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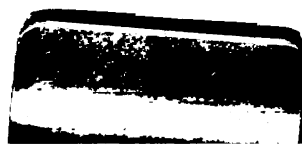


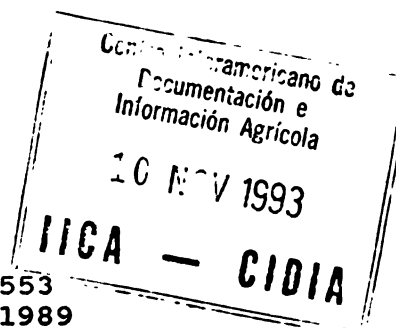
DESERT LOCUSTS IN THE CARIBBEAN
PROCEEDINGS OF A REGIONAL MEETING
PORT OF SPAIN, TRINIDAD AND TOBAGO
NOVEMBER 16TH, 1988

Edited by: Barry Stemshorn
IICA OFFICE IN TRINIDAD AND TOBAGO

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May 4, 1989

CIRCULAR LETTER

TO: National Plant Protection Services in the Caribbean

RE: DESERT LOCUSTS IN THE CARIBBEAN
Proceedings of a Regional Meeting
Port of Spain, Trinidad and Tobago
November 16, 1988
(ISSN 0534-5391 A2/TT-89-01)

SUBJECT: Date of First Desert Locust Sightings in Antigua

A review of events in Antigua has revealed that the first sightings of desert locusts were made around the middle of October and not in September as reported at our meeting on November 16th, 1988.

Sincerely,



Barry Stemshorn
Regional Project Coordinator
Animal Health and Plant
Protection Program

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PORT-OF-SPAIN, TRINIDAD AND TOBAGO
NOVEMBER 16TH, 1988

Edited by

Barry Stenshorn
IICA Office in Trinidad and Tobago
Tacarigua Post Office
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Port-of-Spain, Trinidad and Tobago

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CONTENTS

	Page
Introduction	2
List of National Delegates	4
Opening Remarks:	
C. Brathwaite and B. Stemshorn	6
Introductory Comments on the Acridian Situation in Central America:	
F. Dao	8
The Desert Locust Situation in the Caribbean:	
C. Schotman	11
Reports on Desert Locusts in:	
Barbados	17
Guyana	21
Jamaica	25
Montserrat	29
Organization of Eastern Caribbean States:	
- Antigua and Barbuda	30
- Dominica	32
- Grenada	38
- St. Lucia	45
- St. Vincent and the Grenadines	48
St. Kitts-Nevis	50
Suriname	52
Trinidad and Tobago	54
Recommendations	67



INTRODUCTION

This meeting on the first recorded incursion of desert locusts in the Caribbean was held the day before a regional workshop on the monitoring of agricultural pests and diseases, taking advantage of the presence in Port of Spain of senior plant protection officials from 12 countries. The unexpected arrival of desert locusts in the weeks preceding the workshop dramatically illustrated the importance of maintaining national capability to identify, monitor and control agricultural diseases and pests, and the value of sharing information on outbreaks and methods at the regional level.

The meeting heard reports from the national delegates after a review of the locust situation by the United Nations Food and Agriculture Organization (FAO) and opening remarks by officials of the Inter-American Institute for Cooperation on Agriculture (IICA). Representatives from the Caribbean Agricultural Research and Development Institute, the University of the West Indies, the C.A.B. International Institute of Biological Control and IICA participated in the discussions.

The national reports provide a record of the events and document the speedy and effective responses by responsible Ministries, supported by aforementioned agencies. These included surveys, information dissemination and, in carefully selected circumstances, control measures.

The papers provide several interesting observations. Retrospective reports of locust sightings go back to September 14th, 1988 (Antigua) and October 7th, 1988 (Trinidad & Tobago). Mating was observed, including cross-mating with Schistocerca pallens. There were several reports of new arrivals and sudden disappearances of locust "swarms". A detailed review of the timing of these reports might shed some light on whether they reflect repeated trans-atlantic crossings, movement of desert locusts within the region, or both.

Recommendations were presented by the FAO specialist, several national spokespersons, and finally we present some general recommendations on which the group was able to reach consensus.

These reports and recommendations were helpful in guiding the use of a modest emergency fund that was provided by IICA to assist its member countries in responding to this

locust incursion. These funds were used for a variety of actions according to the different national needs, including field surveillance work, preparation and purchase of materials to inform field staff and the public about the locusts, the purchase of supplies and equipment for insect collection and, where necessary, for limited control actions. In addition to addressing the short term needs, the materials and the activities supported have strengthened the capability of participating countries to respond to future unexpected outbreaks of other insect pests.

Thanks are due to the national participants for their excellent and timely contributions to this proceedings and to the FAO's Regional Plant Protection Specialist, Mr. Charles Schotman, both for his paper and for the support he provided to the region over the past months.

Time will allow us to know the final results of this very large experiment by Mother Nature. We all hope that desert locusts are temporary visitors to the Caribbean, as predicted by our best informed forecasters. At the same time, it is reassuring to know that the responsible agencies have monitored the situation closely, and have taken prudent measures to reduce the chances of the locusts becoming established in this region.

BARRY STEMSHORN
Tacarigua
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December 23, 1988

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OPENING REMARKS

by

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Delegates of the countries of the Caribbean, distinguished guests, ladies and gentlemen.

We are indeed pleased to welcome you to this workshop on the desert locusts which is being held by our Institute in cooperation with the Ministry of Food Production, Marine Exploitation, Forestry and the Environment of Trinidad and Tobago.

As you are no doubt aware, locusts are among the most devastating of all pests. The first recorded incursion of desert locusts (Schistocerca gregaria) into the Caribbean occurred in October, 1988, in the wake of Hurricane Joan. Samples from several countries have been positively identified as S. gregaria.

Schistocerca gregaria is the "desert locust" of Africa, the Middle East and the Indian sub-continent. According to the literature¹, an active adult desert locust weighs about 2 gms and eats its own weight in fresh vegetation each day. Swarms may consist of 50 million individuals per square kilometre, and may cover 1,000 square kilometres. This territory may thus lose 100,000 metric tons of fresh vegetation daily. A wide range of crops including grains, vegetables, fruits and nuts may be attacked. Examples of losses include 7 million grape vines (Libya 1944), 6,000 tons of oranges (Guinea 1957) and 167,000 tons of grain (Ethiopia 1958).

¹"Grasshoppers and locusts" in "Diseases, Pests and Weeds in Tropical Crops". pp. 269-277. John Wiley and Sons, New York. 1977.

The area affected extends from Jamaica to Suriname. Locusts were first reported on Friday, October 14th, with extensive invasions on October 15th. The OECS countries were the hardest hit, with the worst infestation of about 20/m² over several hectares, being found in Dominica. A variety of crops were attacked, and some trees were stripped of their leaves, but no massive crop loss occurred.

It is not known whether the locusts will be able to establish themselves and breed in the region. A consultant brought to the region by FAO, Dr. Phillip Symmons, advised on November 1st that this is unlikely in view of the fact that most of the arrivals were females. Moreover, the locust population appeared to be dispersed and declining due to wet weather and predation by birds.

Subsequent reports indicated a marked increase in the number of locusts. It was suspected that these were new arrivals as some were immature and because wind conditions were such as to support their travel from West Africa in 4-5 days. These were actively feeding and included a higher percentage of males. Some reports described locusts turning yellow, the colour of sexually mature S. gregaria.

However, Dr. Symmons also noted that the ecology of this region differs from the semi-arid conditions and that huge land masses are required for the locust's plaguing cycles. If breeding does occur, he predicted that this would result in scattered populations with little chance of swarming. Where suitable land masses exist in the hemisphere, a species of Schistocerca is already adapted to the niche.

Despite these reassuring observations, the region must remain vigilant and take whatever actions are reasonable to reduce the chances of the locusts becoming established. Given the extent of the incursion, the insect's wide host range, the varied habitat available, and the novelty of this biological situation, we must not be complacent. National and regional agencies must guard against the possibility, remote as it may seem, that these locusts might adapt to become a new and serious pest in this hemisphere.

**INTRODUCTORY COMMENTS ON THE ACRIDIAN SITUATION
IN CENTRAL AMERICA**

by

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BACKGROUND

The flying locust or large grasshopper Schistocerca piceitrons piceitrons (Wlk) (=S. paranensis burm.), invaded Costa Rica for the first time in 1870. Periodic invasions followed, the most recent occurring in 1987.

As a result of the locust invasion of 1940-1947, which caused great losses to Central American agriculture, Mexico and Central America joined forces to combat the pest. Thus, in 1948, the First Agreement of Tapachula was signed, creating the International Coordinating Committee of the Battle Against the Locust (CICLA), which laid the groundwork for a coordinated regional battle against the pest. It produced positive results immediately.

In Costa Rica, the control began with the insecticide BHC, and later chlordane was used.

In light of the success of CICLA, and of the increase in other agriculture-related problems, in 1953, the Ministers of Agriculture of Mexico, Central America and Panama (which had joined the movement) transformed CICLA into what is currently known as Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA).

As for the locust, OIRSA participates in the battle against this pest through:

- Technical advice to the countries involved in the battle against the locust, through advisory services provided by specialists in the area.

- National and international courses to train technical personnel from the member countries of OIRSA.
- Publications
- Direct financial support
- Assistance in the search for support from international agencies

In 1951, the pest began to diminish, with a slight reappearance in 1953.

In 1954-55, the pest ceased to have any effect on the economy, but it was still present, in its "solitary phase," from 1956 to 1984.

In 1984, the pest reappeared in the northern part of Guanacaste province (Costa Rica) in focii of grasshoppers spread out over 400 hectares (has). These were fought by the Ministry of Agriculture and Livestock and OIRSA.

The current infestation began in 1987 and has spread over some 20,000 has., mostly on vacant lands, underbrush, and stubble, although locusts have also shown up in sugar cane and sorghum. This invasion extended into 1988, spread over six to eight thousand has., and could easily go into 1989.

CURRENT SITUATION

During the second half of 1988, the battle against the locust has continued, but the area affected has not been quantified because the newest grasshopper emergency began less than a month ago. Nevertheless, it is felt that this infestation will be less severe than the one at the beginning of the year.

During the week of November 7 to 11, the presence of grasshoppers will be evaluated, and it is hoped that this infestation will be less because of prevailing weather conditions. Of the last fifty years, it can be said that 1988 has been the rainiest, and that the month of August was the rainiest in the last one hundred years. Much of the land on which eggs would normally be laid has been flooded almost constantly, thus reducing the eclosion of eggs and, consequently, outbreaks of the pest.

OIRSA has provided Costa Rica with financial support, insecticides, ongoing technical assistance to battle the locust, and has sought external financial support. Through this effort, FAO approved a project titled "Emergency Campaign Against the Flying Locust" TCP/RLA/6773 (E) for a total of US\$190,000, to reinforce the campaigns already under way in Costa Rica, El Salvador, Nicaragua and Honduras.



THE DESERT LOCUST SITUATION IN THE CARIBBEAN

by

Charles Y.L. Schotman
FAO Regional Plant Protection Officer
Keate Street, Port-of-Spain, Trinidad & Tobago

On October 17th to 18th, 1988, reports were received from many islands in the Caribbean concerning outbreaks of locusts previously unknown in the Caribbean. These islands included Trinidad, Tobago, Grenada, Barbados, St. Vincent and the Grenadines, St. Lucia, Martinique, Dominica, Guadeloupe, Montserrat, Antigua and Barbuda, and St. Kitts/Nevis. These reports were received through the FAO Office in Barbados, CARDI and directly from National Plant Protection Services. The reports all coincided in that the first large locust populations were found on the eastern coasts of the islands on October 14th to 15th. The locusts were subsequently found migrating inland towards urban and cultivated areas, during October 15th to 17th. Feeding was reported by some countries on October 18th. Information received from FAO Headquarters, Rome, indicated that the Cape Verde Islands had been invaded by the desert locust, Schistocerca gregaria, on October 5th to 6th, 1988 and locust swarms were seen by ships on October 9th to 10th, at 1000 - 1500 km north of French Guyana.

There may have been two locust invasions with marked differences between them. The main invasion resulted from desert locusts crossing the Atlantic. The locust populations were scattered and affected a large area in the Caribbean. A resurgence or second wave took place a few weeks later. It affected only a few countries but consisted of large concentrations of much more vigorous insects with a different sex ratio. It is not yet known whether this was another invasion directly from Africa or a redistribution of populations within the Caribbean.

MAIN INVASION

First reports: The first locusts were seen on October 12th, 1988 on the AMOCO oil platform 30 miles off the east coast of Trinidad and on the east coast of Grenada.

