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***In vivo* culturing of entomopathogenic nematodes *Heterorhabditis bacteriophora* and *Steinernema carpocapsae* on silkworm (*Bombyx mori*) and their effect on some lepidopterous insects**

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ABSTRACT : Studies were carried out for *in vivo* culturing of *Heterorhabditis bacteriophora* and *Steinernema carpocapsae* on silkworm, *Bombyx mori* and their effect on some lepidopterous insects, viz., rice moth (*Corcyra cephalonica*), black cutworm (*Agrotis ipsilon*) and silkworm (*Bombyx mori*). Both *H. bacteriophora* and *S. carpocapsae* (500 nematodes/larva) caused 100% mortality of 5th instar larvae of *B. mori* after 24 and 48 hours of application in case of injected and topical methods, respectively. The nematodes did not emerge out of the host when applied on 5th instar larvae of silkworm, While on 3rd instar larva, an average of 2750 and 48703 juveniles of *H. bacteriophora* and *S. carpocapsae*, respectively, were recovered. *H. bacteriophora* resulted in 100% mortality of 5th instar larvae of *C. cephalonica*, 3rd instar of *B. mori* and 4th instar of *A. ipsilon*, within 96, 72 and 72 hours after their topical applications, respectively. Cent per cent mortality of the larvae of the insects was caused by *S. carpocapsae* within 96, 72 and 96 hours after their topical applications, respectively.

Key words: *Agrotis ipsilon*, *Bombyx mori*, *Corcyra cephalonica*, culturing, *Heterorhabditis bacteriophora*, *Steinernema carpocapsae*.

Effect of different doses of *Paecilomyces lilacinus* isolate 6 on *Meloidogyne incognita* infecting tomato*

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ABSTRACT : The effect of different inoculum levels of *Paecilomyces lilacinus*, isolate 6, on *Meloidogyne incognita* was measured and optimum dosage for inoculation in soil was determined. All the treatments receiving *P. lilacinus* showed significantly higher plant growth parameters than nematode alone. The gall development and final nematode population of *M. incognita* decreased with the increasing doses of fungus. Considering the above parameters and analysing data statistically, 8 g (57.92×10^8 spores) fungus infested rice per kg soil was considered to be optimum for suppression of *M. incognita* in tomato. The rice kernel, as a substrate medium for culturing *P. lilacinus* (isolate 6), had no significant role in nematode control.

Key words: *Paecilomyces lilacinus*, Isolate 6, *Meloidogyne incognita*, tomato

Effect of population levels of *Meloidogyne incognita* on seed germination, seedling emergence and plant growth of cauliflower

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ABSTRACT : A significant decrease in germination and seedling emergence of cauliflower was recorded at 500 nematodes/kg soil which further decreased with increase in inoculum level. Seed germination and seedling emergence were more in unsterilized soil than in sterilized soil. Plant growth characters were adversely affected with an increase in the level of inoculum from 50 to 10000 juveniles/kg soil. Significant reduction in growth characters could be noticed at and above the level of 500 nematodes/kg soil.

Key words: Cauliflower, *Meloidogyne incognita*, seed germination, seedling emergence, pathogenicity.

Pathogenic effect of root-knot nematode, *Meloidogyne incognita* on banana, *Musa* sp.

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ABSTRACT : Pathogenicity of root-knot nematode, *Meloidogyne incognita* on banana was studied in green house conditions. Significant reduction occurred in plant growth parameters viz., plant height, pseudostem girth, number of leaves, leaf area, root length and weight in plants inoculated with 1000 and 10,000 juveniles/kg of soil. The highest gall indices of 4.6 and 5.0 were recorded at inoculum levels of 1000 and 10,000, respectively. Reduction in multiplication of the nematode was observed with increase in inoculum level.

Key words: Banana, *Meloidogyne incognita*, pathogenicity.

Management of disease complex of tomato caused by *Meloidogyne incognita* and *Fusarium oxysporum* f. sp. *lycopersici* through bioagent

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ABSTRACT : A pot experiment was conducted to investigate the effect of mustard cake and/or *Glomus etunicatum* in different combinations of *Meloidogyne incognita* and/or *Fusarium oxysporum* f. sp. *lycopersici* infecting tomato cv. Pusa Ruby. Both mustard cake and *G.etunicatum* were equally effective in reducing the damage caused by the nematode and/or the fungus. When both the management components (mustard cake and *G.etunicatum*) were applied together in the infested area, the combined efficacy was much more than the single application.

