Under conditions of this test, the mean data show *P. coffeae* females to have stylets 17 - 18μm long, tails 29 - 30μm long, post-uterine sacs 22 - 24μm long and the distance between the vulva and anus to be 85 - 88μm. There appeared to be no major biometric differences between progeny from females of different populations reared under identical conditions. The most radical differences were in shapes of tail termini which were flattened, knobbed, cleft or slightly digitate.

OTHER CONTRIBUTIONS – – – OTRAS CONTRIBUCIONES

DEPTH OF PENETRATION OF PHYTOPARASITIC NEMATODES IN YAM TUBERS [PROFUNDIDAD DE PENETRACION DE NEMATODOS FITOPARASITICOS EN EL TUBERCULO DEL ÑAME]. Nelia Acosta, Assistant Nematologist, University of Puerto Rico, Mayaguez Campus Agricultural Experiment Station, Río Piedras, Puerto Rico 00928.

ABSTRACT

Phytoparasitic nematodes, especially *Pratylenchus coffeae* (Zimmermann), were concentrated mainly in the outer 6 mm of tissue, but penetration up to 15 mm was found in the Guinea yam tuber. The oldest portion, adjacent to the stems, contained the highest population while few specimens were recovered from the distal portion of the tuber.

INTRODUCTION

The Guinea yam *Dioscorea rotundata* Poir, is one of the most important cultivated root crops in West Africa, Southern Asia and the Caribbean (5). The crop is severely damaged by several biological agents, among which phytoparasitic nematodes are known to destroy the tuber, decreasing considerably its appearance and hence its commercial value.

There are reports on nematodes associated with yam tubers. This association was first observed by Steiner (9), who described *Hoplolaimus* n. sp. feeding on yam tubers. This species was later classified as *Scutellonema* by Andrassy (1). West (10) observed that yams infected by *Scutellonema* had a loosened cortex, which he called "dry rot of yam".

Several other nematode species have been found in association with yam tubers. Ayala (2) and Ayala & Acosta (3) found *Pratylenchus coffeae, Scutellonema bradys, Meloidogyne* sp., *Rotylenchulus reniformis* and *Helicotylenchus* sp. associated with *D. rotundata* in Puerto Rico. Jenkins and Bird (8) found *Meloidogyne incognita, Pratylenchus brachyurus* and *Criconemoides* sp. associated with the wild yam.

In an attempt to improve production and the quality of yam tubers used for propagation, several tests have been performed to rid them of pathogenic nematodes. Bruhn and Wolfgang (4) obtained effective nematode control by immersing the

yam tubers in hot water at 45C for 30 min. Hawley (7) also controlled the nematodes in *D. floribunda* tubers using hot water at 51C for 30 min.

To develop an effective method to control nematodes inside yam tubers it is necessary first to determine the depth of penetration in the tissue. Therefore, the purpose of this study was to find out how deep the different nematode species penetrate yam tubers.

MATERIALS AND METHODS

Nematode-infected Guinea yam tubers were divided into three portions: apical, central and distal. Samples of 15 g of tissue 3 mm thick (figure 1) were taken from each portion at the following depths: 0-3, 3-6, 6-9, 9-12 and 12-15 mm. Each sample was taken starting at the surface of the yam cortex and cutting down to the central cylinder of the tuber. The tuber tissue in each sample was cut into small pieces and the nematodes were extracted using the Baermann funnel method (6). Ten replications of each treatment were used and the nematodes recovered from each sample were identified, counted, and recorded after 24 hr.

RESULTS

The nematode populations attacking the yam tuber were concentrated in the first 6 mm of tissue in each of the 3 portions in which it was divided (apical, central and distal) as shown in Table 1. The nematodes were concentrated in higher populations in the apical portion from where an average of 1809 specimens were recovered from the first 6 mm. *Pratylenchus coffeae* was the dominant species, constituting 96% of the total population. *Aphelenchoides* spp. and *Seinura* sp. were also present but less numerous. In deeper tissue the populations of *P. coffeae* were smaller with an average of 196 specimens at 6 to 12 mm and just few specimens found at 15 mm.

In the central portion of the tuber the average nematode population was 721 specimens. *Pratylenchus coffeae* constituted 99% of the total population. Very low populations of *Scutellonema bradys* and *Seinura* sp. were also recovered. The nematodes, were concentrated in the first 6 mm. Few *P. coffeae* were recovered from tissue at 6 to 9 mm. No nematodes were recovered byond the first 9 mm.

Pratylenchus coffeae was the only nematode species extracted from the distal portion of the yam tuber where an average of 124 specimens were recovered. Here nematodes were not recovered in tissue deeper than 6 mm.

DISCUSSION

Phytoparasitic nematode populations were concentrated in the surface 6 mm of tuber with fewer nematodes found in greater than 6 mm depths and in new tissue of the distal portion. The apparent preference of the parasite for this oldest tissue at the tuber apical portion seems to be simply because it remains longer under the soil surface and in constant contact with the nematodes. The nematodes free in the soil, after the material from a previous crop decays, readily penetrate the succulent tissue when it forms. After the tissue is damaged, they migrate to deeper levels into

Table 1. Average nematode populations present in 3 portions of the yam tuber from samples taken at 5 different depths in the tissue.