Invasion period and area: The major locust invasion took place in the period from October 14th to 16th. The known limits of the invasion area in the Caribbean were French Guyana (south east), Venezuela (south west, Antigua and Barbuda (north east) and Jamaica (north west).

Flying time: Dr. Symmons estimated the maximum time for single flight to be around 4 days for the desert locust. This fits with observations of the Meteorological Department in Trinidad reporting low level winds beginning in the Cape Verde islands showing up in the Caribbean 3 to 4 days later for some time in October.

Number of locusts: Because the invasion pattern was patchy in practically all countries, it is difficult to estimate the numbers. The total number which landed alive in the Caribbean may have been around 100 million. Several larger or many scattered small swarms of locusts appeared along the coasts of the islands, especially on the eastern sides. The large swarms consisted of millions, the smaller swarms of hundreds to thousands of individuals. The most affected countries were Dominica and St. Vincent and the Grenadines. One of the six swarms arriving in Dominica was estimated to be around 10 to 20 million individuals, St. Vincent had hundreds of thousands. In addition, many dead and live locusts were seen on the sea surface by fishing and other boats, an oil platform and at the beaches throughout the eastern Caribbean.

Type of locusts: The species has been positively identified as the desert locust, Schistocerca gregaria. The locusts were mostly pink in colour indicating sexual immaturity. The vast majority of the locusts were female. Only in Dominica were a large number of males reported, some of which were yellow in colour indicating that they were sexually mature.

Behaviour and feeding: The locusts were found roosting for a short while along the beaches and coastal areas, then moving inland, often found at the west coast during the following few days. The locusts appeared to be exhausted and feeding was very reduced. This was not the case however in Dominica, where extensive feeding occurred especially on white cedar, wild legumes and coconut. Crop damage was seen on a small scale in Dominica and St. Vincent and the Grenadines. Amongst these were maize, plantain, breadfruit, yams, sweet potatoes, sorrel, peas and passion fruit.

Disappearance of locust populations: Locust populations decreased very quickly after a period of 5 to 10 days. Four bird species preyed heavily on the locusts in Dominica. Many other countries reported predation by the cattle egret and local blackbirds. Where populations were low, the decrease in numbers may partly be attributed to the birds, but these could not have been responsible for the disappearance without trace of the millions of locusts in Dominica in the matter of 10 days or less.

RESURGENCE OR SECOND INVASION

After the locusts had practically disappeared, large populations of locusts were seen again in some Caribbean countries.

Dates and countries affected: Resurgence of locusts was reported on different dates by different countries. The first reported resurgence was in Barbados (October 25th), followed by St. Lucia (October 28th), Grenada (November 2nd), Trinidad (November 3-5th), Guyana (November 4th) and Suriname (November 8th). On some occasions locusts were seen flying in from sea, such as observed by the AMOCO platform on November 3rd. On November 5th a large swarm landed on a super tanker on the Atlantic, 900 miles south east of St. Lucia. It is not clear yet whether these were new invasions directly from Africa, or a redistribution of swarms within the Caribbean.

Sex ratio and behaviour: Where investigated, the percentage of males was considerably higher than before. The insects were also much more vigorous and feeding more readily than before. The colour was varying from pink to dark pink or brown, sometimes yellow. These colours are known to indicate young sexually immature, old immature and mature adults, respectively. Initially, these gave reason for considerable alarm especially in Trinidad, where emergency assistance was considered. Within a matter of a few days however, the locust populations decreased so dramatically that it was hard to find any live locusts later during the same week.

POSSIBILITIES FOR BREEDING AND ESTABLISHMENT

Besides direct economic damage, the possibilities for breeding and establishment have generally been one of the

major preoccupations which were discussed with Dr. P. Symmons. It was concluded that permanent establishment is highly unlikely, although breeding cannot be ruled out. The following considerations can be cited.

- The climatic conditions in the entire Caribbean area are unfavourable for this species, which normally breeds only in desert areas.
- Sexual maturation has only been seen on rare occasions (except in Dominica).
- Although mating has been observed with related local grasshoppers (E.H. Alleyne, page 18 of this proceedings) the possibility for cross-breeding can be excluded.
- If sexually mature mated females survive, oviposition will necessarily follow, independently of the suitability of the environment. This will not, however, necessarily mean establishment.

In the unlikely event that the pest could establish itself in some part of the Caribbean, the following should be considered:

- If establishment is possible, no feasible action could prevent this, due to the extremely wide invasion area and dispersal of the insects
- It would revert to the solitary phase and behave similarly to the already established local grasshoppers. It would find no area even remotely similar to the type and size of areas it needs to form swarms.
- The population would be susceptible to high natural mortality factors such as high humidity and predation by birds which it does not encounter in its normal breeding areas.

ACTION TAKEN

The action taken by the different countries visited showed that there is a considerable amount of alertness and readiness to deal with emergency situations. In all

instances, actions taken such as organizing special emergency teams for survey and/or spraying, establishing hot lines for incoming calls, involving various governmental services and the public, good public information (maybe too much), were good or very good.

Spraying of insecticides was generally kept to a minimum and environmental considerations prevailed in the choice of chemicals. Ministries were well aware of the importance of birds, and measures were taken to avoid side effects. Particularly in St. Vincent and the Grenadines and in Dominica there were specific actions to this effect. In some countries, especially where locust populations were low, the main actions taken were monitoring without any spraying being done.

Other organizations were involved such as CARDI and IICA, complementing and keeping each other informed on particular activities.

RECOMMENDATIONS

The following recommendations were given to the countries visited and are applicable to the entire Caribbean:

- Control: As long as there is no immediate threat of crop damage, there is no immediate requirement for control. Thresholds for control as well as guidelines for type of insecticides and equipment to use were provided by FAO through the resident FAO Representatives.
- Monitoring: The situation should be monitored as closely as possible in order to discover whether breeding is taking place. This may however be difficult since the solitary phase of the desert locust instars can hardly be distinguished from some local grasshoppers (Schistocerca spp.).

FOLLOW UP ACTIONS

It is important that good information on desert locust be provided to the interested countries. Excellent documentation (ODNRI) has already been handed out by Dr. Symmons to some countries. More handbooks have been made available later by ODNRI and have already been circulated by the author (and IICA will purchase additional copies - ed.).

Some countries have also requested to view the FAO documentary on desert locust. As it is highly unlikely that another invasion would take place in the foreseeable future, any other input that might be needed such as training, equipment, chemicals, should be of benefit for crop protection in general, and not exclusively for desert locust control.

THE DESERT LOCUST SITUATION IN BARBADOS

by

✓
Eslie H. Alleyne
Ministry of Agriculture, Barbados

The desert locust was first reported from beaches on the eastern and south-eastern parishes of the island in mid-October. There is little doubt that these insects were transported on winds of Hurricane Joan, as is evident by the almost simultaneous invasion of all islands of the Caribbean. As far as is known, this is the first record of these insects in this part of the world, although it is not the first occasion that insects have invaded the region on hurricane winds. In 1980, sugar cane thrips were introduced on Hurricane Allen.

A quick local identification indicated that the locusts were the pink immature adults of S. gregaria. Specimens sent to specialists at Anti-Locust Research Centre in London confirmed that the insect was in fact the desert locust.

The initial infestation was very patchy with most insects being badly damaged and those which were undamaged being severely weakened. It is very likely that the severe weather conditions had killed the thousands of adults which littered the beaches, and weakened survivors.

About 1 1/2 weeks after the first invasion, a second report of large swarms at a number of different locations on the east, south-east and northern beaches and surrounding areas was received.

These adults were extremely active, and very few dead ones were found on the beaches. In addition, unlike the adults of the first invasion, these fed very greedily on a wide range of plants.

Of particular interest, was the large numbers on beaches feeding on Ipomoea pres-caprae, a wild growing relative of the sweet potato which is quite common on beaches in Barbados.

Mating was observed not only between male and female desert locust adults but also between local males of a similar grasshopper, S. pallens and female locusts. The results of these matings is not yet known.

SURVEYS

Once the presence of the desert locust was confirmed, an island-wide survey was conducted. This involved members of the Royal Barbados Defence Force as well as teams from the Ministry of Agriculture's Plant Protection Division. A total of about 30 teams was used. In open pasture land the number of locusts flying over 10 paces, was counted, and where numbers exceeded 10 adults, entomologists went to determine for themselves whether insecticidal treatment was necessary. In a few instances populations were so high that treatment had to be applied. In more dense vegetation, trees and sugar cane fields were examined as necessary. This was very variable because of the wide range of situations encountered.

In all, about 10-12 areas were treated. Special attention was devoted to cultivated crops like sugar canes, as well as beaches, where many adult locusts had been seen and also since the coast-line seems to be the first area to be invaded.

INSECTICIDAL TREATMENTS

Insecticides were used rather infrequently and only in situations where it was generally felt that the size of the populations in a particular area posed a serious threat. This was particularly so on the eastern pasture areas when populations could move inland and disperse almost throughout the entire island.

On the first day of the initial invasion, several insecticides were tested in the laboratory for their efficiency against the locusts. From the list of chemicals available, four (4) were selected. These were:-

1. Malathion U.L.V.
2. Decis 2-5 EC. (decamethrin)
3. Sherpa 50 EC. (cypermethrin)
4. Diazinon 60 EC.

These chemicals were applied with mini-ulva U.L.V. battery operated hand-held sprayers. In pasture areas where cattle grazing occurred, the synthetic pyrethroids, Decis and Sherpa were used in preference to the other more persistent insecticides.

RESULTS

Whatever the major controlling factors, it appears that the population of desert locust in Barbados has been greatly reduced. It is believed that the major controlling factors have been:

1. Weather - This was particularly applicable to the first swarm which was apparently weather-beaten and hardly fed. Most of them died a couple days after being caught in nets and caged in the laboratory.
2. Birds - These are believed to have contributed significantly to the overall mortality of locusts but some difficulty has been observed with blackbirds and other small birds which seem to have only limited success in catching active adults.
3. Insecticidal treatment - Although the true impact of these insecticides is not known, observations tend to suggest some measure of success.

The public in Barbados is now quite familiar with these insects and can differentiate between them and the local grasshopper species. This awareness has greatly assisted us in locating isolated areas of infestation, and the overall distribution pattern of the insect.

RECOMMENDATIONS

1. Surveys should continue at a much reduced level to determine whether egg batches have been deposited and more importantly, whether hoppers will be produced.
2. Biological and behavioural studies should be conducted to learn as much as possible about the insect in its new environment.
3. Spraying equipment should be tested for efficiency.

4. Attempts should be made to tackle the locust problem on a regional level since the insect is a powerful flyer and is quite capable of moving from one island to another almost overnight.
5. Particular emphasis should be placed on flight and an investigation of environmental and other factors which encourage or facilitate it.
6. More attention should be paid to movement of depressions and other adverse weather conditions crossing the Atlantic Ocean from the African continent. Meteorological Services should be requested to alert us of such occurrences, particularly those which lose their intensity before reaching the eastern Caribbean area.

✓
THE DESERT LOCUST SITUATION IN GUYANA

by

✓
Victorine Kellman
Ministry of Agriculture,
Georgetown, Guyana

A report was received by the Ministry of Agriculture of Guyana on October 19th, 1988 from the FAO's Office in Trinidad informing us that the desert locust (Schistocerca gregaria) had been sighted in Trinidad and 1000-1500 km off French Guiana.

Following the report many Government departments were alerted including the armed forces, the Guyana Sugar Corporation (Guysuco) and the regions. The Ministry requested the use of Guysuco planes to conduct aerial spraying in the event that large swarms were sighted.

A radio announcement was made the same evening and on the following morning specimens were brought in by various members of the public. Visits were paid to areas where reports were received but the numbers present were small (one to three).

Areas where locusts were reportedly found included much of the sea coast of Guyana. (See attached map). Regional extension staff were advised on the chemicals to use, such as Karate, Fenitrothion or Malathion, whichever was available. Baygon was used very effectively on infested boats.

On November 3rd, adverse weather conditions prevailed throughout the day and into the evening (heavy rain and wind). On the morning of November 4th, numerous members of the public arrived at the Ministry of Agriculture bringing specimens of locusts, often in bags containing several dozen from one locality. There were also several telephone reports and reports of locusts on incoming vessels. It was evident, therefore, that a major invasion had occurred. Reports were received on that day from much of the coast of Guyana (see attached map) and all sightings were within a few hundred yards of the coast. Thus it was clear that the locusts must have alighted as soon as they passed over land, and they were therefore presumably approaching at a low level.

On subsequent days, scattered reports continued to come in and these were frequently from a mile or two inland. Thus it seemed that the locusts were dispersing further inland in search of food. This is presumably the reason why locusts were found by the FAO consultant at Kairuni, 46 miles inland, on October 29th, following the initial invasion nine (9) days earlier.

