PN-ABB-095

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

DATE: 9/23/88

MEMORANDUM

TO: AID/PPC/CDIE/DI, room 209 SA-18

FROM: AID/SCI, Victoria Ose

SUBJECT: Transmittal of AID/SCI Progress Report(s)

Attached for permanent retention/proper disposition is the following:

AID/SCI Progress Report No. 5.35

PR #1

#2

#3

#4

Attachment #5

#6

1

PN-ABB-075
5.350

COCONUT INDUSTRY BOARD

PROGRESS REPORT NO. 1

PERIOD: JULY 1985 TO DECEMBER 1985

PROJECT TITLE: MANAGEMENT OF THE INSECT VECTOR OF LETHAL YELLOWING DISEASE OF PALMS BY MANAGEMENT OF GROUND COVER IN PALM PLANTATIONS

GRANT NO: 532-5542-G-SS-5106-00

The effective starting date of the Grant as set out in Attachment I to the Grant Document dated 9th August, 1985, is 15th July, 1985.

However, due to delays in completing all documents required by U.S.A.I.D., the first quarter's funds were not received by the Coconut Industry Board until March 1986, nearly nine months after the stated effective date of the Grant.

Consequently, work on the project was not started during the period of this report. It is, therefore, envisaged that the date set for the commencement of the Project will have to be reviewed to ensure that the time required to complete the Project is not shortened to the detriment of the research programme.

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10/7/86.

2

U.S.A.I.D. SPONSORED PROJECT

GRANT NO: 532-5542-G-SS-5106-00

PROGRESS REPORT NO. 2

PERIOD JANUARY 1986 TO JUNE 1986

Project Title: Management of the insect vector of lethal yellowing disease of palms by management of ground cover in palm plantations

Screening of grasses to determine whether they are hosts or not of *Myndus crudus* has been started both in Florida and Jamaica.

In Florida, the following grasses are being propagated vegetatively and from seeds:

**Axonopus affinis*, carpet grass

**Brachiaria brizantha*

**Cenchrus ciliaris*

**Chloris gayana*, Rhodes grass

**Cynodon nlemfluensis*, Puerto Rico star grass
(other star grasses included)

Cynodon aethiopicus, a star grass

Cynodon sp.

**Digitaria decumbens*, pangola grass

**Hermarthria altissima*, Limpograss
(other Limpo grasses included)

**Panicum purpurescens*, Para grass

***Stenotaphrum secundatum*, St. Augustine grass

Zoisia matrella, Zoysia

St. Augustine grass (double asterisk above) is known to be a highly favourable host of *Myndus crudus*, and will be incorporated in the tests as a standard. Species

SEP 2 ...

marked with an asterisk are included in initial screening tests as hosts/non-hosts of Myndus crudus. Three methods are being tried.

Method No. 1. Six containers of each grass being tested are exposed in an area where M. crudus populations are high. After a sufficient period of exposure to the insect populations, the grasses are lifted from the containers, the roots examined and counts made of M. crudus nymphs. This method is outlined in the project plan.

Method No. 2. A second method is being attempted as a possible improvement on the first method. Grasses are in containers as in Method 1, but are kept in a screen house into which about 500 M. crudus are introduced each week. Examinations are made as in Method 1. Thus far, this method appears to be more effective because the insects are confined to the grasses being tested and are more likely to infest them and deposit eggs there.

Method No. 3. Fifth instar nymphs of M. crudus are confined on stems of grass species being tested in glass tubes. The survival of the insects is thus tested on each grass species. This method is quicker than the two described above. However, it tests only the survival of M. crudus confined to different plants. In contrast, Methods 1 and 2 test for a combination of factors including attractiveness of the plant species to M. crudus, oviposition rate on the tested species and survival of nymphs.

In Jamaica, the following grasses, etc., are being propagated vegetatively:

Axonopus compressus, carpet grass
Cynodon dactylon, Bahama grass
Cynodon plectostachyus, African star grass
Digitaria decumbens, pangola grass
Digitaria sanguinalis, crab grass
Panicum maximum, Guinea grass
Panicum muticum, para grass
Panicum trichoides, tickle grass
Scleria pterota, cutting sedge
Stenotaphrum secundatum, St. Augustine grass
Andropogon pertusus, seymour grass
Trichachne insularis, sour grass

Commelina diffusa, water grass

Pending results of the "methods development" phase of the project, we anticipate that a combination of methods will be required for initial screening of host plants as hosts of M. crudus.

