

Management of root-knot nematode, <i>Meloidogyne incognita</i> through antagonistic approaches in pointed gourd --A.C. Verma, H.K. Singh and M. Nehal Khan	--	78
Efficacy of <i>Pasteuria penetrans</i> against <i>Meloidogyne incognita</i> on greengram under field condition --B.B. Gogoi and P.P. Neog	--	80
Rice root nematode <i>Meloidogyne graminicola</i> —A threat to rice-wheat cropping system --K.R. Dabur and R.K. Jain	--	81
Polyethylene mulching in the management of plant parasitic nematodes --H.K. Sharma, Pankaj and S.D. Mishra	--	82
Viability of <i>Meloidogyne incognita</i> juveniles exposed to fungal culture filtrates --R.K. Bansal, R.S. Dahiya, I.J. Paruthi and R.K. Jain	--	84
Biodiversity of plant parasitic nematodes on yams, <i>Dioscorea</i> spp. in Kerala --Reni Varghese and N.C. Kurup	--	86
Comparative biology of <i>Meloidogyne incognita</i> on capsularis and olitorius jute --Bibha Luang and B.C. Bora	--	88
Screening of jute cultivars for resistance against root-knot nematode, <i>Meloidogyne incognita</i> --Bibha Luang and B.C. Bora	--	90
Effect of rice root-knot nematode ( <i>Meloidogyne graminicola</i> ) on wheat in rice-wheat cropping system --Daman Jeet Kaur	--	90
Effect of initial inoculum levels of <i>Meloidogyne incognita</i> on root-knot development and growth of <i>Vigna radiata</i> cv. ML-1108 --Akhtar Haseeb, Anita Sharma and Prabhat Kumar Shukla	--	93
New record on the occurrence of <i>Radopholus similis</i> (Cobb, 1893) Thorne, 1949 on pine trees in Manipur --L. Victoria, N. Mohilal and Ch. Dhanachand	--	95
Effect of root-knot nematode with <i>Fusarium solani</i> on damping-off of papaya --Ram Kishore, R.S. Kamalwanshi and Manjul Pandey	--	96
Effect of essential nutrients application for the management of root-knot nematode, <i>Meloidogyne incognita</i> on tomato --G. Rajendran and V. Saritha	--	98
Reaction of accessions of wild relatives of pigeonpea against root-knot nematode, <i>Meloidogyne javanica</i> and pigeonpea cyst nematode, <i>Heterodera cajani</i> --Bansa Singh and I.P. Singh	--	101
Book review --Sudershan Ganguly and A.K. Ganguly	--	105
<b>Vol. 35 No. 2 December, 2005</b>		
Two new species of Dorylaimida (Nematoda) from India --Padma Bohra and Qaiser H. Baqri	--	107
Organic amendments for the control of root-knot nematode on <i>Phaseolus mungo</i> --M. Vaitheeswaran, S. Mohamed Ibrahim and K.Lakshmi Narasimhan	--	112
Pathogenicity of <i>Aphelenchoides composticola</i> on white button mushroom ( <i>Agaricus bisporus</i> ) --Gitanjali and S.N. Nandal	--	120
Effect of marigold, <i>Tagetes erecta</i> intercropped with banana against root-lesion nematode, <i>Pratylenchus coffeae</i> --P. Sundararaju	--	123
Biomangement of reniform nematode, <i>Rotylenchulus reniformis</i> on cowpea ( <i>Vigna unguiculata</i> ) by neem --R. Umamaheswari, Rajeswari Sundarababu and S. Ramakrishnan	--	127