Few of the reports involved serious damage to crops or trees, but the school farm at Campbellville Government School, Georgetown was said to be "devastated". The locusts were often observed to be attacked by birds, including poultry, kiskadees and white cranes.

The weather pattern has been studied from before the minor invasion until after the major invasion, that is from October 18th to November 5th (see graph attached). Apart from light rain on October 18th, the weather was dry until November 3rd which was particularly wet and windy. Since that time there has been rain on most days, frequently heavy.

Similarly, relative humidity was fairly low until November 3rd, when there was a sudden rise which has persisted. Mean temperature fluctuated between 27°C and 29°C until November 4th (the day of the main locust influx) when it fell to 26°C and continued even lower. Cloud cover varied from 2 to 6 until November 1st when it rose above 7 and has remained high. Hours of sunshine have correspondingly fallen over the same period. Thus cloudy conditions set in on November 1st followed by rain, wind and high humidity on the 3rd and lower temperatures on the 4th. All these indicate the onset of the second wet season (November - December) and the arrival of a moist air-mass. The main arrival of the locusts therefore seems to have been associated with this change of seasons. There is no indication, however, that the first arrival was associated with any such change.

It is not intended to carry out an organised survey unless a more serious infestation occurs. Infestations so far have diminished rapidly, possibly due to predation by birds and it is not anticipated that troubles would persist.

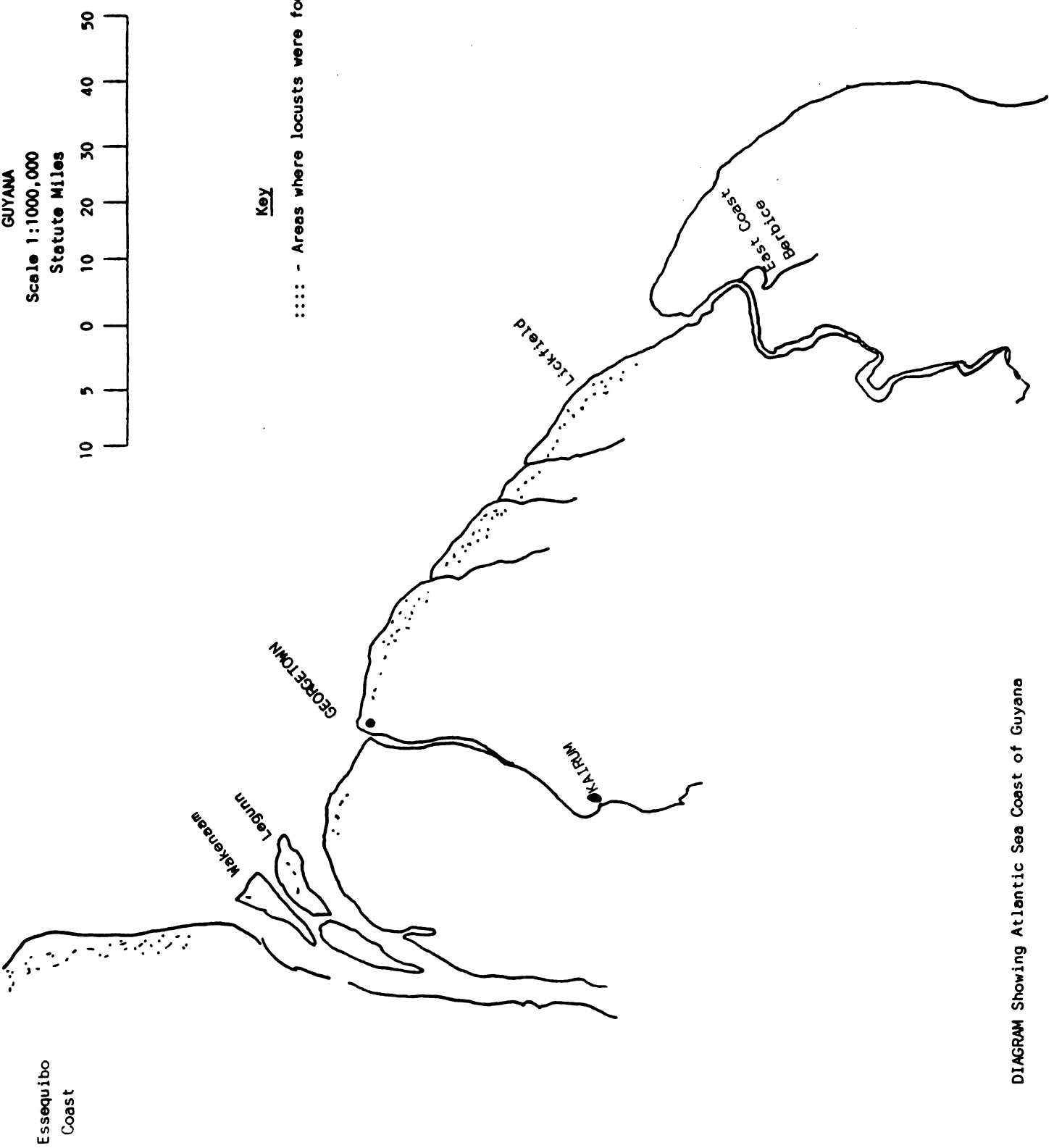
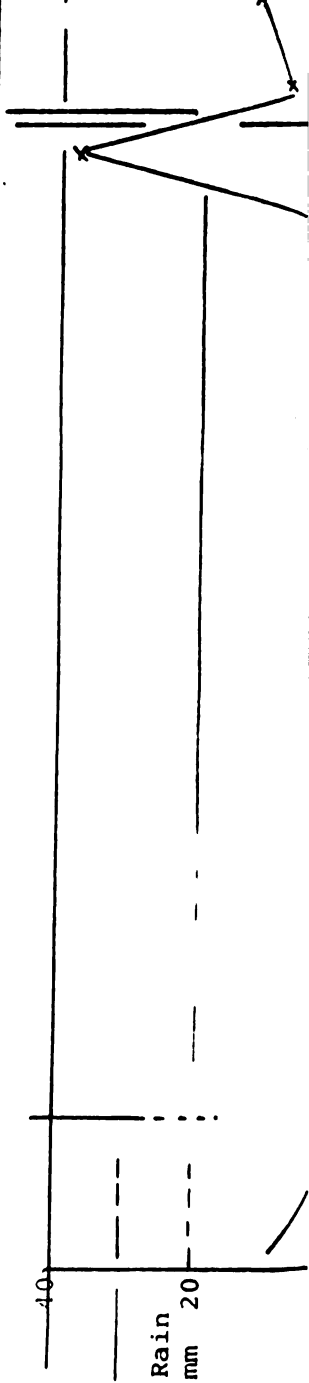
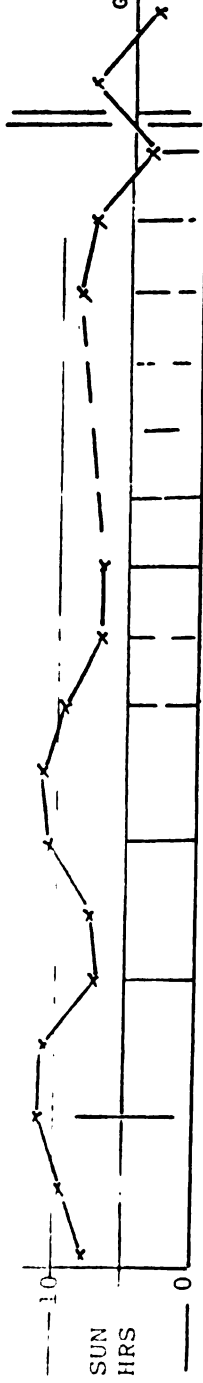
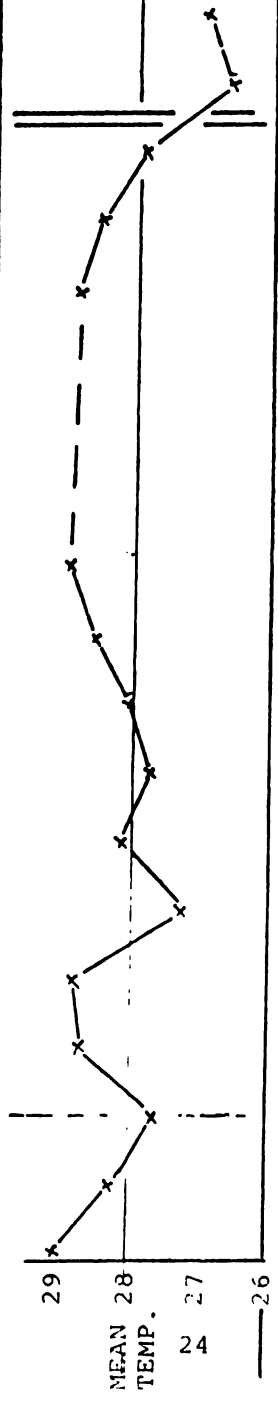
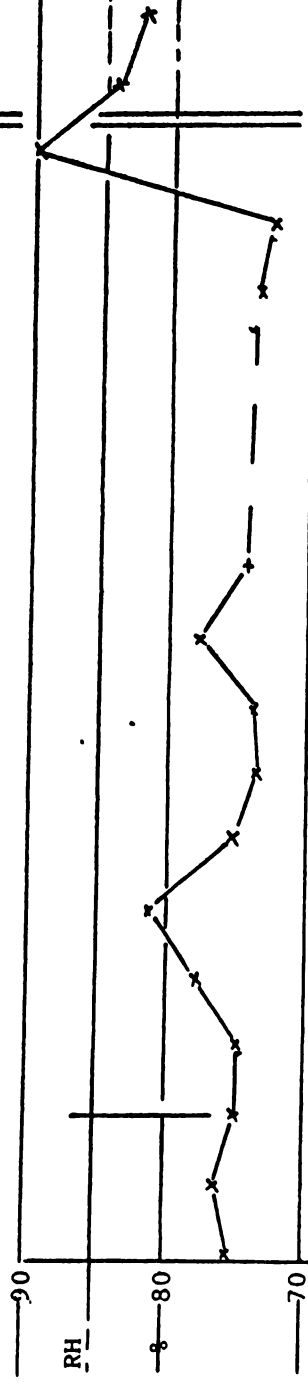
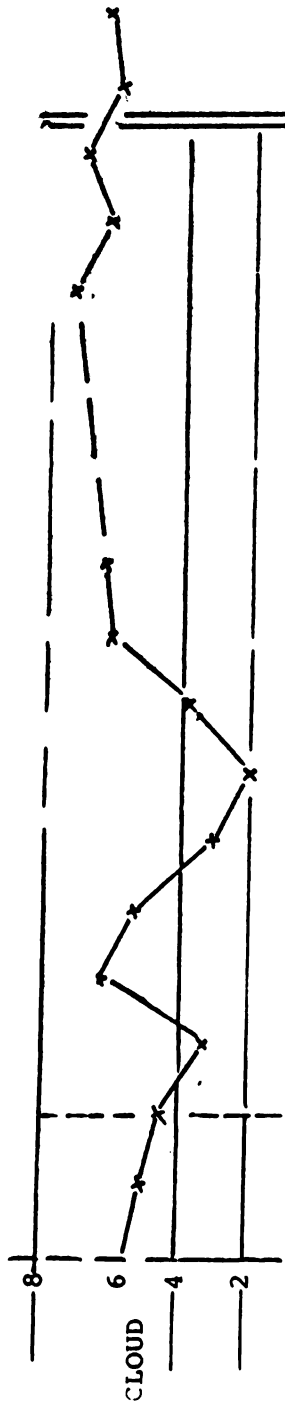


DIAGRAM Showing Atlantic Sea Coast of Guyana



Graph showing Rain Fall, Sunshine
Temperature, Relative Humidity
and Cloud cover for period
17th October - 27th October and 1st-
5th November

THE DESERT LOCUST SITUATION IN JAMAICA

by

David W. Ellis
Ministry of Agriculture
St. Catherine, Jamaica

INTRODUCTION

In October 1988, Jamaica was alerted to the arrival of the desert locust, Schistocerca gregaria (Forsk.) in the eastern Caribbean and Suriname by reports from FAO, IICA, CARDI and the local media.

The Principals of Research and Development conferred immediately about the possible threat to Jamaican agriculture by this great pest. The Ministry of Agriculture consequently informed the country through the press and the electronic media of the potential danger of the locusts to Jamaica. The public was also requested to send to the Ministry for identification all specimens of grasshopper-like insects.

INITIAL INFESTATION

In response to the call, specimens of grasshoppers were turned in for identification. Ten of the specimens were unlike any grasshopper in the Institute of Jamaica that were collected in Jamaica. These specimens appeared consistent with descriptions of S. gregaria and hind femur and hind wing ratios were consistent with this identification. It was the first time insects of this sort were found in Jamaica. Smaller but superficially similar looking grasshoppers S. americana, Thunberg and S. pallens occur in Jamaica as solitary species.

