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EVALUATION OF SIX SPECIES OF GRASSES AS BREEDING HOSTS OF *MYNDUS CRUDUS*, A VECTOR OF LETHAL YELLOWING OF PALMS.

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ABSTRACT

Nymphs of *Myndus crudus* Van Duzee (Homoptera : Cixiidae), a vector of lethal yellowing (LY) of palms, develop in the root zones of grasses. Management of grasses under coconuts is a potential method of suppressing populations of this insect vector. To identify grasses unfavorable as hosts of *M. crudus*, six species of grasses grown in containers were exposed to field collected adult *M. crudus*. Host suitability was measured by the relative degree of colonization of the roots of these grasses by immatures, compared to roots of *Stenotaphrum secundatum* (Walt.) Kuntze, a know host of *M. crudus* immatures. Of the grasses testec. *Hyparrhenia rufa* (Nees) Stapf. proved to be the poorest breeding host of this insect, and may prove useful as a potential ground cover in coconut plantations to reduce the incidence of the vector and thus the spread of LY

RESUME

EVALUATION DE LA QUALITE D'HOTE DE DEVELOPPEMENT DE 6 ESPECES D'HERBES POUR *MYNDUS CRUDUS*, UN VECTEUR DU JAUNISSEMENT LETAL DU PALMIER.

Les nymphes de *Myndus crudus* Van Duzee, un vecteur du jaunissement létal du palmier se développent dans les racines des herbes. Le contrôle des herbages poussant sous les cocotiers est une méthode potentielle pour supprimer les populations de cet insecte vecteur. Pour identifier les herbes mauvais hôtes de *M. crudus*, six espèces d'herbes, cultivées en containers, ont été exposées à des adultes de *M. crudus* récoltés sur le terrain. La

qualité d'hôtes des espèces testées a été mesurée par le degré relatif de colonisation des racines de ces herbes comparé aux racines de *Stenotphrum secundatum,* un hôte connu de *M. crudus.* Parmi les herbes testées, *Hyparrhenia rufa* (Nees) Stapf. s'est montrée l'hôte le plus médiocre de cet insecte et s'avère donc intéressante comme plante de couverture en cocoteraie pour réduire l'impact du vecteur et en conséquence la dispersion du J.L.

The American palm cixiid, *Myndus crudus* Van Duzee (*Homoptera : Cixiidae*), is a planthopper that is associated with palms in parts of the American Tropics. This insect is a vector of lethal yellowing (LY) disease, which affects at least 30 species of palms and has been particularly destructive to coconut plantations in the Western Caribbean (reviewed by Howard 1987). A potential method of preventing or controlling this disease is through reduction or elimination of the insect vector that spreads it.

The possibility of reducing populations of *M. crudus* or preventing their establishment in coconut plantations by ground cover management was proposed at an earlier CFCS meeting (Howard 1985). Since the nymphs of *M. crudus* develop on grasses and the adults fly to palms, these insects would not be expected to thrive where grass hosts were eliminated, or where the plantation ground over consisted of grass or other herbaceous plants that did not support development of this insect.

Currently, we are conducting research to identify ground covers that would serve this strategy. Our objective is to identify among tropical forage and turf grasses those species and varieties upon which a minimum number of *M. crudus* develop. This paper reports the results of a test of 6 tropical forage grasses as breeding hosts of *M. crudus* . The concept of «breeding host» used in this paper is a plant species upon which *M. crudus* oviposits and develops to the adult stage.

MATERIALS AND METHODS

Seeds of the six grasses (Table 1) were obtained from the U.S. Department of Agriculture, Regional Plant Introduction Station, Experiment, Georgia. The seeds were germinated and the grasses grown in containers during the spring of 1989. "Floratam" St. Augustine grass, *Stenotaphrum secundatum* (Walt.) Kuntze, Know to be a favorable host of *M. crudus* (Eden-Green 1978, Reinert 1980, Author, unpublished data) was grown from sprigs and used as a standard of comparison.

Table 1. Mean numbers of Myndus nymphs per container on different species of grass grown in containers and exposed to adult populations.

Grass	M. crudus	Range	Standard
	nymphs		Deviation
Stenotaphrum secundatum (Walt.) Flugge	13.9a[1]	0-32	9,4
Digiteria eriantha Steud .	10.6ab	0-29	9,2
Brachiara eminii (Mez.) Robyn	8.9bc	0-29	8
Panicum maximum Jacq.	8.4bc	0-31	8,5
Axonopus compressus (Swartz) Beauv.	7.0cd	0-22	6,2
Paspalum conjugatum Bergius	5.0cd	0,2	6,1
Hyparrhenia rufa (Nees) Stapf.	2.9d	0,1	3,4

1 Means in a column not followed by the same letter are significantly different [$p < 0.01$, Waller-Duncan Bayesian k-ratio t-test (SAS Institute 1985)].

