Table 1. *Continued....*

Strain	Sclerotial production	Aflatoxin B_1 (μg g^{-1} seed)
AFA 28	Low	150.0
AF 107B	Low	235.0
AFA 24	Nil	290.0
AFA 25	Nil	80.0
Vertisol (irrigated)		
AFA 17	High	2.2
AF 87A	High	70.0
AFA 17-1	Moderate	2.5
AFA 21	Moderate	90.0
AFA 22	Low	80.0
AF 83	Low	90.0
AF 96	Nil	1.7
AF 99	Nil	1.0
SE (fields)		± 12.81
SE (isolates)		± 10.46

There was no association between sclerotial production and aflatoxin production. Some previous reports have suggested that isolates that produced abundant sclerotia were also highly aflatoxigenic (Maggon et al. 1969, Mehan and Chohan 1973). It is possible that among strains which produce both aflatoxin and sclerotia, similar growth conditions would favor their simultaneous production in certain culture media used in several studies. None of the isolates produced sclerotia when grown in vitro on surface-sterilized scarified groundnut seeds.

All isolates tested produced only aflatoxin B_1, confirming our earlier observations that most *A. flavus* isolates from groundnut fields in India produce only aflatoxin B_1.

Our (limited) studies indicate clearly that strains from Vertisols produce lower aflatoxin levels than do strains from light sandy and red sandy loam soil. These results are important in the light of reports indicating low risks of aflatoxin contamination in Vertisols (Mehan et al. 1991). The results of this study emphasize the need to understand and control soil/environmental factors that could influence the aflatoxin-producing potential of *A. flavus* isolates. The cumulative effect of the presence of various toxin-producing strains and their populations, together with the factors influencing the predominance of each strain, is an interesting but complex subject for future investigations.

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Host Races of *Meloidogyne javanica*, with Preliminary Evidence that the 'Groundnut Race' is Widely Distributed in India

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Root-knot disease caused by *Meloidogyne* spp is the most important nematode disease of groundnut. The causal agents are *Meloidogyne arenaria, M. javanica, M. hapla,* and *M. incognita. Meloidogyne arenaria* Race 1 is the most widespread and destructive of the groundnut root-knot nematodes; *M. hapla* is also important, particularly in North Carolina, Oklahoma, and Virginia (USA), north-

Table 1. Proposed host races of *Meloidogyne javanica*.

Race	Tomato (cv Rutgers)	Pepper (cv Early California Wonder)	Groundnut (cv Florunner)	Distribution
1	+	–	–	Widespread
2 (pepper race)	+	+	–	Italy, Morocco
3 (groundnut race)	+	–	+	Brazil, Zimbabwe, Egypt, India, USA

+ susceptible host, – resistant host

ern China, and Australia. *Meloidogyne javanica* is not a common pathogen of groundnut. According to differential host tests in North Carolina, *M. javanica* has only one distinct host race. It reproduces on tobacco, watermelon, and tomato but does not commonly reproduce on cotton, pepper, and groundnut; however, a few populations can reproduce on pepper, and a very few on groundnut (Hartman and Sasser 1985).

Taylor and Sasser (1978) suggested that the word 'race' should be used only for populations of *Meloidogyne* that have been shown by numerous experiments to have host preferences significantly different from those established as 'normal' for that species, and have a wide geographical distribution. On the basis of reports of *M. javanica* parasitizing groundnut in Zimbabwe (Martin 1958), USA (Minton et al. 1969), Brazil (Lordello and Gerin 1981), Egypt (Ibrahim and El Saedy 1976), and India (Prasad et al. 1964, Sakhuja and Sethi 1985, Patel et al. 1988), it is apparent that three distinct host races of *M. javanica* occur in nature (Table 1). Di Vito (1979) reported that two populations of *M. javanica* from Sicily and Calabria reproduced on pepper, and these were tentatively designated as a new race (Di Vito and Greco 1982). This race is also present in Morocco (Rammah and Hirschmann 1990). Race 3 is designated as the 'groundnut race'. Populations of *M. javanica* that can parasitize both pepper and groundnut (race 4?) have not been reported.

Meloidogyne javanica has been reported on groundnut in northern (Delhi and Punjab), western (Gujarat), and southern (Andhra Pradesh) India, and is a potentially important groundnut pathogen (Sakhuja and Sethi 1985). Groundnut has been considered as a possible rotational crop in areas with high levels of *M. javanica*. However, a decision to use groundnut as a rotational crop should be delayed until the race of *M. javanica* present in these areas has been identified.

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Preliminary Investigation of a 'Peg Drying' Problem of Groundnut

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A new 'peg drying' problem of groundnut has recently been observed in about 6000 ha of the crop grown on sandy soil in the Chirala, Vetapalem, and Bapatla regions of southern coastal Andhra Pradesh, India. The affected plants were slightly stunted, and had mottled leaves and blackened pegs and pods. Some pegs were free from lesions but were flaccid. The roots of the affected plants appeared bushy. In the Vetapalem area, seeds were generally not well-formed and often showed hollow heart symptoms. Yield loss due to this problem was estimated at about 30%.

Soil samples collected from fields with the 'peg drying' problem and from fields with apparently healthy crops were analyzed for pH, nutrient status, fungal pathogens, and nematodes. Density of the ring nematode *Criconemella ornata* ranged between 56 and 472 per 100 cm^3 in the 'peg dried' fields, and between 2 and 22 per 100 cm^3 in fields without the problem. The fungi *Fusarium moniliforme*, *F. solani*, *F. semitectum*, *Rhizoctonia solani*, and *Macrophomina phaseolina* were commonly isolated from the affected pegs.

A pot experiment was set up in the greenhouse at ICRISAT Asia Center to study the problem. Soil collected from the top 20 cm profile of affected fields was placed in 15 cm diameter pots. Main treatments were application of 15 L ha^{-1} dibromochloropropane, Vitavax®, and control (no chemical). Subtreatments were—addition of boric acid (1.43 mg kg^{-1} soil), addition of calcium sulphate (0.5 g kg^{-1} soil), and addition of both boric acid and calcium sulphate to the soil. A week after imposing the treatments, two seeds of the groundnut cv TMV 2 were sown in each pot. There were two pots for each subtreatment and six pots for each main treatment. The pots were irrigated regularly with deionized water, and plant growth was visually assessed before harvesting the plants 102 days after sowing.

Blackening of peg tips was noticed to varying degrees in all the treatments. Plant growth in the nematicide-

Table 1. Soil pH and nutrient status of fields with and without the groundnut 'peg drying' problem, southern coastal Andhra Pradesh.

Soil	pH	Na[2]	Fe	Zn	Ca	Mn	Cu
From apparently healthy fields	7.0 (6.6-7.3)[1]	52 (46-57)	45 (25-65)	0.61 (0.48-0.74)	97 (57-137)	11 (8-13)	0.38 (0.36-0.40)
From fields with 'peg drying' problem	5.4 (5.3-5.5)	21 (16-26)	61 (38-90)	0.28 (0.16-0.36)	40 (15-72)	14 (13-16)	0.27 (0.16-0.36)

1. Figures in parentheses show range.
2. Na, Fe, etc. expressed as mg kg^{-1} soil.