A specimen of those that we identified as S. gregaria has been sent to an insect taxonomist in the United States for positive confirmation. Other specimens are being sent to the Commonwealth Institute of Entomology, England, for positive identification.

The ten specimens originated from the parishes of St. Ann, St. Mary, Portland, Clarendon, St. Elizabeth and Manchester i.e. in the eastern, north eastern and mid portions of the island. They were sexually immature adults and were pinkish brown with fully expanded wings.

At present the population of desert locusts in Jamaica seems low and apparently poses no immediate threat to the agricultural sector.

The following strategy has been adopted to address the problem:

1. A locust coordinating committee has been formed in the Ministry with the Director of Research as coordinator
2. Conduct a detailed survey to determine the extent of distribution, population density and factors affecting the population
3. Request main agricultural commodities (Coconut Board, Coffee Board, Cocoa Board, Sugar Research, Banana Board, etc.); CARDI, Jamaica Agricultural Society, College of Agriculture, Extension Service and other agricultural institutions to assist with the survey
4. Alert the public to report promptly any large number of locusts seen. Such sites will be systematically searched
5. Display posters prominently in public places illustrating life size photographs of the locust along-side similar looking native grasshoppers
6. The committee reviews the information obtained and decides on what action to take

The survey is under-way and a search in Clarendon by technical staff from Plant Protection has yielded no locusts so far.

The first specimen was received on October 20, 1988, and the tenth on November 7, 1988.

WEATHER PATTERN

Hurricane Gilbert struck Jamaica September 12th, 1988. Following Gilbert, there were a number of tropical waves and depressions which brought high winds and rain. Rain has been falling fairly regularly all over the island since the hurricane.

During July, August, September of 1988, there were frequent weather disturbances moving off the African Coast and coming into the Caribbean.

The tropical disturbance from which Joan developed, came off the African Coast on October 5, 1988.

A French ship actually reported a swarm of these insects, while this ship was in the safe environs of Joan. However, while accepting that weather systems are responsible for the transport of these insects into the Caribbean, in my opinion, Joan cannot be said to be directly responsible for their transport into the region.

As a matter of fact, on October 9, 1988, another tropical disturbance moved off the African Coast. It took 6 days for the Atlantic crossing, a distance of about 3,000 miles. Fast moving indeed. Now, a low-level jet of 29 to 40 miles per hour was associated with this tropical wave and the wind speeds decelerated rapidly on reaching the Windward Islands, possibly allowing the locusts to drop down in that area.

This tropical wave grew to become the 18th tropical depression of the season at latitude 13.5N and longitude 72.5W. This system stayed well south of the island of Jamaica.

- locusts are migratory
- they can move at altitudes of up to 5-10,000 feet without physiological damage
- they develop the unique phenomenon when they come together in groups, of combining their thorax and abdomen into one major muscle which propels them forward
- FAO has confirmed their movement for distances of up to 2,000 miles

CONTROL MEASURES

The survey is not yet completed but the population is apparently very low so no control measures have been taken.

ACKNOWLEDGEMENT

Calvin R. Grey
National Meteorological Service

THE DESERT LOCUST SITUATION IN MONTSERRAT

by

✓
John Greer
Ministry of Agriculture
Montserrat

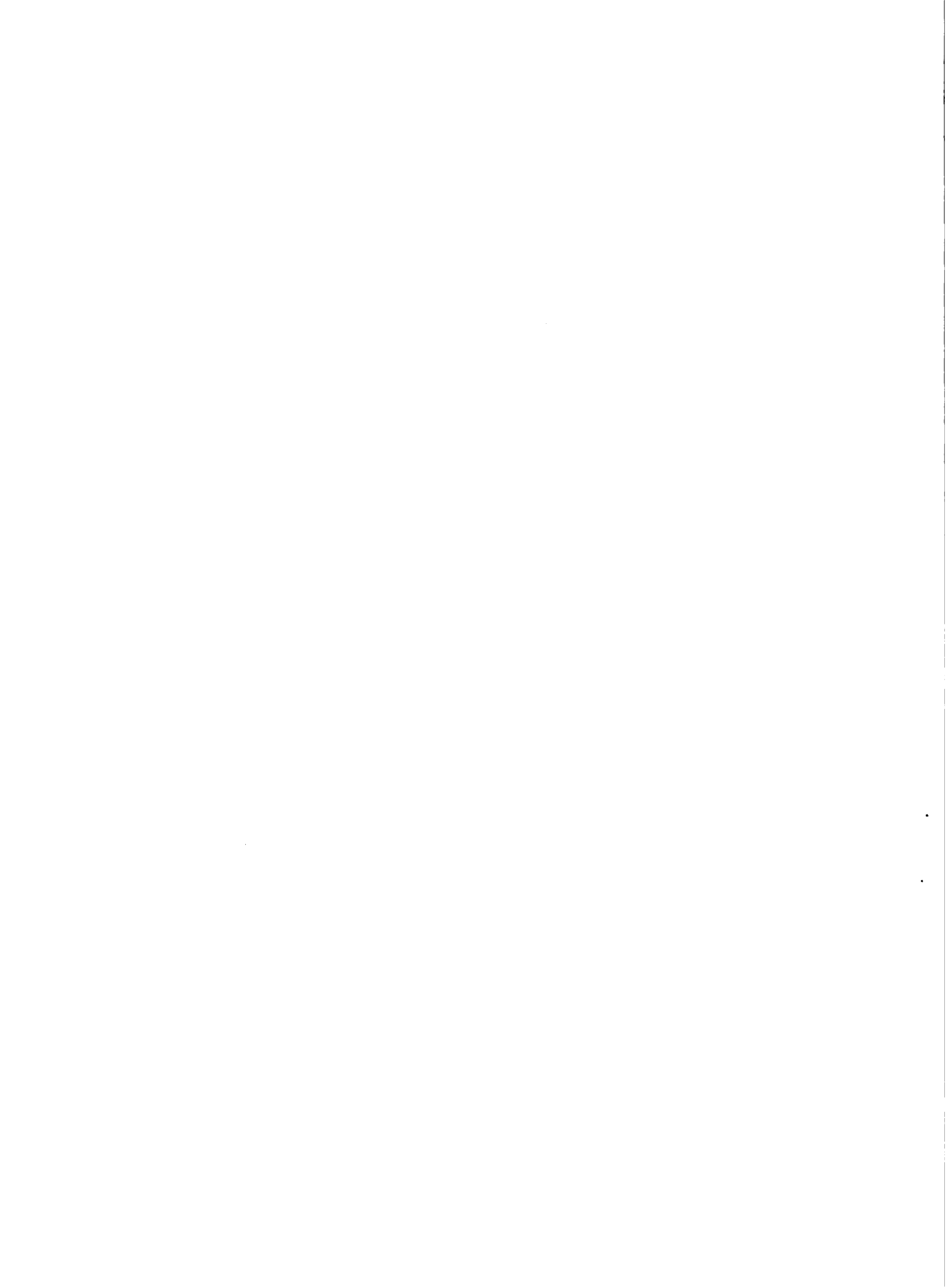
The locusts (later identified as Schistocerca gregaria) were first reported in Montserrat on October 15th, 1988.

Where the insects were seen in large numbers emergency spraying was done firstly with a pyrethroid insecticide (Karate). A high concentration was used and applied with a mist blower. Although the sound of the motor mobilized them, the upwind direction of spraying took the mists to the insects. There was a quick knockdown but the following morning only a few insects were found dead in the area sprayed. The others appeared to have survived and moved on.

As a result, an organochloride insecticide (Diazanon) was applied in another area. At this time, however, the insect numbers were lower and some were reportedly seen dead in areas where no spraying was carried out. No further action was taken.

There appeared to be a dramatic reduction in the population of locusts due to predators (birds, etc.) and at present they pose no immediate threat to agricultural production.

During the period the public was kept informed of developments as information became available.



THE DESERT LOCUST SITUATION IN ANTIGUA

by

**Peter Blanchette
Ministry of Agriculture
Antigua and Barbuda**

FIRST OBSERVED

Locusts were first observed about September 14th, 1988. They were seen on the north-east, east and south-eastern parts of Antigua, and then by September 21st wide-spread reports flooded the Plant Protection Office.

The Food and Agriculture Organization (FAO) was notified of the occurrence of the insect on the island.

The Ministry of Agriculture requested FAO to include Antigua and Barbuda in an investigation.

- a. A press release was issued jointly by the Ministry of Agriculture and CARDI on October 17th, 1988. The public was informed of the occurrence, and was asked to notify the Department of any sightings or of damage done to their crops.
- b. A Plant Protection Consultant was employed to do a survey from October 25th to October 30th, and to collect and mount specimens.

Scouting continued after the consultant's work was ended and spraying began on November 4th wherever locusts were found, using insecticides U.L.V. malathion and Decis. The effects of insecticide application have not been assessed. All locusts observed were pink; no yellow or sexually mature forms were seen.

FEEDING BEHAVIOUR

Presently on Guinea grass, egg plant and lime trees, where they strip both sides of the leaf leaving the mid-rib.

Predators: Flocks of egret and black birds have been observed hunting and eating these locusts. Large numbers have been found dead along the northern shores.

Feeding behaviour: Specimens are being observed daily, to determine what hours of the day they feed, in order to carry out spraying effectively.

THE DESERT LOCUST SITUATION IN DOMINICA

by

Charles Pierre
Division of Agriculture
Dominica

The swarms of locust - Schistocerca gregaria arrived on the eastern coast of the island between the 15th and 16th of October, 1988. Initial observations on the morning of the 16th revealed that they were settling along the beaches and roosting on nearby shrubs and trees. They then started moving inland and by the morning of the 17th had crossed the island and were reported on the western coast. By noon on that same day reports had established their presence island-wide.

An emergency meeting was held on the afternoon of the 17th and present were the Acting Minister of Agriculture, the Chief Agricultural Officer, the Officer in charge of Extension, plant protection personnel and the Orchard Crop Pest Management Advisor. This meeting, gave the necessary mandate and established the pace for all ensuing action.

The locusts that arrived were the pink sexually immature adults and the bright yellow mature adults. By Tuesday the 18th, reports indicated that there were five distinct swarms on the island. These were located at La Plaine, Oroudbay, Font Melle, St. Joseph and Picard (Tibay), with observed population densities of about 3-5/m², 10/m² and as many as 20/m².

Samples were quickly sent off to Overseas Development Natural Resources Institute (ODNRI), London, U.K. for identification. Meanwhile, local dissections revealed the absence of developed gonads.

The vast majority of invading locusts were females. Measurements of different body parts of the insects were done and the results are as shown in Table No. 1.

WEATHER PATTERN

The days preceding the arrival of the locusts saw the island affected by rains and winds of hurricane Joan. These adverse conditions subsided on Sunday, October 16th, the

weather remaining bright and calm for almost one week after the incursion.

INFESTATION SURVEYS

By October 18th a locust survey methodology had been developed to give estimates of the population density in different areas, the crops attacked, and the percent defoliation (slight <10%, moderate 10-50% and severe >70%). A copy of the survey form is attached.

The locusts did not exhibit a preference for any particular crop, although sporadic damage was reported on plantains, coconuts, bananas, white cedar, cinnamon and sweet potatoes. Generally no damage of economic significance was observed.

CONTROL MEASURES

By Thursday, October 20th, extension officers of the Division of Agriculture and the coconut rehabilitation project had been organised into ten different teams. Five of these were designated as observer teams while the other five were spraying teams. The observer teams, each comprising an agricultural instructor and an extension officer, had the responsibility to survey and monitor the locust, and to relay the information as quickly as possible to the main office of the Division of Agriculture. The spraying teams, comprising a supervisor and two spraymen (with mist blowers), would respond to the given information and apply treatment if necessary.

A total of approximately 4-5 acres were treated. Karate was the insecticide used. And although an initial knockdown effect was observed, there was no evidence to indicate that the treatment produced any significant reduction of the population.

Biological control due to predation by birds was observed. Among the species offering such control were:

- Nargaropo funcus - (Guive)
- Quixalus lugutris - (Chupit)
- Tyrannus dominiensis - (grey king bird)
- The voscobo, or black vulture

Domestic yard fowls also offered some measure of control.

FOLLOW UP SURVEY PLANNED

Continued monitoring is planned to determine whether or not the locusts will become established. Serious limitations, including manpower, equipment and training, have been identified.

POPULATION INCREASE AFTER FIRST INCURSION

There has been no observed population increase after the incursion of October 15th - 16th, and local climatic conditions along with bird predation, and possible migration of swarms, keeps the population steadily declining. By Monday, October 24th there were no more large swarms on the island, although scattered individuals could be found in different areas.



TABLE I.

