EFFECTS OF *MUCUNA DEERINGIANA* ON *MELOIDOGYNE INCOGNITA*

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RESUMEN

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Se determinó el efecto de *Mucuna deeringiana* sobre una población de *Meloidogyne incognita* de Isabela, Puerto Rico. Se encontró que en plantas de tomate a las que se le añadió exudados de raíces de *Mucuna* las poblaciones de *Meloidogyne* se reducen significativamente al compararlas con aquellas a las que se les añadió agua de la pluma o extractos de la planta. Sistemas de secuencia de rotación de tomate y *Mucuna* indican una reducción significativa de las poblaciones de *Meloidogyne* en todas las secuencias con *Mucuna*.
Palabras claves adicionales: habichuela de terciopelo, nematodo nodulador.

Velvet bean, *Mucuna deeringiana* (Bort.) Merr., is a legume commonly found throughout tropical regions (2). It is used as cover crop, as a green manure, and as forage (2). Velvet bean requires a hot, moist climate for excellent growth. It can grow on a wide range of soil textures and on acid soils (4). It is also widely promoted in Florida as an annual summer forage plant for intercropping with corn (2). In addition to its agronomic benefits, velvet bean can suppress nematode populations, especially those of the root-knot nematode, *Meloidogyne* spp. (6).

In order to determine the effects of velvet bean on a population of *M. incognita* from Isabela, Puerto Rico, two experiments were conducted. In the first test, the effect of velvet bean root exudates and shoot extracts on *M. incognita* was studied using tomato, *Lycopersicon esculentum* L. cv. Rutgers, as an indicator plant. Three-week-old tomato seedlings were planted in 10-cm-diam plastic pots containing a sandy-loam soil mixture sterilized with methyl bromide, and fertilized with N-P-K (20-20-20). A week later, 20,000 *M. incognita,* consisting of eggs and second-stage juveniles, were added to each pot with tomato plants. The inoculum was extracted from infected pumpkin (*Cucurbita pepo* L.) roots using Hussey and Barker's method (3). Six treatments, each replicated six times, were included in a randomized complete block design. Treatments were: uninoculated tomato receiving tap water, root exudates, or plant extracts; and tomato inoculated with *M. incognita* receiving tap water, plant root exudates, or plant extracts. Plant extracts and plant root exudates were obtained using the method of Aguilar (1). Approximately 50 cm^3 of root exudates or plant extracts were applied to each tomato plant every other day for a month. Plants were harvested a month after inoculation and root-knot indices (5) and number of eggs recovered per root system were recorded.

A second greenhouse experiment was conducted to determine the effects of a rotation sequence of tomato and velvet bean on the final population levels of *M. incognita.* Two-week-old 'Rutgers' tomato seedlings (one seedling/pot) or velvet bean seeds (3 seeds/pot) were each planted in 15-cm-diam. plastic pots containing a sandy-loam soil mixture sterilized with methyl bromide. Two weeks later velvet bean seedlings were thinned to leave one seedling per pot, and all 32 plants (16 tomato and 16 velvet bean) were each inoculated with 13,000 *M. incognita,* consisting of eggs and second-stage juveniles, following Hussey and Barker's method (3). Treatments were replicated eight times in a randomized complete block design. Plants were fertilized periodically with N-P-K (20-20-20) and watered as needed. A month later, all plants were removed, root-knot indices determined, and the pots replanted. Sixteen two-week-old tomato and 16 velvet bean seedlings were each planted in two sets of 8 pots. Each set was previously planted with either tomato or velvet bean. The planting sequence therefore was as follows: tomato growing before tomato, tomato before velvet bean, velvet bean before velvet bean, and velvet bean before tomato. Plants were harvested 45 days after planting the second crop, and root-knot indices and numbers of juveniles in the soil were recorded.

