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Chemical and Non-Chemical Control of *Meloidogyne incognita* Under Field Conditions

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ABSTRACT : Field studies were conducted in 1998 and 1999 to investigate the effects of air-dried milled leaves of neem (*Azadirachta indica*), Siam weed (*Chromolaena odorata*) and roots, each at 30 and 50 kg/ha and carbofuran at 1.5 and 2.5 kg a.i./ha on *Meloidogyne incognita* infecting cowpea cv. IT86D-715. Carbofuran-treated field had the highest grain yield (1.7 t/ha), and the least root galling as well as least nematode population in soil at harvest. Populations of species of *Pratylenchus*, *Helicotylenchus*, *Xiphinema* and *M. incognita* were reduced by 83.2, 86.5, 89.1 and 94.8% respectively. In the neem leaf-treated field, grain yield was recorded as 1.3 t/ha and root gall rating was 1.4

Key words: *Meloidogyne incognita*, neem, Siam weed, carbofuran, cowpea

In Vitro* Study on the Efficacy of *Bacillus subtilis* Strain Bs_t Cell Concentrations and Cell-Free Filtrates on Hatching and Mobility of *Rotylenchulus reniformis*

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ABSTRACT : A preliminary *in vitro* screening trial with 3 isolates of *Bacillus subtilis* (Bs_t, Bs₁ & Bs₂) was evaluated for their efficacy against *Rotylenchulus reniformis*. Only Bs_t isolate inhibited hatching and caused mortality of immature females/males of the nematode. Therefore, it was further evaluated with varying cell concentrations (10⁴ to 10¹⁰ cells/ml) along with undiluted cell-free culture filtrate (S) and its dilutions (S/4, S/8, S/16 and S/20) on hatching and mortality of *R. reniformis* at 3 exposure periods. Both cell concentrations as well as cell-free filtrates inhibited hatching and caused mortality of immature females/males of the nematode. However, significant mortality of immature females/males in the cell-free filtrate was observed at S/8 dilution and above. The observed efficacy was concentration dependent.

Key Words: *Bacillus subtilis*, hatching, mortality, *Rotylenchulus reniformis*

Factors Influencing the Prevalence of the Root-Lesion Nematode, *Pratylenchus coffeae* on Oil Palm (*Elaeis guineensis* Jacq.)

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ABSTRACT : The root-lesion nematode, *Pratylenchus coffeae* is considered to be one of the economically important nematode pests of oil palm and is widely distributed in South India. Its population fluctuates between samples, trees, months and years. Observations on population fluctuation and standardisation of sampling zone on oil palm during 1994-95, revealed a marked increase in nematode population during June to August. Maximum nematode population was recorded at a distance of 100 cm away from the bole region of the palm at a depth of 51-100 cm. Ecological conditions such as rainfall, soil moisture, soil temperature and availability of susceptible roots play important roles in the population build-up. Soil temperature, however, was considered to have a decisive effect.

Key words: *Pratylenchus coffeae*, oil palm, population fluctuation, standardisation, sampling technique

Occurrence and Distribution of Root-Knot Species of FCV Tobacco in Karnataka

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ABSTRACT : FCV tobacco growing areas of Karnataka were surveyed for assessing the incidence and intensity of root-knot nematode and mapping the distribution of *Meloidogyne* species. The incidence ranged from 53.5-91.3% in the different areas, with more in H.D. Kote, Hunsur, Periyapatna and Ramanathapura than in Shimoga. The disease intensity (RKI) varied from 2.0 to 3.1 in all the tobacco growing tracts. Relatively more number of fields were recorded under medium to heavy infection categories. Four species viz., *Meloidgyne incognita*, *M. arenaria*, *M. javanica* and *M. thamesi* were detected on tobacco crop.

Key words: F.C.V. tobacco, *Meloidogyne incognita*, *M. javanica*, *M. arenaria*, incidence, distribution

Evaluation of Various Application Methods of *Pasteuria penetrans* Against *Meloidogyne incognita* in Tomato

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ABSTRACT : Various methods of *Pasteuria penetrans* application viz. nursery, spot and dip were evaluated. There was an increase in the plant growth with corresponding reduction in galls and nematode population in all the treatments receiving *P. penetrans*. Among the various methods of *P. penetrans* application, spot application was observed to be the best followed by application in the nursery bed in respect of increase in plant growth parameters and reduction in nematode multiplication. The root dip treatment was least effective, even though better than control.

