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## **Partial Purification and Characterization of 4-Hydroxycinnamic acid : CoA Ligase (EC. 6.2.1.12) from Resistant and Susceptible Tomato Cultivars Inoculated with *Meloidogyne incognita***

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**ABSTRACT :** The specific activity of 4-hydroxycinnamic acid : CoA ligase was assayed using p-coumaric acid as a substrate at an early stage of infection with the root-knot nematode, *Meloidogyne incognita* in both susceptible (Pusa Ruby) and resistant (Nemamukt and Hisar Lalit) cultivars of tomato. The activity was higher in resistant cultivars Nemamukt (18.0 to 150.8%) and Hisar Lalit (34.2 to 162.7%) at different time intervals compared to susceptible cv. Pusa Ruby (15.0 to 40.0%). The number of isozymes increased from 3 to 6 in resistant cultivars but remained unchanged in susceptible one. The relative specific activity of the enzyme was 15 and 20-fold during the purification process in resistant and susceptible cultivars, respectively. The enzyme activity was maximum at 25-30°C with pH ranging from 7.5 to 8.5 and p-coumaric acid was judged to be the best substrate. The involvement of CoA ligase in host-parasite interaction is indicated.

**Key words:** CoA ligase, enzyme activity, Phenyl propanoid pathway, *Lycopersicon esculentum*, *Meloidogyne incognita*, resistance.

## **Influence of *Meloidogyne incognita*, *Pratylenchus thornei* and *Tylenchorhynchus vulgaris* on Growth and Oil Yield of Menthol Mint**

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**ABSTRACT :** Greenhouse trial was conducted to determine the influence of 3 phytonematodes alone and in combination on growth / oil yield and reproduction potential of nematode species in menthol mint (*Mentha arvensis* L.) var. Kosi. Among the different treatments, alone inoculation of root-knot-nematode, *Meloidogyne incognita* and simultaneous with root lesion nematode, *Pratylenchus thornei*, resulted in maximum adverse effect on growth / oil yield of menthol mint. Stunt nematode, *Tylenchorhynchus vulgaris*, was suppressive of growth and yield of menthol mint. Maximum multiplication rate was recorded with *M. incognita*. *P. thornei* and *T. vulgaris* multiplied slowly on menthol mint.

**Key words:** Menthol mint, *Mentha arvensis*, *Meloidogyne incognita*, *Pratylenchus thornei*, *Tylenchorhynchus vulgaris*.

## Reproductive Variations in *Aphelenchoides besseyi* Populations

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**ABSTRACT** Sixteen populations of *Aphelenchoides besseyi* from different hosts and geographical areas were evaluated for mode of reproduction and host range. Parthenogenetic reproduction was recorded in population from *O. glaberrima* (USA) and populations of *O. sativa* from Bhowali, Coimbatore, Cuttack, Faizabad, Hazaribagh, Hyderabad, Paniel, Port Blair and Raipur (India). Populations from *Fraxinus americana* (USA), *O. sativa* (Almora, Pantnagar (India) and Phillipines), *Setaria italica*, *Panicum miliaceum* (Bangalore, India) and *Stylosanthes hamata* (Australia) had amphimictic mode of reproduction. Based on multiplication rate of populations on eight fungal species and host cultivars, the populations could be assigned to at least three groups.

**Key words:** *Aphelenchoides besseyi*, reproductive variations, mode of reproduction, host range

# Population Dynamics of *Heterodera cajani* Associated with Pigeonpea in Various Cropping Systems of Central Uttar Pradesh\*

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**ABSTRACT :** *Heterodera cajani* is an important nematode problem of pigeonpea in Central Uttar Pradesh. Cropping sequence and fallow of fields influenced the nematode population. Cropping sequence of wheat-fallow-pigeonpea/sorghum was more effective than other existing ones for reducing nematode population. For intercropping of pigeonpea with non-host crop, sorghum was most effective in reducing the nematode population and increasing the yield of pigeonpea upto 40.4 per cent.

**Key words:** *Heterodera cajani*, cropping sequence, inter-cropping, fallow, pigeonpea.

**Studies on the Management of Disease-Complex Caused by  
Root-Knot Nematode, *Meloidogyne incognita* and  
Wilt Fungus, *Fusarium oxysporum* on Cowpea  
by Neem Cake and Carbofuran**

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**ABSTRACT :** Studies conducted to find the efficacy of neem cake and / or carbofuran for management of disease-complex caused by *Meloidogyne incognita* and *Fusarium oxysporum* on cowpea cv. Pusa Komal (PK) showed that application of both neem cake and carbofuran, in general, significantly increased plant growth and reduced nematode multiplication. The combination of neem cake and carbofuran, in reduced doses, revealed the best response in reducing the nematode multiplication with an increase in plant vigour. These results suggest the potential use of neem cake with carbofuran for sustainable management of disease-complex on cowpea.