Tissue portion and nematode species	Depths in mm and nematode populations per sample of 3 mm thick.				
	0 - 3	3 - 6	6 - 9	9 - 12	12 - 15
Apical Portion					
Pratylenchus coffeae	2100	1369	369	23	9
Aphelenchoides spp.	123	18	3	0	0
Seinura sp.	4	5	0	0	0
Central Portion					
Pratylenchus coffeae	1780	374	2	0	0
Scutellonema bradys	1	1	0	0	0
Seinura sp.	4	1	0	0	0
Distal Portion					
Pratylenchus coffeae	223	26	0	0	0

the tissue and to the new tissue being formed which in turn is destroyed. Those nematodes which are not able to colonize the first portion continue their migration through the soil until they penetrate the central and the distal portions which develop later. By the time the tubers are harvested, the apical portion is partially destroyed through the direct action of the nematodes and the invasion of secondary fungi and bacteria, while populations at the central and distal parts remain low.

Knowing that *P. coffeae* is capable of migrating as deep as 15 mm into the tissue of the yam tuber, the need for the use of control substances capable of penetrating deeper becomes evident. Hot water baths and nematicidal dips of yam tubers have been employed for nematode control. Tests performed by immersing tubers in hot water at 45 or 51C for 30 min obtained good control (4, 7). The immersions of yam tubers in 625 ppm Nemagon solutions for 30 min, controlled the nematodes effectively and did not affect germination (3). In future experiments efforts should be made to determine if the treatment has been successful in controlling nematodes present in deeper tissue. The survival of low population will serve as the inocullum for reinfectation of the newly formed tubers.

The information is useful for the selection of the best propagating material. It is evident that the apical tissue should not be used for propagation and that sections of the central or distal portions should be preferred.

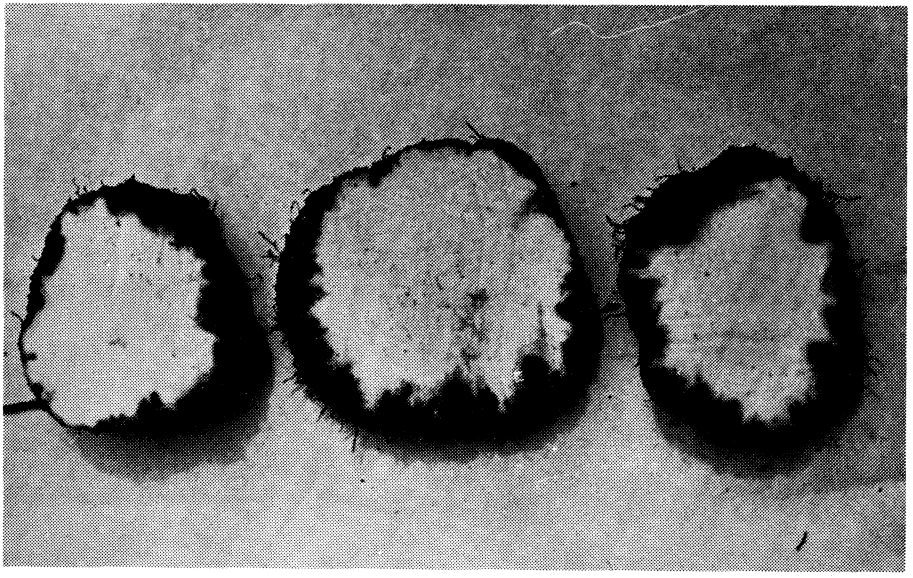

Figure 1. Nematode-infected Guinea yam tuber sections from which 15-g, 3-mm thick samples were taken. The outermost brown tissue shows the severe necrosis caused by nematodes, specially *Pratylenchus coffeae.*

CONCLUSIONS

The results obtained demonstrated that phytoparasitic nematodes produce severe damage to the Guinea yam tuber, colonizing mostly the first 6 mm of the apical portion. The predominant nematode species was *P. coffeae.* No conclusions can be reached regarding the other nematode genera present.

When possible, nematode-free tubers of the Guinea yam should be used for propagation in all the commercial plantings in Puerto Rico. Propagative material should be selected from central or distal portions since apical tissues have great numbers of *P. coffeae.* Hot water and chemical dips of tubers should be used to disinfect the "seeds". This practice should be employed to increase yam production and to improve the quality of the tuber. Experiments using growth regulators should be performed also in an effort to accelerate the germination rate of the central and distal portions of the tuber. In this way the oldest and infected portions can be discarded, making use only of these 2 portions of the tuber which are considerably free of nematodes and are easier to treat when nematode infected. In these tubers the cortex has not acquired the corky appearance so prevalent in the infected apical portion.

