Citrus aurantium* and *C. sinensis* grafted on *C. aurantium*) investigated in greenhouse and laboratory conditions. All plant species reduced the larval population of *T. Semipenetrans* and their effect increase as the period increase. *Datura stramonium* intercropped with citrus reticulate grafted on *C. Auratium* 13.5 and 11% respectively. While *D. stramonium* gave the highest percentage of reduction when intercropped with *C. sinensis* grafted on *C. aurantium*. Root extracts of *D. stramonium* gave the highest effect on juvenile mobility of citrus nematode at 5% dilution after 48hrs with only 50% mobility followed by 71.7%, 95.4%, 52.4% respectively. Leaf extracts of *D. strantonium* at 5% concentration, for 48h exposure showed the highest toxicity for nematode larvae mobility 45.3% followed by 60%, 63.1%, 78.7% for *N. oleander*, Rosemary and *Brassica campestris* respectively.

Keywords: Biological control, Root extracts, *Tylenchulus semipenenetrans*, citrus nematode, Dilution, Leaf extracts

Introduction
Citrus nematode *Tylenchulus Semipenetrans* is one of the most important root nematodes of plant trees that have worldwide distribution and cause reduction of crop production and vegetative growth. It is causing immense damage and serious disease known as slow decline to citrus trees.

Affected trees exhibit reduced vigor, chlorosis, leaf drop is more pronounced producing exposed branch terminals, poor root development, dirty appearance of infested roots, faster decay of feeder roots, root death due to heavy infestation, early wilting during water stress. Eighty species and varieties of the genes citrus were found to be susceptible to citrus nematode Banies *et al*. (1948) [1]. Taking into account of the worldwide distribution of citrus nematode, it is necessary to find out the most effective and feasible measure. The use of chemical for nematode control on large scale is an expensive and impactable operation. This situation demands the search for cheaper alternative control measure which can be made available to small growers. There are reports that Datura plant parts and extracts possess nematocidal properties Bhatti (1983) [14], Awan *et al*. (1992) [8]. Application of the plant parts or extracts to nematode infested soil affects nematode directly and stimulates soil microbes that reduce nematode populations Reddy *et al*. (1996) [15], Ahmed *et al*. (2004) [12]. In the context, the use of plant extracts with nematicides property is effective, cheaper, healthier and safer control measure than nematicides.

Therefore, this work was designed to study the effect of some plant species on citrus nematode disease severity under greenhouse and laboratory condition aqueous leaf and root extracts s and nematode population.

Materials and Methods
Laboratory experiment: Aqueous leaf and root extracts of the *Datura stramonium* prepared by grinding 50 grams of plant leaves or roots with 50 ml distilled water using a warring blender. Dilution of 1 and 5% prepared from each strand. Five milliliters of solution and 100 second stage juveniles of *T. Semipenetrans* placed in 5 cm petri dishes. Water served as a control, and each treatment replicated 5 times. Separate sets of petri dishes maintained for each period of observation (12, 24, 48 hrs.). Percentage of mobility assessed and confirmed by touching the juvenile with fine needle.

According to the findings of a study, among male psychiatric population, the absolute risk of suicide was highest for bipolar disorder, followed by unipolar affective disorder and schizophrenia. Among female psychiatric population, as well, the highest risk was found among women with schizophrenia, followed by bipolar disorder [2].

