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SOIL APPLICATION OF SYSTEMIC NEMATOCIDES IN RELATION TO
EMERGENCE, PENETRATION AND DEVELOPMENT OF
*HETERODERA ZEA*¹

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Abstract : Soil application of test systemic nematicides, in two doses, resulted in reduced emergence of larvae from cysts of *Heterodera zeae* except for oxamyl wherein both the dosages stimulated it. Aldicarb and phenamiphos were most effective in suppressing larval emergence. Larval penetration in roots as well as cysts formed were least with phenamiphos application. About 45 per cent of the penetrated larvae developed into cysts in carbofuran treatment as against 62-68 per cent in aldicarb.

Key words : *Heterodera zeae*, development, nematicides.

INTERACTION OF BURROWING NEMATODE, *RADOPHOLUS SIMILIS*
(COBB, 1893) THORNE 1949, AND VA MYCORRHIZA, *GLOMUS*
FASCICULATUM (THAXT.) GERD. AND TRAPPE IN BANANA
(*MUSA ACUMINATA* COLLA.)¹

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Abstract : Interaction of VA mycorrhiza, *Glomus fasciculatum* and burrowing nematode, *Radopholus similis* on banana Cv. 'Dwarf Cavendish' was investigated. Length, fresh and dry weights of root were increased by mycorrhizal inoculation, while nematode inoculation retarded the root growth. The plants which received mycorrhiza seven days prior to nematodes were able to offset the ill effect caused by the latter and had more vigorous roots even as against the uninoculated plants. Although root colonization by mycorrhiza was reduced in plants inoculated with nematodes, the spore production was not adversely affected. Nematode number, both in roots and soil, on the other hand, was significantly lower in such a situation. Plants inoculated with mycorrhiza had higher, N, P, K, Ca and Mg; reducing and total sugars; phenols and total amino acids in their roots.

Key words : *Radopholus similis*, *Glomus fasciculatum*, Banana, Interaction, Mycorrhiza.

EFFECT OF CYST EXTRACTION TECHNIQUES ON BIOLOGY OF *HETERODERA AVENAE*

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Abstract : Cysts of *Heterodera avenae* extracted through zinc sulphate, magnesium sulphate, acetone and ethanol + glycerine have been compared with manually extracted ones with regard to efficiency of the method and their effect on larval penetration and development inside wheat roots. Manually picked cysts were superior in all aspects. Amongst the chemicals zinc sulphate and magnesium sulphate, were least harmful. Schemes for extraction and separation of cysts of *H. avenae* from soil are provided.

Key words : Extraction techniques, biology, *Heterodera avenae*.

**POPULATION BEHAVIOUR OF *RADOPHOLUS SIMILIS* IN ROOTS
OF BLACK PEPPER (*PIPER NIGRUM* L.) IN KERALA, INDIA***

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Abstract : The population of *R. similis* reached maximum in the month of September/October and minimum in the month of April/May, and detectable throughout the year. Black pepper was found to harbour more nematodes per gram of root compared to citrus, banana, coconut or arecanut. Rainfall and temperature influenced nematode population.

Key words : Population behaviour, *Radopholus similis*, *Piper nigrum* L.

**COST EFFECTIVE PRE-TREATMENT OF CHICKEN MANURE FOR
CONTROLLING NEMATODES AND FUNGAL FLORA IN
SYNTHETIC COMPOST USED FOR THE CULTIVA-
TION OF *AGARICUS BISPORUS* (LANGE) SINGER**

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Abstract : Chicken manure is used as a nitrogen source in the synthetic compost for the cultivation of *Agaricus bisporus*. It was found to harbour a heavy population of pathogenic nematodes and harmful fungal flora, thereby acting as a major source of infestation. Pasteurization is the best treatment for elimination of the nematodes and fungal flora from the chicken manure. Out of the three pesticides tried., dichlorvos was the most effective followed by carbofuran and formalin, respectively for controlling *Aphelenchoides composticola*, *Rhabditis* spp. and some major competitor/pathogenic moulds. Therefore, pre-treatment of chicken manure with dichlorvos @ 0.04 per cent under a polythene cover for 144 hours is recommended. It reduces the cost of the treatment to one sixth of that otherwise needed to treat the compost.