A site has been selected in Jamaica to test whether the suggested size of field plots will be adequate.

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U.S.A.I.D. SPONSORED PROJECT

GRANT NO: 532-5542-G-SS-5106-00

PROGRESS REPORT NO. 3

PERIOD JULY 1986 - DECEMBER 1986

PROJECT TITLE: MANAGEMENT OF THE INSECT VECTOR OF LETHAL YELLOWING DISEASE OF PALMS BY MANAGEMENT OF GROUND COVER IN PALM PLANTATIONS

Screening of grasses was continued in Jamaica and Florida during the period.

It was observed that the population of *Myndus crudus* was very low at the test site in Kingston, Jamaica, so, in order to increase the *Myndus crudus* population at this site, an area approximately 7,000 sq. ft. has been planted with *Stenotaphrum secundatum* a known host of *Myndus crudus*.

Grass varieties, etc. (see list) set out in pots in the glasshouse continue to grow but roots have not proliferated to facilitate field placement and examination. The method now being used at the Agricultural Research Centre in Fort Lauderdale will be tried.

Axonopus compressus, carpet grass
Cynodon dactylon, Bahama grass
Cynodon plectostachyus, African star grass
Digitaria decumbens, pangola grass
Digitaria sanguinalis, crab grass
Panicum maximum, Guinea grass
Panicum muticum, para grass
Panicum trichoides, tickle grass
Scleria pterota, cutting sedge
Stenotaphrum secundatum, St. Augustine grass
Andropogon pertusus, seymour grass
Trichachne insularis, sour grass

Commelina diffusa, water grass

In Florida, tests were continued and the following report covers work for the period.

An efficient method of screening grass species and varieties for suitability as hosts of the planthopper, Myndus crudus, has been developed. Repeated attempts over a period of several months to test grasses by placing them in a coconut palm grove that was highly infested with M. crudus were unsuccessful. St. Augustine grass, Stenotaphrum secundatum, a known host of M. crudus, was included in these tests. When the grasses, including St. Augustine, failed to become infested with M. crudus, the pots were watered more frequently, since this species of planthopper is reported to prefer grasses in moist habitats (Myers, J. G. 1926, Contributions from the Harvard Institute of Tropical Biology and Medicine, III). The pots were moved nearer to coconut palms to bring the grasses in closer contact with M. crudus and to utilize the partial shade of the fronds which would prevent the soil in the pots from drying out so quickly. When the grasses still failed to become infested with M. crudus, it was postulated that this may have been due to predation on the planthoppers by red imported fire ants, Solenopsis invicta, which were ubiquitous in the grove. The potted grasses were then kept on greenhouse benches set in the grove. The legs of the benches were ringed with an adhesive to prevent ants from climbing onto the tables. Since only a few of the potted grasses became infested, it seemed possible that the planthoppers were attracted to the large expanses of St. Augustine grass in the grove, and "missed" the potted grasses. It was reasoned that if each test grass were exposed in a larger mass, the grass species attractive to M. crudus might be more likely to become infested. Large blocks of potted St. Augustine grass and several other grasses were therefore exposed in the coconut grove. When the potted grasses still failed to become infested, half of them were placed in a large cage and several hundred M. crudus introduced into the cage. Using this technique resulted in a fairly uniform level of infestation of the potted grasses by M. crudus in comparison with the grasses in the coconut grove, which remained virtually free of infestation. In summary, the results thus far indicate that the best way to test grasses as hosts of M. crudus is to confine adult M. crudus in cages with the test plants so that ovipositing females have only to select among these plants.

Problems that remained to be solved were (1) the space occupied by the 20cm diameter pots limited the numbers of species and replications of test grasses; (2) traditional nursery pots are opaque so that grass and soil must be lifted out of the pot to examine the roots for M. crudus nymphs; (3) although the method of introducing adult M. crudus into a cage with the test grasses was an improvement over exposing the potted grasses in the field, populations were still low and sporadic. To address the first two problems, grasses were grown in 8cm x 9cm transparent plastic containers with openings in the bottoms for drainage. Four of these containers can be placed in the same area occupied by one of the 20cm diameter pots, and

M. crudus nymphs, which occupy spaces between the soil and sides of the containers, can be observed and counted through the transparent sides of these containers.

