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Adverse Effect of Root-Knot Nematode, *Meloidogyne incognita* on Spinach beet *Beta vulgaris bengalensis* and Fenugreek, *Trigonella foenum graecum*

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ABSTRACT: Root-knot nematode *Meloidogyne incognita* revealed its significant adverse effect on seed germination and seedling emergence of spinach beet at 500 J₂/kg soil in both sterilized as well as in unsterilized soil. However, in fenugreek the significant inhibition of germination started at 500 J₂/kg soil in both the soils but seedling emergence was inhibited at 1000 J₂/kg soil in unsterilized soil while in sterilized soil it was at 500 J₂/kg soil. The significant reduction in plant growth characters of spinach beet and fenugreek was revealed at 500 J₂/kg soil and above levels. There was increase in number of galls and total nematode population with increase in inoculum level from 50 to 5000 nematodes/kg soil.

Key words : Spinach beet, fenugreek, *Meloidogyne incognita*, Pathogenicity.

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Comparative Efficacy of *Glomus fasciculatum* with Neem Cake and Carbofuran for the Management of *Meloidogyne incognita* on Brinjal

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ABSTRACT: Microplot experiments were conducted to know the compatibility of *Glomus fasciculatum* with neem cake and carbofuran 3G for integrated management of *Meloidogyne incognita* on brinjal cv. JV-2. VAM fungus, neem cake and carbofuran alone or in combination significantly decreased root-knot index and nematode population in soil over that of nematode alone. The treatments with VAM + neem cake @ 0.5 t/ha and VAM alone were found to be effective in increasing plant growth parameters and yield of brinjal. The treatments with carbofuran @ 3 kg a.i./ha and VAM + carbofuran @ 1.5 kg a.i./ha were found to be effective in reducing root-knot index and nematode population in soil.

Key words : *Glomus fasciculatum*, neem cake, carbofuran, *Meloidogyne incognita*, comparative efficacy, brinjal.

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Effect of Aqueous Extract of Neem (*Azadirachta indica*) on Egg Hatching of *Meloidogyne incognita*

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ABSTRACT: Different concentrations of shade-dried leaves, bark and kernels of neem were tested for their inhibitory role in egg hatching of *Meloidogyne incognita*. In general, with the increase in concentration and exposure period, there was reduced egg hatching. Neem kernels (S concentration) proved to be most effective which did not allow hatching even up to 11 days of exposure, and its lowest concentration (S/8) allowed 69.22% hatching as against 91.66 in control. Neem bark was the least effective among the three as its S, S/4 concentrations allowed 69.8 and 88.1% eggs hatching, respectively.

Keywords : Neem leaves, neem bark, neem kernels, hatching, *Meloidogyne incognita*, aqueous extract.

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Management of Root-Knot Nematode, *Meloidogyne incognita* using Organic Amendments in Frenchbean

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ABSTRACT: In a field experiment, four organic amendments *viz.*, saw dust, poultry manure, mustard cake and neem cake were used to manage root-knot nematode, *Meloidogyne incognita* in frenchbean. Poultry manure applied as spot application was found to be effective in increasing plant growth characters whereas neem cake, as spot application, was found effective in reducing gall, egg masses and soil population of *Meloidogyne incognita*. Spot application of all the organic amendments was comparatively better than furrow application in reducing nematode population and increasing yield.

Key words : *Meloidogyne incognita*, frenchbean, organic amendments, spot application, furrow application.

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Studies on Occurrence, Pathogenic Potential and Management of Reniform Nematode on Spearmint

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ABSTRACT: *Rotylenchulus reniformis* has recently emerged as widely distributed and dominant pest of *Mentha spicata*. Pathogenicity experiment indicated severe reduction in plant weight, oil yield, limonene content in oil, and leaf chlorophyll/total sugar/phenol content of spearmint cv. MSS-5 due to nematode infection. Leaf-stem ratio was less suppressed, while carvone content in oil was increased. Nematode transmission through infected planting material was minimized by exposure to sunlight and dipping it in 0.1% carbofuran solution for one hour. Pre-transplant treatment with carbofuran, phorate, neem seed powder, neem cake and *Trichoderma harzianum* effectively reduced the nematode and enhanced plant growth and oil yield.