Key Words : Mushroom, Compost, *Aphelenchoides composticola*, Fungi.

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**BAQRIELLA QAISERI GEN. N., SP. N. (NEMATODA : DORYLAIMIDA)
FROM MUSSOORI HILLS, INDIA**

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Abstract : *Baqriella* gen. n. closely related to *Oriverutus* Siddiqi, 1971 and *Labronemella* Andr assy, 1985 is described and illustrated. It differs from the former in having discoid lip region and in the posterior location of dorsal oesophageal gland orifice and from the latter in having a small and slender body, slender odontostyle, single guiding ring and in the presence of cardiac glands.

Key words : Taxonomy, Dorylaimida, *Baqriella qaiseri* gen. n., sp. n.

INTEGRATED CONTROL OF ROOT-KNOT NEMATODE, *MELOIDOGYNE JAVANICA* INFECTING TOMATO

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Abstract : In a field naturally infested with *Meloidogyne javanica*, age of tomato nursery (cv HS 101) at transplanting alone, and in combination with bare-root dip treatment with phosphamidon at transplanting/field treatment with aldicarb or 'neem' (*Azadirachta indica*) leaves were tried for control of root-knot nematode. Transplanting of eight-week-old tomato seedlings alone reduced root-knot index and final population resulting in better yield compared to four-week-old seedlings. However, statistically they were at par with each other. Spot treatment of aldicarb @ 1 kg a.i./ha at transplanting in tomato seedlings of either age gave significantly lower final population and higher yield compared to other treatment combinations. Bare-root dip treatment with phosphamidon @ 1,000 ppm for eight hours at transplanting, was effective against nematode but phytotoxic.

Key words : *Meloidogyne javanica*, aldicarb, 'neem' leaves, phosphamidon, spot application, seedling age, bare-root dip, integrated control, tomato.

ON THE BIOLOGY OF PIGEONPEA CYST NEMATODE, *HETERODERA*
CAJANI KOSHY, 1967

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Abstract : Root leachates of pigeonpea, hyacinth bean, cowpea, *moth* bean and sesame stimulated the larval hatch of *Heterodera cajani*. Leachates collected from 2,3,4-week old plants or soil were more stimulatory than those from 1-week-old plants. Maximum larval penetration and multiplication occurred on pigeonpea, *dhaincha* (*Sesbania aculeata*) and hyacinth bean. The nematode took 23 days for completion of one life cycle on pigeonpea, *dhaincha*, *moth* bean (*Vigna aconitifolia*), sesame; 26 days on green gram and 29 days on black gram and cowpea at 24.3-38.8°C. *H. cajani* did not develop beyond 3rd stage larva on cluster bean. The fecundity of the nematode was not affected by the host.

Key words : *Heterodera cajani*, biology, root leachates, life cycle.

EFFECT OF INOCULUM DENSITY OF *HETERODERA AVENAE* ON PHOTOSYNTHETIC EFFICIENCY, CHLOROPHYLL, AND MINERAL CONTENTS OF WHEAT*

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Abstract : Decreased photosynthetic efficiency of wheat in terms of Absolute Growth Rate (AGR), Relative Growth Rate (RGR) and Net Assimilation Rate (NAR) due to *Heterodera avenae* infection was recorded. Chlorophyll and net photosynthetic rate decreased with increasing levels of nematode inoculum. Nitrogen and potash contents were decreased significantly in straw, respectively, at 20 and 10 eggs and larvae/cm³ soil. Phosphorus was significantly decreased in grain as well as straw, respectively, at 15 and 20 eggs and larvae/cm³ soil. A negative correlation was recorded between inoculum level of *H. avenae* and chlorophyll, photosynthesis and mineral contents of wheat.

Key words : Chlorophyll, photosynthesis, mineral contents, *Heterodera avenae* wheat.