Key words: *Pasteuria penetrans*, application methods, *Meloidogyne incognita*

Evaluation of Biochemical Parameters for Screening Resistance of Chickpea Cultivars Against *Meloidogyne incognita*

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ABSTRACT : Nine out of ten cultivars of chickpea under study have shown susceptible reaction and all the cultivars showed highly galled root systems due to the attack of *Meloidogyne incognita*. In spite of heavy galling, the cultivar BG 1067 showed very less effect in biomass production as compared to other cultivars accompanied with high activity of peroxidase in its root and hence it was categorized as tolerant to *M. incognita*. The post-infectious increase in phenolic and potassium content were significantly correlated to the tolerance mechanism of the varieties and can be used for screening germplasms against root-knot nematode.

Key words: Chickpea, resistance, *Meloidogyne incognita*

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Studies on the Life Cycle of *Meloidogyne incognita* on Papaya in Presence of *Fusarium solani*

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ABSTRACT : Larval penetration in papaya roots was reduced in the presence of *Fusarium solani*. Further, only 66.3% penetrated larvae developed into females in *Meloidogyne incognita* alone in comparison to 42.7% where *F. solani* was present along with *M. incognita*. Fecundity was also reduced with an average of 207 eggs per eggmass in roots infected with *M. incognita* and *F. solani* as compared to 356 eggs with *M. incognita* alone. Also, the percentage of male was high (7.3) in roots infected with *M. incognita* and *F. solani*. Presence of *F. solani* delayed the life cycle of the root-knot nematode by 9 days.

Key words: Payaya, life cycle, *Meloidogyne incognita*, *Fusarium solani*, penetration

Parasitism of *Meloidogyne incognita* Eggs by *Fusarium oxysporum* and other Fungi

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ABSTRACT : The fungal parasites *Paecilomyces lilacinus*, *Fusarium oxysporum*, *F. sporotrichioides*, *Phoma glomerata* and *Trichoderma viride* were isolated from the eggs of *Meloidogyne incognita*. This is first report of *F. sporotrichioides* and *P. glomerata* isolated from eggs of *M. incognita*. Hundred per cent parasitism of eggs of *M. incognita*, *Heterodera cajani* and *Rotylenchulus reniformis* were observed with *P. lilacinus* and *F. oxysporum* under laboratory condition. In potted condition on tomato, considerable reduction of galls and eggmasses of *M. incognita* were recorded by application of *F. oxysporum*. About 65.7% parasitism of eggmasses and 68.5% parasitism of eggs were recorded with *F. oxysporum* isolate 1.

Key words: Fungal parasites, *Fusarium oxysporum*, *Meloidogyne incognita*, tomato

Effect of Cell Concentrations and Cell-Free Filtrates of *Pseudomonas fluorescens* (Isolate Pf₁) on Hatching and Mortality of *Rotylenchulus reniformis**

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ABSTRACT : Studies were conducted *in vitro* to evaluate the efficacy of cell concentrations at varying levels of 10⁴ to 10¹⁰ cells/ml and undiluted cell-free filtrate (S) and its dilutions S/4, S/8, S/16 and S/20 of *Pseudomonas fluorescens* isolate Pf₁ on hatching and mortality of *Rotylenchulus reniformis* at 3 exposure periods. Both bacterial cell concentrations and cell-free filtrates of Pf₁ isolate suppressed egg hatching and viability of immature females/males of the nematode. However, significant mortality of the nematode was achieved at concentrations of 10⁸ cells/ml and above but other concentrations (10⁴ to 10⁷) were at par with control (water). A negative correlation was evinced between levels of cell concentrations/cell-free filtrates and hatching but a positive one with mortality of the nematode.

