Effects of Pratylenchus coffeae and Scutellonema bradys Alone and in Combination on Guinea Yam (Dioscorea rotundata)[1]

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Abstract: When Guinea yam, *Dioscorea rotundata* Poir, was inoculated with *Pratylenchus coffeae* and *Scutellonema bradys* together, there was a 53% suppression of top growth, but when plants were inoculated separately, there was a 29% suppression with *P. coffeae* and a 21% suppression with *S. bradys*. The reproduction of *S. bradys* was greatly inhibited when both nematode species were together on the same plant in comparison with that on plants inoculated with *S. bradys* alone. *Scutellonema bradys* apparently did not affect the reproduction of *P. coffeae*. Storage-root quality was reduced 72% by *P. coffeae* but only 20% by *S. bradys*. The two species together resulted in a reduction in storage-root quality of 84%. Although the Guinea yam is a good host of *P. coffeae* and *S. bradys*, our results indicate that *P. coffeae* is responsible for most of the storage-root deterioration and dry rot of yam in Puerto Rico. *Key Words:* storage-root quality, lesion nematode, yam nematode, deterioration, nematode-nematode interactions.

Dry rot of storage roots of the edible Guinea yam (*Dioscorea rotundata* Poir) has been reported from several countries (7, 9, 10, 11, 13). *Scutellonema bradys* (Steiner & Lehen) Andrassy has been suspected as the cause of the disease (11). In Puerto Rico, the yam is of great economic importance as a source of food for local consumption and for exportation. Several nematode species, including *S. bradys, Pratylenchus coffeae,* and others have been reported associated with Guinea *(D. rotundata)* and Florida (*D. alata* L.) yams (2, 3, 4). Acosta and Ayala (1) demonstrated experimentally that *P. coffeae* causes a dry-rot condition of the Guinea storage root. It is also damaged, but to a lesser degree (1), by *Scutellonema bradys.*

Unpublished results from a previous survey conducted by the authors (unpublished data) showed that in most of the localities where *P. coffeae* was the predominant species, populations of *S. bradys* were low. To determine the nature of the association between both species and the separate and combined effects of these two nematode species on yams, an experiment was conducted under greenhouse conditions.

MATERIALS AND METHODS

Small Guinea-yam plants (60 days old) established from stem cuttings in sterile soil were transplanted into a steam-sterilized soil mix in 20-cm diam pots. The mixture was composed of an alluvial sandy loam, organic soil, and sand (3:2:1). The soil texture was 72.6% sand, 13.8% silt, 13.6% clay, and 10.6% organic matter content.

Pratylenchus coffeae (Zimmermann) Filip. & Schuurm.-Stekh. and *Scutellonema bradys* were separately maintained on yams. The culture of *S. bradys* came from yams purchased at a market place in Mayaguez, Puerto Rico, and the *P. coffeae* culture was isolated from yams in a commercial planting from Laguna in Aguada, Puerto Rico. Nematodes were extracted from infected yam tissue by using Baermann funnels. Plants were inoculated with nematodes in water by pipetting a fixed amount into holes punched in the soil around the base of the plants. Treatments were 600 *P. coffeae*/plant, 600 *S. bradys* per plant, 600 each *P. coffeae* and *S. bradys*/plant, and no nematodes. Each treatment was replicated 5 times in a randomized block design. The duration of the experiment was 3 months.

All pots placed in the greenhouse were on wooden blocks on concrete tables to avoid contamination with nematodes from adjacent pots. Air and soil temperatures recorded during the experimental periods were 22 and 27 C, respectively.

Plants were irrigated every 2 days and Hoagland's nutritive solution (12) was applied every 2 weeks at a rate of 100 ml per plant during the test. Plants were sprayed periodically to control foliage mites. Nematode populations extracted by Baer-

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mann funnel from 100 cm^3 of soil, 1 gm of roots, and 6 gm of storage root cortex were counted at the end of the test (after 3 months).

RESULTS AND DISCUSSION

Top, root, and storage-root weights of Guinea yams were not altered by the presence of *P. coffeae, S. bradys,* or the combination of these species (Table 1). This lack of change was probably due to the fact that most of the nematodes were concentrated in the storage root, a factor which reduced storage root quality. At an initial population density of 600 *P. coffeae* or *S. bradys*/plant, symptoms of dry rot were observed and storage-root quality was reduced. The influence of an initial population density of 600 *P. coffeae* and 600 *S. bradys*/plant on dry rot appeared to be additive in comparison with the dry rot resulting from the individual species. These results compared with those obtained by Acosta and Ayala (1) when they demon-

TABLE 1. Influence of *Pratylenchus coffeae* and *Scutellonema bradys* singly and in combination on the growth and quality of Guinea Yam.