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PLANT PARASITIC NEMATODES OF PUNJAB, INDIA V. *MERLINIUS COMMUNICA* N. SP. WITH KEY TO SPECIES OF THE GENUS AND *TELOTYLENCHUS ELONGATUS* N. SP.

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Abstract : Two new species viz., *Merlininus communica* and *Telotylenchus elongatus* on *Pyrus communis* and *Eriobotrya japonica* from Bhunga, Hoshiarpur and Madarpura, Ludhiana respectively are described and illustrated. *M. brevidens* is also recorded.

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**SURVIVAL AND INFECTIVITY OF THE RENIFORM NEMATODE,
ROTYLENCHULUS RENIFORMIS, IN RELATION TO MOISTURE
STRESS IN SOIL WITHOUT HOST***

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Abstract : The pre-adult females and males of *Rotylenchulus reniformis* survived under six levels of moisture stress ranging from 0.02 to 21.3 bars in sandy loam soil for 450 days in the absence of host. The population density declined faster during the initial three months period and slowly thereafter. Nine to 33 per cent *R. reniformis* were found to survive at various moisture tensions after 450 days. Survival was better in relatively dry soil compared to moist and wet soil. Moisture tension of 3.0 bars was found optimum for longer survival. The nematodes in soil with high moisture tension were found to survive in tightly coiled anhydrobiotic state. A few individuals were also loosely coiled in soil with sufficient moisture. The infectivity, rate of development and fecundity of the surviving nematodes was adversely affected with an increase or decrease in moisture tension from 3.0 bars. The nematodes reactivated after 180 and 450 days infected and reproduced, at lower rates than the fresh nematodes, on the root of green gram (*Vigna radiata*).

Key words : Moisture stress, survival, Anhydrobiosis, *Rotylenchulus reniformis*

EFFECT OF HOST ON MORPHOMETRICS OF *PRATYLENCHUS ZEAЕ*
GRAHAM, 1951

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Abstract : Variability and reliability of twenty morphological characters commonly used in taxonomy of *Pratylenchus* spp. were evaluated with reference to *P. zeaе*, raised from all single female on six different hosts viz sugarcane, maize, tobacco, wheat, cotton and groundnut. Host induced significant differences in mean length of body, oesophagus, tail, post-uterine sac, width of body, lip height and distance from anterior end to hemizonid, excretory pore and nerve ring which could not be considered reliable. However stylet length, total number of tail annules and number of annules between anus and phasmid, distance of oesophageal gland from base of spear knob, C, C' and V value did not vary significantly because of the host and were considered to be reliable for distinguishing species of this group.

Key words : Host effect, morphometrics, *Pratylenchus zeaе*

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**PASTEURIA PENETRANS A PATHOGEN OF THE GENUS
HETERODERA, ITS EFFECT ON NEMATODE BIOLOGY
AND CONTROL**

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Abstract : The bacterial pathogen, *Pasteuria penetrans*, parasitized larvae of *Heterodera* species and *Meloidogyne incognita*. Mass multiplication of the bacterial inoculum was done on root-knot nematode infested brinjal plants. The total life cycle of the bacterium was completed in 49 days at 10-17°C. Amongst the methods of application, direct mixing of bacterial spore infested soil was found to be most effective against the nematode population. Maximum reduction in cyst population was obtained when spore infected soil was incubated at 30°C before application.

Key words : *Pasteuria penetrans*, Biology, *Heterodera avenae* *H. cajani*, *H. sorghi*, *H. zaeae*, *Meloidogyne incognita*, control.

ULTRASTRUCTURE OF THE PHASMIDS OF *MELOIDODERA FLORIDENSIS* LARVAE

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Abstract : Transmission electron microscopic studies revealed that phasmids of larvae of *Meloidodera floridensis* (female) include ampulla, duct, receptor cavity, dendrite receptors, tight junction, socket and sheath cells. The ampulla is continuous with a duct surrounded by the socket cells. It then enters the receptor cavity and the tight junction surrounded by the sheath cells. Both the socket and sheath cells are secretory glands. The dendrite receptor originates from the neuron that enters the tight junction, receptor cavity ending near the ampulla. The plasmalemma of the sheath cells surrounds the receptor cells and creates the tight junction. The microtubule in *M. floridensis* deviates from the 9 + 2 arrangement of animal parasites and the saucer shaped ampulla is typical of phasmidian nematodes, in which it is reported to be cup shaped.

