

PASPALUM ORBICULARE Forst., an Alternate Host of a Sugarcane Cyst Nematode, HETERODERA SACCHARI in Nigeria

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ABSTRACT

A survey of the weed hosts of a sugarcane cyst nematode, *Heterodera sacchari* was carried out at the Bacita Sugarcane Plantation. *Paspalum orbiculare*, a grass weed, was an alternate host of *H. sacchari*. Weeds which were non-host include *Physalis angulata* L., *Euphorbia hypericifolia* L., *Ageratum conyzoides* L., *Portulaca oleracea*, L., *Echinochloa colonum* (L) Link, *Imperata cylindrica*(L) Beauv., *Sesbania exaltata* (Raf) Cory, *Euphorbia hirta* L., *Amaranthus spinosus* L., *Ipomea aquatica*, *Hibiscus aspa*, *Cyperus rotundus*, *Rottboelia exaltata* L. F., *Mullogo nudicaulis* and *Crotolaria retusa*.

INTRODUCTION

Bacita Sugar Estate, near Jebba, Kwara State, was established in 1961, primarily to grow sugarcane and produce refined sugar for local consumption. The Estate which is located in the River Niger Valley terrace, grew its first crop in 1964 to 1965.

Caveness (1967) and Jerath (1968) reported a cyst-forming nematode of the genus *Heterodera*, associated with the roots of sugarcane at the Estate. The nematode species had previously been reported in association with the roots of sugarcane in Congo-Brazzaville, identified and described as *H. sacchari* (Luc and Merny, 1963). The decline in yield of sugarcane at the Bacita Sugar Estate in 1966 and 1970, particularly in the sandy soil, was attributed to the extensive damage caused to sugarcane roots by *H. sacchari* infection (Odihirin, 1976).

The host range of *H. sacchari* among the weeds, has not been extensively surveyed and studied in Nigeria. Many broadleaf and grass weeds are found throughout the year in the plantation despite the weed control measures applied by the grower.

Little is known about the efficiency of the weeds in maintaining the cyst nematode population during the cane growth and after the canes had been harvested from the field.

The object of this investigation is to identify the alternate hosts of *H. sacchari* in the Estate, as part of an effort to control the pest.

MATERIALS AND METHODS

A survey of the weeds growing in the sugarcane fields and those thriving along the canals, was carried out at the Bacita Sugar Estate. The following weed species were collected, and identified using the type-species preserved at the Estate's Herbarium: *Physalis angulata*, *Euphorbia hypericifolia*, *Ageratum conyzoides*, *Portulaca oleracea*, *Echinochloa colonum*, *Imperata cylindrica*, *Sesbania exaltata*, *Euphorbia hirta*, *Ipomea aquatica*, *Cyperus rotundus*, *Rottboelia exaltata*, *Hibiscus aspa*, *Mullogo nudicaulis*, *Crotolaria retusa*, *Paspalum orbiculare* and *Amaranthus spinosus*.

The roots of each weed were carefully lifted from the soil and examined for the presence of mature females of *H. sacchari*, and later preserved in polythene bags. In the laboratory, the roots were gently washed free of adhering soil particles with tap water, and re-examined for mature females emerging from the roots. Two to three grams, random samples of roots were collected from each weed, stained in 0.1% Acid Fuschin, cleared in pure lactophenol, teased and later examined microscopically for larval stages of *H. sacchari*. In certain weeds with little roots (less than 1g), the whole roots were stained and examined.

Further tests were carried out on the weeds found infected by *H. sacchari* in the field. Seeds of the weeds were sown in steam-sterilized soil, in 5-litre plastic pots. Two weeks after germination, the plants were thinned down to one plant per pot and later inoculated with 1000 second stage larvae of *H. saccharis*. Plants were removed from pots, forty days after inoculation. Cysts were extracted from soil using a modified Fenwick can (Ooestenbrink, 1950). Host efficiency rating was based on the development of cysts.

RESULTS AND DISCUSSION

The result of the investigation revealed that *Paspalum orbiculare* was an alternate host of *H. sacchari*. From the field investigation, as many as five hundred mature females were recovered, per ten gram roots of the weed. The screenhouse test also revealed that the second stage larvae penetrated, and as many as one hundred cysts were recovered per 250 cubic centimeters of soil, forty days after inoculation.

Although, there were lesions on the roots of the weed, the roots appeared not to be extensively damaged. Larval stages were recovered from the roots of weed, which indicated that more than one generation of the nematode occurred in 40 days.

Table 1. Weeds associated with sugarcane at Bacita Sugar Estate, and their efficiency as alternate host of sugarcane cyst nematode, *Heterodera sacchari*.

Plant Species	Host efficiency rating
<i>Physalis angulata</i>	Non-host
<i>Euphorbia hypericifolia</i>	Non-host
<i>Euphorbia hirta</i>	Non-host
<i>Ageratum conyzoides</i>	Non-host
<i>Portulaca oleracea</i>	Non-host
<i>Echinochloa colonum</i>	Non-host
<i>Imperata cylindrica</i>	Non-host
<i>Sesbania exaltata</i>	Non-host
<i>Ipomea aquatica</i>	Non-host
<i>Cyperus rotundus</i>	Non-host
<i>Rottboelia exaltata</i>	Non-host
<i>Hibiscus aspa</i>	Non-host
<i>Mulugo nudicaulis</i>	Non-host
<i>Crotolaria retusa</i>	Non-host
<i>Paspalum orbiculare</i>	Host, Excellent.
<i>Amaranthus spinosus</i>	Non-host.

The list of the host and non-host is summarised in Table 1. *Heterodera sacchari* is an important nematode pest of sugarcane in Nigeria. According to Odihirin (1976), the nematode contributed largely to a decline in yield of sugarcane in 1966 and 1970 cropping seasons. It was estimated that more than 100 hectares of land, particularly the sandy soil, had been abandoned because of total crop failure due to cyst nematode infestation.

Several attempts to control the cyst nematode, at the Bacita Sugar Estate, had proved unsuccessful. Parsons (1970), spread molasses, in some of the experimental plots at the Estate, and found molasses toxic to cane plants.

The discovery of an alternate weed host of *H. sacchari* at the Bacita Sugarcane Plantation, is significant. The weed, *Paspalum orbiculare* occur very frequently and grow extensively in cane fields particularly in the sandy soil. The nematode feed on the weed, reproduce and multiply, thus increasing the nematode population in the fields. The nematode control on the principal host can possibly be achieved, when the alternate host is eradicated from the sugarcane fields.

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