Variations in Infectivity Among Populations of *Meloidogyne javanica* on Tobacco and Pepper

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ABSTRACT

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Ten populations of *Meloidogyne javanica* from Nigeria were tested on tobacco (NC95) and pepper (California Wonder). Except for one population that did not feed or reproduce on either crop, populations that reproduced on tobacco failed to do so on pepper and vice versa. These test plants can be used as host differentials in separating two races of *M. javanica*.

Several researchers (1–3,6,11,12) have shown that populations of certain species of root-knot nematodes vary in their ability to parasitize host plants. These populations have been referred to as physiologic races, biotypes, or pathotypes. Physiologic races have been reported for *Meloidogyne arenaria* (9,11), *M. hapla* (3,8), *M. incognita* (1,5,11–13), and *M. javanica* (3). The morphological and physiologic variability among *Meloidogyne* spp. has been reviewed (7).

Evidence of pathogenic variation within a species involves differences in parasitism of differential hosts. This method is based on the assumption that populations within a species will always react on given hosts according to previous tests, unless the population is a mixture of two or more species (10). Sasser (9) established four races of *M. incognita* using tobacco (NC95) and cotton (Deltapine 16). Both plants are resistant to race 1; race 2 attacks tobacco but not cotton; race 3 attacks cotton but not tobacco; and both plants are susceptible to race 4. Two races of *M. arenaria* have been reported (9): one infects peanut (Florrunner), the other does not.

In this trial, 10 *M. javanica* populations collected from diverse habitats, hosts, and types of agriculture in northern and southern Nigeria were tested on tobacco (NC95) and pepper (California Wonder) to establish evidence of pathogenic variation within the species.

MATERIALS AND METHODS

Ten root-knot nematode populations were collected and identified as *M. javanica* (Treub) Chitwood by the perineal patterns of 10 mature females from each population. The populations were cultured in a shadehouse on tomato (*Lycopersicon esculentum* cv. Bonny Best) for 6 wk at an average recorded temperature of 27.4 C (day). Nematode eggs were obtained from the galled tomato roots by the Sasser method (4) using 10% sodium hypochlorite solution and concentrated in a flask.

Seedlings (7–10 cm tall) of tobacco (*Nicotiana tabacum* cv. NC95) and pepper (*Capsicum frutescens* cv. California Wonder) were transplanted into steam-sterilized sandy loam soil (80% sand, 0% silt, 20% clay) in 10-cm clay pots. Plants were inoculated with 10,000 nematode eggs/pot placed in depressions made in the potting soil. Treatments were replicated four times, and pots were arranged in a completely randomized design on a greenhouse bench.

Three weeks after inoculation, about 5 g of mixed NPK fertilizer was applied to each tomato stand (normal rate used = 500 kg/ha ≡ 10 g/stand). Plants were grown for 45 days after inoculation in an ambient temperature range of 26–30 C. Plant roots were carefully lifted from the soil with a hand trowel and washed under a slow stream of cold tap water. Egg mass and root-gall ratings were determined on a 0–5 scale used in the International *Meloidogyne* Project (4): 0 = 0, 1 = 1–2, 2 = 3–10, 3 = 11–30, 4 = 31–100, and 5 = more than 100 galls or egg masses per root system. The perineal patterns of at least five mature females were examined again to confirm the identity of each population.

RESULTS AND DISCUSSION

Egg mass and root-gall indexes for the 10 populations of *M. javanica* on tobacco and pepper are presented in Table 1. Populations from Enugu, Ogoni, and Asa-Ezebudele severely infected tobacco but did not infect pepper. Populations from Abakaliki, Sokoto, Kadawa, Asa-Obuzor, Badeggi, and Nsukka infected pepper but not tobacco. The population from Igarra (Bendel State) did not reproduce on either tobacco or pepper. None of the 10 populations appeared to be mixed. Species identity of each population was the same after as before plants were inoculated.

The results from this preliminary study indicate that tobacco (NC95) and pepper (California Wonder) can be used as host differentials to identify two races of *M. javanica*. Note also that both races occurred in Anambra State (Ex-Enugu and Ex-Abakaliki) and in Imo State (Ex-Asa-Ezebudele and Ex-Asa-Obuzor). Race is a matter of different physiologic characteristics and is independent of distance.

Table 1. Effects of 10 populations of *Meloidogyne javanica* from Nigeria on host differentials tobacco and pepper

City or town (state)	Host: Tobacco (NC95)	Host: Pepper (California Wonder)	LSD 0.05
Enugu (Anambra)	4.5[a]	0	0.70
Ogoni (Rivers)	4.25	0	1.17
Asa-Ezebudele (Imo)	3.75	0	1.17
Abakaliki (Anambra)	0	4.25	0.61
Sokoto (Sokoto)	0	3.75	0.61
Kadawa (Kano)	0	4.5	0.70
Asa-Obuzor (Imo)	0	4.25	1.17
Badeggi (Niger)	0	4.75	0.61
Nsukka (Anambra)	0	3.5	0.71
Igarra (Bendel)	0	0	0

[a] 0–5 scale: 0 = 0, 1 = 1–2, 2 = 3–10, 3 = 11–30, 4 = 31–100, and 5 = more than 100 galls or egg masses per root system. Each number is the mean of four replicates. Except for the Igarra population, differences between means in the two test plants are significant (LSD 0.05).

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