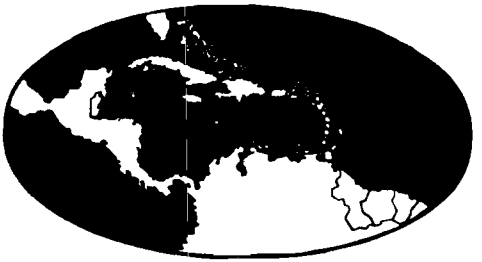
CARIBBEAN FOOD CROPS SOCIETY



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PRELIMINARY EVIDENCE FOR RESISTANCE TO RENIFORM NEMATODE, *ROTYLENCHULUS RENIFORMIS* IN BENGAL BEAN *STIZOLOBIUM ATERRIMUM*

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ABSTRACT

The reniform nematode population in the rhizosphere of Bengal bean (*Stizolobium aterrimum* Piper & Tracy) was significantly lower than that of Cowpea (*Vigna unguiculata* (L.) Walp.) three months after planting both crops in soil of similar initial nematode population density. Moreover, examination of the development of the nematode on Bengal bean roots revealed that only a small percentage of the reniform nematodes which enter the root develop to become egg-laying females. The data suggest that Bengal bean has resistance to reniform nematode.

Several studies have shown that the reniform nematode *Rotylenchulus reniformis* Linford and Oliveira, 1940, is one of the most abundant plant parasitic nematodes in the soils of the Caribbean (1, 2, 4, 6).

Brathwaite (1) found that although reniform nematode was widespread in Montserrat, the nematode did not occur in the rhizosphere of Bengal bean (*Stizolobium aterrimum* Piper & Tracy). The objective of the study was to define the host parasite relationship, if any, between reniform nematode and Bengal bean.

MATERIALS AND METHODS

An area of land at the Field Station of the University of the West Indies (UWI), Champ Fleurs, Trinidad, which was previously in weeds, was ploughed and harrowed. The area was divided into 10 plots each 4.88 m x 1.22 m and the reniform nematode population of each plot was determined as follows:

About 1000 cc of soil consisting of 10 sub-samples from each plot was collected at random with a 2.5 cm diameter soil sampler. Each

sample was thoroughly mixed and passed through a 22 mesh sieve to remove stones and soil clods. The nematodes in a 100 cc aliquot from each sample were extracted with local extraction pans made and arranged as described by Gowen and Edmunds. The suspensions were collected after 24 hr and the number of reniform nematodes present were counted with a stereoscopic microscope.

After sampling, each plot was divided into two equal sub-plots one of which was planted with either blackeye (*Vigna unguiculata* (L.) Walp. local cultivar) or Bengal bean. Three months after planting, 10 plants from each sub-plot were removed and the rhizosphere soil collected. The number of reniform nematodes in 100 cc of rhizosphere soil was determined as described above.

To determine the development of the reniform nematode on Bengal bean roots, seeds were planted in reniform nematode infested soil contained in 20 cm clay pots. The pots were placed outside the greenhouse on the UWI campus. At 4, 11, 18, 25, 32, 46, 67, 74, 81 and 88 days after planting the roots of two plants were collected. The soil particles were gently removed from the roots with running tap water and these were cut into pieces of approximately 2 cm long and stained with acid fuchsin. Three replicates each consisting of a 20.5 cm of length of root or similar diameter were examined with a stereoscopic microscope and the numbers of reniform nematode larvae, developing females, mature females and mature females with eggs were determined.

The rate of development of the reniform nematode on roots of sweet potato and Bengal bean was determined by planting Bengal bean seed or 20 cm long cuttings of sweet potato (*Ipomoea batatas* (L.) Lam. cv. 049, UWI selection), in each of six, 13 cm plastic pots containing reniform nematode infested soil (approximately 3000 nematodes per 100 cc of soil). At 28 days after planting, the roots from each species were washed in running tap water to remove soil particles, and blotted dry by gently pressing them between pads of tissue paper. Six 1 g portions of roots from each species were stained in acid fuchsin. The roots were examined with a stereoscopic microscope and the numbers of reniform nematode larvae, mature females without eggs and mature females with eggs were determined.

RESULTS

The reniform nematode population associated with the soil prior to planting and with the rhizosphere of Blackeye and Bengal bean after three months is shown in Table 1.

TABLE 1. **Mean number of reniform nematode per 100 cc of soil prior to planting and in the rhizosphere of Bengal bean and Blackeye, three months after planting.**

Original Population	Bengal bean	Blackeye
81[a]	41[a]	1046[b]

Mean of 10 determinations.

Means having the same superscript are not significantly different at P = 0.1% level using the t - test.

While there was a marked increase in the population of reniform nematode in the rhizosphere of cowpea, the nematode population in the rhizosphere of Bengal bean was not significantly different from the original population.

There was a gradual decline in the number of larvae and developing females associated with the roots of Bengal bean and at 81 days after planting, no nematodes were found on the roots (Table 2).

Although a large number of larvae gained entry into Bengal bean roots only a small proportion became mature females and an even smaller number produced eggs.

TABLE 2. Number of reniform nematodes associated with Bengal bean roots after 88 days.

Days after planting	Total	Larvae	No. of Reniform Nematodes/20.5 cm of root (mean of 3 Reps)		
			Develop. female	Mature female	Females with eggs
4	109	107	2	0	0
11	105	74	28	3	0
18	64	48	15	1	0
25	41	29	11	1	0
32	46	35	11	0	0
46	20	11	4	3	2
67	2	1	1	0	0
74	4	1	1	0	1
81	0	0	0	0	0
88	0	0	0	0	0

When the development of the nematodes was compared on Bengal bean and sweet potato although the number of larvae entering the root were not significantly different, there were significantly fewer mature females and mature females with eggs in the roots of Bengal bean (Table 3).

TABLE 3. Number of reniform nematodes associated with sweet potato and Bengal bean roots, 28 days after planting in infested soil.

	No. of reniform nematodes per gram of root tissues*	
	Sweet Potato	Bengal bean
Larvae	152[a]	133[a]
Mature females	191[a]	15[b]
Mature females with eggs	51[a]	1[b]

* Mean of 6 determinations. Mean having a different superscript in a single horizontal line are significantly different at the 5% t - test.

DISCUSSION

Bengal bean has been used as a cover crop and as a forage legume in Tropical Africa for decades (7). Recently, it has been used as a cover crop in some parts of the Caribbean. In addition to its ability to provide a quick and effective cover thus assisting in weed control, Bengal bean, being a legume, also increases the nitrogen status of soil. The evidence presented here which suggest that the plant can suppress the build up of reniform nematode populations could mean that there is a triple advantage to growing the crop.

The mechanism by which Bengal bean suppresses the development of reniform nematode is not known. Further work along these lines is warranted.

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