**Key words:** Carbofuran, Cowpea, *Fusarium oxysporum*, *Meloidogyne incognita*, neem cake.

## **Efficacy of Neem Leaf Extract on Root-Knot Nematode, *Meloidogyne incognita* Infecting Cowpea**

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**ABSTRACT:** A pot culture experiment was carried out to study the effect of soil and foliar application of neem leaf extract at two concentrations viz. 10 and 15 per cent on the root-knot nematode, *Meloidogyne incognita*. Soil application showed higher reduction in nematode population compared to foliar application. Soil application at 15 per cent recorded minimum number of nematodes in soil and root which was 90 and 90.3% decrease over control, respectively. The gall index was only 1.3 at 15% concentration, where as it was 5 in untreated control. The plant growth was promoted by soil application of neem leaf extract at 15 per cent followed by 10 per cent concentration. Numbers of pods were 3.8 at 15% while it was nil in control.

**Key words:** Neem leaf extract, *Meloidogyne incognita*, foliar and soil application.

# Effect of Various Exposure Periods and Concentrations of Cured Leaf Extract of Bidi Tobacco on Egg Hatching of Root-Knot Nematodes

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**ABSTRACT:** Studies on various exposure periods and concentrations of cured leaf extract of *bidi* tobacco on egg hatching of root-knot nematodes was carried out in completely randomized design. Result on various exposure periods (1 to 120 hours) and concentrations (1, 5, 10 and 15 per cent) on egg hatching of root-knot nematodes in cured leaf extract of *bidi* tobacco cv. GT 5 revealed that with increase in concentrations, there was corresponding reduction in egg hatching. Increase in exposure period upto 48 hours, correspondingly reduced the egg hatching and thereafter, beyond 72 hours to 120 hours, erratic trend was observed. Interactions between exposure periods and concentrations of the extract correspondingly reduced egg hatching upto 48 hours of exposure. Comparison between control and rest of the treatments of extract and durations revealed significant reduction in egg hatching within the extract and on transfer of the egg masses in water, showing ovistatic or ovicidal action of the extract on egg hatching of root knot nematodes.

**Key words:** Cured *bidi* tobacco extract, exposure periods, concentrations, egg-hatching, *Meloidogyne* spp.

## Management of Root-Knot Nematode, *Meloidogyne incognita* Infecting Cowpea by Calotropis Leaf Extract

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**ABSTRACT:** The effect of calotropis leaf extract at 5, 10, 15 per cent concentration on root penetration and at 10 and 15 per cent as soil and foliar application on population suppression of root knot nematode was studied under glass house condition. Maximum inhibition of penetration was observed on the first day itself at 15 per cent (0.6 % penetration). When the leaf extract was applied as soil and foliar treatment at 10 and 15 per cent concentration, maximum shoot and root weight with more pods were observed in soil application at 15 per cent concentration followed by 10 per cent. Nematode population was minimum at 15 per cent soil application (88.5% and 72% reduction over control) followed by 10 per cent (87.1 and 79.3%) in root and soil application at 15 per cent.

**Key words:** Calotropis leaf extract, *Meloidogyne incognita*, cowpea, penetration, foliar application, soil application.

## Soil Solarization for Control of Soil-borne Pathogen Complex due to *Meloidogyne incognita* and *Pythium aphanidermatum*

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**ABSTRACT :** An experiment was conducted to study the effect of soil solarization for the control of *Meloidogyne incognita* and *Pythium aphanidermatum* pathogen complex of tomato in the nursery. Soil solarization with clear transparent polythene sheet for 6 weeks during hot summer months showed an increase in soil temperature (8° C) and conservation of soil moisture (4.5%) when compared to unsolarized control. Increased soil temperature coupled with soil moisture resulted in a significant reduction in population densities of *M. incognita* ( 85.8%), *P. aphanidermatum* ( 85.4%), weeds (91.2%) and their dry weight (93.3%). Though the physical and chemical characteristics of soil remained unchanged, the availability of soil nutrients increased by soil solarization.

**Key words :** Soil solarization, tomato, *Meloidogyne incognita*, *Pythium aphanidermatum*, pathogen complex.

## Interrelationships between *Meloidogyne incognita* and *Fusarium oxysporum* on Susceptible and Resistant Cultivars of Cowpea

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**ABSTRACT** *Meloidogyne incognita* enhanced wilting of cowpea cultivar Pusa Komal when inoculated in combination with *Fusarium oxysporum*. Nematode inoculation preceded by fungal inoculation showed maximum effect (synergistic), followed by the treatment where both the pathogens were inoculated simultaneously. Presence of nematodes not only predisposed the host but also shortened the incubation period for disease expression. Both the pathogens interacting simultaneously or nematode infecting prior to fungus, affected nodulation.