Diversity of phytophagous nematodes associated with economically important crops in Gujarat, India --Padma Bohra, Qaiser H. Baqri and Alok K. Dwivedi	-- 130
Evaluation of application methods of the nematode trapping fungus, <i>Arthrobotrys oligospora</i> a potential biocontrol agent of root-knot nematode, <i>Meloidogyne incognita</i> on okra --S.C. Dhawan, R. Narayana and N. Prakash Babu	-- 134
Effect of fungal filtrates of some opportunistic fungi on hatching and mortality of root-knot nematode, <i>Meloidogyne javanica</i> --Mohd. Shaikhul Ashraf and Tabreiz Ahmad Khan	-- 138
Plant extracts and their role in management of juveniles of <i>Meloidogyne incognita</i> --Ranjana Saxena and Aparajita Gangopadhyay	-- 142
Biotoxicity of some ornamental leaf extracts against <i>Meloidogyne incognita</i> --Ranjana Saxena and Lalita	-- 145
Studies on interaction between brinjal mosaic virus and root-knot nematode on brinjal --K.P. Chovatiya, B.N. Patel and H.R. Patel	-- 148
Bio-efficacy of avermectin against root-knot nematode, <i>Meloidogyne incognita</i> in tomato --J. Jayakumar, G. Rajendran and S. Ramakrishnan	-- 151
Effects of temperature and relative humidity on the emergence of infective juveniles of <i>Heterorhabditis indica</i> from Meghalaya, India --Lalramliana, Arun K. Yadav and A.N. Shylesha	-- 157
Estimation of salicylic acid and its role in resistance mechanism in chickpea against <i>Meloidogyne incognita</i> --Pankaj, Gautam Chawla, N. A. Shakil, Veer Kishor and Deepika Rohatgi	-- 160
Movement of cadusafos in soil and invasion of <i>Meloidogyne incognita</i> juveniles in eggplant roots --H.C. Meher, H.S. Gaur and G. Singh	-- 163
Evaluation of different tissue cultures of chilli, <i>Capsicum annum</i> for <i>in vitro</i> establishment of <i>Meloidogyne incognita</i> --R.K. Kaul	-- 166
Viability of <i>Pasteuria penetrans</i> parasitising <i>Meloidogyne incognita</i> under different conditions --R.K. Kaul and K.K. Chaudhary	-- 171
Integrated management of root-knot nematode ( <i>Meloidogyne incognita</i> ) on okra ( <i>Abelmoschus esculentus</i> (L.) Moench) --Nabanita Das and A.K. Sinha	-- 175
Bioactivity of normal and UV exposed azadirachtins A, B and H against the root-knot nematode, <i>Meloidogyne incognita</i> --Subhomay Sinha, Uttam Chakraborty, S.D. Mishra and Balraj S. Parmar	-- 183
Host range, biology and races of <i>Heterodera cajani</i> Koshy, 1967 occurring in Tamil Nadu (India) --K. Senthamizh, G. Rajendran and S. Subramanian	-- 187
Management of disease complex involving <i>Heterodera cajani</i> Koshy, 1967 and <i>Macrophomina phaseolina</i> (Tassi.) Goid. on greengram ( <i>Vigna radiata</i> L. Wilczek) --M. Zareenaa Begum and M. Sivakumar	-- 192
Bare root dip application of SAR inducing chemicals in tomato against root-knot nematode, <i>Meloidogyne incognita</i> --Anil Sirohi and Pankaj	-- 195
Interactive effect of <i>Meloidogyne incognita</i> and <i>Fusarium oxysporum</i> on growth and yield of <i>Vigna radiata</i> --Anita Sharma, Akhtar Haseeb and Prabhat Kumar Shukla	-- 199
<b>SHORT COMMUNICATIONS</b>	
New record of <i>Steinernema siamkayai</i> Stock <i>et al.</i> , 1998 from Champawat district of Uttaranchal, and its biochemical characterisation --Sudershan Ganguly, Kabindra Singh Rathour and Jola Pandey	-- 203
Carbohydrate metabolism in a host plant, <i>Hibiscus cannabinus</i> infected by <i>Meloidogyne incognita</i> --M. Vaitheeswaran, S. Mohamed Ibrahim and K. Senthil Kumar	-- 205