**Mean Measurement (mm) of the length of different
body parts of the locust - Schistocerca gregaria**
20 specimens were used

Head and body	-	58.3mm
Abdomen	-	37.7mm
Wing span	-	133.7mm
Wing femur	-	27.5mm
Wing tibia	-	25.2
Hind leg	-	61.2mm
Width of head	-	7.2mm
Length of antennae	-	17.1mm
*E/F ratio	-	2.3mm

* Where E = length of elytra

F = length of hind femur

LOCUST SURVEY

1. LOCATION (As accurately as possible for mapping)

2. DATE: _____ 3. TIME BEGUN: _____

4. LOCUSTS PRESENT (✓)? YES NO

5. a. GRASSLAND AND LOW BUSH

Walk for 50m (65 easy paces) in a straight line
Count No. of locusts flushed into flight by your feet

No. of locusts

b. FIELD CROPS

Walk for 50m (65 easy paces), arms out, hands down
Count all locusts under arms or no. of paces for 100 locusts
Estimate defoliation; slight = < 10%, moderate = 10 - 50%, severe = > 50%

	Crop	No. of locusts/ OR		Defoliation ()		
		50m	No. of paces/ 100 locusts	light	mod.	sev
1.						
2.						
3.						

c. TREE CROPS, BANANAS, FOREST

Check 10 trees in 2 rows of 5 at right angles
Count No. of locusts per tree and record
Estimate defoliation as above for all trees together

	Crop	1	2	3	4	5	6	7	8	9	10	Defoliation
1.												
2.												
3.												
4.												

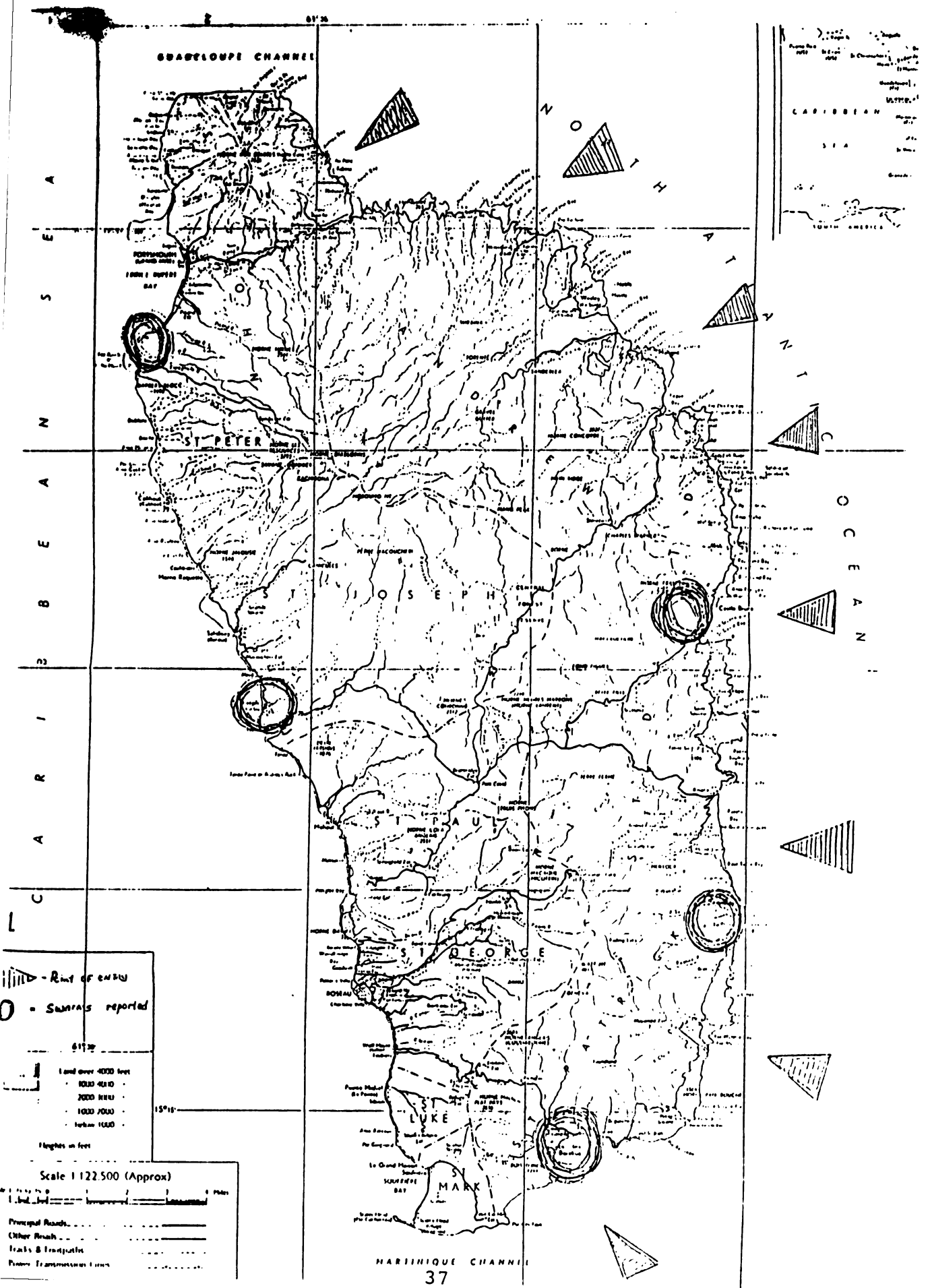
6. NUMBER OF LOCUSTS FLYING DURING VISIT: _____

7. TIME ENDED: _____

8. COMMENTS: _____

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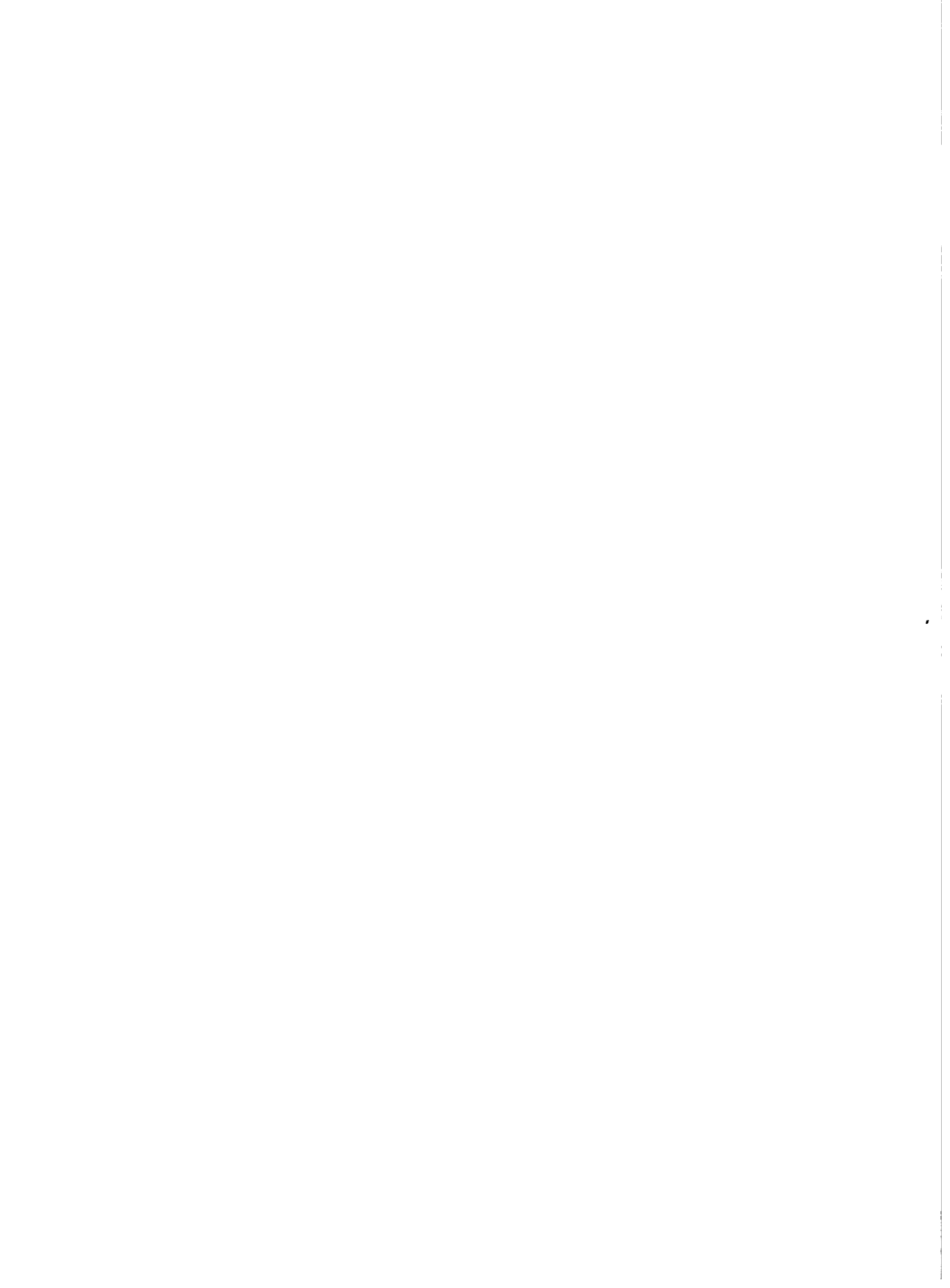
LOCUST DISTRIBUTION



- Limit of survey
 - Surveys reported

61720
 Land over 4000 feet
 1000 4000
 2000 1000
 1000 2000
 below 1000

Heights in feet
 Scale 1:22,500 (Approx)
 Principal Roads
 Other Roads
 Tracks & Footpaths
 Power Transmission Lines



THE DESERT LOCUST SITUATION IN GRENADA

by

**Dale Francis-Ellis
Ministry of Agriculture
Grenada**

Immediately after reports of a locust incursion reached the Ministry of Agriculture, a Locust Technical Committee was established to deal with the situation. This committee was comprised of:

- | | | |
|-------------------------|---|---|
| Dr. Cyril Dominique | - | Chief Technical Officer,
Ministry of Agriculture
(MOA) - Chairperson and
an Entomologist |
| Mr. Alphonsus Antoine | - | Head of Planning Unit,
MOA |
| Mr. Terrence Beddoe | - | FAO (Agronomist) |
| Mr. Kenneth Buckmire | - | CARDI (Entomologist) |
| Mr. Orgias Campbell | - | Chief Extension Officer,
MOA |
| Mrs. Dale Francis-Ellis | - | Pest Management Officer,
MOA |
| Mrs. Denise Peters | - | Head of Information
Division, MOA |

The functions of the committee were to co-ordinate, monitor and implement all aspects of our response to the locust infestation.

For the first two weeks, daily meetings were held from 3.00 - 5.30 p.m., later reduced to three times weekly. Press releases were issued after each meeting.

A secretariat was set up with Mrs. Dale Francis-Ellis as co-ordinator and the Pest Management Unit providing work space and a telephone operator.

INITIAL INFESTATION

The first locust sightings were along the northern, eastern and south-eastern coast of the country and in Carriacou and Petit Martinique on October 17th. Hundreds of locusts were observed in flight around the coastal areas, while hundreds were found dead on the beaches.

A few days later locusts were noticed inland. Groups of 5 - 10 were dispersing throughout the country.

Locusts were reportedly very active and very difficult to catch. They were all immature adults, pink in colour with a grey pattern on the wings. Most were females.

Surveys carried out by the extension staff and officers of the Pest Management Unit showed that the population was declining and that birds were preying on the pests.

METHODS FOR ASSESSING INFESTATION

Officers of the Extension Service, M.O.A., the Pest Management Unit, the Cocoa Rehabilitation Project, the Productive Farmers Union, the Grenada Banana Co-operative Society and the Grenada Cocoa Association were distributed throughout the country. Each officer was provided with a recording sheet (Annex). A member of the Pest Management Unit was assigned to collect the data sheets and bring them into the central office at St. George's.

In Carriacou and Petit Martinique twenty four persons were mobilised under a senior member of the Pest Management Unit, the Deputy Chief Extension Officer, and the Agricultural Officer for Carriacou. An exercise similar to that in Grenada was undertaken.

The small islands off Grenada from north to south were visited by a team comprising the FAO officer in Grenada, two members of the Pest Management Unit and members of the Grenada Coast Guard. Investigations were undertaken similar to above.

Incoming data was recorded on maps indicating the areas and dates of sightings.

RE-INFESTATION

A second influx of locusts, smaller in number than the first, was reported on November 2nd, again along the north-eastern and south-eastern coasts and in Carriacou and Petit Martinique. These insects were more active but also pink in colour indicating immature adults. Samples showed a rough ratio of one male to 20-25 females. This second batch was widely distributed throughout the country, including areas further away from the coast such as Grand Etang Forest. Larger numbers were also sighted along the coastal areas. A notable difference from the first flush of locusts was the much reduced number of dead insects found on the coastal sands.

