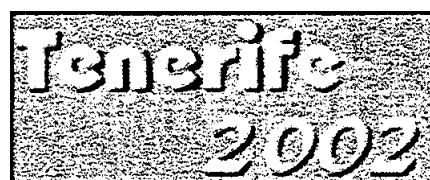


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257 Progress of two kinds of symptom appearing in the body of recovered *Pinus thumbergii* from pine wilt disease

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Pine wood nematode can cause fatal damage to Japanese black pine, *Pinus thumbergii* and red pine, *Pinus densiflora*. However, not enough is known about the mechanisms leading to the death of pines killed by this organism. Hence, study of the various aspects of pine trees which are purported to represent the processes of the disease from its early stages through to its lethal stages has helped to clarify both disease development and causal mechanism. Thionazin or mesulfenfos was injected into 11-year-old *P. thumbergii* infected with pine wilt disease following inoculation of pine wood nematodes 2, 5 and 6 weeks prior to treatment with nematicides. At the time of injection with nematicides, all the trees tested were judged as having pine wilt disease because they had ceased to exude pine resin. Recovery, expressed as resumption of resin exudation by surviving trees, was observed in pines injected with thionazin 2 weeks after inoculation. By examining cross-sections of recovered pine trees felled 2 years after this experiment, two apparently distinct symptoms were observed, one an early symptom associated with the formation of small non-water-conducting patches, and the other associated with cambium death. Both symptoms seemed to begin in and progress from the pith.

258 Impact of *Meloidogyne graminicola* on yield of lowland rainfed rice in Bangladesh

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Replicated plots with and without the application of Furadan 5G (40 kg/ha) were established at an agricultural research station and on farmer fields in northwestern Bangladesh to assess the impact of *Meloidogyne graminicola* on lowland rainfed rice yield in the rice-wheat production system. At the research station, rice yields in-

creased by 0.2, 0.8 and 1.1 t/ha where Furadan was applied to the seedbed only, to the field only, and to both the seedbed and field, respectively, compared to a non-treated control. Averaged across three farmer fields, rice yield increased by 1.1 t/ha where Furadan was applied to both the seedbed and field compared to the control. At harvest, soil levels of *M. graminicola* in the non-treated plots were more than three times greater than those in the treated plots at both locations. Prior to transplanting, seedling shoot height and dry weight were significantly greater, and soil levels of *M. graminicola* significantly less, in the treated seedbed plots compared to the non-treated plots. This is the first on-farm study to demonstrate a negative impact of *M. graminicola* on rice growth and yield during the monsoon season in Bangladesh.

259 Reaction of olive to *Pratylenchus vulnus* infections in Italy

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The reaction of seven olive cultivars, Cellina di Nardò, Cima di Bitonto, Coratina, FS 17, Frantoio, Leccino and Yusti and of the rootstock DA 12 I to *Pratylenchus vulnus* infections was evaluated in a glasshouse experiment. Plants were artificially inoculated with 200 nematodes per pot. Plant growth and nematode reproduction parameters were recorded. Host reaction was rated according to the reproduction factor $r = Pf/Pi$. All the tested cultivars and rootstock were good hosts for *P. vulnus*, although the highest susceptibility was shown by FS 17. No statistical difference was found among the *P. vulnus* reproduction parameters on the other cultivars.

260 Impact of *Pratylenchus neglectus* infestation on wheat in Western Australia

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Pratylenchus neglectus is very widespread in cereal-producing regions of Western Australia. A recent study revealed that the average nematode population in 64% of the surveyed locations exceeded the lowest level that causes significant yield loss. Experiments were

established between 1999 and 2001 in nematode-infested fields at five locations in central and southern wheat-belts to study impact of the nematode on performance of wheat. Large plots (1.8 × 40 m or 1.44 × 20 m) were sown to susceptible wheat (cvs Machete or Cunderdin or Brookton). In half of the 64 plots (paired plots), aldicarb (Temik 150G) was applied (20-30 kg/ha) at seeding. Ten weeks after sowing nematode densities in roots were assessed. Nematode density and wheat yield in the nematicide-treated and check plots were compared using analysis of variance. Aldicarb partially controlled the nematode populations. Yield enhancement with nematicide application was 6-14%. At one location, yield differences following use of aldicarb were not significant, partly due to inadequate nematode control. The study established economic damage potential of *P. neglectus* in Western Australia; however, this loss assessment could be an under-estimation of actual loss as nematicide provided only partial protection to plants from nematode infection.

261 Population dynamics of, and yield loss caused by, *Pratylenchus neglectus* and *P. thornei* in cereal crops in Australia

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A range of initial soil densities of either *P. neglectus* or *P. thornei* was established in field sites in South Australia. This was achieved by growing replicated plots of susceptible wheat (cvs Machete and Spear), moderately resistant wheat (cv. Excalibur), moderately resistant barley (cv. Chebec) and resistant triticale (cv. Tahara) in the 1st year. In the 2nd year, these cultivars resulted in initial *P. neglectus* densities for Machete, Spear, Excalibur, Chebec and Tahara of 18, 8, 4, 2 and 3/g soil, respectively. For *P. thornei*, these cultivars resulted in initial densities of 14, 10, 3, 1 and 1/g soil. Plots were oversown in the 2nd year with an intolerant oat cultivar (Echidna). Initial (P_i) and final numbers (P_f) of nematodes were assessed from soil of all plots in each year. For both *P. neglectus* and *P. thornei*, a significant negative linear relationship was observed between yield of the intolerant oat and initial nematode density in the 2nd year. Yield losses of 27% for *P. neglectus* and 22%

for *P. thornei* were estimated. In addition, an exponential relationship was observed between initial density and nematode multiplication rate (P_f/P_i).