Key words: *Pseudomonas fluorescens*, *Rotylenchulus reniformis*, cell-free filtrate, hatching, mortality, Rhizobacte

***In Vitro* Production of Entomopathogenic Nematodes in Different Artificial Media**

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ABSTRACT : Different plant and animal protein media were evaluated *in vitro* for production of 3 indigenous isolates of *Steinernema carpocapsae*, 2 isolates of *S. bicornutum* and one of *Heterorhabditis indica*. The flasks containing specific media with foam chips were inoculated with different isolates of *Steinernema spp.*, incubated at $24\pm 1^\circ\text{C}$ for 25 days. Of the 9 artificial media evaluated for mass multiplication of *Steinernema spp.*, 4 viz., Wout's medium, modified egg yolk, soyflour + cholesterol and modified dog biscuit, yielded highest number of IJs of 2 isolates of *S. carpocapsae*, one isolate of *S. bicornutum* (PDBC EN 2.1) and one of *H. indica* (PDBC EN 6.71). Maximum yield of IJs of *S. carpocapsae* (PDBC EN 6.11 and 6.61) was observed on modified dog biscuit, while *S. bicornutum* (PDBC EN 2.1) recorded maximum yield of IJs on modified egg yolk medium. *H. indica* (PDBC EN 6.71) recorded maximum yield of IJs on Wout's medium. The isolates of *S. bicornutum* (PDBC EN 3.1 and 3.2) did not multiply on any of the 9 media tried suggesting further improvement of the tested media.

Biodegradable Effect of Oil-Seed Cakes on Plant-Parasitic Nematodes and Soil-Inhabiting Fungi Infesting *Trigonella foenum-greacum* and *Phaseolus aureus*

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ABSTRACT : The biodegradable effect of oil-seed cakes of neem (*Azadirachta indica*), castor (*Ricinus communis*), linseed (*Linum usitatissimum*), groundnut (*Arachis hypogaea*), mustard (*Brassica campestris*) and dhan (*Eruca sativa*), were observed against plant-parasitic nematodes and soil-inhabiting fungi infesting fenugreek and also on the succeeding crop, mungbean, in field condition. The resultant biodegradation effect of oil-seed cakes effectively contained the population of plant-parasitic nematodes such as *Meloidogyne incognita*, *Rotylenchulus reniformis*, *Tylenchorhynchus brassicae*, *Helicotylenchus indicus*, etc. and the frequency of parasitic-fungi *Macrophomina phaseolina*, *Fusarium oxysporum*, *Rhizoctonia solani*, *Phyllosticta phaseolina*, *Sclerotium rolfsii*, etc. However the frequency of saprophytic fungi *Aspergillus niger*, *Trichoderma viride*, *Penicillium degetatum*, etc. was increased. As a consequence, several-fold improvement was observed in plant-growth parameters (Height, percent pollen fertility, pod numbers, root nodulation, nitrate reductase activity in leaves and chlorophyll contents. Residual effect of oil-seed cakes was also noticed in the succeeding crop mungbean in the next growing season.

Key words : Oil-seed cakes, *Trigonella foenum-greacum*, *Phaseolus aureus*, plant-parasitic nematodes, soil-inhabiting fungi

Two New Species of *Xiphinema* Cobb, (Nematoda: Dorylamida) Associated with Perennials in Udaipur with Notes on a Known Associated Species.

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ABSTRACT ; Two new species of *Xiphinema* Cobb, 1913 (Nematoda: Dorylamida) associated with perennials have been described and illustrated. *X. kesarii* sp.n. collected from the rhizosphere of Fig (*Ficus carica*L.) from Horticulture Farm, RCA, Udaipur is characterized by having : L = 3.040-3.875mm; a = 54.28-65.12; b = 7.85 - 10.70; c = 66.93 - 94.51; c = 1.108 - 1.48; V = 45.12 - 50.98%; Odontostylet length = 127.5 - 140 µm; Odontophore length = 51-75.5 µm; total stylet length = 178.5 - 215.0 µm; Guiding ring = 92.5 - 115.2 µm; Tail length = 39-48 µm; cylindrical body with tapering ends, gonads didelphic, amphidelphic with vulva located just at middle of the body and sub-digitate tail. *Xiphinema udaipurensis* sp.n. collected around the rhizosphere of Pomegranate (*Punica granatum*) from Krishi Vigyan Kendra, Badgaon around Udaipur city, is characterized by having L = 2.24-2.40; a = 42.14 - 43.07; b = 5.97-6.40; c = 30.68-32.02; c = 2.77 - 3.31; V = 30.26 - 40.40 %; Odontostylet length = 95.5 - 100.0 µm; Odontophore length = 51-60 µm; total stylet length = 151.0 - 155.5 µm; guiding ring = 70-77 µm; Tail length = 73-75 µm; posteriorly ventrally arcuate body, rounded and slightly offset head with well developed spear. Gonads didelphic, amphidelphic but vulva anterior and long ventrally conoid tail.

