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Penetration and development of root-knot nematode, *Meloidogyne incognita* alone and in presence of wilt fungus, *Fusarium oxysporum* in susceptible and resistant cultivars of cowpea*

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ABSTRACT : Ten day old seedlings of cowpea cultivars viz; Pusa Komal (susceptible to both nematode and wilt fungus) and C-152 (resistant to nematode and susceptible to wilt fungus) were inoculated separately with *Meloidogyne incognita* @ 2 J₂/g soil, both alone and in presence of wilt fungus, *Fusarium oxysporum* (inoculated simultaneously) in 4 cm diameter plastic pots containing 200 g sterilized soil. Maximum penetration of *M. incognita* in both the treatments i.e., (nematode alone and nematode+fungus simultaneously) in both the cultivars occurred upto 7 days after inoculation. In the roots of Pusa Komal, 21 to 28 days were required by *M. incognita* (in both the treatments) to complete its development from 2nd stage to adult stage. However, in C-152, *M. incognita* took 32 days for development. In C-152, besides reduced penetration, a delayed development of second stage larva to adult with a marked increase in the number of males was observed. No significant difference was observed in respect to penetration and development of *M. incognita* within the roots subjected to nematode alone or in presence of *F. oxysporum* in either of the cowpea cultivars.

Key words: Cowpea, development, *Fusarium oxysporum*, *Meloidogyne incognita*, penetration.

Comparison of different methods of application of *Pasteuria penetrans* for the control of *Heterodera cajani* on cowpea

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ABSTRACT : Of the four methods tested for spore application of *Pasteuria penetrans*, strain isolated from *Heterodera cajani*, spores mixed with sand gave better control of *H. cajani* compared to application of spore suspension, infected cysts or seed coating. The maximum reduction in cyst and juvenile population was found to be 38.5 and 53.3%, respectively, by the application of sand mixed with spores and the minimum was only 8.9 and 20.3% when spores were applied as seed coating. Plant growth characters were at par in treatments receiving either spores mixed with sand or as spore suspension compared to control.

Key words: Application methods, cowpea, *Heterodera cajani*, *Pasteuria penetrans*.

Effect of *Meloidogyne incognita* on growth, physiology and oil yield of *Ocimum sanctum*

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ABSTRACT : Influence of varying initial inoculum densities (Pi) of *Meloidogyne incognita* on growth, physiological/biochemical changes and oil content of *Ocimum sanctum* cv. Shyama was studied under glasshouse conditions. An inversely proportional relationship was observed between Pi and fresh and dry weights, total chlorophyll, sugar, phenol and oil content of *O. sanctum*. The intensity of root galling was directly proportional to the increase in Pi. Highest reduction in all the growth parameters was observed in plants inoculated with highest Pi (2.1 J2 /g of soil). The highest reproduction factor (Rf = 20.37) was found in plants inoculated with lowest Pi (0.1 J2 /g of soil).

Key words: Inoculum densities, *Meloidogyne incognita*, *Ocimum sanctum*, reproduction factor.

Mononchida of Garhwal Himalayas (U.P.), India-I. Description of known and new species of the genus *Coomansus* Jairajpuri & Khan, 1977 (Nematoda : Mononchida)

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ABSTRACT : Three known and two new species of the genus *Coomansus* have been described. *C. indicus*, *C. parvus*, *C. campbelli* were collected from different localities in Garhwal Himalayas. *C. parvus* was most frequent. *Coomansus minor* n.sp. is collected from high altitude in Uttarkashi District. It is smallest among all species of the genus. It comes close to *C. parvus* (De man, 1980) Jairajpuri & Khan, 1977 and *C. obliquoris* (Eroshenko, 1975) Jairajpuri & Khan, 1977, but differs from *C. parvus* in the size of body length, shape of lips and value of "a". It differs from the latter in having a shorter body length and shorter tail. *Coomansus garhwalicus* n.sp. comes close to *C. indicus* Jairajpuri & Khan, 1977 but differs in its lip width, lip height, length and width of buccal cavity, the position of dorsal tooth from the base of buccal cavity, measurements of "V" and tail length.

Key words: *Coomansus campbelli*, *C. parvus*, *C. indicus*, *C. minor* sp.n., *C. garhwalicus* sp.n., Garhwal Himalayas.

Variability in *Tylenchorhynchus brevilineatus* Williams, 1960

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ABSTRACT : Morphometric and morphological variations were recorded on maize population of *Tylenchorhynchus brevilineatus* Williams, 1960. Data were statistically analysed for coefficient of variation (C.V.) of each character and a correlation matrix table was prepared. Intra-specific variations in some characters viz., lip region, lateral field, longitudinal striations, oesophageal bulb and cardia, hemizonid and excretory pore position, post-anal blind sac, spicule and gubernaculum and tail shape are discussed.

