HOST RANGE STUDIES OF THE YAM NEMATODE, *SCUTELLONEMA BRADYS* [INVESTIGACIONES SOBRE LA GAMA DE HOSPEDEROS DEL NEMATODO DEL ÑAME, *SCUTELLONEMA BRADYS*]

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ABSTRACT

A host range study of 30 crop plants and weeds revealed that Benniseed (*Sesamum indicum* L.) and Cowpea (*Vigna unguiculata* Walp.) were good alternative hosts of the yam nematode *Scutellonema bradys* in Nigeria. Siam weed (*Eupatorium odoratum* L.), *Synedrella* sp., Roselle (*Hibiscus sabdariffa* L.), Yam bean (*Sphenostylis stenocarpa* Harms.), and Pigeon pea (*Cajanus cajan* Mill.) were grouped among the moderate hosts. Guinea corn (*Sorghum vulgare* var *Durra* Hubbard and Rehd.) and Jute (*Corchorus olitorius* L.) were regarded as poor hosts. Non-hosts included Maize and Tobacco.

INTRODUCTION

Although the economic losses caused by *S. bradys* on yam in Nigeria was reported by (1), too little is known about other crops which may be hosts to this nematode. Therefore, there are two reasons to determine the host range of *S. bradys* using common Nigerian plants: 1) to avoid such plants in mixed cropping, and 2) to obtain information needed in planning crop rotations on yam plots. This paper reports a host range study of *S. bradys* amongst 30 crop plants including some weeds which commonly grow in Nigeria.

MATERIALS AND METHODS

Autoclaved sandy loam, consisting of 3 parts loam and 1 part sand were thoroughly mixed, potted, and planted to 30 test plants. After 14 days, the seedlings of these test plants were each inoculated with a suspension of about 500 males and 500 females of *S. bradys*. As a control, the highly susceptible water yam, (*Dioscorea alata*), was inoculated with the same nematode numbers and grown in the same soil mixture as the other plants. Each determination was replicated 5 times. All plants were maintained in plastic pots in the greenhouse. After 60 days, the roots of the plants were harvested, washed, and a 5 g sample from each test plant was macerated in a Waring blender for 30 sec. The macerated roots were then extracted into small petri dishes using sieves of nylon gauze embedded in rigid polyethylene supporting rings. Nematode counts were made after 48 hrs.

RESULTS

Table 1 lists the test plants in descending order of nematode population. Host plant efficiency was rated in terms of the highest nematode population increase. Even though only 3 plants supported a significant population increase, 20 of the 30 test plants were found to be suitable hosts for *S. bradys*. Substantial population increases were obtained with Benniseed, Cowpea, (var. 'New Era'), and Cowpea (var. 'Ife Brown'). The high rate of reproduction on Cowpea is of considerable importance. Four other legumes were found to be moderate hosts to this nematode. These were Yam bean, Green gram, Pigeon pea and *Pueraria* sp. Of equal interest is that Tobacco, Cotton, Groundnut and Maize were non-hosts.

Table 1. Host Range Studies of *S. bradys*

Common names of plants	Scientific names	No. of nematodes per sq. root tissue**	Host plant efficiency rating
*Water yam	*Dioscorea alata* L.	3,680	v. good
Benniseed	*Sesamum indicum* L.	2,540	good
Cowpea (var 'New Era')	*Vigna unguiculata* Walp.	1,664	"
Cowpea (var 'Ife Brown')	*Vigna unguiculata* Walp.	1,196	"
Eriosema	*Eriosema psoraloides* Don.	342	moderate
Siam Weed	*Eupatorium odoratum* L.	252	"
Yam bean	*Sphenostylis stenocarpa* Harms.	239	"
Synedrella (a common weed)	*Synedrella nodiflora* Gaertn.	208	"
Greengram	*Vigna aureus* L.	172	"
Mallow	*Urena lobata* L.	157	"
Pigeon pea	*Cajanus cajan* Mill.	152	"
Okra	*Abelmoschus esculentus* Moench.	143	"
Kenaf	*Hibiscus cannabinus* L.	140	"
Loofa gourd	*Luffa aegyptiaca* Mill.	135	"
Soko	*Celosia argentea* L.	131	"
Tomato	*Lycopersicon esculentum* Mill.	129	"
Melon	*Cucurbita pepo* L.	128	"
Pueraria	*Pueraria phaseoloides* Benth.	118	"
Roselle	*Hibiscus sabdariffa* L.	116	"
Jute	*Corchorus olitorius* L.	97	Poor host
Guinea corn	*Sorghum vulgare* var. *Durra* Hubbard & Rehd.	96	" "
Maize	*Zea mays* L.	0	Non-host
Tobacco	*Nicotiana tabacum* L.	0	"
Indian spinach	*Basella alba* L.	0	"
Cotton	*Gossypium hirsutum* L.	0	"
Groundnut	*Arachis hypogaea* L.	0	"
Water leaf	*Talinum triangulare* Willd.	0	"
Tridax	*Tridax procumbens* L.	0	"
Hot pepper	*Capsicum frutescens* L.	0	"
Snake gourd	*Trichosanthes anguina* L.	0	"
Green tete	*Amaranthus viridis* L.	0	"

* Control
** Means of five replicates
Host plant efficiency rating
Very good host = a number increase of 3 - 4 times
Good host = a number increase of 2 - 3 times
Moderate = entry accomplished
Poor = entry just accomplished
Non-host = entry of nematode into the root not accomplished

DISCUSSION

A few workers in the past 3 years have investigated the survival of *S. bradys* in crops other than yam. Bridge in 1973 reported that yam is the only good host to *S. bradys* but that the nematode survived endoparasitically in the roots of Melon, Sorghum, Okra, Tomato, Kenaf and Pigeon pea. He listed Cassava, Maize, Hot pepper, Pineapple, Pawpaw, Coco yam, Oil palm, Groundnut, Yam bean, Roselle, and Rice as non-hosts. Odihirin and Ososami (Private comm., 1974) found Cowpea and Groundnut to be "very good" hosts. Tomato, Yam bean and *Eupatorium* sp. were rated as "fairly good" hosts. *Celosia* sp. Maize and *Tridax* sp. were among the plants listed as non-hosts.