An initial test was conducted using these smaller, transparent containers. The containers were placed in black plastic sleeves, since M. crudus nymphs are negatively phototactic. St. Augustine grass, Bahia grass (Paspalum notatum), and 'Puerto Rico' star grass (Cynodon nlemfluensis var. nlemfluensis were grown in 8 containers each. These were placed in a randomized block in a cage 1.2m x 2.4m, and 100 to 300 M. crudus introduced twice weekly for 4 weeks (Total = 1200 M. crudus). Nymphs associated with the roots of test grasses were observed after 4 weeks. It was noted at that time that the Puerto Rico star grass had become contaminated with an unidentified species of Digitaria. Since the numbers of M. crudus nymphs associated with the contaminated Puerto Rico star grass were relatively low compared to the other 2 grasses, one or both of these grasses seems likely to be a poor host of M. crudus. Further testing with these grasses will be carried out. Results of the preliminary test are shown below:

Table 1. Numbers of Myndus crudus observed in root zones of containerized grasses of different species. Preliminary test, December 1986.

	St. Augustine grass	Bahia grass	Puerto Rico star grass*
	0	26	0
	17	17	1
	0	26	0
	0	21	0
	18	0	7
	23	19	19
	17	58	1
	63	0	0
Averages	17.3	20.8	3.5

*contaminated with Digitaria sp.

Grasses which have been propagated at the Fort Lauderdale Research & Education Center and which will be tested in the next few months include the following:

Carpet grass, *Axonopus affinis*
Brachiaria brizantha
Cenchrus ciliaris
Rhodes grass, *Chloris gayana*
McCaleb star grass, *Cynodon aethiopicus*
Cane patch star grass, *Cynodon nlemfluensis* var. *nlemfluensis*
Ona star grass, a strain of *C. nlemfluensis* var. *nlemfluensis*
Puerto Rico star grass " " " " " "
Bermuda hybrid 79-16 Cynodon sp.
Tifton 78 "
Callie hybrid "
Pangola grass, *Digitaria decumbens*
Limpograss, *Hemarthria altissima* var. *'Floralta'*
" " " var. 'Big Alta'
" " " PI 364869
" " " PI 364871
Para grass, *Panicum purpurescens*
Zoisia, *Zoisia matrella*

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U.S.A.I.D. SPONSORED PROJECT

Grant No: 532-5542-G-SS-5106-00

PROGRESS REPORT NO. 4

PERIOD JANUARY 1987 TO JUNE 1987

PROJECT TITLE: Management of the Insect Vector of Lethal Yellowing Disease of Palms by Management of Ground Cover in Palm Plantations.

During the period covered by this report work was continued on the screening of grasses as hosts of *Myndus crudus*, the survival of the insect vector on the grasses on test alone and in association with palms, and the population of the vector at the field plot sites.

In Kingston the following grasses have been planted in 7.0 cm diameter transparent plastic containers for screening in a test cage.

Cynodon dactylon, Bahama grass
Cynodon plectostachyus, African star grass
Digitaria sanguinalis, crab grass
Stenotaphrum secundatum, St. Augustine grass
Trichachne insularis, sour grass
Commelina diffusa, water grass

Very low numbers of *M. crudus* have been trapped in all areas where sticky traps have been set and where collections have been made. Although the St. Augustine grass planted in Kingston is growing very well the *M. crudus* population has not increased to date.

Two sites Caenwood and Fair Prospect in Portland are being used for ground cover manipulation studies. Forty insect traps have been set out and insect counts will begin in July.

In Florida in an experiment to determine whether palms are an essential host plant in the life cycle of *M. crudus*, St. Augustine grass (*Stenotaphrum secundatum*)was grown in 17 cm dia. transparent plastic containers. These were exposed to field populations of *M. crudus*. On March 27, at which time there was a mean of 11.6 *M. crudus* nymphs visible in the root zone of each

container (as seen through the transparent sides), 6 containers each were placed under 2 different treatments: (1) kept in a cage without access to palms, and (2) kept in a cage with 4 coconut palms each about 1.5m tall. The numbers of M. crudus nymphs/container were determined monthly for 3 months (88 days). The results were that under both treatments the populations of nymphs declined slightly for the first 2 months and then increased slightly the 3rd month. Since the average development time of the nymphs of M. crudus has been reported as 61.3 days, the presence of nymphs at 88 days, and moreover, the slight increase in nymphs in both treatments after 2 months, was evidently due to reproduction within the cages, i.e., M. crudus survives as well on grass alone as with palms and grasses. An attempt to maintain M. crudus on grasses alone for a 1-year period is now in progress.