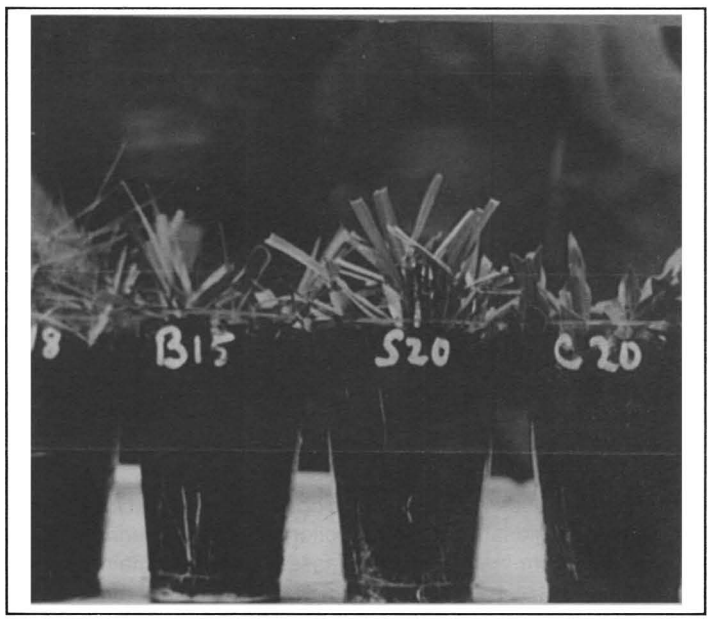

Figure 1 : Grasses grown in transparent containers for testing as breeding host of Myndus crudus

The containers were polystyrene drinking vessels with drainage holes in the bottoms. The growing medium consisted of equal parts of muck, sharp sand and cypress shavings. When the grasses were about 2 cm tall they were fertilized with 14-14-14 Osmocote (Sierra Chemical Co., Milpitas, California 95035, U.S.A.). Grasses were watered about three times per week. To maintain a dark environment in the root zone, a black sleeve of polyethylene film was fitted over the sides of each container and removed only when the root zone of the grass was examined. The containerized grasses were grown in a walk-in cage with sides of fiberglass mesh screen with 0.9 mm x 0.9 mm openings. This screeding material prevents passage of *M. crudus* (Howard & Thomas 1980). The grasses were ready for testing when they had spread to cover the surface of the soil and roots were visible through the transparent sides of the container (Fig. 1).

The grasses were then placed in a completely randomized design with 20 replications per grass species in a 1.2 x 1.2 x 2.4 m cage made with the same screening as described. *Myndus crudus* adults were collected from palm foliage in a bottle fitted with a glass tube (Howard & Thomas 1980) and released into the cage. About 200 of these planthoppers were released into the cage per week for 2 months until early instar *M. crudus* nymphs were visible through the container sides in the root zones of all *S. secundatum* samples. The development of the nymphs was monitored by frequent examinations through the transparent container sides. Twenty days later, at which time most of the nymphs were in late instars, the soil of each container was emptied in a basin of water and the numbers of *M. crudus* nymphs that floated to the surface determined. Results were analyzed by the analysis of variance and significant differences in means determined by the Waller-Duncan Bayesian K-ratio t-test (SAS Institute 1985).

RESULTS AND DISCUSSION

Results are shown in Table 1. All of the six grasses tested served at least to some extent as breeding hosts of *M. crudus*. *Hyparrhenia rufa* (Nees) Stapf. was the poorest breeding host. There were nearly five times fewer nymphs in the root zones of this grass compared to *S. secundatum* ($P < 0.01$). *Hyparrhenia rufa* , known in various countries as «yaragua, farugua and puntero», is native to Africa. It was accidentally introduced into the neotropics from Africa in early colonial times (Toledo and Nores 1986), and is moderately valuable as a forage grass (Hitchcock 1950). Further research is planned to determine whether it can be used as a ground cover in coconut plantations to reduce the rate of spread of LY.

Axonopus compressus (Swartz) Beauv. and *Paspalum conjugatum* Bergius could be considered as moderately favorable breeding hosts of *M. crudus*

. The mean number of nymphs associatied with each of these grasses was about half or less than the mean number of nymphs associated with *S. secundatum* ($P < 0.01$). These grasses are common in unimproved pasture under coconuts in many tropical countries, partucularly is Asia and Oceania (Payne 1984). Whether use of this grass as opposed to, e.g., *S. secundatum* , in coconut plantations would significantly lower the risk or the rate of spread of LY remains problematical.

Based on these results, *Panicum maximum* Jacquin is a favorable breeding host of *M. crudus* . Although there was a statistically significant difference ($P < 0.01$) in the mean numbers of *M. crudus* nymphs associated with P. maximum ($x = 8.3$) compared to *S. secundatum* ($x = 14.0$), it is again problematical whether this implies a difference in the potential rate of spread of LY in coconut plantations planted to these different grasses. Known as «guinea grass,» P. maximum is probably the most common grass in Jamaica, where during the 1960"s and 1970"s an estimated 4 million coconut palms were Killed by LY (Eden-Green 1978). It seems likely that guinea grass may have played a role in this epidemic.

In work which will be reported elsewhere (Howard, unpublished), *Brachiaria brizantha* Hochstetter ex A. Richard, a valuable forage grass recommended for use in coconut-cattle farm systems (Payne 1984), was found to be a poor breeding host of *M. crudus* .

In addition to grasses, we are investigating tropical legumes as ground cover under coconuts, since dicotyledonous plants apparently do not serve as breeding hosts of *M. crudus* (Howard et al. 1984). On coconut plantations, they might best be used in combination with grasses, which are generally more fast-spreading and persistent. The use of LY-resistant coconut palms (Harries 1971) with ground covers unfavorable as breeding hosts of *M. crudus* would constitute an integrated control method for LY.

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Figure Caption

Fig. 1. Grasses grown in transparent containers for testing as breeding hosts of *Myndus crudus* .