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Susceptibility of Sweet Potato (*Ipomea batatas*) Varieties to Root Knot Nematode, *Meloidogyne Incognita*.

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Abstract: Two field trials were carried out to assess the susceptibility of three local Nigerian varieties of sweet potato (white star, red nancy and puerto-rico) to root knot nematode, *Meloidogyne incognita*. Within the sweet potato rhizosphere, the population of root knot nematode, *Meloidogyne incognita* increased significantly. All the sweet potato varieties examined were moderately susceptible to root knot nematode infection. There were warty and knobbly symptoms and evidences of root knot nematode galls on the sweet potato tubers. Farmers are advised not to plant sweet potato in root knot nematode endemic areas and that it must not follow another crop that is known to be host of root knot nematode on crop rotational scheme.

Key words: Susceptibility · sweet potato · root knot nematode

INTRODUCTION

Sweet potato, *Ipomea batatas* (L) Lam belongs to the family convolulaceae. It is an important staple food crop providing essential minerals, vitamins and carbohydrate in the diet of many people in the tropical country [1]. Sweet potato is grown primarily for human consumption. Root tubers of sweet potato can be boiled, roasted, baked, fried or chopped into chips, dried and processed into flour [2].

Studies on the pathogenicity of nematodes on some tuber crops have been carried out [3-6]. Information on the effects of nematodes on sweet potato is very rare and scanty. This present research work therefore aimed at assessing the susceptibility of three local Nigerian varieties of sweet potato, which considered the most common sweet potato tuber in Nigerian markets, to the root knot nematode, *Meloidogyne incognita*.

MATERIALS AND METHODS

The experiment was conducted for two consecutive years (2004 and 2005) on the root knot nematode infested field. Root knot nematode galled roots obtained from stock culture of tomato were chopped into small pieces, about 5 cm each and used to inoculate the experimental field in order to augment the naturally infested root knot nematode on the field. Ten (10) kg galled roots were chopped and used for the inoculation of each plot with size 5×5 m. A day after field inoculation, stem cuttings of the local sweet potato varieties of average length of 15 cm were planted on the ridges, at a spacing of 1m (100 cm) within the rows. Varieties of sweet potato planted were red nancy, white star and puerto-rico. Allocation of the different sweet potato varieties into plots within the experimental field was by Randomized Complete Block Design. Each variety was replicated four times, thus there were twelve (12) plots, each was 5m X 5m size, within the experimental field with alleys of 2m wide left in-between plots.

Weeding was done twice at fourth and eighth weeks after planting. N:P:K (15:15:15) fertilizer was applied once at seventh week using band application method. Twenty (20) g of N:P:K fertilizer was applied to each sweet potato stand.

Soil samples (zigzag form) were collected from each plot at planting and harvesting. Root knot nematode was extracted from 200 ml soil sample using a standard technique of nematode assessment in the soil [7]. Root knot nematodes in each sample were counted under a stereoscopic microscope.

At maturity, 20 weeks after planting, tubers were harvested and were assessed for gall indices [8] on a scale

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of 0-5, where 0 = 0 gall; 1 = 1-2 galls; 2 = 3-30 galls; 4 = 31-100 galls and 5 = more than 100 galls. Data were also measured on vine length and weight of tuber per plot.

Analysis of variance was carried out on the data and where necessary the means were partitioned using Duncan's Multiple Range Test.

RESULTS

Root knot nematode, *Meloidogyne incognita*, within the rhizosphere of sweet potato was shown in Table 1. No significant difference was observed between the plant parasitic root knot nematode populations at planting (initial population) in either year, but the populations of root knot nematode at harvesting period (final population) in 2004 and 2005 cropping years differed significantly. The tremendous increases in the population density of the root knot nematode might be due to conducive environmental factor and availability of suitable host.

$$*\text{Multiplication rate} = \frac{\text{Final Population}}{\text{Intial Population}}$$

Moreover, the result on Table 1 shows that sweet potato varieties are moderately susceptible to root knot nematode. Galls (warty and knobbly appearances) were observed on sweet potato tubers in either year. Thus, the sweet potato varieties examined were moderately susceptible to root knot nematode infection. It shows that sweet potato is a potential host of *Meloidogyne incognita*.

Effects of root knot nematode disease on the vine and yield of sweet potato was presented on Table 2.

Though no significant difference was observed on the vine length and yield of the three varieties of sweet potato, it is evident from the data obtained that root knot nematode reduces the vine length and yield of sweet potato.

The average yield in 2004 was higher than average yield in 2005. Therefore, if the farmer continuing the cultivation of sweet potato where there is occurrence of root knot nematode population build-up on yearly basis.

DISCUSSION

The tremendous increases in the population density of the root knot nematode during the course of this experiment might be due to favourable environmental factor and availability of suitable host. An average yield of 3,864 kg ha^{-1} (healthy sweet potato) as against average range of 1905 kg ha^{-1} - 2260 kg ha^{-1} (Table 2) obtained on root knot infested soil during the course of this experiment had been reported [1]. Crop loss due to plant parasitic nematode had been reported to range between 20-100% [10]. *Scutellonema bradys*, yam nematode, is responsible for heavy losses of yam in storage [9, 10]. All the sweet potato varieties examined were moderately susceptible to root knot nematode infection. There were warty and knobbly symptoms and evidences of root knot nematode galls on the sweet potato tubers.

Yield losses on specific crops attributable to root knot nematodes, *Meloidogyne* species, in Nigeria and nearby countries have been put at range between 10% and 100%. Parasitic nematodes have caused 100% losses in tomato, 20-50% in cowpeas, 25-40% in yam [11, 12].

Table 1: Severity of root knot nematode on sweet potato

	Meloidogyne incognita									
	Initial population		Final population		Multiplication rate*		Gall index		Degree of susceptibility	
Sweet potato varieties	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Red Nancy	360	1074	1060	1807a	2.9	1.7	3.8	3.2	Moderately susceptible	Moderately susceptible
Puerto-rico	355	1080	1070	1904b	3.0	1.8	3.1	3.5	Moderately susceptible	Moderately susceptible
White star	361	1085	1268	1900b	3.5	1.75	3.7	3.4	Moderately susceptible	Moderately susceptible
	N.S	N.S	N.S							

Means followed by different letters in the same column are statistically different at P = 0.05

Table 2: Effect of root knot nematode *Meloidogyne incognita*, on vine length and yield of sweet potato.

	Mean vein length (cm)		Mean yield (kg ha^{-1})		
Sweet potato varieties	2004	2005	2004	2005	Mean yield of healthy sweet potato (kg ha^{-1})
Red Nancy	268.5	260	2260	2105	3860
Puerto-Rico	280.4	280	2250	1905	3868
White Star	170.14	171	1925	2050	3864

In conclusion therefore, sweet potato being a potential host of root knot nematode, the farmers should endeavour not to plant it on root knot nematode endemic field. Moreover, sweet potato should not follow another crop known to be susceptible to root knot nematode on crop rotational scheme.

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