Three tests comparing different grasses as hosts of M. crulus were completed. The design of the tests was as follows: grasses are grown in 7 cm dia. transparent containers. A number (usually 20) of containers of each grass are placed in a 1.2 X 1.2 X 2.4 cage and about 100 field collected M. crudus released into the cage twice each week for 1 to 2 months. The root zones of the grasses are examined weekly through the transparent container for the presence of nymphs. St. Augustine grass, a known host of M. crudus, is used as a standard. Twenty days after all St. Augustine grass containers are infested with M. crudus nymphs, the grasses are removed from the containers and a total count of nymphs in each container is determined. Results of 3 tests are summarized below:

Test No.	Grass	M. crudus nymphs (mean)
1	St. Augustine grass, Stenotaphrum secundatum	14.3
	Bahia grass, Paspalum notatum	12.6
2	Bahia grass	37.3
	St. Augustine grass	27.0
	Zoisia, Zoisia matrella	19.7
	Limpograss, Hemarthria altissima cult. 'Floralta'	8.8
	Carpet grass, Axonopus affinis	8.7

Test No.	Grass	M. crudus nymphs (mean)
3	Puerto Rico star grass, *Cynodon nlemfluensis* cult. *nlemfluensis*	15.4
	St. Augustine grass	14.4
	Para grass, *Panicum purpurescens*	11.6
	Rhodes grass, *Chloris gayana*	6.1
	Limpograss, *Hemarthria altissima*, breeding line PI 36 4871	5.25

Counts have not yet been made on the legumes tested.

Although these results have not yet been analyzed statistically, it appears from Tests 1 and 2 that limpograss is a poor host of *M. crudus* and will be tested further.

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U.S.A.I.D. SPONSORED PROJECT

GRANT NO: 532-5542-G-SS-5106-00

PROGRESS REPORT NO. 5

PERIOD: JULY 1987 TO DECEMBER 1987

PROJECT TITLE: MANAGEMENT OF THE INSECT VECTOR OF LETHAL YELLOWING DISEASE OF PALMS BY MANAGEMENT OF GROUND COVER IN PALM PLANTATIONS.

Myndus Crudus Population - Waterloo Road, Kingston

The 7,000 sq. ft plot which was planted with *Stenotaphrum secundatum* (St. Augustine grass) in November 1986 has been growing very well. Sticky traps which were not showing any catches of the vector at this site are now showing catches and collections are being made for the screen cage pot test.

Myndus crudus population is, however still low. For the period 31st August to 4th December, 1987 a total of 36 *M. crudus* was caught on ten traps set on coconut palms. Most of *M. crudus* were found on traps set on palms in the St. Augustine grass plot or in close proximity. During the period 5th October to 24th December, 1987 catches of *M. crudus* in the same area, for introduction into the screen cage, totalled 36. All were collected from palms growing in the St. Augustine grass plot.

Ground Cover Manipulation Studies

The two sites selected, Caenwood (5 acres) and Fair Prospect (4 acres) were each divided into two sections and ten sticky traps set in each section.

Counts of *M. crudus* trapped between 21st July and 25th November, 1987 are shown below:

	SECTION 1					SECTION 2				
	July	Aug.	Sept.	Oct.	Nov.	July	Aug.	Sept.	Oct.	Nov.
Caenwood	21	6	6	7	2	0	1	0	0	0
Fair Prospect	-	14	4	0	2	-	12	3	5	11

Section 2 at Caenwood and section 1 at Fair Prospect were sprayed with weed killer during November and December, respectively, and are being kept weed-free. Collection of M. crudus catches has continued.

At the Fort Lauderdale Research and Education Center, an experiment to determine whether palms are essential host plants in the life cycle of M. crudus was completed. St. Augustine grass, Stenotaphrum secundatum, was grown in 17 cm. dia. black plastic pots and exposed to ovipositing M. crudus. The root zones of the grasses were examined and found to have a mean of 9.8 M. crudus nymphs/pot (Total = 618 nymphs in 63 pots). The infested potted grasses were then placed in a 3 x 3 x 3m cage made with fiberglass screening impassable to M. crudus. There were no palms in this cage. The grasses were examined again for M. crudus nymphs 6 months later (i.e., in December 1987) and found to have a total of 36 nymphs in the 63 pots. The decline in the M. crudus population was probably due to a general deterioration in the quality of the grasses during the 6-month period. Nevertheless, it was significant that the M. crudus population survived in the absence of palms. The mean development time of M. crudus has been reported as 61.3 days, thus nymphs found in this cage 6 months after the pots were caged were offspring of adults that mated while in the cage, i.e., in the absence of palms.