Key words : *Fusarium oxysporum* f.sp. *lycopersici*, *Glomus etunicatum*, management, *Meloidogyne incognita*, mustard cake, tomato.

Morphological characterisation of an Indian population of root knot nematode, *Meloidogyne hapla* Chitwood, 1949 (Nematoda : Meloidogynidae)*

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ABSTRACT : A population of root knot nematode, collected from the roots of tomato from Simla, Himachal Pradesh, India, was identified as *Meloidogyne hapla*, and was characterised morphologically as well as morphometrically. The perineal patterns of the females were mostly elliptical and typical of the species with distinct punctations concentrated in the area between anus and the tail terminus, small vulval slit and closely located phasmids: lateral field with two distinct incisures and often the striae of dorsal and ventral arch formed lateral wings. Most of its morphological and morphometrical characters were similar to those described earlier by Chitwood (1949) and Whitehead (1968). However, it showed some variations from the former in having less value for DGO in females and b in second stage juveniles (J₂) and slightly higher values for L, c, stylet and DGO in J₂. From the latter, it differed by having higher values for stylet length in females and L, c' and stylet length in J₂. The present population also showed some variations when compared with morphometric data of Jepson (1987). These were, however, considered as intraspecific variations of *M. hapla*. The morphometric characters have also been assessed on the basis of coefficient of variability.

Key words : Indian population, *Meloidogyne hapla*, morphological, morphometrical, root knot nematode, taxonomy, variations.

Effect of Carbofuran seed dressing and soil application of Carbofuran or Sebuphos for the control of Kalahasti malady caused by *Tylenchorhynchus brevilineatus* in groundnut

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ABSTRACT : A field experiment with carbofuran 25 SD as seed treatment followed soil application of sebuphos 10 G or carbofuran 3G, 30 days after sowing, was conducted for the control of Kalahasti malady. Maximum reduction in nematode population, disease severity and increase in pod yields were obtained in sebuphos 10 G and carbofran 3G soil treatments at 4 kg a.i./ha. JL-24 groundnut seed treatment with carbofuran 25 ST at 2% followed by soil application of sebuphos 10 G at 3.25 kg a.i/ha was next best with significant decrease in nematode population and disease severity and increase in pod yield. It was at par with the soil treatments of sebuphos 10G and carbofuran 3G at 4kg a.i./ha each. Hence, it can be recommended to the farmers for the control of the disease.

Key words : Carbofuran, groundnut, Kalahasti malady, sebuphos, seed treatments, soil application, *Tylenchorhynchus brevilineatus*.

Studies on soil nematodes of Manipur - VII : *Tylencholaimus vanguimus* sp.n. and *Dorella papila* sp.n.

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ABSTRACT : Two new species of dorylaims belonging to the genera *Tylencholaimus* and *Dorella* were recorded from soil around roots of *Vanguireas spinosa* and *Gravilea robusta* respectively. *Tylencholaimus vanguimus* sp.n. has body length 0.37 - 0.42 mm., a = 20.1 - 23.3, b = 2.5 - 2.8, c = 29.1 - 32.6, odontostyle = 4.8 - 6.4 μ m, expanded part of oesophagus 34-36% of the total oesophageal length, mono-prodelphic reproductive system and elongated hemispheroid tail. *Dorella papila* sp.n. is characterised by having 0.65 - 0.76 mm long body, lips with papillae, absence of disc, spear one to one-half times its head width, faint stiffening piece, mono-prodelphic reproductive system, presence of uterine sac and conoid to rounded tail terminus.

Key words : *Tylencholaimus*, *Dorella*, new species, soil nematodes.

Burrowing nematode *Radopholus similis* associated with banana crop in Madhya Pradesh

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ABSTRACT : Five plant parasitic nematodes were identified as key pests of banana in Madhya Pradesh. Spiral nematode, *Helicotylenchus multincinctus* was encountered in each locality. Relative density and total biomass u/mg soil of *H. multincinctus* was maximum in Nimar plateau. Lesion nematode, *Pratylenchus coffeae* was noticed in each agro climatic zones except Nimar plateau, whereas *Radopholus similis* was predominant in Malwa and Chhatisgarh plains. Cultivars Robusta and Basai (Bhusavali) were more prone to spiral and burrowing nematodes as they exhibited typical symptoms in most of the surveyed fields.