Standardization of a method of fixation and dehydration of criconematids --Kumkum Walia and Harish K. Bajaj	-- 207
Community analysis of plant parasitic nematodes associated with groundnut ( <i>Arachis hypogaea</i> L.) in Erode district of Tamil Nadu --K. Senthamizh, M. Sivakumar and C.V. Sivakumar	-- 209
Control of <i>Radopholus similis</i> using fermented bamboo-shoot "SOIBUM" --N. Mohilal, M. Promodini and Ch. Dhanachand	-- 210
Studies on cured leaf extract of bidi tobacco on growth and development of okra and root-knot disease --D.N.P. Sharma and H.R. Patel	-- 212
Reaction of okra varieties to root-knot nematode ( <i>Meloidogyne incognita</i> ) --Nabanita Das and A.K. Sinha	-- 214
New record of an entomopathogenic nematode, <i>Steinernema siamkayai</i> Stock, Somsook and Reid, 1998 from Tamil Nadu, India --R. Uma Maheswari, M. Sivakumar and S. Subramanian	-- 215
Reaction of brinjal germplasm against root-knot nematode, <i>Meloidogyne incognita</i> --H.K. Sharma, Pankaj, Siyanand, G. Singh and Ravinder Agarwal	-- 216
Nematodes associated with vegetable crops in Ri-Bhoi district of Meghalaya --N.S. Azad Thakur, Gitanjali Devi and A.N. Shylesha	-- 217
A new record of <i>Meloidogyne graminicola</i> on rice, <i>Oryza sativa</i> in Kerala --M.S. Sheela, T. Jiji, M.S. Nisha and Joseph Rajkumar	-- 218
Screening of cowpea varieties for resistance against <i>Meloidogyne incognita</i> --B.N. Choudhury, M.F. Rahman and Aparajita Bora	-- 219
Gallant soldier, <i>Galinsoga parviflora</i> L., a new host of root-knot nematode ( <i>Meloidogyne incognita</i> ) from Meghalaya --N.S. Azad Thakur and Gitanjali	-- 220
Isolation of entomopathogenic nematode from Jhansi, Uttar Pradesh --N.K. Shah and M.I. Azmi	-- 220
Community analysis of phytonematodes in the sugarcane ecosystem in Bundi district of Rajasthan --R.P. Nandwana, M.K. Varma and Arjun Lal	-- 221
Association of <i>Tylenchulus semipenetrans</i> with slow-decline of citrus in humid south eastern plains of Rajasthan --R.P. Nandwana, M.K. Varma and Arjun Lal	-- 222
Biodiversity of nemic fauna associated with wheat in two districts of Haryana --Kumkum Walia, R.S. Kanwar and H.K. Bajaj	-- 224
Reaction of tomato cultivars against root-knot nematode, <i>Meloidogyne incognita</i> --K.V. Gopinatha, D. Nanje Gowda, Zaheer Ahmed and M. Nagesh	-- 226
Nematodes associated with kiwi ( <i>Actinidia deliceous</i> Chev.) in Kashmir valley, India --M.I.S. Waliullah	-- 227
Field screening of lentil cultivars against <i>Meloidogyne incognita</i> – <i>Fusarium oxysporum</i> f. sp. <i>lentis</i> disease complex --A. Haseeb, A. Sharma and S. Abuzar	-- 227
Book reviews	-- 229
Proceedings of National Symposium	-- 232
Recommendations of Biennial Group Meeting	-- 234

## Two New Species of Dorylaimida (Nematoda) from India

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**ABSTRACT:** Two new species of Dorylaimida from India, are reported. *Ischiodorylaimus rathori* sp.n. is characterised by having 2.67-2.90 mm long body, cuticle marked by 30-32 longitudinal lines, lip region amalgamated marked by depression; odontostyle 39-41  $\mu$ m; odontophore 42-44  $\mu$ m; female reproductive system amphidelphic; tails dissimilar in two sexes; female tail 4.4-5.3 anal body width while male tail 0.65-0.77 anal body width; spicules 65-75  $\mu$ m long and two groups of ventromedian supplements separated by 3-4 spaced supplements (8+4+9-11+3+10). *Dorylaimellus sewaki* sp.n. is characterised by having 0.82-0.93 mm long body; lip region distinctly set off by constriction, narrower than adjoining body; odontostyle 6-7  $\mu$ m long; odontophore 8-9  $\mu$ m long; female reproductive system amphidelphic; spicules 23  $\mu$ m long; 5 ventromedian supplements irregularly arranged; tail similar in both sexes 34-35  $\mu$ m long, arcuate conoid with rounded tip.

**Key Words:** *Ischiodorylaimus rathori* sp.n., *Dorylaimellus sewaki* sp.n., Dorylaimida, Taxonomy.

[Back to Contents](#)

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## Organic Amendments for the Control of Root-Knot Nematode on *Phaseolus mungo*

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**ABSTRACT:** The different organic amendments were observed to suppress the reproduction and population build up of *Meloidogyne incognita* on *Phaseolus mungo* and also improved plant growth. The growth was found to be maximum in neem oil cake treated infected plant. The impact of pathogenesis is reflected at tissue level with low sugar and elevated phenol and protein levels in the infected plant. The activities of dehydrogenases and endogenous reductases were more in the infected plant under different organic amendments treatment albeit the efficiency of different organic amendments in controlling the nematode population and improving the plant growth was in the following order: Neem cake > Groundnut cake and Neem cake > Cauliflower leaf extract > Groundnut cake.

