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DISTRIBUTION AND ABUNDANCE OF ROOT-KNOT NEMATODE SPECIES (*MELOIDOGYNE*) IN NORTHERN NIGERIA

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ABSTRACT

Earlier reports have shown that the root-knot nematode, Meloidogyne javanica is more prevalent than M. incognita in northern Nigeria. However, preliminary reports of surveys on some crops around Zaria indicate the reverse. Thus, a survey of several field crops in some parts of fourteen (14) States of northern Nigeria including the Federal Capital Territory (FCT) was carried out in order to determine the distribution and abundance of different root-knot nematode (Meloidogyne) species in northern Nigeria. Matured females isolated from roots of plants taken randomly at several locations were identified using perineal patterns. The results revealed the prevalence of three root-knot species with M. incognita being more prevalent (70.7% than M. javanica (28.7%) and M. arenaria (0.3% in northern Nigeria. M. arenaria was isolated in only two locations in Plateau State. The results of this study indicate that distribution of root-knot nematodes in cultivated soils is dynamic with serious implication on profitable production since degree of damage, among other factors, is species dependent.

Key words: Distribution, Meloidogyne species, Northern Nigeria

INTRODUCTION

The relative abundance of the various root-knot nematode (*Meloidogyne*) species have been well documented in Nigeria (Bridge, 1972; Bos, 1978; Emechebe *et al.*, 1980; Caveness, 1992). In all these reports, the species reported to be occurring in Nigeria are *M. incognita*, *M. javanica* and *M. arenaria*, with *M. incognita* being most prevalent in the southern parts of the country while *M. javanica* in the north and *M arenaria* occurring in isolated locations especially highland areas (Bos, 1978). However, recent reports of nematodes associated with fruit tree crops in the Zaria area (Khan and Chindo, 1989; Sambo, 1992) and preliminary observations of field crops around Zaria and some locations in the north indicate that *M. incognita* is more prevalent than *M. javanica*. Because of this discrepancy, extensive surveys were conducted in various States of the north with the view to determine the relative distribution/abundance of the *Meloidogyne* species occurring in northern Nigeria. It is known that degree of damage is directly related to nematode population density (Chindo and Khan, 1988; Chindo *et al.*, 2005)

MATERIALS AND METHODS

Sampling sites

Surveys of field crops (tomato, kenaf, pepper, cotton, roselle, yam, okra, garden egg, pawpaw, grapes, cowpea and potato) were undertaken over period of five years at several locations in fourteen (14) States of the north including the Federal Capital Territory (FCT). The States are Adamawa, Bauchi, Benue, FCT, Jigawa, Kaduna Kano, Katsina, Kebbi, Nasarawa, Niger, Plateau, Sokoto, Taraba and Zamfara. The number of samples taken from each state depended on the proximity of the state to the Institute for Agricultural Research (IAR), Zaria. Zaria is is located between latitude 11° 11′ and longitude 7° 36′ East. Locations and crops from which samples were taken are presented in Table 1.

Sample collection

From each location one composite sample comprising about ten galled plants was taken for each crop. Roots of plants except pawpaw and grapevine, were taken by digging round the base of the plant to ensure that the entire root system was uprooted. Roots of pawpaw and grapevine were taken by cutting some of the roots from the plants with a knife. Galled roots were taken and placed in polyethylene bags, labeled properly and then taken to the laboratory. They were thoroughly washed of soil and other debris with tap water. Roots of each composite sample were cut into small pieces of 1 cm and placed in petri-dishes containing small quantity of distilled water. From this, 1 gm roots were taken from which matured females were isolated by teasing out the roots with dissecting needles and forceps under the dissecting microscope at X10 magnification. The different *Meloidogyne* species were distinguished on the basis of their perineal patterns (Taylor and Sasser, 1978).

From each sample, ten perineal patterns were made from the matured females and placed on a slide with glycerol and observed under the compound microscope under X100 magnification. The number of perineal patterns belonging to each *Meloidogyne* species was counted and the results expressed as a percentage.