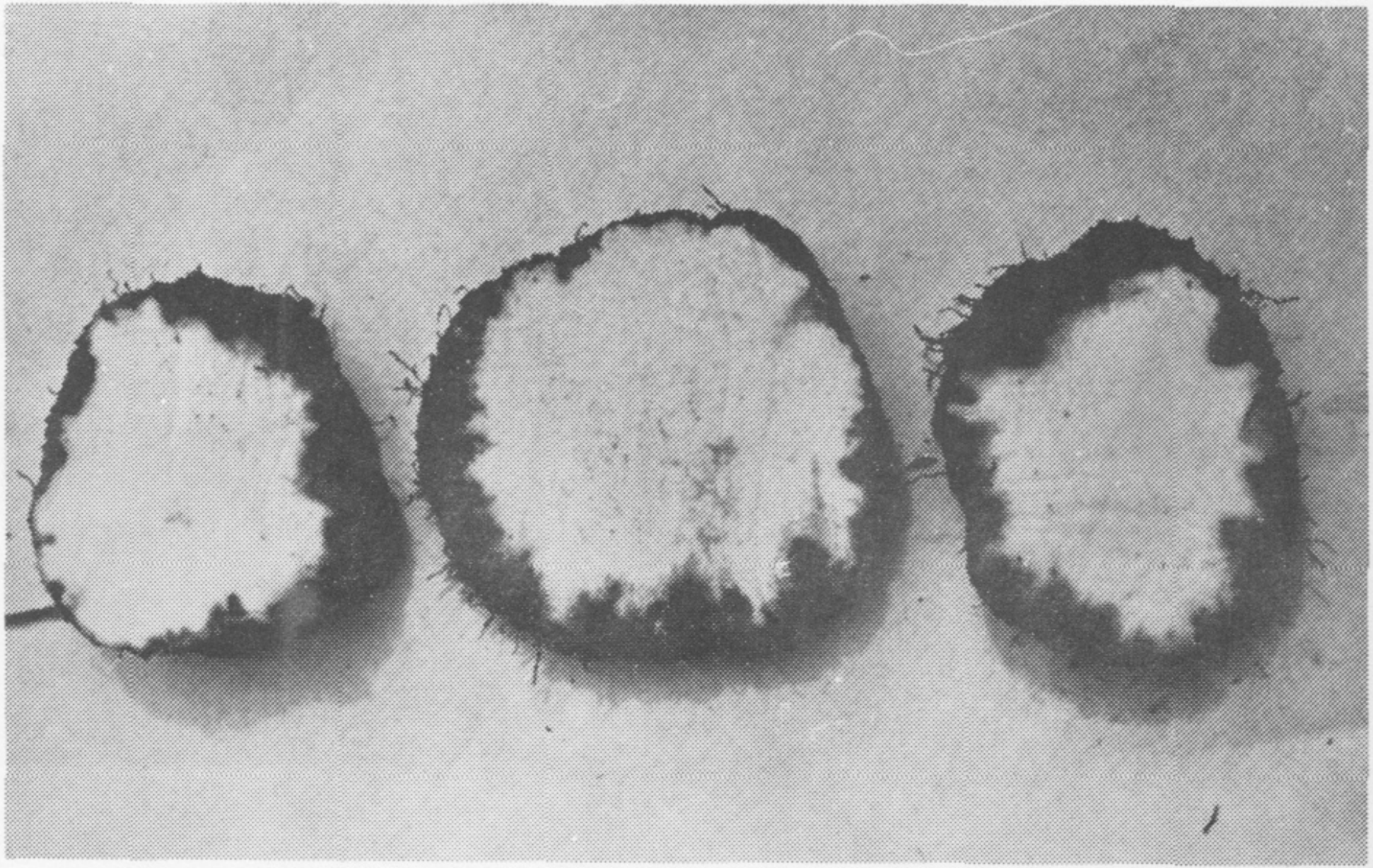

Figure 1. Nematode-infected Guinea yam tuber sections from which 15-g, 3-mm thick samples were taken. The outermost brown tissue shows the severe necrosis caused by nematodes, specially *Pratylenchus coffeae*.

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RESUMEN

Los nemátodos fitoparasíticos, especialmente *Pratylenchus coffeae,* se concentran mayormente en los 6 mm de tejido más cercanos a la superficie, pero penetran hasta 15 mm en los tubérculos del ñame de Guinea. La mayor concentración de especímenes occurió en la región adyancente al tallo, mientras se recobraron menos de la porción distal del tubérculo.

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PRELIMINARY INVESTIGATIONS ON THE PARASITIC NEMATODES ASSOCIATED WITH TOBACCO IN TRINIDAD [INVESTIGACIONES PRELIMINARES SOBRE LOS NEMATODOS PARASITOS ASOCIADOS CON EL TABACA EN TRINIDAD]. N. D. Singh. Department of Crop Science, The University of the West Indies, St. Augustine, Trinidad, W. I.

ABSTRACT

One hundred and eighty-four soil and root samples taken from 92 tobacco fields in Central Trinidad were analyzed for plant parasitic nematode populations.