**Key words:** *Phaseolus mungo*, *Meloidogyne incognita*, nematode population, organic amendments, plant growth.

[Back to Contents](#)

## Pathogenicity of *Aphelenchoides composticola* on White Button Mushroom (*Agaricus bisporus*)\*

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**ABSTRACT:** The pathogenic potential of *Aphelenchoides composticola* to *Agaricus bisporus* was found to be dependent on the initial inoculum level and time of infestation of the mushroom beds. Yield parameters were found to be significantly less at and above 10 nemas per kg compost, irrespective of time of inoculation. Highest yield and number of fruiting bodies were recorded when inoculation was done at the time of casing followed by spawning and lowest at composting. Maximum nematode population was recorded when inoculation was done at the time of composting followed by spawning and minimum at casing.

**Key words:** *Aphelenchoides composticola*, *Agaricus bisporus*, composting, spawning, casing, spawn run.

[Back to Contents](#)

## Effect of Marigold, *Tagetes erecta* Intercropped with Banana against Root-Lesion Nematode, *Pratylenchus coffeae*

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**ABSTRACT:** An experiment was conducted at farmer's field on banana cv. Nendran (AAB) infested with root-lesion nematode. Maximum reduction in root-lesion index and nematode population was noticed, where *Tagetes erecta* was grown as an intercrop and on par with chemical treatment, whereas, maximum population was recorded in untreated control plants. The yield of banana increased significantly to 12.5 and 12 kg/plant in plants treated with chemical pesticides and intercropped with *Tagetes* respectively compared to a minimum bunch weight of 7 kg per plant in untreated control plants. Though the plants treated with chemical pesticides were found to be on par with marigold grown as an intercrop, but the use of marigold as an intercrop in banana field warrants more economical and ecofriendly compared to chemical nematicides.

**Key words:** *Pratylenchus coffeae*, *Tagetes erecta*, monocrotophos, carbofuran, neem cake, banana, Nendran (AAB)

[Back to Contents](#)

## **Bio-management of Reniform Nematode, *Rotylenchulus reniformis* on Cowpea (*Vigna unguiculata*) by Neem**

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**ABSTRACT:** Two glass house experiments were conducted to study the impact of neem (*Azadirachta indica*) leaf extract and leaf powder on *Rotylenchulus reniformis* infecting cowpea. Aqueous leaf extract of neem was applied as foliar and soil application at two concentrations (10 and 15 %). Soil application with 15% extract recorded maximum growth parameters and yield (25.5 g/plant) and minimum nematode population in soil (109.5/250 cc) and root (10/g). Foliar application also showed significantly higher growth parameters and lesser nematode population compared to control. In another experiment, neem leaf powder as seed treatment at 10% w/w recorded the highest growth parameters and yield (36.5g/plant) and the lowest nematode population in soil (43.5/250 c.c.) and roots (3.5/g).

**Key words:** Neem leaf extract, leaf powder, *Rotylenchulus reniformis*, *Vigna unguiculata*.

[Back to Contents](#)

## **Diversity of Phytophagous Nematodes associated with Economically Important Crops in Gujarat, India**

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**ABSTRACT:** During 2000-2004, surveys were conducted in 25 districts of Gujarat for collecting soil samples for isolating plant and soil nematodes. The collected samples yielded a variety of nematodes. About 100 species were identified during this study belonging to 40 genera and 20 families of the orders Tylenchida (21 spp.), Aphelenchida (1 sp.), Dorylaimida (70 spp.) and Mononchida (8 spp.), including 13 species as new records. Their distribution up to district level has also been provided.

**Key words:** Anhydrous glycerine, formalin, Gujarat, new record, plant and soil nematodes.

[Back to Contents](#)

## **Evaluation of Application Methods of the Nematode Trapping Fungus, *Arthrobotrys oligospora* a Potential Biocontrol Agent of Root-Knot Nematode, *Meloidogyne incognita* on Okra**

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**ABSTRACT:** A trial was conducted in earthen pots to evaluate the efficacy of talc-based formulation of nematode trapping fungus, *Arthrobotrys oligospora* as seed treatment and soil application against root-knot nematode, *Meloidogyne incognita* on okra under screen house. The highest lengths and weights of shoot and root were recorded in the treatment that received soil application of the fungus @ 3% w/w and the minimum was found in nematode alone treatment. The nematode multiplication was significantly reduced in the treatment with soil application of the fungus at both the doses (1.5 & 3.0). The highest reduction in number of galls, egg mass/plant and eggs/egg mass was 42.6, 48.4 and 43.4% respectively in treatment that received soil application of the fungus @ 3% w/w. Soil application of the fungus was found superior in reducing the nematode population compared to seed treatment.