Key words : Distribution, *Mentha spicata*, management, Occurrence, Pathogenicity, *Rotylenchulus reniformis*, Solar treatment, Nematicides, Oil cake, bio-control agent.

On the Species and Pathotypes of *Heterodera avenae* Complex of India

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ABSTRACT: Eight populations of *Heterodera avenae* complex procured from Delhi, Haryana (Ambala, Mahendergarh and Sirsa), Himachal Pradesh, Punjab and Rajasthan (Jaipur and Udaipur) states of India were tested on 21 international host differentials for characterization of pathotypes. Delhi, Jaipur, Mahendergarh, Sirsa and Udaipur populations behaved as pathotype Ha 21. Reaction of Himachal Pradesh population was similar to pathotype Ha 31 and that of Punjab and Ambala populations to pathotype Ha 41. Detailed taxonomic studies revealed the existence of two species-*Heterodera avenae* Wollenweber, 1924 *sensu stricto* and *H. filipjevi* (Madzhidov, 1981) Stelter, 1984. Ambala, Punjab and Himachal Pradesh populations belonged to *H. filipjevi* and rests to *H. avenae*.

Key words : Taxonomy, *Heterodera avenae*, *H. filipjevi*, Biotypes, Races.

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On the Species and Pathotypes of *Heterodera avenae* Complex of India

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Key words : Taxonomy, *Heterodera avenae*, *H. filipjevi*, Biotypes, Races.

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On the Gall-Forming Anguinids of India

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ABSTRACT: One new and four known species of gall-forming anguinids of India have been studied. *Subanguina neominuta* sp.n. is characterized by having female with L=0.63 mm, a=25.3; V=77, post vulval uterine sac with ovarian cells, long tail with slender posterior region ending in a rounded terminus; and males with 15µm long spicules. *S. minuta* is redescribed. Observations on *Anguina tritici*, *S. chrysopogoni* and *Ditylenchus phyllobius* have been included.

Key words: Taxonomy, *Anguina tritici*, *Subanguina chrysopogoni*, *S. minuta*, *S. neominuta* n. sp., *Ditylenchus phyllobius*.

Effect of Intercropping of Mustard (*Brassica compestris* var. *Toria/B. compestris* var. *Sarson*) with Sugarcane on Nematode Population and Yield of Crop

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ABSTRACT: An experiment was conducted to see the effect of intercropping of toria/yellow mustard (*Brassica compestris*), one and two rows, with sugarcane on nematode population and yield of crop. Intercropping of two rows of yellow sarson with sugarcane recorded the highest reduction (23.7%) in nematode population followed by sugarcane + one row of yellow mustard at the time of harvest of intercrops. This sequence showed prolonged effect of toxicity as evidenced by 12% reduction in nematode population from initial density level at the time of harvest of sugarcane. Sugarcane + Yellow mustard intercropping system exhibited the highest cane equivalent yield.

Key words : Intercropping, toria/yellow sarson, Sugarcane, Nematode population, *Brassica compestris*.

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Effect of Intercropping of Mustard (*Brassica compestris* var. *Toria/B. compestris* var. *Sarson*) with Sugarcane on Nematode Population and Yield of Crop

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Key words : Intercropping, toria/yellow sarson, Sugarcane, Nematode population, *Brassica compestris*.

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Effect of Brassinolide on Development of *Meloidogyne incognita* in *Raphanus sativus* L. Plants

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ABSTRACT: *Raphanus* seedlings treated with brassinolide for 10 days were infected with root-knot nematode (*Meloidogyne incognita*) and its developmental studies (gall size, gall number and egg mass number) were carried out periodically. Likewise, the development of root system of brassinolide treated seedlings after infection of nematode was observed. It was observed that the growth of roots and development of *M. incognita* was enhanced when compared with untreated seedlings, thus suggesting a stimulatory effect on the development of *Meloidogyne incognita*.