Two tests of grass species as hosts of M. crudus additional to those tested previously (report for period January - June 1987) were completed, using techniques described in the previous report. Results are shown in the following table:

Test No.	Grass	Total M. crudus nymphs in 20 containers
4	St. Augustine grass, Stenotaphrum secundatum cult. 'Floratam'	249
	St. Augustine grass select. No. 332	299
	Brachiaria brizantha	101
	Cenchrus ciliaris	211
	Limpo grass, Hermarthria altissima cult. 'Big Alta'	141
5	St. Augustine grass 'Floratam'	175
	Elephant grass, Pennisetum purpureum Schumacher	45
	Sugar cane, Saccharum officinarum L.	17

Based on these results, Brachiaria brizantha, limpo grass and elephant grass are poor hosts of M. crudus. These are also

used as forage grasses in the Tropics. Also, based on these results, sugar cane is not a major host of M. crudus and is probably, if ever, seldom involved in the disease epidemiology of LY in sugar cane-producing areas such as in Jamaica.

An experiment was initiated to test under field conditions the grasses selected as poor M. crudus hosts from tests with containerized grasses. The grasses included the following:

'Floratam' St. Augustine grass

Brachiaria brizantha

Rhodes grass, Chloris gayana

Limpo grass, Hemarthria altissima Select. No. 364871

Carpet grass, Axonopus affinis

Each grass (treatment) was replicated 4 times and the treatments completely randomized. The plots are weeded frequently and watered and fertilized frequently to encourage vigorous growth of the test grasses. As of January 14, 1985, coverage of the plots was as indicated:

St. Augustine grass	90% of plot area
Limpo grass	50% of plot area
Others	25% of plot area

When the grass plots are established, populations of M. crudus will be sampled using specially designed traps which are now being constructed. Also, field testing of elephant grass is planned for the future.

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U.S.A.I.D. SPONSORED PROJECT

GRANT NO. 532-5542-G-SS-5106-00

PROGRESS REPORT NO. 6

PERIOD: JANUARY 1988 TO JUNE 1988

PROJECT TITLE: MANAGEMENT OF THE INSECT VECTOR OF LETHAL YELLOWING DISEASE OF PALMS BY MANAGEMENT OF GROUND COVER IN PALM PLANTATIONS

Myndus Crudus Population - Waterloo Road, Kingston

For the period, 5th December, 1987, to 7th June, 1988, a total of 87 M. crudus was caught on ten traps on palms in and adjacent to the St. Augustine grass plot. Over 60 insects were caught in May the highest total up to that time for one month.

In addition to the insects caught on traps, 191 were collected from palms growing in the St. Augustine grass plot. The highest catches were made in April and May.

Ground Cover Manipulation Studies

Two plots at Caenwood and Fair Prospect, 5 acres and 4 acres respectively, were used in this study. The plots were divided into two sections - one kept weed free using chemical weed control and the other allowed to grow mostly uncontrolled except for an occasional cutting with a machette.

Counts of Myndus crudus trapped between January and June 1988 in the plots are shown below:

Caenwood

	Jan.	Feb.	Mar.	Apr.	May	June
Unsprayed	0	1	3	2	1	-
Sprayed	0	0	0	0	0	-

Fair Prospect

	Jan.	Feb.	Mar.	Apr.	May	June
Unsprayed	0	1	1	19	0	10
Sprayed	0	0	0	13	2	1

The number of M.crudus trapped at both sites continues to be low but is apparently affected by ground cover treatment.

Three plots each of the following grasses and legume - Panicum maximum (guinea grass), Panicum muticum (para grass), Stenotaphrum secundatum (St. Augustine grass) and Pueria sp. (Kudzu) were established at Waterloo Road, Kingston, for evaluation as alternate hosts of M.crudus.

Adult insects will be trapped as they leave the plots.

The Project entomologist conducted a survey of insects at Half Moon Resort near Montego Bay, Jamaica, where between 1983 and the present about 40% of 2,000 'Malayan Dwarf' coconut palms were killed by lethal yellowing, an unusual situation because this variety is normally highly resistant. Auchenorrhynchous insects (leafhoppers and planthoppers) were observed and collected to obtain preliminary evidence of a vector other than Mendus crudus. About 400 coconut palms plus several other species of palms were examined over a 2-day period. The most common insects of this taxonomic group in order of abundance were : Nymphocixia caribbea Fennah, M. crudus, Omolicna sp. and Cedusa sp.