**Key words :** Interaction, *Meloidogyne incognita*, *Fusarium oxysporum*, cowpea.

## Effect of some Medicinal Plant Leaves on the Biology of *Heterodera cajani*

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**ABSTRACT :** Soil amendment with leaf powders of some medicinal plants such as neem (*Azadirachata indica*), madar (*Calotropis procera*), behaya (*Impomoea fistulosa*), saijan (*Moringā deifera*), and arjun (*Terminelia arjuna*) at the rate of 1% (W/W) affected adversely entry of *Heterodera cajani* juvenile in roots of pigeonpea. Development and egg-laying were also delayed by amendments. Water extracts of plant leaves reduced egg-hatching and emergence of juveniles from cysts. The maximum lethal effect on second stage juveniles was produced by leaf extract of *madar* followed by *behaya* and neem.

**Key words :** *Heterodera cajani*, biology, Plant leaf extracts

## Optimum Thermal Requirements for Infectivity and Development of an Indigenous Entomopathogenic Nematode, *Steinernema thermophilum* Ganguly & Singh, 2000

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**ABSTRACT :** Investigations were initiated to evaluate optimum temperature requirements for infectivity and development of an indigenous entomopathogenic nematode, *Steinernema thermophilum* Ganguly & Singh, 2000 (IARI-EPNI), under laboratory conditions, using greater wax moth larvae (*Galleria mellonella*) as insect host. The nematode-inoculated insect larvae were exposed to 5 different temperatures, viz. 10, 20, 25, 30 and 35°C. At 35°C, the larval mortality up to 100% was achieved, within 36 hrs. after inoculation (HAI) while at 25 and 30°C, it occurred within 48 HAI, and at 20°C within 216 HAI. At 10°C, the larval mortality was considerably affected, with only 16% mortality even at 216 HAI i.e. 9 days after inoculation (DAI). The IJs started emerging from the cadaver at 7,6 and 5 DAI at 25, 30 and 35°C, respectively. The emergence continued for 3-5 weeks at 25-35°C, with maximum harvest within 16 DAI at these 3 temperature conditions. The number of infective juveniles (IJs) produced per cadaver was maximum at 30 and 35°C. It has been demonstrated that *S. thermophilum* can infect and develop at a wide range of temperature (20-35°C), the optimum being 25-35°C, with better performance at 30-35°C. Hence, it may prove to be useful bioagent against insect pests of crops especially in tropical and subtropical parts of the world.

**Key words :** *Steinernema thermophilum*, temperature, infectivity, mortality, development, reproduction, wax moth larvae,

## **Eco-friendly Management of Root-knot Nematode of Tomato by *Arthrobotrys oligospora* and *Dactylaria brochopaga***

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**ABSTRACT :** Two predacious fungi, *Arthrobotrys oligospora* and *Dactylaria brochopaga*, were mass cultured on splitted sorghum seed, wheat bran + wheat straw, wheat bran + wheat straw + 2% jaggery solution and splitted maize seed. All the substrates supported excellent growth of *A. oligospora*. For *D. brochopaga*, splitted maize supported fair growth. Both the fungi, when applied in plots, significantly reduced the number of root knots of tomato in sterilized and unsteilized soils. *D. brochopaga* was superior to *A. oligospora* in reducing incidence of root knot nematode on tomato in unsterilized soil.

**Key words :** Root-knot nematode, Tomato, *Arthrobotrys oligospora*, *Dactylaria brochopaga*

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# Pathogenicity of Lesion Nematode, *Pratylenchus zaeae*, On Maize

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**ABSTRACT :** An inoculum level of 1,000 and above nematodes/plant significantly decreased plant height, fresh shoot and root weights of maize cv. Farm Sameri. Soil, root and total nematode population build up/plant progressively increased with increase in nematode inoculum levels from 10 to 10,000 nematodes/plant. Nematode reproduction rate decreased with an increase in inoculum levels. It was maximum (66 times) in 10 nematodes/plant and minimum (5.5 times) in 10,000 nematodes/plant. Uptake of various nutrients viz., nitrogen(N), phosphorous (P), potassium (K), calcium (Ca), magnesium (Mg) and sulphur (S) was significantly reduced from the levels of 1,000 to 10,000 nematodes/plant.

**Key words :** *Pratylenchus zaeae*, Pathogenicity, maize, *Zea mays*