EFFECT OF ROOT-KNOT-NEMATODE (*Meloidogyne incognita)* ON GROWTH AND YIELD OF HAUSA POTATO (*Solenostemon rotundifolius Poir)*

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ABSTRACT
Investigation was carried out to determine the susceptibility of Hausa Potato (Solenostemon rotundifolius Poir) to toot-knot nematode (Meloidogyne incognita). Six population levels of 0, 1000, 2000, 3000, 4000 and 5000 replicated five times were inoculated to each Hausa potato seedling. At a nematode population of zero (0) the highest number of clean tubers were obtained and no nematode symptoms were observed whereas the leas number of tubers were obtained at a nematode population of 5000 eggs which also had the highest nematode incidence symptomized by heavy galling on the roots and on the tubers causing them to appear unattractive. The number of tubers significantly (p = 0.05) decreased as the nematode population increased. Higher soil nematode population were also recovered from plots inoculated with 5000 eggs. Mean tuber, fresh and dry shoot weights decreased as nematode population also increased. This therefore implies that Hausa potato (Solenostemon rotundifolius) may not be successfully cultivated in fields highly infested with Meloidogyne spp, nor used in crop rotation with other crops susceptible to root-knot nematode.

KEYWORDS: Rootknot nematode Growth, Yield - Hausa potato

INTRODUCTION
Hausa potato (*Solenostemon rotundifolius Poir)* a perennial herb with prostrate or ascending habits belong to the family of labiatae (Allemann, 2006). It is an annual plant that probably originated from tropical Africa around Ethiopia (Tindall, 1983). At the moment, the crop is cultivated in some Nothern parts of Nigeria, South India and South East Asian Countries. The shallow, fibrous root-system produces tubers in clusters of 3-7 which are in diverse shapes, sizes and are harvested 150-200 days after planting (Jansen, 1996). The crop is cultivated in well-drained loamy or sandy loam soils with a yield of 7-15t/ha-1 or 18-20 t/ha-1 under more favourable conditions (Grubben and Denton, 2004). According to Allemann, (2006), a standard serving disl, of Hausa potato provides a large percentage of the daily requirement of calcium, vitamin 'A' as well as more than the daily need of iron. Different roots and tuber crops are reported susceptible to root-knot nematode (Iwahori et al; 2001). Hausa potato is said to be suppressing plant parasitic nematodes in South Africa while due to plant parasitic nematodes large yield loss occurs in Ghana (Tetteh and Guo, 1993; Grubben and Denton, 2004). In Nigeria, much work on the effects of root-knot nematode population density on Hausa potato has not been reported. It is suspected that root-knot nematode may constitute menace and a limiting factor to the production of this nutritionally important crop in Nigeria hence, this investigation is intended to; determine the influence of root-knot nematode (*Meloidogyne incognita*) population density on the growth and yield of Hausa potato.

MATERIALS AND METHODS
Thirty polythene bags of 50 liters in volve were surface-sterilized with alcohol and filled with 10kg of steam sterilized sandy loam soil. Two sprouted tubers of Hausa potato Ex-Yola obtained from National Root Crops Research Institute, Umudike were planted into each of the bags. Two weeks after planting, the plants were thinned down to one plant per bag followed by NPK 15:15:15 fertilizer application at the rate of 20g per 10kg of soil. The plants were watered throughout the six (6) months. Four weeks after planting the seedlings were

inoculcated with eggs of root-knot nematode (*Meloidogyne incognita*) extracted from galled roots of Indian Spinach (*Basela rubra*) using Sodium hypochlorite (NaOCl) technique (Hussey and Baker, 1973). One milliliter of the inoculum suspension contained approximately 200 eggs per count. So 0ml, 5mls, 10mls, 15mls, 20mls and 25mls of the inoculums suspension giving six inoculum levels of 0, 1000, 2000, 3000, 4000 and 5000 were dropped in a depression made in the soil round the base of each seedling. The experiment was a completely Randomized Design (CRD) replicated five times. Six months after planting, the data collected were: number of tubers per plant, fresh weight of tubers, fresh shoot weight, dry shoot weight, number of galls on roots. The data collected were statistically analyzed by analysis of variance (ANOVA) and means separated by LSD.