CONTROL MEASURES

All control measures taken so far have been manual. A public awareness campaign is calling on every Grenadian citizen to eliminate any locusts found, using nets, home made brooms, or whatever means possible. The public awareness campaign includes:

- (i) Fact Sheet for field officers and schools prepared by Mr. K. Buckmire
- (ii) Placement of specimens in eighty two schools, twelve banks and forty public areas
- (iii) Placement of posters in public places
- (iv) The use of the radio, television and newspaper

Trial fogging exercises were conducted using malathion 7% and 21% in highly infested pockets along the sea coast. Live locusts placed in nets were used for bioassay checks. These tests were to verify the methodology and insecticide in the event chemical application was necessary, particularly for Carriacou and Petit Martinique. The exercise proved to be unsuccessful.

FOLLOW-UP SURVEYS

Surveys would be routinely carried out in the field in order to:

1. Determine population level and distribution pattern
2. Observe if reproductive activities occur
3. Observe if any "hoppers" are present
4. Observe any damage and type of crops on which feeding occurs
5. Manual eradication
6. Observe and identify predators

OTHER ACTIVITIES

1. Mr. Buckmire and members of the Pest Management Unit continue to hold live insects, feeding them on corn leaves and other planting materials to observe colour changes.
2. Weekly visits to areas where large numbers (up to 100) were observed. Sweeping would be done to check on any life history trends.

After the first incursion the population declined considerably. It then increased after the second infestation.

Notes on how to identify and collect the locust in Grenada

by

K.B. Buckmire
Entomological Toxicologist, CARDI

Locusts are serious pest in Africa and India. They eat green foliage. Swarm damage usually results in complete defoliation of the vegetation.

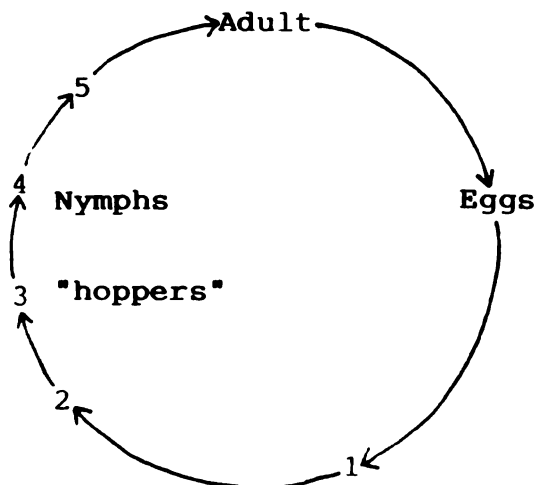
Description

Locusts belong to the same group of insects as our crickets and grasshoppers. The adults are about two to four inches long with the wings grey, brown, pink to bright yellow. The immature adult is of a distinct pink colouration. Wings are mottled with small dark brown markings. Most of those so far seen in Grenada are pinkish in colour.

Life History

Eggs are laid in a hole in the ground made by the female. The eggs are embedded in a tubular sheath known as an egg-pod. Each egg-pod contains 70-100 eggs and each female may lay four to five pods of eggs during her life time. Egg development takes two or more weeks. The larva that emerges from an egg moults almost immediately to form the first hopper. Over a period of several weeks the hoppers develop through five instars. These nymphs, as they are called, can be distinguished by the differences in colour.

Summary of Life History: Incomplete Metamorphosis



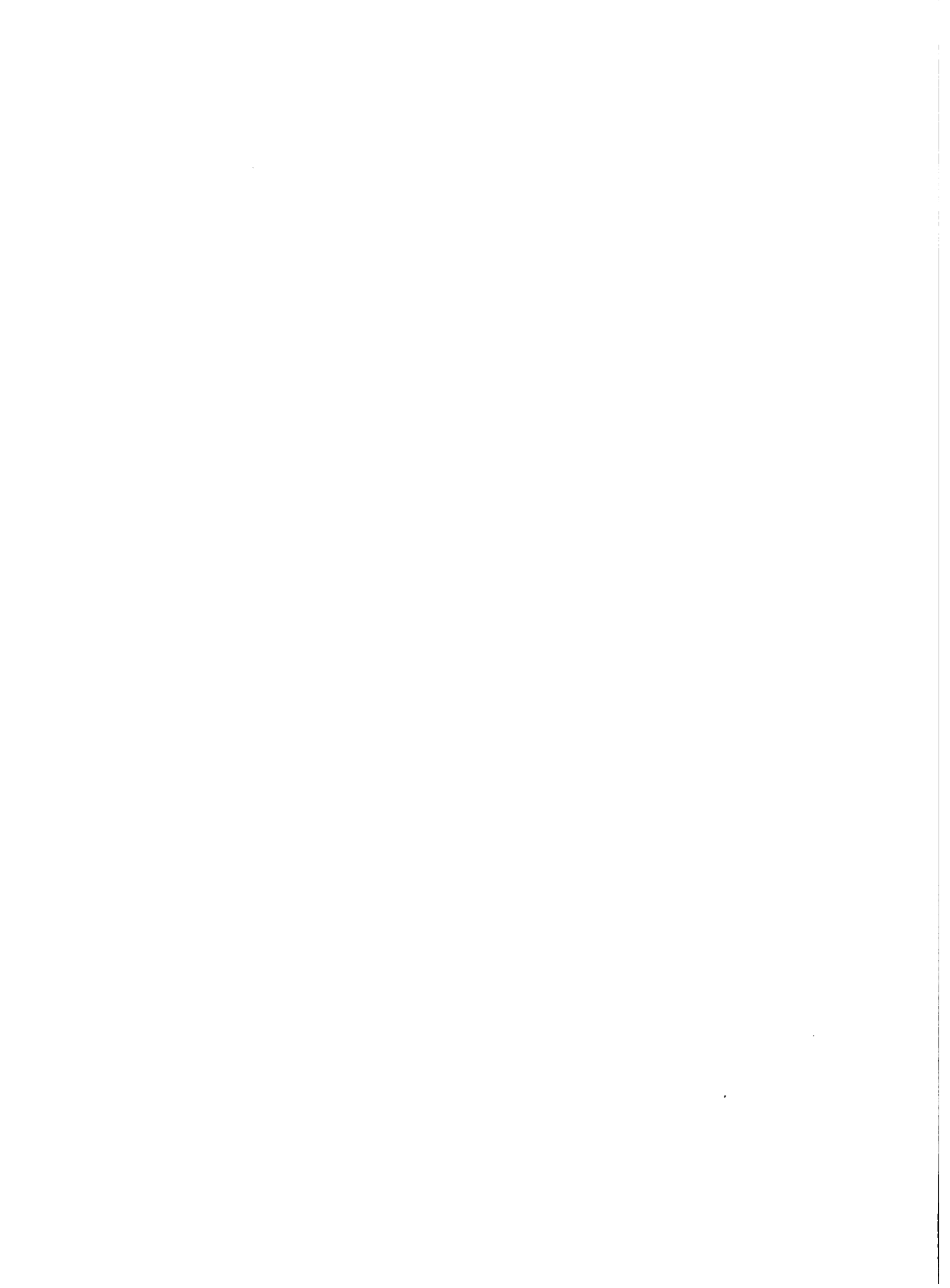
Damage

Leaves and soft shoots are eaten from the margins inward leaving irregularly shaped feeding areas. Swarm damage usually results in the complete defoliation of plants.

Collection

The insects can be caught in nets, by beating with broom (plants and others). The live insects caught can be put in a plastic bag or bottle with a leaf of the plant on which they are found.

Dead insects are best stored in a jar or container containing 75% rum, methylated spirits or alcohol. The collected insects should be passed on to any Agricultural Officer or office.



THE DESERT LOCUST SITUATION IN ST. LUCIA

by

Guy Mathurin
Ministry of Agriculture
Castries, St. Lucia

The desert locust Schistocerca gregaria was first reported in St. Lucia on the weekend preceding October 17th 1988. It is believed that they were associated with tropical storm Joan. They were reported along the whole eastern coast.

At the Ministry of Agriculture, an emergency meeting was called that morning to:

- a. formulate plans to assess and monitor the locust situation and
- b. devise measures to counter the locust threat if any

Present at the meeting were representatives from the Inter-American Institute for Cooperation on Agriculture, Caribbean Agricultural Research and Development Institute, Windward Island Banana Research Scheme, St. Lucia Banana Growers' Association (SLBGA) and the Ministry of Agriculture (MOA).

It was decided that a telephone "hotline" be immediately established and that the public be informed so that any sightings of locusts could be reported to the Ministry. In that way a rapid and rough determination of the extent of the distribution of the locusts could be made. The decision was also taken to alert the regional office of the FAO and to request any information available. Specimens were sent to the USDA for identification of the species which was suspected to be the desert locust.

On October 18th, another meeting was held to determine the course of action to be taken following the receipts of reports by telephone. Reports had been received from all over

the island. Spray teams were sent out immediately to areas from where large numbers were reported. It was also decided to go out and verify these reports. Farmers seeing locusts on their crops were advised to spray those crops immediately with insecticide.

By Friday October 21st, there were so many reports of locust sightings that it was decided that an emergency survey be carried out by the Extension Officers of the MOA with the assistance of the SLBGA. These officers were called to a meeting on Sunday, October 23rd to explain the situation, to inform them of the survey procedure, and to deploy them. They were to move along all roads island-wide, stop every half-mile and walk through the vegetation in a random zigzag pattern for 200 yards.

This survey was carried out by eighty-four personnel for two days (October 24 - 25th). Survey results indicated that not too many locusts were observed by the officers, and more than 1-10 were observed in any one walk only in three locations. In most instances, locusts were not seen. At that time, only minor feeding was observed on cultivated crops.

On Friday, October 28th a sudden rise in the population of locusts was observed, especially on eastern coastal grassy areas along the whole island. By that time information had been received confirming that the insect was indeed S. gregaria. It was suspected that this sudden rise in the number of locusts was due to new arrivals. The Locust Committee decided to immediately send spray teams to all of the infested areas in an effort to stop the insects from moving inland and from maturing. To this end, six spray teams were sent to fifteen locations. The chemicals used were karate and malathion.

On Monday November 7th, a super tanker arriving outside St. Lucian waters reported having encountered a swarm of locusts 900 miles southeast of St. Lucia in the Atlantic Ocean on Saturday, November 5th. The Captain reported that the swarm was so thick that the whole deck was covered in pink. He also told us that the swarm took off from his vessel on Sunday, November 6th at about 1.00 p.m., headed in the direction of the Orinocco region. Because there were still a number of locusts on deck, the tanker was asked to remain in international waters until an inspection and spraying exercise was carried out by the Plant Protection Unit with the assistance of a pest control company. About four sexually mature locusts were found on the vessel. After the spraying, the tanker was cleared for entry into St. Lucian waters.

On Thursday, November 10th, the Locust Committee met to assess the situation. With reports of the arrival of new swarms in Trinidad on November 9th, and Barbados on November 10th, and the possibility of the same thing happening in St. Lucia, it was decided that a locust unit be formed. This locust unit is to include the six spray teams already mentioned, in addition to four officers who would monitor the eastern coastal areas for new arrivals as well as any signs of mating and multiplication. This unit will be active for three months in the first instance.

**THE DESERT LOCUST SITUATION IN
ST. VINCENT AND THE GRENADINES**

by

**Philmore Isaacs
Plant Protection Officer
Ministry of Agriculture
St. Vincent and the Grenadines**

BACKGROUND

By Sunday October 16th, 1988 a survey by the Plant Protection Unit (PPU) confirmed that an exotic insect had invaded the eastern and south-western coastal areas of St. Vincent and the Grenadines in large numbers. This followed reports of sightings by the public on the afternoon of Saturday October 15th.

During an emergency meeting at the Ministry of Agriculture on Monday, October 18th, it was reported that the Grenadine islands and some of our sister territories in CARICOM had suffered a similar experience. The distribution was patchy. A few areas had relatively high populations, others had just a few insects.

The plan of action drawn up at this emergency meeting involved the PPU, the Extension Services, the Forestry Division and some private organisations. It was agreed that:

- (i) The Extension Officers be mobilized to participate in eradication and monitoring of the pest.
- (ii) Daily reports be submitted by team leaders on the movement, behaviour and control of the locusts.
- (iii) The Plant Protection Unit Head co-ordinate all activities in the campaign.
- (iv) Diazinon be used to control the locusts.

- (v) The Forestry radio communication system be used to co-ordinate field activities.
- (vi) FAO be alerted and Public awareness mounted. The island was divided into regions and supervisors of these regions were to co-ordinate spraying operations.