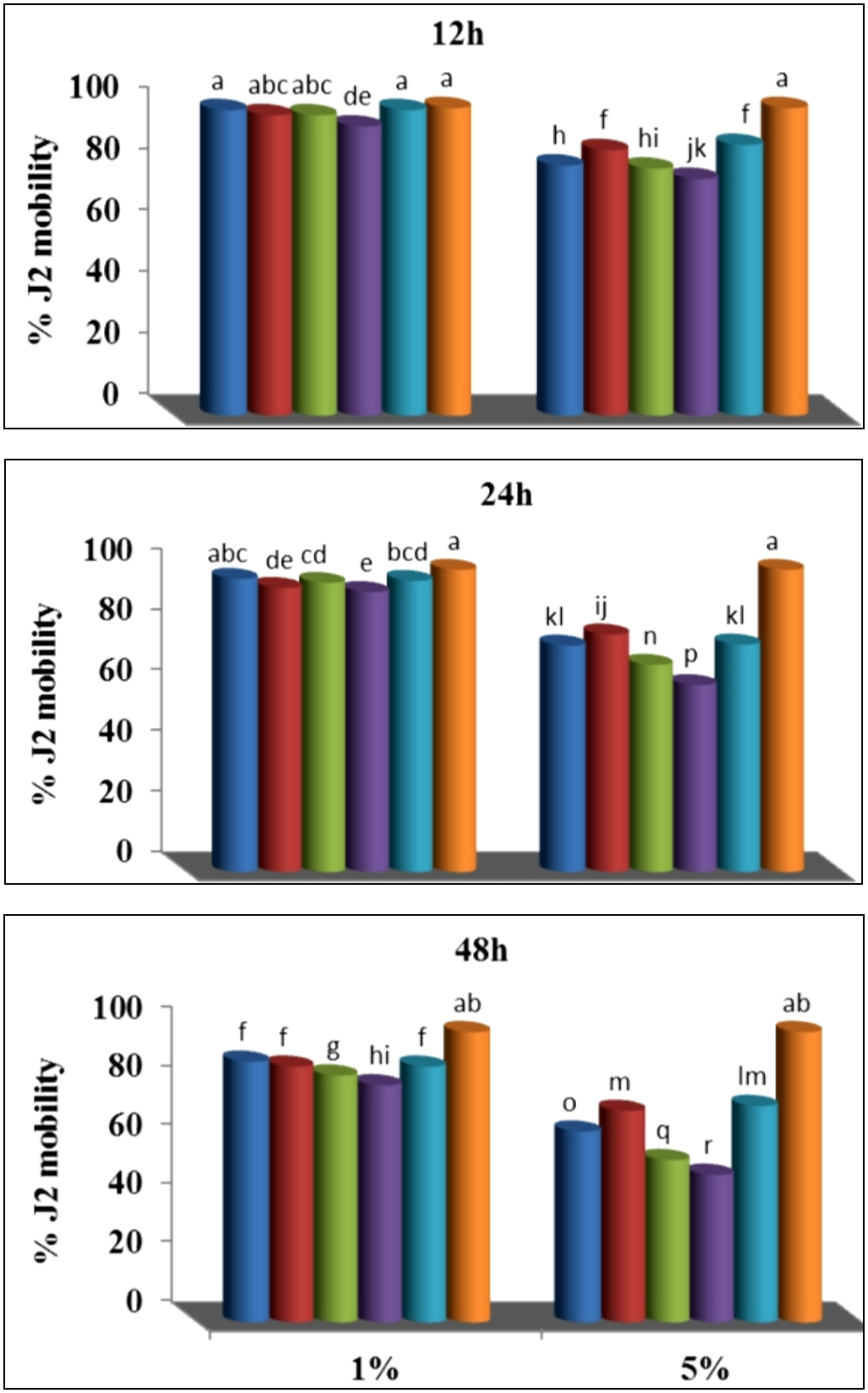

Fig 1: Effect of root extracts of some plant species on juvenile mobility of *T. Semipenetrans* under laboratory conditions

Greenhouse experiment: One year old seedling of highly susceptible citrus cultivar transplanted singly in 60 cm clay plastic pot containing about 5 kg of sterilized sandy and loam soil. Inoculation of *T. Semipenetrans* took from the stock culture and added used to study their effect on population density of citrus nematode. Around the system of each seedling. Four plant species (*Datura stramonium*, *Nerium oleander*, Rosemary, *Brassica campestris*) used to

study their effect on population density of citrus nematode. Each pot inoculated with 5000 j2 population initial of T. Semipenetrans. The nematode inocula pipetted into 4 holes in the soil around the stem of citrus seedling. The pots randomized on greenhouse bench and the temperature maintained at 27+-2 degree celsius. The experiment maintained in the greenhouse for 60 days and soil sampling took. Soil samples kept in polyethylene bags to prevent water drying and sent directly to the laboratory for nematode extraction and counting. Population density of second stage larvae 250g soil estimated as previously mentioned.