**Key words:** Bio-management, *Arthrobotrys oligospora*, *Meloidogyne incognita*, okra.

[Back to Contents](#)

## Effect of Fungal Filtrates of Some Opportunistic Fungi on Hatching and Mortality of Root-Knot Nematode, *Meloidogyne javanica*

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**ABSTRACT:** *In vitro* experiment on the effect of culture filtrates of four opportunistic fungi (*Paecilomyces lilacinus*, *Cladosporium oxysporum*, *Gliocadium virens* and *Talaromyces flavus*) on the larval hatching and mortality of *Meloidogyne javanica*, showed *P. lilacinus* the most effective and that of *T. flavus* the least against *M. javanica*. However S/100 concentration of *T. flavus* was slightly hatch stimulatory. Percentage mortality and hatching of *M. javanica* was directly proportional to the concentration of fungal filtrate and exposure time.

**Key words:** Root-knot nematode, *Meloidogyne javanica*, *Paecilomyces lilacinus*, *Cladosporium oxysporum*, *Gliocadium virens*, *Talaromyces flavus*, fungal filtrates, hatching, mortality.

## Plant Extracts and their Role in Management of Juveniles of *Meloidogyne incognita*

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**ABSTRACT:** The crude extracts of fruit leaves viz., *Citrus aurantifolia* (lemon); *Annona squamosa* (custard apple), *Psidium guajava* (guava), *Musa* species (banana) and *Aegle marmelos* (bel) were obtained by fractionating with organic solvent petroleum ether (60°C-80°C). Juveniles of *Meloidogyne incognita* were exposed to various concentrations viz., 250, 500, 1000 & 2000 ppm of the plant extracts for 3, 6, 24, 48 and 72 h. *Citrus aurantifolia* at 500 ppm was sufficient to immobilize more than 50% of the juveniles after 24 h, whereas 1000 ppm showed 100% mortality after 72 h, other extracts were toxic at 100 ppm showing more than 50% mortality after 24 h. Thus all the extracts had nematostatic properties and effective against *M. incognita* juveniles. LC<sub>50</sub> value showed that out of five extracts *Citrus aurantifolia* was found to be the most effective.

**Key words:** Nematicidal activity, plant extracts, *Meloidogyne incognita*, *in vitro*.

[Back to Contents](#)

## **Biotoxicity of Some Ornamental Leaf Extracts against *Meloidogyne incognita***

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**ABSTRACT:** *In vitro* experiments were conducted to know the efficacy of ornamental leaf extracts of *Catharanthus roseus*, *Callistemon lanceolatus*, *Dandelion* sp. and *Chrysanthemum* sp. in different concentrations (250, 500, 1000 and 2000 ppm) for the management of J<sub>2</sub> of root-knot nematode, *Meloidogyne incognita*. Extracts of *Catharanthus roseus* and *Dandelion* sp. @ 2000 ppm were found most effective followed by *Chrysanthemum* sp. and *Callistemon lanceolatus*. On the basis of LC<sub>50</sub> values, 250 ppm of *C. roseus*, 440 ppm of *C. lanceolatus*, 860 ppm of *Dandelion* sp. and 1550 ppm of *Chrysanthemum* sp. were found effective after 24 h against J<sub>2</sub> of *Meloidogyne incognita*.

**Keywords:** *Meloidogyne incognita*, *Catharanthus roseus*, *Chrysanthemum* sp., *Dandelion* sp., *Callistemon lanceolatus*, *in vitro*.

[Back to Contents](#)

## **Studies on Interaction between Brinjal Mosaic Virus and Root-Knot Nematode on Brinjal**

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**ABSTRACT:** An experiment on the interaction between brinjal mosaic virus and root-knot nematode on brinjal, revealed that root-knot nematode infected plants had more impact in reducing growth parameters viz., plant height, shoot weight, root length, number of leaves and flowers than brinjal mosaic virus infection; root weight, however, was increased due to heavy galling by the nematodes. Combined infection of both the pathogens considerably lowered the growth parameters compared with control or infection with either pathogen. Simultaneous infection of both pathogens exhibited more severe impact on growth parameters as compared to the single infections indicating synergistic effect on growth of brinjal. Root-knot index, number of galls and root population of the nematode were higher in the treatments with nematode alone or prior to the virus or in simultaneous inoculations of both the pathogens.