Key words : *Pratylenchus coffeae*, *Radopholus similis*, *Helicotylenchus multincinctus*, biomass, prominence value.

Population ecology and community structure of plant parasitic nematodes associated with ginger in northern West Bengal

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ABSTRACT : A two year survey of ginger in 24 plantations was done at 4 locations (Kalimpong, Pedong, Dupteen and Mirik) of Darjeeling district, West Bengal. Plant parasitic nematodes belonging to 8 genera and 10 species were detected. *Rotylenchulus reniformis*, *Hoplolaimus indicus* and *Xiphinema elongatum* were adjudged the first three positions in importance value and *R. reniformis*, *Pratylenchus coffeae* and *Helicotylenchus multicinctus* in prominence value, both in descending order. Cluster analysis, dendrogram and similarity index computed for ginger in the region indicated indenticality of more than 90%. nemic fauna of Kalimpong and Pedong. Factor analysis suggested that the location effect due to variations in climate, cropping system and management practices were least in most of the ginger growing areas. A system of pathogenic significance ranking (PSR) has been proposed. The findings may prove useful in diagnostic, advisory and management services in the region.

Key words : Community analysis, Cluster analysis, Ginger, Plant parasitic nematodes, West Bengal.

Description of three new species of dorylaims (Nematoda : Dorylaimida) associated with Litchi fruit trees in Doon valley (U.P.) India.

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ABSTRACT : Three new species of dorylaims i.e. *Thornenema garhwalicum* sp.n. *Aporcelaimus litchi* sp. n., and *Carcharolaimus denticus* sp.n., collected around the root zone of Litchi fruit trees from Doon valley are being described. *Thornenema garhwalicum* sp.n. resembles with *T. mauritanum* (Williams, 1959) Baqri & Jairajpuri, 1967 and *T. baldum* (Thorne, 1959) Andrassy, 1959. It differs in having a shorter tail, longer spicule and more number of ventro-median supplements and having a differently shaped longer and narrower body, longer spicule and more ventromedian supplements. *Aporcelaimus litchi* sp.n. resembles with *A. cobbi* Thorne, 1937 and *A. pachydermus* Thorne 1937, but differs in having differently shaped lip region with sclerotization, longer spear, anterior vulva and body width and having conoid tail and shorter body. *Carcharolaimus denticus* sp.n. resembles with *Carcharolaimus banaticus* Karjaic and Loof, 1975 and *C. masoodi* Jairajpuri, 1968, but differs in having more denticles, longer body, short tail and longer body and tail length, small denticles absent, longer denticles attached to buccal cavity, oesophago-intestinal pad absent.

Key words : *Thornenema*, *Aporcelaimus*, *Carcharolaimus*, litchi fruit trees, new species.

Studies on soil nematodes of Manipur - VIII: Two new species of *Dorylaimellus* from the hills of Manipur.

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ABSTRACT : Two new species, *Dorylaimellus (Dorylaimellus) himilus* sp.n. and *Dorylaimellus (Belondorylaimellus) chakpilus* sp.n were found at Chakpikarong, a hill station of Manipur. *D. (D.) himilus* has 0.39 - 0.50 mm long body, a =26.7 - 31.4, c =25.3 - 31.3, odontostyle =6.4 - 8.8 μ m, amphidelphic gonad and subcylindrical tail. *D. (B) chakpilus* has 0.57 - 0.60 mm long body. a =34.8 -37.6, b =3.2 -3.5, c =13.9 -15.6, odontostyle =5.6 - 7.2 μ m, expanded part of oesophagus 52.8 - 54.9% of total oesophageal length, amphidelphic gonad and elongate dorsally convex conoid tail.

Key words : *Dorylaimellus chakpilus* sp.n, *D. himilus* sp.n., Manipur, new species.