Key words: Morphological, morphometrical, *Tylenchorhynchus brevilineatus*, variability.

Studies on host preferences of two races of reniform nematode, *Rotylenchulus reniformis* from India*

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ABSTRACT : A set of 13 crops was used to know the host preferences of two populations representing different host races of reniform nematode, *Rotylenchulus reniformis*, one from Delhi (Race 1) and the other from Andhra Pradesh (Race 4), collected from the roots of grapevine. Two crops i.e. chilli cv. Pusa Jwala and sorghum cv. SC-1 were found nonhosts for both the races since there was no penetration on the roots. Both populations formed eggmasses, in varying number (19-68 eggs/root system), on the roots of seven crops viz. bottlegourd cv. Pusa Summer Prolific Long, cowpea cv. Pusa Komal, castor cv. GAU-CH1, cotton cv. H-777, okra cv. Pusa Sawani, brinjal cv. Pusa Purple Long and tomato cv. Pusa Ruby, which were common hosts for both the populations. The populations exhibited marked differences in their capability to reproduce on four crops (pea cv. AP-1, *bajra* cv. Pusa-23, mustard cv. Pusa Bold and maize cv. Luxmi), on which Delhi-population produced eggmasses while AP-population could not. Fecundity of two races also varied from crop to crop. The two host races were thus further differentiated on the basis of their host preferences, with Delhi-population being more virulent and aggressive than the AP-population.

Key words: Host races, reniform nematode, *Rotylenchulus reniformis*.

Nematicidal effect of culture filtrates of *Paecilomyces lilacinus* isolates on *Meloidogyne incognita*

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ABSTRACT : The culture filtrates of tested Indian isolates of *Paecilomyces lilacinus* possessed nematicidal action on *Meloidogyne incognita* (J₂). The highest percentage (77%) of juvenile mortality was recorded in isolate 6 and lowest in isolates 3 and 4. Fungal filtrates of each Indian isolate caused irreversible kill of *M. incognita* even after 24 hours exposure. The isolates exhibited variation with respect to their nematicidal action.

Key words: Culture filtrate, *Meloidogyne incognita*, Nematicidal action, *Paecilomyces lilacinus*.

Occurrence and distribution of *Tylenchulus semipenetrans* Cobb in Nagpur mandarin orchards of Vidarbha, Maharashtra

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ABSTRACT : Survey of Nagpur mandarin orchards was conducted to determine the occurrence, distribution and population density of plant parasitic nematodes in Vidarbha region of Maharashtra. A total of 119 orchards were sampled from six Talukas viz., Nagpur, Kalmeshwar, Katol, Narkhed, Parseoni and Warud. Fourteen plant parasitic nematode species were found associated with Nagpur mandarin. *Tylenchulus semipenetrans* was the most abundant and widely distributed throughout the region followed by *Basiria graminophila* and *Rotylenchulus reniformis*. *T. semipenetrans* recorded highest absolute frequency (80.7%), absolute density (2212 nematode/250 cc soil) and prominence value (1990.8). High, medium and low populations of *T. semipenetrans* were observed in 52, 13 and 16% of the orchards. The maximum (3049 nematodes/250 cc soil) population of *T. semipenetrans* was observed in Kalmeshwar followed by Katol (3033 nematodes/250 cc soil) and the minimum population (267 nematodes/250 cc soil) in Parseoni Taluka. The population of *T. semipenetrans* was observed more in trees showing initial decline than in trees of advanced stage of decline. It was observed that the trees of 11-15 years of age supported maximum population of *T. semipenetrans* compared to younger or older trees.

Key words: *Citrus reticulata*, distribution, Nagpur mandarin, survey, *Tylenchulus semipenetrans*.

Three new species of *Aphelenchoides* Fisher, 1894 (Aphelenchina : Nematoda) from India alongwith a compendium of Indian species