**Keywords:** Root-knot nematode, brinjal mosaic virus, brinjal.

[Back to Contents](#)

## **Bio-Efficacy of Avermectin against Root-Knot Nematode, *Meloidogyne incognita* in Tomato**

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**ABSTRACT:** An experiment conducted under glasshouse conditions for the management of *Meloidogyne incognita* on tomato with avermectin, revealed that the plants treated with avermectin 75% as seedling root dip recorded the maximum shoot length of 38.8 cm, fresh shoot weight of 22.3 g, dry shoot weight of 10.7 g and fruit yield of 324.3 g. Significantly increased root length (26.4 cm), fresh root weight (7.3 g), and dry root weight (2.6 g) were also recorded in plants treated with avermectin 75% seedling root dip. The treatment was on par with carbofuran 3 G @ 1 kg a.i./ha and avermectin 100% as seedling root dip. Among all treatments, highest reduction in root knot index (1.3), soil nematode population (132.8), number of females/g root (12.8), egg masses/g root (5.4), and eggs/egg mass (125.2) were recorded by avermectin 100% as seedling root dip. It was followed by and on par with carbofuran 3 G @ 1 kg a.i./ha and avermectin 75% seedling root dip. Similarly, enhanced activities of total phenol, peroxidase and IAA oxidase activity in tomato plants infected with *M. incognita* was noted compared to control.

**Keywords:** Avermectin, root-knot nematode, tomato

[Back to Contents](#)

## Effects of Temperature and Relative Humidity on the Emergence of Infective Juveniles of *Heterorhabditis indica* from Meghalaya, India

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**ABSTRACT:** The present study reports the effects of temperature and relative humidity (RH) on the emergence and production of infective juveniles (IJs) of *Heterorhabditis indica*, an entomopathogenic nematode (EPN) isolated from forest soil of Meghalaya, India. Larvae of *Galleria mellonella* were infected by 100 IJs/ larva of *H. indica* at 25°C and 100% RH. The infected dead larvae of *G. mellonella* were exposed to varying degree of temperature and emergence of IJs was observed at regular time intervals. The IJs could emerge only at 15, 20, 25 and 30°C. The earliest emergence (8 days) of IJs occurred at 25°C. At 85, 96 and 100% RH, the emergence of IJs was observed between 8 to 9 days. At 75% RH, a delay (17 days) in the emergence of IJs was noticed. At 53% RH the cadavers were found severely desiccated and failed to release any IJ. Total production of IJs after 20 days post inoculation was recorded in both the experiments.

**Key words:** Entomopathogenic nematodes, *Heterorhabditis indica*, temperature, relative humidity, Meghalaya, India

[Back to Contents](#)

## Estimation of Salicylic Acid and its Role in Resistance Mechanism in Chickpea against *Meloidogyne incognita*

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**ABSTRACT :** Eleven promising genotypes of chickpea were screened against root-knot (*Meloidogyne incognita*) nematodes in 15 cm diam. pots. The varieties were characterized as resistant, moderately resistant, and susceptible. Out of 11 genotypes, all were moderately resistant except Pusa 362 which was susceptible. Only four varieties, BGD-93, Pusa 267 (MR), Pusa 391 (MR) and Pusa 362 (S) were selected for the estimation of Salicylic acid (SA) by spectrophotometer. The results showed that the moderately resistant varieties BGD93, Pusa 267 and Pusa 391 had higher content of SA, 16.44, 16.11, 15.55 and 14.75 ppm/g sample respectively, compared to susceptible variety, Pusa 362 (14.75 ppm). Moreover, the SA content in roots (24.00 - 18.14 ppm/g sample) was more as compared in the shoots which ranged between 16.44 - 14.75 ppm. Therefore, the SA has a positive role in resistant mechanism in chickpea.

**Keywords:** Salicylic acid, estimation, chickpea, *Meloidogyne incognita*

[Back to Contents](#)

## Movement of Cadusafos in Soil and Invasion of *Meloidogyne incognita* Juveniles in Eggplant Roots

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**ABSTRACT:** Movement of cadusafos, an organophosphatic nematicide-insecticide, was studied in sandy loam soil by applying it @ 0.0, 1.0, 2.0 and 3.0 kg a.i./ha in 15 cm x 6.25 cm plastic cylinders and estimating its concentration in soil profile (0-5 cm, 5-10 cm and 10-15 cm) with a gas chromatograph. Thirty-day old seedlings of eggplant (*Solanum melongena* L.) cultivar Pusa Purple Long were transplanted in these soils and inoculated with juveniles of *Meloidogyne incognita* (5 juveniles/g soil). Invasion of juveniles in roots was studied after 10 days. Cadusafos adversely affected the juvenile invasion in roots. Reduction in invasion of juveniles in roots and residue concentration of cadusafos in soil was significantly correlated and this criterion may have a potential use as indicator of movement of cadusafos in alluvial soils.