Management of Kalahasti Malady (*Tylenchorhynchus brevilineatus*) of groundnut through crop rotation

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ABSTRACT : Field experiments with 15 crop rotation treatments were conducted in farmers field at Guttivaripalli, Chittoor district, Andhra Pradesh, to determine the effect of crop rotation on kalahasti malady. *Rabi* groundnut preceded by summer rice and *kharif* rice recorded maximum decrease in nematode population (59.7%), disease severity (42.6%) and increase in pod yield (83.3%). This was closely followed by the two cropping sequences viz., *rabi* groundnut preceded by summer rice and *kharif* sunhemp and *rabi* groundnut preceded by *kharif* rice. Blackgram, greengram and maize proved to be susceptible hosts for the nematode.

Key words : Crop rotation, disease severity, Kalahasti malady, Pod yield, *Tylenchorhynchus brevilineatus*.

Mononchida of Garhwal Himalayas (U.P.) India II. Two known and one new species of the genus *Mononchus* Bastian, 1865 (Nematoda : Mononchida)

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ABSTRACT : In a survey for predatory soil nematodes of the order Mononchida, in 5 hill districts of Garhwal Himalayas, during 1994-1997, 2 known and one new species of the genus *Mononchus*. (*M.aquaticus*, *M. truncatus* and *M. himalayensis* sp. n.) were collected and are described here. *M. truncatus* is reported for the first time from India. *M. himalayensis* sp.n. comes close to *M. truncatus* Bastian, 1865 and *M. pulcher* Andrassy, 1993. It differs from the former in the value of " c' ", presence of one pre-vulval papillae, ABD and tail length. From *M. pulcher* it differs in having longer buccal cavity, presence of one pre-vulval papillae, tail length and in the value of "b"; "c".

Key words : *Mononchus aquaticus*, *M. truncatus*, *M. himalayensis* sp. n. Garhwal Himalayas.

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Influence of two *Chenopodium* species on the larval emergence of *Heterodera avenae*

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ABSTRACT : Influence of aqueous shoot extracts (stock 40% w/v) of two *Chenopodium* spp., *C. album* and *C. murale*, on the larval emergence from *Heterodera avenae* cysts was studied *in vitro*. An inhibition in the emergence of larvae was observed in 100% concentration of the extract (stock) of both *Chenopodium* spp. as compared to control (water alone). The effect decreased with dilution of the extract but increased with exposure time. The cysts exposed to S concentration did not resume hatching upon transfer to water. At lower concentration too, resumption in hatching was significantly less compared to control. *C. album* was more effective than *C. murale*.

Key words : *Chenopodium murale*, *C. album*, aqueous shoot, cereal cyst nematode, juvenile emergence.

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Morphological characterisation of five Indian populations of root-knot nematode, *Meloidogyne javanica* (Treub, 1885) Chitwood, 1949.

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ABSTRACT : Five populations of root-knot nematodes, *Meloidogyne javanica* collected from Delhi, Haryana, Rajasthan, Tamil Nadu and Gujarat, were identified and characterised morphologically. In general, the body size of the females and larvae was maximum in Rajasthan-population and minimum in Delhi-population. But, the neck size was minimum in the former and maximum in the latter. The females with longer necks tend to have bigger median bulb and its valve and its more posterior location from the head. Like wise in juveniles, the size and location of median bulb, tail length and anal body width exhibited direct correlation with the body length. Inter-population differences were also evident in morphometrics of perineal patterns, stylet and oesophagus of females and second stage juveniles and tail of second stage juveniles. Among the various taxonomic characters, the perineal pattern, head and stylet morphology of mature females were the most reliable for precise identification of this species. Evaluation of morphometric characters indicated that stylet length, distance from head to stylet base, length and width of median valve, position of dorsal oesophageal gland orifice of females, length, width and ratio a of eggs were the least variable characters; length and width of median bulb and ratio a of females were moderately variable; while length and width of female body and its neck, distance from head to median bulb and ratio a of neck were highly variable characters. In second stage juveniles (J₂), body length, width, stylet length, width of median bulb, distance from head to stylet base, median bulb, median valve, excretory pore and oesophageo-intestinal junction, tail length, anal body width, ratios a, b, c' and b, were stable characters; distance from head to oesophageal gland base, length of median bulb and b' were moderately variable while position of dorsal gland orifice, 0%, hyaline part of tail and ratio were highly variable characters. Most of these characters were in conformity with the type description of *M.javanica* except for some variations, which have been discussed.

Key words : Morphological, morphometrical, characterisation, *M. javanica*, Indian populations.