Key words : *Xiphinema kesarii* sp.n., *Xiphinema udaipurensis* sp.n., Fig, Pomegranate, Taxonomy

In Vitro* and Field Evaluation of Some Indigenous Isolates of *Steinernema* and *Heterorhabditis indica* against Shoot and Fruit Borer, *Leucinodes orbonalis

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ABSTRACT : *In vitro* studies indicated that the isolates, PDBC EN 3.1 of *S. bicornutum*, PDBC EN 13.3 of *H. indica* and PDBC EN 6.11 of *S. carpocapsae* recorded maximum mortality of *L. orbonalis* at 50 IJ/larvae in 48 to 72 h of exposure. Other isolates also exhibited lowered mortality either at higher concentration or at longer duration of exposure. Preliminary field trial with the isolates, PDBC EN 6.11 of *S. carpocapsae* and PDBC EN 6.71 of *H. indica* on brinjal indicated that higher the concentration of infective juveniles per dose, higher the reduction in borer holes on brinjal fruits and the results were comparable with sprays of neem seed kernel extract. Between the two species evaluated, isolate PDBC EN 6.11 of *S. carpocapsae* was more effective in reducing the fruit damage in terms of number of fruits with borer holes and increase in yields.

Three New Species of the Genus *Aporcelaimellus* (Dorylaimida : Aporcelaimidae) Associated with Pulse Crops from Rohilkhand Division, U.P.

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ABSTRACT : Three new species of genus *Aporcelaimellus* viz, *A. faridpuriensis*, *A. nawabganjense* and *A. jairajpurii* have been described from Rohilkhand division of Uttar Pradesh, India *A. faridpuriensis* is characterised by well set off lip region, longer size of pre-rectum and bluntly rounded tail. *A. nawabganjense* sp. n. is characterised by cylindroid body, broader lip region, rounded cardia and conoid tail. *A. jairajpurii* sp. n. is having almost straight body, conoid cardia and short conoid tail.

Key words : *Aporcelaimellus faridpuriensis* sp. n., *A. nawabganjense* sp. n., *A. jairajpurii*, pulse crops, taxonomy

Description of *Neohalenchus bryophilus* gen. n. sp. n. (Tylenchida: Anguinoidea) Associated with Mosses in Bhutan with Proposal of a New Subfamily

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ABSTRACT : *Neohalenchus bryophilus* gen. n. sp.n. is described and illustrated alongwith proposal and diagnosis of a new subfamily Neohalenchinae. The new genus is closely related to *Halenchus* Cobb, 1933 due to presence of a wide and prominent excretory pore with highly sclerotised excretory duct and oesophageal gland overlap but differs in having valvate and muscular median bulb, extremely long tail with terminus not hooked ventrally and bursa enveloping only 1/4th to 1/5th of the tail. *Neohalenchus bryophilus* gen.n.sp.n. is characterized by L=970-1250 μ m; a=34.6-47.6; c=6.6-8.0; c'=7.6-8.9; V=60=66%; Stylet = 18-21 μ m; tail length = 130-190 μ m; excretory pore wide with highly sclerotised excretory duct; median bulb with distinct valve plates; Spicules=25=26 μ m; gubernaculum = 7-9 μ m; bursa adanal enveloping only a small part of the tail. Under Anguinidae sensu Siddiqi (2000), three subfamilies are recognised: Anguininae, Halenchinae and Neohalenchinae subfam. n. A diagnostic key to the subfamilies of Anguinidae is also provided.

Key words : *Neohalenchus bryophilus* gen. n. sp.n., Neohalenchinae subfam. n., taxonomy, mosses, Bhutan