**Key words:** Biomonitor, nematicide, vertical movement, invasion, *Meloidogyne incognita*, *Solanum melongena* L.

[Back to Contents](#)

## Evaluation of different Tissue Cultures of Chilli, *Capsicum annuum* for *in vitro* Establishment of *Meloidogyne incognita*

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**ABSTRACT:** Excised root segments, callus, roots induced from callus and root segments and axenic plant cultures of chilli, *Capsicum annuum* were evaluated for their response to *Meloidogyne incognita*. Second-stage juveniles of *M. incognita* were surface sterilized by exposing them to 0.01% strepto-penicillin sulphate for an hour. The results of larval inoculations revealed that none of the larvae were able to infect excised root segments. In callus cultures only 2%, in callus induced roots 33%, and in root to root cultures 17% larvae were able to establish and develop into next stages. Axenic plant cultures showed maximum susceptibility to the nematode with 44% larval infection. Irrespective of varying degrees of infection, the development of larvae was normal in all the tissues. Culturing nematode on callus induced roots, root-to-root cultures and axenic plant cultures was not observed to have any adverse effect on its fecundity.

**Key words:** *Meloidogyne incognita*, *Capsicum annuum*, excised roots, callus, axenic plant cultures, *in vitro*.

## **Viability of *Pasteuria penetrans* Parasitising *Meloidogyne incognita* under Different Conditions**

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**ABSTRACT:** *Pasteuria penetrans* infested soil exposed to 19 and 28°C and natural field conditions over a period of 12 months was evaluated for spore attachment on the juveniles of *Meloidogyne incognita*. Maximum reduction in the adherence of spores was recorded in the soils kept under natural conditions. In this treatment the decline in spore attachment was more during summer months than winter months. The soils stored at 19 and 28°C also showed a reduction in the spore viability. At both these temperatures reduction in spore attachment increased with the increase in the storage period. The overall reduction in per cent spore encumbrance on juveniles of *M. incognita* after a period of 12 months was 73.8, 67.9 and 61.7% in the soils kept under natural conditions and at 28 and 19°C respectively. The storage period was also found to affect the per cent larval infection by the bacterium and after a period of 12 months under natural conditions only 20% larvae showed infection by the bacterium while it was 47-50% in case of soils stored under incubated conditions.

**Key words:** *Pasteuria penetrans*, *Meloidogyne incognita*, endospore, viability

[Back to Contents](#)

## **Integrated Management of Root-Knot Nematode (*Meloidogyne incognita*) on Okra (*Abelmoschus esculentus* (L.) Moench)**

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**ABSTRACT :** The experiment was carried out for two years during the *kharif* seasons of 2003 and 2004 to study the efficacy of *Paecilomyces lilacinus*, carbosulfan (as seed treatment), poultry manure and FYM alone and in combination in the management of *Meloidogyne incognita* on okra. Maximum increase in growth parameters viz., plant height, root length, fresh and dry weight of shoot and root including yield and decrease in number of galls, eggmasses per root system and final nematode population in soil was observed in the combined treatment with *P. lilacinus* @ 4g/kg soil, carbosulfan, 25 EC @ 0.2%, poultry manure @ 2.5 t/ha and FYM @ 2.5 t/ha. All the treatments were found to be significantly different from the control in increasing growth parameters and reducing in nematode population in soil.

**Key words:** Okra, *Meloidogyne incognita*, *Paecilomyces lilacinus*, carbosulfan, poultry manure, FYM.

[Back to Contents](#)

## **Bioactivity of Normal and UV Exposed Azadirachtins A, B and H against the Root-Knot Nematode, *Meloidogyne incognita***

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**ABSTRACT:** Azadirachtins A, B and H showed LD<sub>50</sub> of 460.7, 125.8 and 229.4 ppm, respectively against the second stage juveniles of root-knot nematode, *Meloidogyne incognita*. On exposure to UV light, 32 times loss in the nematicidal activity of Aza-A, 14.6 times in Aza-B and 66.5 times in Aza-H, was observed. Aza-A was the most sensitive to hydrolysis with only 17% of the initial content remaining in the aqueous nematode culture medium after 48 h. In contrast, 86 to 87% of azadirachtins B and H was found after this period. The nematode mortality correlated significantly with period of incubation and azadirachtin content of the medium. Aza-B showed the maximum nematicidal activity against *M. incognita* and was stable against both hydrolytic and photodegradation.