BEHAVIOUR OF INSECTS

The first few days after the arrival of the locusts were rainy. This and the long journey resulted in the locusts just resting on the plants. Few observations of feeding were reported, but as the weather warmed up, more feeding was observed on maize, coconut fronds, sorrel, papaya, pigeon peas and citrus. Wild plants such as Gliricidia sepium and white cedar were also attacked. However, the damage was well below economic levels.

CONTROL

By the afternoon of Wednesday October 19th, it was evident that the population was dropping dramatically. Natural mortality, predation by black birds, cattle egrets and other birds and chemical treatments combined to reduce the number of locusts. By the afternoon of Thursday October 20th, the instruction was given to halt the spraying except where sufficiently large numbers were seen. This was rare. Over the following weekend, Forestry guards surveyed the interior forested regions. Sightings of a few locusts were reported in some areas.

PRESENT STATUS

The locusts have virtually vanished and the few that are now occasionally seen are being monitored by the PPU. Several specimens are kept in the laboratory, being fed on maize leaves, pigeon peas, Gliricidia sepium. The objective is to observe any change in colour, mating habit, ovipositing, etc. St. Vincent and the Grenadines has not had any subsequent invasion to date.

THE DESERT LOCUST SITUATION IN ST. KITTS-NEVIS

by

Jerome C. Thomas
Ministry of Agriculture
St. Kitts-Nevis

St. Kitts and Nevis are two relatively small islands separated at the closest points by three kilometres of sea. Sightings of the desert locust (Schistocerca gregaria F.) were first reported on October 16, 1988. Scores of locusts were initially seen on the north-eastern Atlantic coasts of both islands. During the following few days, hundreds were seen on the beaches and many were dead or lethargic.

The insects were generally pink, suggesting that they were sexually immature. Discussions with farmers indicate that the locust might have been seen as early as October 13, up to five kilometres inland.

MONITORING

Following these initial observations, the public was informed on October 18th and requested to report sightings. Many reports were made island-wide, with the majority from the north-eastern portions of the islands.

On November 1st, 1988, a recent survey was conducted in the relatively uninhabited south-east peninsula which is approximately ten kilometres long. Locusts were observed in a number of areas, but the population was generally low. An exception was along a road of approximately 300 metres in length, where an estimated population density of three per square metre was seen close to a large salt pond.

RESULTS

Survey results indicate that the population has fallen significantly. Frequently, two or three days after reported sightings, very few have been found. Fewer sightings of small numbers are now being reported. An exception is the small area on the south-east peninsula. This is relatively dry, sandy and saline.

With one exception, there have been no reports of crop damage. No control measures have been undertaken as these have not been considered necessary. However, monitoring is continuing and the population appears to be declining. Cattle egrets have been observed to be one of the natural predators.

THE DESERT LOCUST SITUATION IN SURINAME

by

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To date there have been two invasions. The first on October 14th and the second on November 8th, 1988. The second invasion seemed to have a higher number of locust per swarm.

Observations to date indicate a higher number of pink and sexually immature adults and that about 85% were females.

The first invasion was focussed in the central and eastern region while the second was a broader east-west invasion.

Whether the population was reduced by coastal birds or whether the swarms moved on to the tropical rain forest remains to be determined. Based on a life cycle of 2.5 - 5 months it seems that evaluation of such has to be postponed unless crop damaged will be reported.

What is clear is that the damage first anticipated has not occurred; a little damage of agricultural crops was reported after the second invasion.

At this stage with information from FAO and IICA, and advice at hand, the proposed barrier spraying and spraying into the flying swarms has not been considered. A minimum of chemicals, apart from dieldrin and endrin, is in stock for emergency use.

FAO's support is expected and signals have been given to the regional office for emergency capacity building.

Personnel of the Fisheries and Forestry Divisions working at the coast have been asked to alert the Ministry of Agriculture should there be any further sightings.

From the meteorological data of one weather station in Paramaribo, the following patterns can be sketched over the period of October 12th until November 12th, 1988.

In total 65.1 mm of rainfall was recorded. This is close to a typical average of the driest month October.

During this period there was no wind velocity except on October 27th and 30th and no clouds except for October 17th and November 9th last.

The conclusion can be drawn that most probably the invasion was not supported by clouds and wind velocity and that the rainfall was not excessive compared to the long term average of 50 mm.

A follow-up survey that could be carried out is the number or ratio of sexual mature and sexually immature locusts (pink/yellow ratio) and, as already done, the male/female ratio of any subsequent invasions.

Unless there is reason to believe that Suriname, with its tropical rain forest climate, might be a breeding site for locusts, barrier spraying etc. will not be planned. This policy might be changed should substantial damage be reported. The environmental effects should be then considered.

The most logical action at this time would be to maintain a vigilance for the possible emergence of a hopper population, through the training of personnel and other measures.

THE DESERT LOCUST SITUATION IN TRINIDAD AND TOBAGO

by

Lilory McComie

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INTRODUCTION

Locust migrations have been reported from time immemorial. Records indicate that from time to time since the middle of the last century locusts have invaded Trinidad (3, 11) from the South American mainland. None of these invading insects managed to become established to pose a threat to agriculture in the Country. Recently three separate waves of locusts entered the country. Between October 9th and November 5th there were influxes of insects along the coastlines. It is well established that the insects were borne from West Africa (pers, comm., FAO Consultant) on unusually strong winds emanating from the west African coast and moving directly to the eastern Caribbean. (personal communication - Trinidad & Tobago Meteorology Department). These invading locusts were identified as the desert locust Schistocerca gregaria (Forsk.) (Orthoptera Acrididae Cyrtacanthacridinae). The desert locust is one of the World's oldest and worst pests which is notorious for voracious feeding. It is a polyphagous insect with a wide host range of wild and cultivated plants. There is a strong preference for gramineous crops such as sugar cane and cereals. (1,9).

DATA COLLECTION

Information was collected by our Ministry's Head Office at St. Clair; the Research Division, Centeno, and the County Extension Offices. Much information was collected in response to an appeal by the Ministry for the public to report sightings of these insects. Samples were also brought into the Ministry at the county level, Research Division and Head Office. A data collection format was devised, to reduce the risk of unreliable reporting. The following information was tabulated at the time of data collection.

- Date of report
- Name and address of informant

- Date of sightings/numbers of insects
- Location of insects
- Description of insect: colour, size, adults
- Number of insects/unit area
- Behaviour of insects: feeding, plant damage, whether alive or dead, diurnal activity, etc.

The FAO - G.E.R.D.A.T. - P.R.I.F.A.S. Factsheet (2) was used as a guide for our field investigations.

Field surveys and investigations of reports of over twenty insects were conducted by the Entomologist and assistants with prior training in grasshopper survey methods. For quick field assessment, imaginary line transects, visual estimates and quadrat sampling were used. Field interviews were also done. Tentative identification was done from experience and descriptions in the literature (9). Insects were dissected to determine the level of sexual maturity.

RESULTS AND DISCUSSION

The colour, morphometrics and degree of sexual development fitted the description of the pink immature adult of the gregarious phase of Schistocerca gregaria. This identification has now been confirmed. (P. Symmons, FAO Consultant, Personal Communication).

Reports filtered into the Ministry for two days prior to the mass influx of swarms and declined 3 - 4 days after. In Trinidad the earliest confirmed sightings of these insects were from AMOCO's offshore drilling platform 48 km south east of Trinidad. A swarm was seen towards land on October 12th, 1988. Informers along the south east coast beaches claimed that insects had reached Trinidad around that time. Fishermen reported seeing "thousands" of dead insects floating at sea. There were other mass invasions from October 15th - 17th and November 3rd - 5th, 1988. From reports of population densities and from observations along the coastline, it is certain that the coastal areas were the first to be invaded.

Insects in the first two invasions arrived on very unfavourable weather mainly along east, north east and south east coast beaches (Fig. a and Table 1). Many of them died

before they were able to recover from exhaustion after crossing the Atlantic. Quadrat samples on October 20th, yielded cadavers of 2-12 insects/m² in a line transect along east coast beaches. These were found among debris on the upper shoreline in an advanced state of decomposition. Most inland reports gave sporadic sightings of low density populations of 1-5 insects. The third influx of insects came in mainly along the south and south west coast under very favourable conditions. Fig. b and Table 2. This permitted quick dispersal of more vigorous insects. The rapid movement inland to mainly urban and residential areas caused some alarm among people. A swarm of over 12,000 insects was reliably reported from Quinam.

Similar numbers were reported from Gulf City/La Romain, Brickfield/Waterloo. Large numbers of dead insects (12 insects/m²) were also washed up on the beaches at Mayaro, and Guayaguayare.

An overwhelmingly large number of females were encountered in the first two influxes in a ratio of about twenty females to one male. The female to male ratio in the third wave was four to one. Two unexpected specimens were collected: they seemed to be intermediate between the solitarious and gregarious phase.

BEHAVIOUR

Many reports described the insects as being tired or lethargic. Large swarms of approximately 12,000 insects were observed flying at 60m from Midday on October 4th, 1988. These swarms seemed to split up as they moved inland. Some stragglers were left behind. Once settled they took to low flight over short distances at the slightest disturbance. The reporting entomologist observed a swarm of 3,000 insects early on November 5th, 1988.

7.45 - 8.45 hrs - Insects which had settled and roosted overnight were becoming increasingly active. Many basked in the sun and took to low flight to resettle shortly afterwards. Four hundred insects were resting and feeding slightly on a single coconut tree.

12.00 hrs - Insects had left the area. There was no evidence of further feeding. Directional movement of insects could not be verified.

Large swarms of insects seem to "disappear" after 2 - 3 days.

FEEDING

Slight feeding was observed on citrus, papaya and coconut. Reports of feeding on patchoi, dasheen leaves, banana and corn have not been verified. The insects showed a preference for palms. Most feeding was observed on coconut fronds. Only about 1% damage was found on nine trees in a field containing about 3,000 locusts. Thus feeding did not reflect the numbers of insects which were present in this field. This level of damage is economically insignificant. Caged insects fed slightly on foliage offered to them but died after 3 - 4 days.

PREDATION ON S. GREGARIA

S. gregaria was reported preyed upon by kiskadees, egrets and blackbirds (mel corbeaux). The situation was very similar in Tobago as confirmed by field visits to the island and discussions with staff at the Agriculture Department, Tobago.

It was decided that emergency monitoring and control should be handled at the county level through the newly created Regional Offices North and South, should it be necessary. Two regional co-ordinators were appointed and selected county extension officers trained as part of a contingency plan.

CONCLUSIONS, RECOMMENDATIONS

1. Many of the insects which arrived in the country are already dead. Most seemed to have died on the beaches and environs. Those which survived might be losing their gregarious habit and existing sporadically throughout the country in low density populations.
2. Crop damage has been minimal so far and cannot be considered as economically significant.

3. Of greater concern is the possibility of the insects becoming established to plague the country later on. This is unlikely given the history of past invasions of other locust spp., geographic, climatic and ecological factors. The situation should, however, be monitored.
4. Field surveys in an emergency situation as was experienced recently could be guided by reports of sightings from all sources. A long term survey/monitoring programme should be well planned and structured to encompass findings of the recent experience and documentation on the Desert Locust. This would be detailed elsewhere.
5. A control programme should be centrally organised and administered. Control and other field operations would be best handled at the county level, to facilitate quick decision-making and fast follow up action, since the field situation changes rapidly and constantly. Mechanisms for this approach are currently being put in place as part of a contingency plan. A good communication system should be in place for such an operation to be successful. Effective control could be carried out early morning or late evening when insects have settled.
6. Ground spraying with mist-blowers and airblast sprayers seems most appropriate (4,5,6,7) given prevailing field conditions which include dense vegetation and widespread inundation. Aerial spraying should be considered only as a last resort even if it is the most effective method of tackling swarms in flight. Recent reports from mainly urban and residential areas make this difficult. The swarm would have moved on by the time reports are received, logistics worked out and the necessary precautions taken.
7. At a national level selection of insecticide for locust control should be based on Toxicology; availability of suitable formulations and equipment, costs and contraindications. FAO gives an excellent selection guide (8). Given that the preferred insecticides propoxur and fenitrothion were unavailable, the synthetic pyrethroid fenvalerate was recommended.
8. Farmers and other members of the public were advised to control insects either chemically or mechanically with whatever insecticides or equipment were available to them

9. An education campaign has already been initiated through training of Extension Officers, media and press releases. Trinidadians, particularly those of south-east Trinidad are familiar with locusts in the country. The current problem, and previous outbreaks of Coscineuta virens (Thung.) and with Tropidacris sp. in the recent past have been given wide exposure in the media.