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ABSTRACT: Three new species of genus *Aphelenchoides* have been described from Haryana, India. *A. brushimucronatus* sp.n. (from mushroom beds) has females with L = 0.43-0.51 mm; a = 29-32; b = 8.3-9.8; b' = 4.2-4.6; c = 11-13; c' = 4.8-5.5; stylet = 13 μ m; V = 62-73; post vulval uterine sac = 31-47 μ m long; lateral lines 4. Males common, dorsal limb of spicule = 20-22 μ m and mucro in both sexes hair brush like. *A. pinusi* sp.n. (from rhizosphere of *Pinus* sp.) has females with. L = 0.56-0.80 mm; a = 25-43; b = 9.1-11.6; b' = 4.0-5.0; c = 12.16; c' = 3.7-6.9; stylet = 13 μ m; V = 65-70; post vulval uterine sac = 34-60 μ m long; lateral lines 2; mucro ventral. Males common, dorsal limb of spicule 25-30 μ m long, with knob like process at its distal end. *A. spinohamatus* sp.n. (from mushroom beds) has females with L = 0.63-0.79 mm; a = 31-36; b = 10.3-15.2; b' = 4.5-7.6; c = 13-17; c' = 3.5-4.8; stylet = 11-13 μ m; V = 69-73; post vulval uterine sac = 61-76 μ m; lateral lines 4; mucro spiny with broad base. Males common, dorsal limb of spicule 25-27 μ m long, with a knob-like process at the distal end. Twelve known species of the genus collected from Haryana and Himachal Pradesh have been reported with *A. blastophthorus* Franklin, 1952 being a new record from India. Compendium and key to Indian species of *Aphelenchoides* are provided.

Key words: *Aphelenchoides brushimucronatus* sp. n., *A. pinusi* sp.n., *A. spinohamatus* sp.n., *A. blastophthorus*, compendium, key, taxonomy.

Bio-management of *Meloidogyne incognita* on tomato by integrating *Glomus mosseae* with *Pasteuria penetrans*

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ABSTRACT : Studies conducted to evaluate the effect of integration of *Pasteuria penetrans* and *Glomus mosseae* for the management of *Meloidogyne incognita* infecting tomato revealed significant increase in plant growth parameters and reduction in root galling, nematode population in roots, egg mass production and fecundity of the nematode. Combination of these two eco-friendly components has also significantly increased the parasitisation of nematode females by *P. penetrans*. Bacterial bioagent did not affect the root colonisation of endomycorrhiza after transplanting. These results suggest the potential use of these eco-friendly components for the sustainable management of root-knot nematode on tomato.

Key words: *Glomus mosseae*, integrated management, *Pasteuria penetrans*, root-knot nematode, tomato.

Mode of reproduction and interbreeding capabilities of two host races of reniform nematode, *Rotylenchulus reniformis**

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ABSTRACT : The interbreeding capabilities of two geographical populations representing different host races (race 1 from Delhi and race 4 from Andhra Pradesh) of reniform nematode, *Rotylenchulus reniformis* were studied under laboratory conditions. The data on root population showed that the absence of males did not prevent bud did affect the penetration by females. The two populations were indicated to be amphimictically reproducing since males were essential for reproduction. Furthermore, females of Delhi population (race 1) could not reproduce with the males of A.P. population (race 4), while females of the latter could successfully reproduce with males of the former, thus exhibiting the phenomenon of partial reproductive isolation. Hence, it is hypothesised that the two host races of different geographical origin, are perhaps in the process of speciation, but not yet to the extent of complete reproductive isolation.

Key words: Host races, interbreeding, reproduction, reniform nematode, *Rotylenchulus reniformis*.

Mass production technology for entomopathogenic nematodes, *Steinernema* spp.

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ABSTRACT : *In vitro* mass production technology for entomopathogenic nematode, *Steinernema glaseri* and one unknown species of this genus, has been developed using artificial media. With this technique an average of 50,000 nematodes were produced from 1.5 cm³ polyurethane sponges incorporated with 5 ml medium. The symbiont bacteria *Xenorhabdus* also grew well and multiplied rapidly in the formulated medium. *In vitro* produced infective juveniles (IJs) of *S. glaseri* induced cent percent mortality of test insect, *Spodoptera litura* larvae under laboratory conditions. The IJs, treated with antidesiccant (5% starch solution) when applied @ 1,00,000/m² produced 83.8% mortality of *Holotrichia consanguinea* larvae on groundnut.

Key words: Entomopathogenic nematode, *Holotrichia consanguinea*, mass production, *Spodoptera litura*, *Steinernema* spp., *Xenorhabdus* sp.,

Salicylic acid induced resistance in tomato against *Meloidogyne incognita* Race 1

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ABSTRACT : Salicylic acid is a natural phenolic compound present in many plants and is involved in induction of pathogenesis related proteins in various crops including tomato. Foliar application of salicylic acid on tomato cv. Pusa Ruby, @ 25 and 50 $\mu\text{g/ml}$ affected the development of the root-knot nematode, *Meloidogyne incognita*. The development of juveniles into adult females was considerably delayed and population of males increased indicating sex reversal, on application of 50 $\mu\text{g/ml}$ of salicylic acid. Reduced root galling (50% or lower) was observed in the treated tomato plants over control.

Key words: *Meloidogyne incognita*, resistance, salicylic acid.