Nematode species	Top wt (gm) (fresh)	Top wt (gm) (dry)	Root wt (gm) (fresh)	tubers wt (gm)	Quality index (0.5)[x]
Pratylenchus coffeae	16.7 a[y]	4.2 a	4.9 a	87.2 a	1.4 c
Scutellonema bradys	18.6 a	4.1 a	3.9 a	67.7 a	4.0 b
Pratylenchus coffeae + *Scutellonema bradys*	11.0 a	2.7 a	3.0 a	69.0 a	0.8 c
Control	23.4 a	4.8 a	5.5 a	73.3 a	5.0 a

[y]Averages followed by the same letter indicate no significant difference ($P = 0.05$), according to Duncan's Multiple Range Test (data obtained 3 months after inoculation).
[x]Tuber quality index rating scale: 0=severely damaged tubers; 5=highest quality tubers.

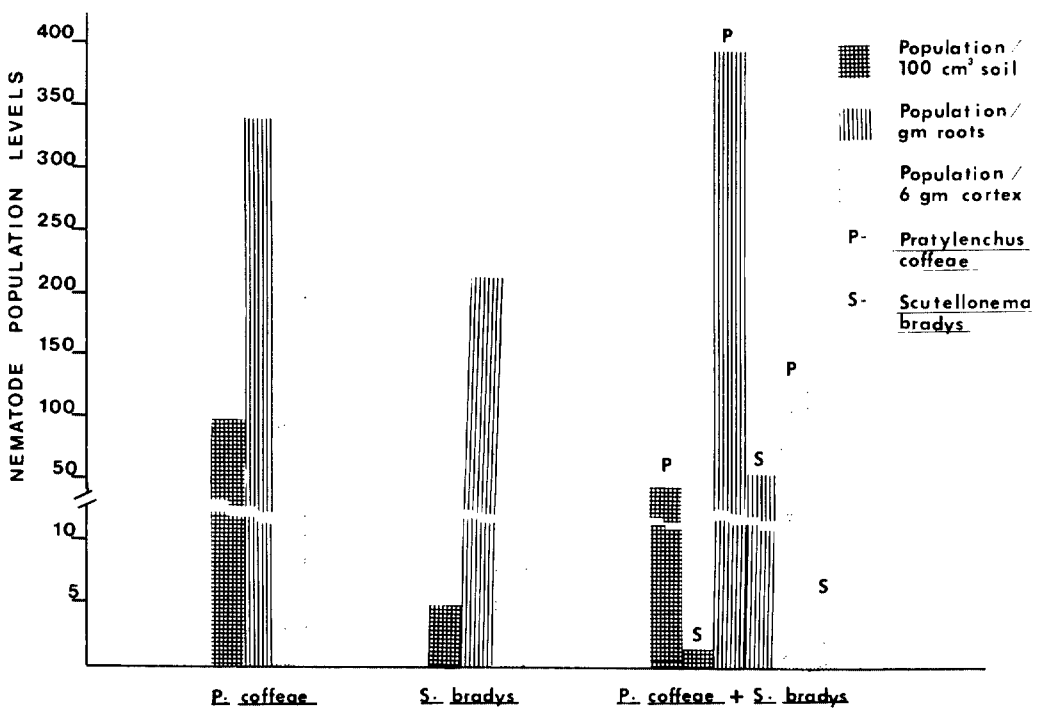

FIG. 1. Nematode-population density at harvest. Guinea yams initially inoculated with 600 *Pratylenchus coffeae,* 600 *Scutellonema bradys,* alone and in combination.

strated that either species alone (*P. coffeae* or *S. bradys*) can cause dry-rot symptoms on Guinea yam.

After 3 months, population densities of *P. coffeae* recovered from yam soil, roots, and storage roots were considerably higher than those of *S. bradys* (Fig. 1). According to a t-test analysis, it was demonstrated that when both species were present, soil, root, and tuber populations of *S. bradys* were lower than in the absence of the concomitant species. The presence of *S. bradys* had no significant influence on soil, root, or storage-root population densities of *P. coffeae*. Evidence on the association between different species of root-feeding nematodes in different crops indicates that the reproduction of one of the species may be affected favorably, unfavorably, or not be affected when the concomitant species is present (6). Apparently, *P. coffeae* is the dominant species. The same result has also been observed under field conditions.

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