262 Infection of *Arachis hypogaea* by *Meloidogyne arenaria* may increase aflatoxin contamination of kernels

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A field-microplot study was conducted to determine whether aflatoxin levels in peanut, *Arachis hypogaea*, were correlated with pod and root galling caused by *Meloidogyne arenaria* (*Ma*). The experiment was a completely randomised 2 × 2 factorial with six replicates per treatment. Factors were nematodes, plus and minus *Ma*, and fungus, plus and minus *Aspergillus flavus* (*Af*). Peanut seedlings, either infected with *Ma* or uninfected, were transplanted into 2.3 m² plots previously fumigated with methyl bromide. Inoculum of *Af* was sprinkled over the plant canopy at mid bloom. Drought was induced after pod set by covering plots during rain with a fibreglass shelter. Pod- and root-gall indices (1-5 scale) were determined for all plants in the plot and averaged. Pods from each plot were bulked, shelled, and a subsample of kernels was used to determine aflatoxin concentration and percentage colonised by *Af*. Neither factor, nematodes or fungus, affected aflatoxin concentration; however, there was an interaction between these factors ($P = 0.003$). In plots without added fungus, there was a correlation between aflatoxin concentration vs pod-gall index ($P = 0.001$, $r = 0.82$) and vs root-gall index ($P = 0.006$, $r = 0.74$). Colonisation of kernels by *Af* increased with increasing pod galling ($P = 0.04$, $r = 0.42$).

263 Yield losses of barley, oat and wheat due to root lesion nematode in South Australia

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Increased demand in the domestic and international market for the horticultural produce has led to intensive cultivation of horticultural crops in various states of India. This has resulted in the increase of root-knot nematodes (*Meloidogyne* spp.) to an alarming extent affecting adversely the crop growth and productivity. No single method of control of nematodes and no single component of management of nematodes was effective in the management of nematodes on any horticultural crop on a sustainable basis. Biocontrol agents such as *Paecilomyces lilacinus*, *Trichoderma harzianum*, *Verticillium chlamydosporium* and *Pasteuria penetrans* are not effective individually in the management of nematodes under field conditions. Similarly, endomycorrhiza (*Glomus mosseae* or *G. fasciculatum*), botanicals (neem or castor or pongamia cakes) or any trap crop, antagonistic plant or any cultural practice is not effective individually in the field. Hence, we investigated the possibilities of integration of these components for the management of the nematodes on horticultural crops on a sustainable basis. The investigations have resulted in the development of integrated nematode management strategies of economically important nematodes of this region by integrating biocontrol agents, botanicals and endomycorrhizae under field conditions by exploiting the synergistic interaction between *P. lilacinus* + neem cake + *G. mosseae*; *P. lilacinus* + castor cake + *G. fasciculatum*; *T. harzianum* + neem cake + *G. mosseae*; *V. chlamydosporium* + neem cake + *G. mosseae* combinations. The data on the adoption of the technology, percent increase in the yield and the reduction in the use of chemicals is presented.

527 Influence of tillage on soybean pathogens in Illinois

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Fusarium solani f. sp. *glycines* (FSG), the causal agent of soybean sudden death syndrome (SDS), and *Heterodera glycines* are the two most important soybean pathogens in Illinois. Sudden death syndrome is generally more severe in areas with greater soil compaction and/or waterlogged conditions. At two locations, the effects of three tillage practices on pathogen populations and foliar severity of

SDS were evaluated. Treatments were fall subsoiling (depth of 46 cm), convention tillage, and no tillage. In each treatment, 16 varieties were planted in 2000 and 32 varieties were planted in 2001. The varieties varied with regards to SCN and SDS resistance. In both years, SCN reproduction was higher on SCN-susceptible varieties. Egg densities of SCN were higher in plots receiving subsoiling treatments at one site in 2000 and at both sites in 2001. Across varieties, subsoiling reduced the severity of SDS at both locations in 2000 and 2001. Root colonisation by FSG differed among varieties but was not affected by the tillage practices. In 2000 and 2001, soybean yield was higher in plots receiving the subsoiling treatment.

528 Crop rotation options for management of *Pratylenchus neglectus* in cereal-based production systems in Western Australia

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Pratylenchus neglectus is a key nematode parasite of cereals in Western Australia. To identify crop rotation options for nematode management, cultivars of barley (Stirling), oat (Dalyup), wheat (Nyabing), canola (Dunkeld and Karoo), chickpea (Heera), faba bean (Fiord), field pea (Dundale) and lupin (Merri) were sown in 1999 in 40 × 1.8 m plots in a randomised block design with six replications in a nematode-infested field. Nematode numbers in soil before planting and in roots after 10 weeks were assessed. Wheat cv. Machete was the highly susceptible check. All the plots in 2000 were sown with wheat cv. Cunderdin, and in 2001 with the same crop as in 1999. Nematode data were log-transformed for analysis. Field pea and faba bean supported significantly fewer nematodes than other crops. Previous year crops significantly influenced nematode infestation and the fewest were extracted from plants in plots previously planted to faba bean and most in plots previously planted to wheat. In 2001, infestations were least in faba bean and field pea and greatest in chickpea, oats and canola cv. Karoo. Faba bean and field pea were identified as suitable crop options to aid in the rotational management of *P. neglectus*.