Key Words: Brassinolide, brassinosteroids, ecdysteroids, *Meloidogyne incognita*, moulting hormone, *Raphanus sativus*.

Effect of pH on Survival, Pathogenicity and Progeny Production of Some Indigenous Isolates of Entomopathogenic Nematodes

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ABSTRACT: Effect of post application factor (pH) was tested on the survival of indigenous isolates of *Steinernema carpocapsae* PDBC EN 11 and *Heterorhabditis indica* PDBC EN 13.3. Survival of infective juveniles was tested at pH 5 levels varying from 2-9. Maximum survival for *H. indica* was obtained at pH 5 and for *S. carpocapsae* at 7 and least at pH 2 and 3, respectively. *S. carpocapsae* tolerated a broader range of pH (4-9) than *H. indica* whose survival was affected from 2-3 and 8-9 showing least survival at extremes of acidity and alkalinity. Infectivity and progeny production of exposed nematodes were recorded at varying intervals. Infectivity of IJs of both the nematodes were not affected by varying pH levels except at 2 and 3. Progeny production was found at par with control for both the nematodes tested.

Key Words: EPN, *Steinernema carpocapsae*, *Heterorhabditis indica*, pH.

Histopathological Observations of the Roots of Tomato Infected with Root-knot Nematode, *Meloidogyne incognita*

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ABSTRACT : Selected commercial cultivars of tomato were screened for resistance against root-knot nematode, *Meloidogyne incognita*. The cultivars having moderate resistance and susceptibility were subjected to histopathological observations. The results revealed that the cultivars with moderate resistance manifested higher concentrations of total insoluble polysaccharides, nucleic acids and total proteins when compared to susceptible cultivars. Further, there was increase in overall size of the cells in epidermal and cortical layers of the infected roots of tomato as compared to their healthy counterparts.

Key Words: Histopathology, tomato, root-knot nematode, *Meloidogyne incognita*.

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Efficacy of *Steinernema riobrave* against *Agrotis ipsilon* Hufnagel (Lepidoptera: Noctuidae) on Potato

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ABSTRACT: To know the performance of entomopathogenic nematode, *Steinernema riobrave* (Indian isolate) against cutworm on potato crop, a preliminary field study was carried out during 2002-03. In the field, there were about 5 larvae of *Agrotis ipsilon* per waste heap before spraying. At the end of the experiment, number of larvae per waste heap were reduced up to 2.33, 1.50 and 1.17 in entomopathogenic nematodes (EPN) (100,000 IJs/m²), endosulfan 35 EC (0.07%) and farmer's practices respectively. Significant reduction in plant damage in EPN treatment (10.92%) over control (28.29%) was observed on 6th day of treatment.

Key words: *Steinernema riobrave*, *Agrotis ipsilon*, Field efficacy, Potato.

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Effect of Some Plant Extracts on *Meloidogyne incognita* (Kofoid and White, 1919) Chitwood, 1949 Juvenile Mortality

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ABSTRACT : An experiment was carried out *in vitro* to test the efficacy of 7 plant extracts viz., leaf extracts of *Tagetes erecta* L., *Azadirachta indica* A. Juss., *Calotropis gigantea* Ait., seed extracts of *Citrullus lanatus* (Thunb.), *Areca catechu* L., latex of *Carica papaya* L., and *C. gigantea* on the juveniles of *M. incognita*. Leaf extract of *C. gigantea* (17.7%) and latex of *C. gigantea* (32.6%) were found to be the best at 0.1 and 1.0% concentrations respectively and latex of *C. papaya* recorded cent per cent juvenile mortality after 72 h of exposure both at 5.0 and 10.0% concentrations. At 10.0% concentration, seed extract of *C. lanatus* and latex of *C. gigantea* caused cent per cent mortality after 72 and 120 h of exposure respectively.

Key words: *M. incognita*, Plant extracts, Juvenile mortality.