RESULTS AND DISCUSSION

The results of this study (Table 2) show that *M. incognita* occurred more frequently than the other species in all the samples collected. *M. incognita* occurred in 70.7% of the samples while *M. javanica* and *M arenaria* were found in about 28.7 and 0.3% of the samples, respectively. *M. arenaria* was found mainly in two locations in Plateau State.

This result is not in consonance with earlier reports by Bridge (1972), Bos (1978) and Caveness (1992) that *M. javanica* is more prevalent than *M. incognita* in northern Nigeria. However, the results agree with the findings of Khan and Chindo (1989) and Sambo (1992) who revealed that *M. incognita* is

javanica in some crops around Zaria. This discrepancy may be as a result of change in crop culture due to the introduction of new crop varieties which may be more efficient hosts of *incognita* than *M. javanica*. In addition, the type differences and soil edaphic factors arising from soil fertilization may account for this difference (Cuarezma *et al.*, 1984; Abd-Elgawad and Saad, 1989). The isolated occurrence of *M. arenaria* in Plateau State is not surprising since the species is a much cooler temperature loving one than *M. incognita* and *javanica* (Taylor and Sasser, 1978).

The result of this study indicate the dynamic nature of the nematode species in our agricultural soils with serious implications on the productivity of our crops. Crop performance is known to be directly proportional to nematode population density (Chindo and Khan, 1988; Chindo *et al.* 2005). More work is therefore needed to test different populations of *Meloidogyne* species on different crops and crop varieties in order to properly understand the changes in the distribution status of the *Meloidogyne* species.

Table 1: Locations and crops surveyed in northern states of Nigeria

State	Locations sampled	Crops sampled
Adamawa	Numan, Guyuk, Mubi	Tomato, okra, tomato, pepper, cowpea
Bauchi	Bauchi, Miya, Nabordo, Azare, Misau	Tomato, pepper, okra cowpea, roselle
Benue	Gboko, Makurdi	Yam, okra
Federal Capital Territory	Suleja	Okra, yam, kenaf
Jigawa	Hadejia, Dutse, Birnin kudu, Chiyeko, Gumel	Tomato, garden egg, pepper, okra, cowpea
Kaduna	Zaria, Shika, Tsibiri, Shika dam, Zonkwa, Sabon Gida, Kafanchan, Birnin Gwari, Maigana	Pawpaw, okra, tomato, pepper, cowpea, grapes, kenaf
Kano	Kadawa, Minjibir, Tomas, Jekarade, Kura, Danhassan	Tomato, pepper, cowpea, pepper, garden egg
Katsina	Funtua, Dutsinma, Ajiwa	pepper, tomato
Kebbi	Birnin Kebbi, Argungu, Aliero	Tomato, pepper, garden egg
Nassarawa	Keffi	Tomato, roselle, kenaf, okra
Niger	Minna, Mokwa	Yam, kenaf, roselle
Plateau	Bukuru, Jos	Potato, kenaf, roselle
Sokoto	Talata mafara	Tomato
Taraba	Wukari, Jalingo	Okra, kenaf, pepper
Zamfara	Gusau	Cotton, kenaf, tomato, okra

Table 2: Distribution of *Meloidogyne spp.* in northern Nigeria

State	*M.incognita* %	*M. javanica* %	*M. arenaria* %
Adamawa	70	30	0
Bauchi	85	15	0
Benue	65	35	0
Federal Capital Territory	55	45	0
Jigawa	80	20	0
Kaduna	85	15	0
Kano	75	25	0
Katsina	65	35	0
Kebbi	60	40	0
Nasarawa	70	30	0
Niger	70	30	0
Plateau	65	25	0
Sokoto	75	35	0
Taraba	65	25	0
Zamfara	75	35	0
	65	25	0
	75	25	0
	70.7	28.7	0.3

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