RESEARCH NOTES—NOTAS DE INVESTIGACION

EFFECTS OF SEPARATE AND CONCOMITANT POPULATIONS OF *BELONOLAIMUS LONGICAUDATUS* AND *DOLICHODORUS HETEROCEPHALUS* ON *ZEA MAYS*

H. L. Rhoades

Nematologist, University of Florida, Central Florida Research and Education Center, P. O. Box 909, Sanford, Florida 32771, U.S.A.

Accepted:

21.V.1985

Aceptado:

RESUMEN

Rhoades, H. L. 1985. Efecto de las poblaciones de *Belonolaimus longicaudatus* y *Dolichodorus heterocephalus,* separadas y concomitantes sobre el *Zea mays.* Nematropica 15:171-174.

Las poblaciones de *Belonolaimus longicaudatus* y *Dolichodorus heterocephalus,* separadas y concomitantes, fueron colocadas sobre el *Zea mays.* Separadamente ambas especies aumentaron a niveles altos, pero en infestaciones concomitantes solamente el *B. longicaudatus* aumentó a niveles altos. El *B. longicautadus* daño las plantas de maíz más serveramente que el *D. heterocephalus.* Los daños de las poblaciones concomitantes fueron similares a aquellos asociados con *B. longicaudatus* sólo.

Palabras claves adicionales: nematodo de punzón, nematodo de aguijón, maíz de campo.

The sting nematode, *Belonolaimus longicaudatus* Rau, is widely distributed in the fine sandy soils of Florida where it causes extensive injury to many agronomic and vegetable crops (1,2). The awl nematode, *Dolichodorus heterocephalus* Cobb, also occurs in various locations throughout the state (2), but the areas of heavy infestation are much more limited in number and distribution. Both nematodes damage plants in a similar manner (4). In the fine sandy soils used for winter vegetable production near Sanford, Florida, the sting nematode is present in nearly all fields and frequently builds up to injurious populations on many crops. The awl nematode occurs much less frequently in the area but occasional 'pockets' of high infestations build up and cause severe injury to some crops. Although both nematodes are often found together in some fields, it has been observed that high populations of both nematodes seem never to occur concomitantly. If a high population of one exists, the other is present only in low numbers or is absent. The purpose of this research was to determine: 1) if the presence of one of these nematode species influences development of the other on the same host, and 2) plant damage attributed to single-species and bi-species populations.

The experiment was established on 15 March 1984 in 15-cm diameter pots (2200 cm^3) of steamed Myakka fine sand. The experimental design was a randomized complete block, replicated five times with seven treatments. Treatments consisted of: 1) control (no nematodes), 2) 500 sting, 3) 500 awl, 4) 250 sting + 250 awl, 5) 1000 sting, 6) 1000 awl, and 7) 500 sting + 500 awl. The nematodes were added around five field corn (*Zea mays* L.) seeds at planting. The corn plants were thinned to two per pot soon after emergence and allowed to grow for 6 wks when they were cut and weighed. The pots were then tilled and left fallow for 2 wks before they were replanted. This was repeated four times and soil samples (three 2.5 cm cores from each pot) were removed for nematode assay at the end of the last three plantings and processed by centrifugal flotation (3). Steamed sand was added to the pots each time to replace the soil removed in sampling. After harvesting the final planting, the roots were washed, examined, and weighed.

At the end of the first planting, plant growth was uniform in all treatments with no evidence of injury. However, after 6 wks of growth in the second planting, stunting and plant discoloration were clearly evident in treatments of 500 and 1000 sting nematodes. Symptoms were also present, but less noticeable, in treatments of concomitant populations. Injury was not evident in pots receiving only awl nematodes. Plant weights were less in pots infested with sting nematodes and were significantly less where 1000 had been added originally (Table 1). Soil samples from the second planting revealed that both sting and awl populations had increased rapidly when alone, but in concomitant populations, the sting nematode had increased much faster than the awl nematode. This trend continued during the third and fourth plantings with severe injury occurring in pots containing only sting or concomitant populations. At the end of the study, sting nematode populations were very high in both separate and concomitant populations, whereas awl nematode populations had attained high levels when alone but remained low in concomitant populations. Although it had been expected that the awl nematode would cause severe injury and suppression of growth, this did not occur. However, an examination of the roots revealed that many lesions and a dark discoloration were present with very little reduction in weight. In contrast, sting infested corn had symptoms of stubby-root, discoloration, necrosis, and greatly reduced root systems.

This experiment demonstrated that the sting nematode is more aggressive than the awl nematode since its presence greatly inhibited the increase of the latter on a suitable host for both. This may explain the absence of high populations of both species at the same location and the

Table 1. Effects of separate and concomitant populations of *Belonolaimus longicaudatus* (sting) and *Dolichodorus heterocephalus* (awl) on continuous plantings of *Zea mays*.

	Second planting[x]			Third planting			Fourth planting			
	Nematodes[y]			Nematodes			Nematodes			
Treatment	Sting	Awl	Plant weight[z]	Sting	Awl	Plant weight	Sting	Awl	Plant weight	Root weight[z]
Control	0	0	66.5	0	0	70.1	0	0	84.4	67.9
500 sting	150	0	50.7	538	0	47.1	1630	0	17.9	8.5
500 awl	0	157	63.8	0	395	70.8	0	1127	78.9	57.4
250 sting + 250 awl	89	35	61.0	394	68	54.1	1220	28	38.4	21.8
1000 sting	172	0	38.1	646	0	32.2	1155	0	26.5	17.1
1000 awl	0	309	63.6	0	535	71.4	0	1220	78.7	60.0
500 sting + 500 awl	146	93	53.0	468	31	39.7	1513	33	43.2	26.9
LSD .05	39	73	15.3	NS	168	20.7	NS	341	22.3	13.2
.01	58	111	20.7		236	27.8		478	30.0	17.8

[x]Growth of the first planting was not affected by the initial inoculation of nematodes.
[y]Average number of nematodes in 100 cm^3 of soil.
[z]Grams fresh weight of tops and roots.

much wider distribution of the sting nematode in the fine sandy soils of Florida.

LITERATURE CITED

1. CHRISTIE, J. R. 1959. Plant nematodes, their bionomics and control. Florida Agricultural Experiment Station, Gainesville, 256 pp.
2. CHRISTIE, J. R., A. N. BROOKS, and V. G. PERRY. 1952. The sting nematode, *Belonolaimus gracilis,* a parasite of major importance on strawberries, celery, and sweet corn in Florida. Phytopathology 42:173-176.
3. JENKINS, W. R. 1964. A rapid centrifugal-flotation technique for separating nematodes from soil. Plant Dis. Reptr. 48:692.
4. PERRY, V. G. 1953. The awl nematode, *Dolichodorus heterocephalus,* a devastating plant parasite. Proc. Helminthol. Soc. Wash. 20:21-27.

Received for publication:
3.IV.1985
Recibido para publicar:

---

[1]Florida Agricultural Experiment Stations Journal Series No. 6313.