TABLE 1**Distribution of Locusts Throughout Trinidad and Tobago****19/10/88 - 24/10/88**

Location	No. of Report and Average No. of Locusts seen per Report				Total No. Reports
	1-5	6-20	>20	>100	
Mayaro				10	10
Manzanilla				8	8
Guyaguayare				6	6
Toco				8	8
Matura				2	2
Matelot				2	2
Valencia			1		1
Ecclesville				2	2
San Fernando	5				5
Chaguanas	1				1
Chaguaramas	7			2	9
West Moorings	5			1	6
Diego Martin	4	1			6
Wallerfield	3		1		3
San Juan	1				1
Barataria	1				1
Port-of-Spain	13				13
Wharf	4				4
Tobago	2			1	3
Guaracara	1				1
Macoya	1				1
Freeport	1				1
Nariva	No info.				1
Bonne Aventure		1		1	2
Talparo	1				1
				TOTAL	98

TABLE 1 (CONT'D)

Distribution of Locusts Throughout Trinidad and Tobago

1/11/88 - 8/11/88

Location	No. of Report and Average No. of Locusts seen per Report				Total No. Reports
	1-5	6-20	>20	>100	
Waterloo	1				1
San Francique	No info.				1
Hindustan	No info.				
Welcome	1				1
Tumpuna Road	1				1
Carlsen Field	2				2
Tortuga	No info.				1
Gran Couva	1				1
Preysal	1				1
Point Lisas	1				1
Paramin	2	1			3
Heights of Guanapo				1	1
Granville	1				1
Cocorite	1				1
Glencoe	1				1
Rio Claro	No info.				5
Bayshore	1				1
Goodwood Park	1				1
La Pastora	No info.				1
Pt. Galeota				1	3
Penal	1				1
Fishing Pond				1	1
Constrat Island		1			1
Balandra			1	1	2
Erin				1	1
Quinam				1	1
Blanchisseuse				1	1
					TOTAL 135

TABLE 2**Distribution of Locusts Throughout Trinidad and Tobago****1/11/88 - 8/11/88**

Location	No. of Reports and Average No. of Locusts seen per Reports				Total No. Reports
	1-5	6-20	>20	>100	
Diego Martin	1	1			2
Manzanilla		1		1	1
Guayaguayare				5	5
Mayaro	1			4	1
Ecclesville	No info.				2
San Fernando				1	1
Chaguaramas		1			1
Tobago	1	1			2
Bristol Village			2	2	4
Piparo			2		2
Moruga		1			2
Point Fortin	4			1	5
La Brea				1	1
Freeport				1	1
Poole					1
Arima		1			1
New Grant (La Gloria)				1	1
Debe				1	1
San Francique				2	1
Rio Claro				1	1
Penal	1		2	4	7
Erin/Buenos Ayres	1		1	2	4
Quinam			1	2	3
Blanchisseuse				1	1
Chin Chin Rd			1	1	1
Princes Town	1				1
Cedros				2	2
Icacas & Offshore				2	2
La Romain Gulf City				3	3
Morne Diablo				1	1
Brickfield				2	1
Waterloo			1	2	1
Toco	1				1
				TOTAL	67

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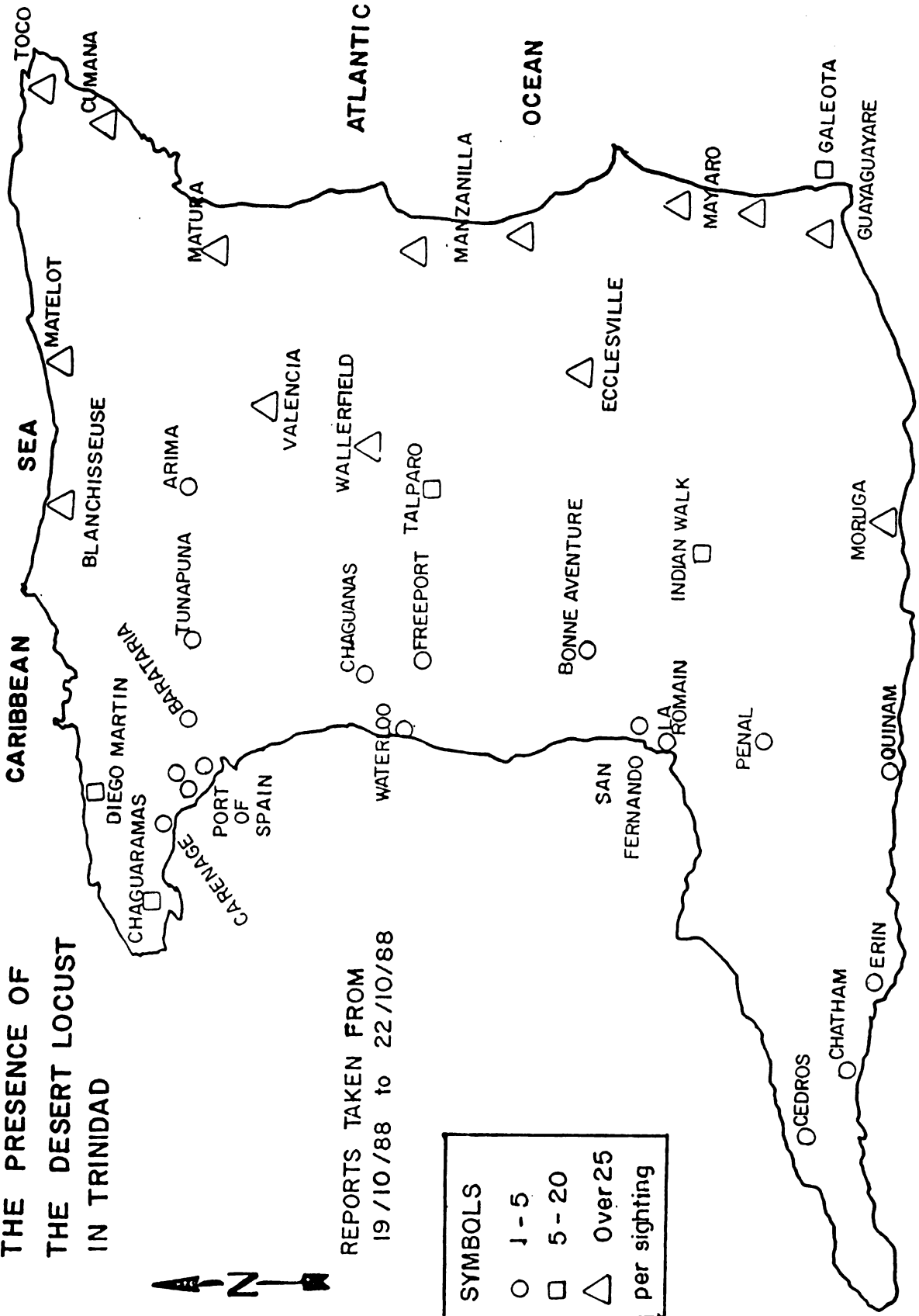
I would also thank FAO for training in methods for locust survey and control.

**THE PRESENCE OF
THE DESERT LOCUST
IN TRINIDAD**

**REPORTS TAKEN FROM
19/10/88 to 22/10/88**



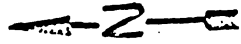
SYMBOLS	
○	1 - 5
□	5 - 20
△	Over 25 per sighting



COLUMBUS CHANNEL

Fig a.

THE PRESENCE OF THE DESERT LOCUST IN TRINIDAD



REPORTS TAKEN FROM
1/11/88 to 8/11/88.

SYMBOLS per sighting	
○	1 - 5
□	5 - 20
△	Over 25

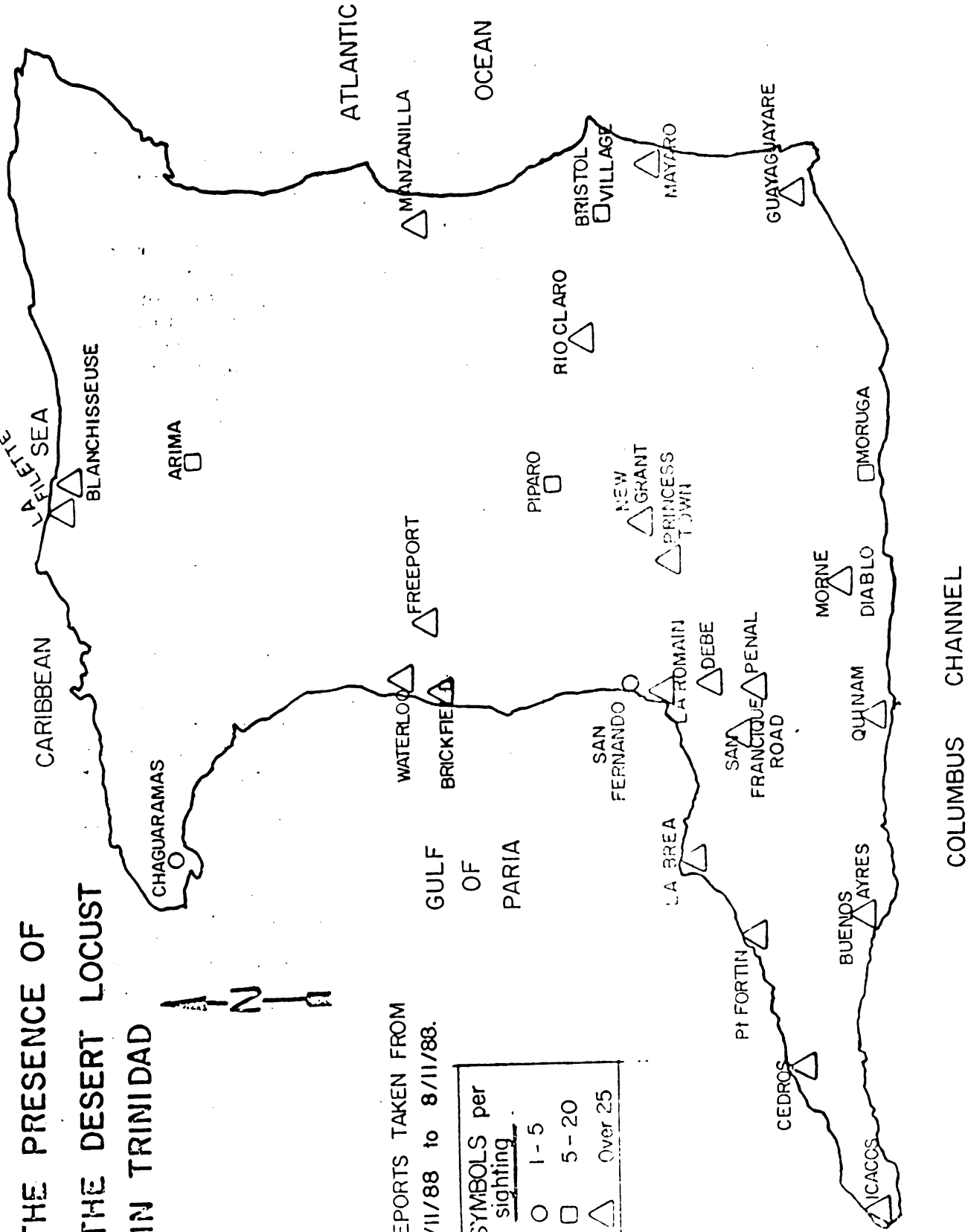


Fig b

RECOMMENDATIONS

Following are the recommendations made by Plant Protection Officers from 13 Caribbean countries at a Regional Meeting on desert locusts.

1. The Food and Agriculture Organisation (FAO) of the United Nations should continue to monitor the current locust situation in the region and should issue regular reports to each country. They should also assemble and distribute meteorological data from regional and international sources and should monitor the movement of west African locust swarms and weather conditions during plagues in order to predict possible future incursions of Schistocerca gregaria into the Caribbean.
2. An expert committee should be formed to develop and standardize locust survey methods for the region.
3. A training course is required for regional plant protection personnel to cover all aspects of locust surveillance and control.
4. A regional approach is required to foreign disease and pest management. Thus a "Regional Task Force" comprising the international and regional organisations involved with plant protection in the region, should be formed and mandated to deal with emergency pest outbreaks and pest movement within the region. It is proposed that the FAO be the convenor of the group and that the networking mechanisms of the Caribbean Agricultural Research and Development Institute (CARDI), the Inter-American Institute for Cooperation on Agriculture (IICA), the University of the West Indies and others be used for coordinating and carrying out its activities. It is further proposed that Trinidad and Tobago be the "Headquarters" since the head offices of several regional institutions are located here. The Task Force should be able to coopt other organisations, Ministries of Agriculture and individuals both regional and international for assistance and expertise.

5. **These recommendations and the report of this workshop should be submitted to the Secretariat of the Caribbean Community (CARICOM) and to Ministers responsible for Agriculture in each country, both to illustrate the effective action taken at the national and regional levels and to solicit their support for the proposed actions.**