Nymphocixia caribbea was collected by him in 1981 from coconut palms in the Dominican Republic, but it is a rare insect on palms and almost nothing is otherwise known about it. Both N. caribbea and M. crudus are in the family Cixiidae. Since M. crudus is a proven vector of lethal yellowing, N. caribbea is of particular interest because if a disease pathogen has more than 1 vector, the vector species are usually closely related taxonomically.

Additional observations at Half Moon Resort indicated that N. caribbea was associated with palms. As many as 684 were observed on a single leaf of a coconut palm. These were brushed off and the leaf examined again in 3 hours, at which time this leaf was again infested with 190 insects of this species. Plants in the vicinity of palms infested with this insect were examined and found not to harbor N. caribbea. These plants included sugarcane, banana, heliconia, philodendron, fig, casaurina, oleander, Seymour grass, Bahama grass, and other grasses. Since the site where N. caribbea was collected in the Dominican Republic was near the seashore, as is Half Moon Resort, it was suspected that the primary host might be maritime vegetation. Thus, mangroves and associated plants along the shore near the Half Moon Resort site were examined. However, N. caribbea was found only on palms.

At Half Moon Resort, N. caribbea was most abundant on palms on the golf course. By comparison, very few were observed on palms in the hotel and beach area of this property and on palms on the grounds of nearby hotels.

Two field days were devoted to examining foliage of palms that could be reached from the ground at Bengal Estate, where since 1986 14% of 8,000 'Malayan Dwarf' have contracted lethal yellowing. In the areas of the plantation with grass there were about 3 to 5 M. crudus per palm, which is comparable with populations at the

.17

Ft. Lauderdale Research & Education Center. Lethal yellowing is highly epidemic in the latter area. M. crudus could not be found on palms in a corner of the plantation that was devoid of grass. This is consistent with a principal hypothesis of this study, that M. crudus can be controlled by controlling the ground cover.

One field day was devoted to examining palms on the west end of Jamaica. Thirty of 500 coconut palms at Tryall Golf Course west of Montego Bay were examined and found to be free of auchenorrhynchous insects. This was probably because it was extremely windy during this period. There were 3 cases of lethal yellowing on this property. Very few coconut palms were growing between Montego Bay and Negril. One extensive plantation of 'Malayan Dwarf' coconut palms west of Montego Bay was free of lethal yellowing. About 1/3 of a planting of 'Jamaica Tall' coconut palms along the shoreline consisted of dead trunks, evidence that lethal yellowing had affected the planting several years ago. There were substantial numbers of coconut palms in Negril and many of them appeared to be of the 'Jamaica Tall'variety or hybrids. One case of lethal yellowing was seen.

Plans for a short study of the relationship between M. crudus and sugar cane with different portions of the work to be done in Florida and Jamaica.

At the Ft. Lauderdale Research & Education Center field plots were established to test grasses selected from earlier laboratory screening of grasses as hosts of M. crudus. The grasses were Rhodes grass (Chloris gayana), limpograss (Hemarthria altissima), carpet grass (Axonopus affinis), and Brachiaria brizantha, which is related to signal grass. St. Augustine grass (Stenotaphrum secundatum) was selected as a standard of comparison. Four replicates of 3.7m^2 each were established for each grass in a completely randomized block. A specially designed modification of the "Malaise-type" insect trap was placed over each replicate for a period of 1 week. Adult M. crudus that emerge from the grass are caught in this trap. Four replications of each grass have now been completed. Mean adult M. crudus emerging per week from the different grasses were as follows:

Species	Mean adult M. crudus/week
St. Augustine grass	35.0
Sp. near signal grass	7.0
Limpo grass	5.8
Rhodes grass	3.5

This test will be repeated in September. A large field test of one of these grasses will be conducted to determine whether M. crudus populations can be curtailed by maintaining one of these grasses as the principal ground cover in a coconut plantation.

Publications and papers presented:

Howard, F.W., R. Atilano, C. I. Barrant, N. A. Harrison, W. F. Theobald, and D. S. Williams 1988. Unusually high lethal yellowing incidence in Malayan Dwarf coconut palms on localized sites in Jamaica and Florida. Submitted to the Journal of Plantation Crops.

Howard, F.W. and C. I. Barrant 1988. Host plant resistance in grasses as a possible tool for managing Myndus crudus, a vector of lethal yellowing disease of palms. Paper to be presented at the 71st Annual Meeting of the Florida Entomological Society, Clearwater, Florida, August 2-5, 1988.

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