Key words : ampulla, phasmid, receptor cavity, dendrite receptor, socket cell, sheath cell ultrastructure, *Meloidodera floridensis*.

ON THE IDENTIFICATION OF PHYSIOLOGICAL SPECIALIZATION
IN *ANGUINA TRITICI* POPULATIONS

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Abstract : Existence of physiological variations in geographical populations of *Anguina tritici* was fully established. Two distinct physiological populations, one represented by Bihar and the other by Haryana, U.P., Rajasthan and Delhi were identified. Nematode galls from Bihar were much more aggressive than the galls collected from Delhi, Haryana, Rajasthan and U.P.

Key words : *Anguina tritici*, Physiological specialization, Populations.

A SUITABLE METHOD OF STORAGE OF *HETERODERA AVENAE* CYSTS FOR USE IN LABORATORY EXPERIMENTS

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Abstract : Laboratory experiments were conducted to evolve a suitable method for the storage of *Heterodera avenae* cysts, which would provide the encysted eggs without loss of viability and infectivity for use in investigations by the researchers. Cysts were stored for six months in four media (filter paper, dry sandy soil, mineral oil and agar gel) and kept at two temperatures (30°C and 7-10°C). Viability of the encysted eggs has been judged by the emergence of juveniles and infectivity by the penetration and multiplication of the nematode in/on wheat roots. The results revealed that the encysted eggs of *H. avenae* could be conveniently stored for at least six months in dry sandy soil at 30°C without losing the viability and infectivity.

Key words : Storage method, *Heterodera avenae* cysts

**INFLUENCE OF ENDOMYCORRHIZAL FUNGI *GLOMUS FASCICULATUM*
AND *G. EPIGAEUS* ON PENETRATION AND DEVELOPMENT OF
HETERODERA CAJANI ON COWPEA***

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Abstract : Effect of earlier establishment of *Glomus fasciculatum* or *G. epigaeus* on penetration and development of *H. cajani* in cowpea was studied in pots. Earlier introduction of mycorrhizal fungi by 15 days adversely affected root penetration to a greater extent than simultaneous inoculations. Over 60 per cent colonization of root system by VAM fungi considerably hampered root invasion. However, the endophytes did not further influence the development of penetrated juveniles or the fecundity of the nematode.

Key words : Cowpea, *Glomus fasciculatum*, *G. epigaeus*, *Heterodera cajani*, penetration

DISSEMINATION AND MODE OF SURVIVAL OF NEMATODES IN DUST STORMS

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Abstract : Dust trapped at a height of 5 m above ground in a residential area contained a number of nematode species including rhabditids (63 per cent), tylenchids (18 per cent), a few dorylaims and others. The tylenchids included species of *Meloidogyne*, *Rotylenchulus*, *Tylenchorhynchus*, *Telotylenchus* and *Pratylenchus*. The nematodes in coiled anhydrobiotic state were reactivated when kept in water while most of the straight ones failed to revive. Of the coiled nematodes about 60 per cent of the rhabditids and 40 per cent of the tylenchids could be reactivated when extracted from the dust after one year and kept in water for 96 hrs. The process of reactivation of rhabditid nematodes is exhibited.

Key words : Dust storm, Dissemination, Survival, Anhydrobiosis.

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STUDIES ON SOME BIOCHEMICAL AND HISTOCHEMICAL CHANGES IN *ANGUINA TRITICI*—INFECTED TISSUES

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Abstract : *Anguina tritici*—infected wheat seedlings exhibited increased amounts of indole 3—acetic acid, soluble proteins, and carbohydrates, particularly at the basal swelling stage. These observations were also substantiated histochemically. There was also increased concentration of proteins, carbohydrates and RNA in infected tissues.

Key words : *Anguina tritici*, indole 3—acetic acid, proteins, Carbohydrates.

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