RESULTS

Table 1 presents the number of nematodes recovered from tubers, roots, soil and number of galled roots. All the nematode population levels had nematode infection symptoms on Hausa potato the test crop compared with the crops where nematode (*M. incognita*) was not inoculated. 5000 population level produced the highest galled roots, highest number of nematodes in tubers, roots and soil and significantly differed from 1000 and 2000 population levels which produced the least galled roots and number of nematodes in tubers, roots and soil. 1000 and 2000 population levels had no significant difference in all the parameters observed. Also 3000 and 4000 population levels did not differ significantly from each other in most of the parameters except in number of galls on roots. These observations indicate that Hausa potato is susceptible to root-knot nematode *(M. incognita*). The incidence of root-knot nematode (*M. incognita*) on Hausa potato increased as the nematode (*M. incognita*) population increased.

Table 1: Number of Nematodes Recovered from Tubers, Roots, Soil and Numbers of Galls

No of eggs	Mean no. of nematodes in tubers	Mean no. of nematodes in roots	Mean no. of nematodes in soil	Mean no. of galls on roots	Mean wt. of galled roots (kg/plant)
0	-	-	-	-	-
1000	358.00	338.00	616.00	10.60	0.166
2000	420.00	360.00	590.00	31.80	0.164
3000	560.00	544.00	1100.00	80.00	0.210
4000	560.00	360.00	1240.00	110.00	0.232
5000	740.00	680.00	1750.00	180.00	0.272
LSD (0.05)	88.24	179.20	266.60	29.59	NS

The result of the different nematode population levels on yield and yield components are presented in Table 2. The number of tubers significantly (p=0.05) decreased as the nematode population levels increased. The plant with no nematode had the highest number of tubers while the highest population density of nematodes induced the least number of tubers. The same trend appeared in the mean fresh and mean dry shoot weights which decreased as nematode population increased expect 4000 population level which did not significantly (p=0.05) differ from 5000 population level.

Table 2: Effect of Nematodes/Density on Yield and Yield Components of Hausa Potato in Green House.

No of Eggs	Mean No. of Nematodes in Tubers/ Plant	Mean Fresh Tuber Wt. (Kg/Plant)	Mean Fresh Shoot Wt/(Kg/Plant)	Mean Dry Shoot Wt/(Kg/Plant)
0	15.20	0.620	0.470	0.354
1000	12.60	0.400	0.408	0.298
2000	10.40	0.340	0.372	0.244
3000	9.20	0.270	0.310	0.202
4000	8.60	0.228	0.260	0.172
5000	7.00	0.164	0.256	0.148
LSD (0/05)	1.440	0.092	0.058	0.058

DISCUSSION

This study has shown that all the nematode population densities tested had damage symptoms of root-knot nematodes on the test crop. This damage symptoms increased with increase in the population density of nematodes. This indicates that the higher the population density of root knot nematodes in the soil, the higher the extent of damage on crops. The highest population density of 5000 nematodes (*M. incognita*) per plant in this study gave the highest damage incidence and also the least yield and yield components. This agrees with the report of Ononuju and Fawole, (1997) who reported that extent of damage by nematodes is influenced by the level of soil nematode infestation and environmental factors. The poor yield and yield components of Hausa potato in this study is caused by nematode (*M. incognita)* due to its physiochemical destruction of the crop roots making them inefficient in moisture and nutrient utilization. This is in agreement with (Jonathan and Hedwig, 1991) who stated that severe damage on roots result in unmarketable products, reduced yield and quality of products or even total crop failure. Okorocha *et al*, 2006 also reported that at high nematode population density, a significant damage was observered on Hausa potato. (Franklin, 2003) also reported that damage to the roots interferes with the plants ability to deliver water and nutrient to above ground portions of the plant. Observation from this study further shows that in the absence of root knot nematode infestation, the crop, Hausa potato will give better yield as there would be no damages through galling incidence.

CONCLUSION AND RECOMMENDATION

Root-knot nematode population density of 1000 per 10kg of soil has potential to cause damage and reduce yield and yield components in Hausa potato (*Solenostemon rotundifolius*). In creasing population density of *(M. incognita)* has potential to cause more damage with attendant increase in nematode population in the soil over time.

Since increased population density of nematode *(M. incognita)* induced more damages on the test crop, it becomes necessary therefore to employ measures or farming practices which will help to reduce nematode population density to the bearest minimum to enhance Hausa potato production.

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