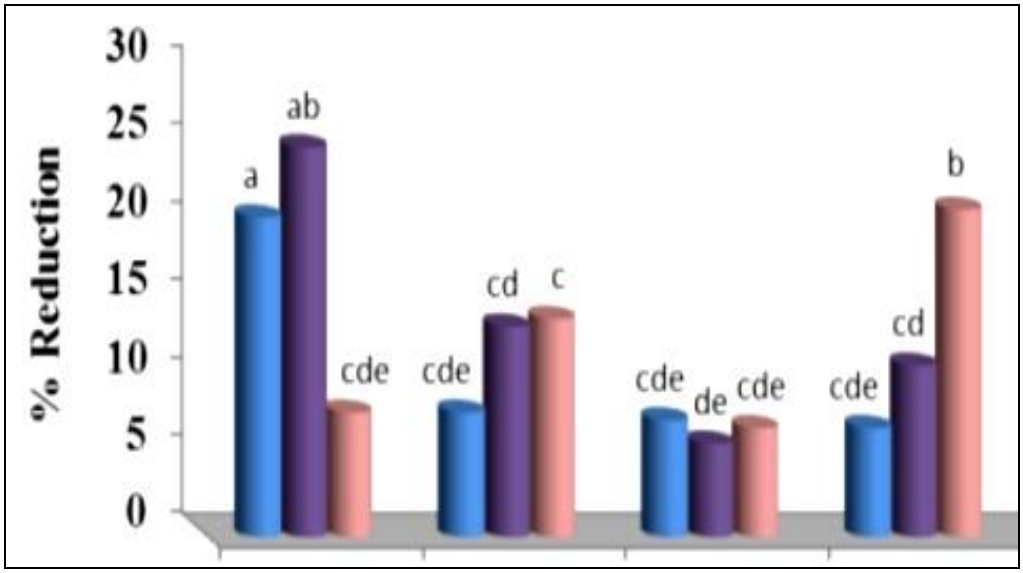

Fig 2: Effect of some plant species on severity of *T. Semipenetrans* infecting three citrus rootstocks under greenhouse conditions

Results and Discussion

Laboratory experiment

Results revealed that the citrus nematode of *T. Semipenetrans* isolated from all rhizophere of citrus sinensis, citrus reticulate. Navel detected as j2 and females. These results are in agreement with those that say *T. Semipenetrans* occurred in the rhizoshphere of citrus trees at detected population density and causes many problems, damage and yield decreasing. Our results showed that the plant extracts of *Datura stramonium*, *Nerium oleander*, Rosemary, *Brassia compestris*, in addition to organic manure significantly decreased the j2 citrus nematode.

Greenhouse experiment

All plant species reduced the larval population of *T. Semipenetrans*. *N. oleander* and *Datura Stramonium* when intercropped with C. Reticulate grafted on *C. Aurantium* 13.5% and 11%, respectively. While *D. Stramonium* gave the highest percentage of reduction when intercropped with *C. Sinensis* grafted on *C. Aurantium*. Such results are in agreement with those reported by Kumari *et al*. (1986) [16], Ahmad *et al*. (2004) [12], Tibugari *et al*. (2012) [17]. The inhibition of *T. semipenetrans* population in this investigation may be due to the acuumulation of toxic byproducts of decomposition and/or to increase phenolic contents which result in host resistance. The nematicidal compound in marigold identified as alfa-terthienyl and its analougues, which kill nematodes that enter the root.