Root-knot indices were similar in all inoculated treatments in the first test (Table 1). Significant differences in the numbers of eggs recovered per root system among treatments are also shown in Table 1. Tomato plants receiving velvet bean root exudates had a significantly lower number of eggs than those receiving water or extracts. The velvet bean plant macerate appeared to enhance nematode reproduction whereas the root exudates appeared to reduce it. It may be possible that certain substances in the root or above-ground tissues of velvet bean could affect nematode development.

The cropping sequence experiment showed that roots with root-knot indices of 5.0 were obtained from all tomato plants but there was no gall formation in the velvet bean roots (Table 2). At the end of the second crop, the numbers of juveniles recovered from the soil with a rotation system of tomato followed by tomato were significantly larger than those in other treatments (Table 2). The numbers of juveniles found in the velvet bean-tomato sequence, the tomato-velvet bean, and velvet bean-velvet bean sequences were not significantly different, apparently due

Table 1. Effect of velvet bean plant extracts and root exudates on root-knot index and reproduction of *M. incognita* on inoculated tomatoes after 30 days.

Treatment	Root-knot index[z]	Eggs/root system
Plant extract	5.0 a	235,050 a
Tap water	5.0 a	210,700 b
Root exudates	5.0 a	170,700 c

[z]Root knot index based on the following scale: 0 = 0, 1 = 1-2, 2 = 3-10, 3 = 11-30, 4 = 31-100, 5 = greater than 100 galls per root system. Column means followed by the same letter are not significantly different at the 5% level, according to Duncan's multiple range test.

to the fact that *Meloidogyne* does not enter velvet bean roots and remains in the soil for a long period of time. It may be possible that a few of the eggs and juveniles initially added to the soil reached the second juvenile stage and remained in the soil until the end of the experiment. In the velvet bean-tomato sequence, the majority of the second juvenile stages present in the soil after the first planting of velvet bean appeared to enter the tomato roots. Therefore few larvae were recovered from the soil at the end of the experiment from this sequence (velvet bean-tomato). Further research is needed to define the host-nematode relationship and the effect of velvet bean on the nematode. Nevertheless, these results suggest the presence of nematode inhibitors in velvet bean roots.

Table 2. Effect of tomato-velvet bean rotation on root-knot index and number of juveniles of *M. incognita*.

Treatment	Root-knot index (after first crop)[z]	Root-knot index (after second crop)	No. juveniles/ pot in soil
Tomato-tomato	5.0 a	5.0 a	5955 a
Tomato-*Mucuna*	5.0 a	0.0 b	696 b
Mucuna-Mucuna	0.0 b	0.0 b	924 b
Mucuna-tomato	0.0 b	5.0 a	86 b

[z]Root knot index based on the following scale: 0 = 0, 1 = 1-2, 2 = 3-10, 3 = 11-30, 4 = 31-100, and 5 = greater than 100 galls. Column means followed by the same letter are not significantly different at the 5% level, according to Duncan's multiple range test.

LITERATURE CITED

1. AGUILAR, H. 1984. Determinación del efecto alelopático del haba de terciopelo (*Mucuna deeringiana* (Bort.) Merr.). M.S. thesis, Crop Protection Department, University of Puerto Rico at Mayagüez. 54 pp.
2. ALLEN, O. N., and E. K. ALLEN. 1981. The Leguminosae, a source book of characteristics, uses and nodulation. The University of Wisconsin Press, Madison. 446 pp.
3. HUSSEY, R. S., and K. R. BARKER. 1973. A comparison of methods of collecting inocula of *Meloidogyne* spp. including a new technique. Plant Dis. Reptr. 57:1025-1028.
4. SKERMAN, P. J. 1977. Tropical forage legumes. FAO, Rome. 357 pp.
5. TAYLOR, A. L., and J. N. SASSER. 1978. Biology, identification and control of root-knot nematodes (*Meloidogyne* species). North Carolina State University Graphics, Raleigh. 111 pp.
6. WATSON, J. R. 1922. Bunch velvet beans to control root knot. Univ. Fla. Agric. Exp. Sta. Bull. 163:54-59.

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