Even though Yams are still the preferred host of *S. bradys* the results of this investigation showed that Benniseed, Cowpea ('New Era' and 'Ife Brown' varieties) are good hosts to *S. bradys* because of the two to three-fold population increase recorded. Small populations of *S. bradys* just survived endoparasitically in the roots of 17 plants including Kenaf, Roselle, Tomato, Melon, *Synedrella* sp. and *Eupatorium* sp. Ten plants were rated non-hosts and these included Maize, Tobacco, *Triax* sp. and Water leaf (*Talinum triangulare* Willd.).

The results obtained agree in some respect with the results obtained by (2) and Odihirin and Ososami in 1974. Roselle and Yam bean were found to be fairly susceptible. However, Groundnut was not found to be a host. For the first time Benniseed (*Sesamum indicum* L.) is being reported as a good host and Tobacco as a non-host.

Because of the economic importance of *S. bradys* on Yams, the need to search for other crops that harbour this nematode cannot be over-emphasized. Such alternative hosts can be excluded in rotation sequence. Rotation of non-hosts like Maize, Tobacco or Cotton with susceptible hosts may give an effective control of nematode population in the soil. Such non-hosts will be a suitable alternative to nematicides which cannot be afforded by the majority of the farmers in the tropics. Even where farmers can afford nematicides, an effective crop rotation involving the use of non-hosts is also necessary so that the nematodes escaping from the nematicide will be deprived. However, such non-hosts must be high value crops to compensate the farmers for income derived from the sale of Yams.

The high rate of reproduction of *S. bradys* on legumes is particularly disturbing. Equally disturbing is the fact that some weeds like Siam weed (*Eupatorium odoratum* L.) and *Synedrella* sp., and some vegetables like Jute and Soko (*Celosia argentea* L.) commonly used in mixed cropping all support populations of *S. bradys*. These weeds and vegetables growing in rows with highly susceptible crops like Yams, Cowpea and Benniseed with their roots intermingled, would encourage the build-up of large nematode populations and perhaps lead to greater damage and loss.

It is, however, interesting to note that crops like Tobacco, Cotton and Maize did not support the reproduction of the nematode which would mean these crops may be of value in rotations. The results reported here show that *S. bradys* is able to reproduce on a considerable range of plants. Where this nematode is a problem, these crops should not be used in rotation without supplementary chemical control. Weed control and exclusion of legumes in Yam plots are very important in preventing population increase and the use of non-hosts may also aid in population reduction.

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RESUMEN

Un estudio con 30 plantas de cultivo y malezas sobre la gama de hospederos del nemátodo del ñame, *Scutellonema bradys*, en Nigeria reveló que el sésame (*Sesamum indicum* L.) y el frijol pintado (*Vigna unguiculata*) son buenos hospederos alternos. La hierba de Siam (*Eupatorium odoratum* L.), *Synedrella* sp. la malva viñuela (*Hibiscus sabdariffa* L.), el frijol ñame (*Sphenostylis stenocarpa*), y el gandúl (*Cajanus cajan* Mill) fueron clasificados como hospederos intermedios, El sorgo (*Sorghum vulgare* var *Durra* Hubbard y Rehd.) y el yute (*Corchorus olitorius* L.) fueron considerados como malos hospederos. Entre las plantas inhospedables se encontraron el maíz y el tabaco.

LITERATURE CITED

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EFECTO DE LOS NEMATODOS *MELOIDOGYNE INCOGNITA* Y *MELOIDOGYNE JAVANICA* SOBRE LA DEFICIENCIA DE BORO EN PLANTAS DE TABACO BURLEY (*NICOTIANA TABACUM* L.) [EFFECT OF THE NEMATODES *MELOIDOGYNE INCOGNITA* AND *MELOIDOGYNE JAVANICA* ON BORON DEFICIENCY IN PLANTS OF BURLEY TOBACCO (*NICOTIANA TABACUM* L.)]

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RESUMEN

En un ensayo usando suelo de Las Vegas de San Carlos, Estado Cojedes, Venezuela, el cual se caracteriza por una marcada deficiencia de boro, se encontró que plantas de tabaco Burley, variedad 'Ky 9', inoculadas con los nematodos *Meloidogyne incognita* y *M. javanica*, presentaron 28% menos de contenido de boro en las hojas en comparación con el testigo no inoculado pero también deficiente en boro. Desde el punto de vista de crecimiento y desarrollo, las plantas inoculadas con *M. javanica* no presentaron diferencias en comparación con el testigo, mientras que las plantas inoculadas con *M. incognita* sí presentaron diferencias significativas, siendo ésta la especie de mayor importancia comercial. Las plantas inoculadas con ambas especies presentaron un crecimiento y desarrollo similar al de las plantas inoculadas con *M. incognita;* sin embargo, se encontró que el contenido de boro en las hojas era mayor que en los tratamientos individuales y no había diferencia con el testigo.