These results indicate that the plant extracts improved the growth parameters, helpful in the control of plant parasitic nematodes under greenhouse conditions. Application and use the intercultural plants and plant extracts is easy and economical as compared to chemical treatment. The ability of plant extracts to inhibit and control the plant disease is due some natural compounds such as sterols, saponins, tannin, alkaloids and flavonoids Mousa *et al*. (2011) [13]. Thus, it is concluded that plant extracts could consider as a bio-control agent that could decrease the nematode population densities the threshold level. Moreover, they seem also to be safer and relatively low-cost method for nematode management.

References

1. Banies RC, Clarck OF, Bitters WP. Susceptibility of some citrus species and other plants to the citrus-root nematode, *Tylenchulus Semipenetrans*. Phytopathology. 1948;38:912.
2. Oteifa BA, Shaarawi AM. Citrus slow decline in Egyptian orchards. The Egyptian Society of Horticulture Magazine. 1964;137:3-12.
3. Cohn E. The citrus nematode, *Tylenchulus Semipenetrans* Cobb, as a pest of citrus in Israel. Proceedings of the first International Citrus Symposium. 1969;2:1013-1017.
4. Ahmed SS. Ecological and Biological studies on the citrus Nematode *Tylenchulus semipenestrans*. M.Sc. Thesis, Fac. Agric., Cairo Univ; c1974. p. 53.
5. Milne DL. The impact of new nematicide and irrigation practices on method of citrus nematode control. Proceedings of the International Society of Citriculture. 1977;3:835-838.
6. Abou-EL-Naga MM, Metwaly AM, Montasser SA. New records of nematodes associated with citrus fields in Egypt. Agricultural Research Review. 1984;62:271-275.
7. Kaplan DT, Cohn E. Influence of root exudates on *Tylenchulus Semipenetrans* egg hatch and juvenile activity. Journal of Nematology. 1991;23:535.
8. Awan MA, Javed N, Ahmed R, Inam-ul-haq M. Effect of leaf extract of four plant species on larva mortality of citrus nematode (*Tylenchulus semipenetrans*) and citrus

plant growth. Pakistan Journal of Phytopathology. 1992;4:41-45.
9. Amen HH, Hasabo SA. Effect of some plant extracts on citrus nematode, *Tylenchulus Semipenetrans* infecting sour orange seedlings. Egypt. J Appl. Sc. 1985;10(12): 52-56.
10. Raj Kumar Saroj, Sanjay Kumar, Shatrunjay Yadav. Effect of bio-fertilizers with chemical fertilizers on growth, yield, and quality of cauliflower (*Brassica oleracea* var. *botrytis*). Int. J Hortic Food Sci. 2022;4(1):26-31.
11. Duncan LW. Citrus fibrous root and *Tylenchulus Semipenetrans* sample optimization in Florida Flat-woods citrus orchards. J Nematology. 1988;20(4):633.
12. Ahmed MS, Tariq M, Riaz A. Some studies on the control of citrus nematode (*Tylenchulus semipenetrans*) by leaf extracts of three plants and their effects on plant growth variables. Journal of Plant Science. 2004;3:544-548.
13. Bakr RA, Mahdy ME, Mousa EM. A survey of root-knot and citrus nematode in some new reclaimed land in Egypt. Pakistan Journal of Nematology. 2011;29:165-170.
14. Shah JJ, Bhatti NA. Radial nerve paralysis associated with fractures of the humerus: a review of 62 cases. Clinical Orthopaedics and Related Research®. 1983 Jan 1;172:171-6.
15. Reddy BS, Chatterji BN. An FFT-based technique for translation, rotation, and scale-invariant image registration. IEEE transactions on image processing. 1996 Aug;5(8):1266-71.
16. Lal B, Singh A, Kumari A, Sinha N. Biochemical and haematological changes following malathion treatment in the freshwater catfish Heteropneustes fossilis (Bloch). Environmental Pollution Series A, Ecological and Biological. 1986 Jan 1;42(2):151-6.
17. Tibugari H, Mombeshora D, Mandumbu R, Karavina C, Parwada C. A comparison of the effectiveness of the aqueous extracts of garlic, castor beans and marigold in the biocontrol of root-knot nematode in tomato. J. Agric. Technol. 2012;8(2):479-92.