**Key words:** Neem, *Azadirachta indica*, A. juss, Meliacins, transformed azadirachtins, Nematicidal activity, *Meloidogyne incognita*.

[Back to Contents](#)

## Host Range, Biology and Races of *Heterodera cajani* Koshy, 1967 occurring in Tamil Nadu (India)

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**ABSTRACT:** Host range of *Heterodera cajani* was studied using 49 plants belonging to different families. Out of these, 14 plant species were recorded as hosts and 35 as non-hosts. *Sesamum malabaricum* was recorded as new host for *H. cajani*. The biology of *H. cajani* was studied under pot culture condition at a mean atmospheric temperature of  $25.5 \pm 0.5^{\circ}\text{C}$ . The penetration of  $J_2$  started within 12 h and continued upto four days after inoculation. The second and third moults were completed between fifth and seventh day and fourth moult within 9 days. Egg laying started from 16<sup>th</sup> to 17<sup>th</sup> day. It was observed that for completion of one life cycle of *H. cajani*, 17 days were required from  $J_2$  to  $J_2$  and it took 28-29 days from  $J_2$  to hard cyst. Twenty five populations of *H. cajani* collected from different districts of Tamil Nadu were identified as Race A.

**Key words:** *Heterodera cajani*, host range, biology, races, blackgram

[Back to Contents](#)

## **Management of Disease Complex involving *Heterodera cajani* Koshy, 1967 and *Macrophomina phaseolina* (Tassi.) Goid. on Greengram (*Vigna radiata* L. Wilczek)\***

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**ABSTRACT:** Soil application of carbofuran 3G @ 3 kg a.i/ha alone and combined treatment of *Pseudomonas fluorescens* (pf-1) as seed treatment and neem cake as soil application were effective in the management of the disease complex involving *Heterodera cajani* and *Macrophomina phaseolina*. Combined treatments of *P. fluorescens* as seed treatment and neem cake as soil application and *Trichoderma viride* as seed treatment and neem cake as soil application has resulted in lowest root rot incidence of 11.1 and 22.2 per cent respectively with significant increase in the germination per cent, plant growth and pod yield.

**Key words:** *Heterodera cajani*, *Macrophomina phaseolina*, greengram, biocontrol agents, botanicals, organic amendments.

[Back to Contents](#)

## **Bare Root Dip Application of SAR inducing Chemicals in Tomato against Root-Knot Nematode, *Meloidogyne incognita***

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**ABSTRACT:** Induction of systemic resistance by salicylic acid, rose bengal and giberrellic acid in tomato against root-knot nematode, *Meloidogyne incognita* was studied under glass house conditions. The results of SA spray @ 100 ug/ml decreased galling in roots of nematode infested tomato significantly when compared to inoculated control. The per cent increase in root and shoot weight as well as root and shoot length was also highest in the plants sprayed with SA @ 100 µg/ml, whether inoculated simultaneously or after 24 h of spray.

**Key words:** Salicylic acid, rose bengal and giberrellic acid, systemic acquired resistance, tomato, *Meloidogyne incognita*

## **Interactive Effect of *Meloidogyne incognita* and *Fusarium oxysporum* on Growth and Yield of *Vigna radiata***

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**ABSTRACT:** An experiment, carried out under pot conditions to study the effect of *Meloidogyne incognita* (2000 J<sub>2</sub>/kg of soil) and *Fusarium oxysporum* (2×10<sup>8</sup> spores/kg of soil) alone and in combination on the multiplication of the nematode, wilt disease development and on the growth of *Vigna radiata* cv. ML-1108, indicated that both the pathogens caused significant reduction in all growth and yield parameters in combination as well as in either of these pathogens alone. Highest reduction in all growth and yield parameters was observed in plants inoculated with nematode and fungus simultaneously followed by nematode 7 days prior + fungus post, fungus 7 days prior + nematode post, nematode alone and fungus alone respectively. Root colonization by the fungus was significantly increased in the presence of nematode, whereas, the reproduction factor of the nematode was significantly decreased in the presence of the fungus.

**Key words:** Interaction, *Meloidogyne incognita*, *Fusarium oxysporum*, *Vigna radiata*