Selection for High Temperature Tolerance in Some Native *Steinernema* and *Heterorhabditis* Species

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ABSTRACT: Effect of heat-shock treatment on survival and viability of some isolates of *Steinernema* spp. and *Heterorhabditis* spp. at relatively higher temperatures was studied. Survival, infectivity and multiplication were unaffected at sub-lethal temperatures 35 and 37°C. Exposure to 40°C affected the survival and infectivity of both *Steinernema* spp. and *Heterorhabditis* spp. Pre-conditioning at 37°C enhanced survival rate and viability of IJs on subsequent exposure at 40°C. Studies on F1 generation revealed the superior tolerance of F1 generation to high temperature compared to wild population. Pathogenicity of F1 generation was only marginally affected after exposure to 42°C for 3 and 4 h whereas wild population experienced marked reduction in pathogenicity under the same conditions. This is the first successful attempt at detecting thermotolerance in native isolates in India.

Key Words: *Heterorhabditis*, *Steinernema* sp., Selection, Temperature tolerance

Management of Reniform Nematode, *Rotylenchulus reniformis* on Cowpea through Seed and Soil Treatment with Plant Products

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ABSTRACT: Neem, castor and karanj products (leaf and seed kernel) were tested as seed dresser (10% w/w) along with soil applicant (2.5 q/ha) for management of *Rotylenchulus reniformis* on cowpea (Pusa Barsati). Results revealed that plant products were effective in improving plant growth and reducing nematode reproduction over untreated check. However, neem seed kernel was found to be the most effective among all the plant products.

Key words: Neem, Castor, Karanj, Leaf, Seed kernel, Seed dressing, Soil application, *Rotylenchulus reniformis*, Cowpea.

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***Telotylenchoides bhutanensis* Sp. N. (Tylenchida: Telotylenchidae) from Bhutan**

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Abstract: *Telotylenchoides bhutanensis* sp.n., isolated from an unidentified grass from Bhutan, is diagnosed and differentiated from other two species of the genus by having conspicuous phasmids in shallow pits and a rounded tail terminus with abnormally thickened cuticle in both the sexes. *T. bhutanensis* sp.n. is characterized by having females with L = 480 – 580 μ m; a = 26.6 – 32.2; b = 3.1 – 5.2; b = 2.9 – 4.4; c = 16.5 – 26.6; c = 1.5 – 2.4; V = 60.14 – 62.06%; stylet = 18-20 μ m; dgo = 3.0 – 3.5 μ m; excretory pore = 76 – 103 μ m; tail = 28-35 μ m; h=8–9 μ m; continuous hemispherical head with 5-6 annules, stylet with rounded knobs, oesophagous with an ovate median bulb, oesophageal glands overlapping the intestine dorso-laterally in the form of a long lobe, gonad didelphic amphidelphic, lateral field with four incisures without areolation, the outer two lines, crenate, phasmids in distinct shallow pits located in the posterior half of the tail, and a cylindrical to clavate tail with broadly rounded annulated terminus comprised of abnormally thickened cuticle in both the sexes. Spicules not distally flanged, gubernaculum simple; bursa low with crenate margin, reaching upto the tail terminus.

Key Words: Bhutan, new species, *Telotylenchoides bhutanensis* sp.n., grass.

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Effect of Carbofuran and Carbosulfan following Soil, Seed and Foliar Application on Plant Growth of Maize and Reproduction of Maize Cyst Nematode, *Heterodera zae*

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ABSTRACT: Carbosulfan seed treatment (25 ST) @ 2% w/w used alone or combined with either carbofuran soil application @ 0.5 or 1% or carbosulfan foliar spray @ 250 ug/ ml was most effective in increasing plant growth characters of maize cv. Deccan -103 and reducing final population of maize cyst nematode *Heterodera zae*. Even though carbofuran soil application @ 1kg a.i./ ha produced significantly lower number of eggs and juveniles per cyst, the final nematode population was greatly reduced by carbosulfan seed treatment (2% w/w).

Key words: Carbofuran, carbosulfan, control, fecundity, *Heterodera zae*, maize, maize cyst nematode, management, reproduction, *Zea mays*