SUMMARY REPORT

Status of the Pink Hibiscus Mealybug (PHMB), *Maconellicoccus hirsutus* Management Programme in Jamaica

Prepared by

Michelle Sherwood, Senior Plant Protection Officer, Research and Development, Ministry of Agriculture and Fisheries

for

On behalf of the Plant Health Coordinating Committee- PHMB Subcommittee (Dr. Lisa Myers- Morgan, Dr. Dwight Robinson and Mrs. Dionne Clarke Harris)

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Background/Introduction

The pink hibiscus mealybug (PHMB), *Maconellicoccus hirsutus* (Green) was detected in Grenada in 1994 and subsequently the infestation spread to over 25 Caribbean territories. In June 2007, the PHMB, *Maconellicoccus hirsutus* (Green) was detected in Jamaica affecting hibiscus plants in the extension area of Manchioneal in the parish of Portland. The result of delimiting surveys revealed that residential areas spreading over an area of 8.5 square kilometers was mostly affected and by September, 2007 this area widened to about 12 square kilometres.

Over 300 plants have been recorded as hosts for this pest which includes ornamental, fruit and forest trees, vegetables, leguminous plants and weeds. The experience of other countries in the region has shown that the PHMB in the absence of effective natural enemies can reach epidemic proportions causing serious economic damage by destroying the agricultural sector and devastating the environment. Many uninfested countries imposed trade barriers on infested countries resulting in a loss of trade. The agricultural losses to Grenada and Trinidad in the first year of introduction of the pink hibiscus mealybug were estimated at US $10 and $18 million respectively. Economic losses exceeded US $3.5 million/year in Grenada and US $5million /year in Trinidad and Tobago. In Grenada the PHMB caused extensive damage to over 150 species of tree crops, vegetables, root crops, ornamentals, forest trees and weeds. It was estimated that for the period 1995 to 1997 St. Kitts suffered economic losses amounting to US$280,000 inclusive of control cost. The economic impact of this pest was US $3.4 million for St. Vincent and Grenada. The US has projected a potential loss of US$750 million / year.

Currently the pest has started to invade some production areas in Jamaica especially sorrel but no other agricultural and forested areas as yet. The spread of PHMB to production and forested areas could devastate the local agricultural sector, threatening the already fragile food security and the environment. Its presence in tourist areas could also impact negatively on our economy with the movement of people across the island. The passage of hurricane Dean in August 2007 could also have facilitated spread in other areas where incipient populations could exist.

iological control has been identified as the best sustainable means of managing the PHMB. In 1997 a regional biological control project funded by FAO (TCP/RLA/6719(A) was implemented to support regional activities towards a long term sustainable control of the PHMB in the Caribbean. Excellent control was achieved in infested countries with reductions in PHMB populations of up to 95%. This success was primarily attributable to two natural enemies, *Anagyrus kamali* and *Cryptolaemus montrouzieri*. The programme was also accompanied with the implementation of cultural practices such as pruning and weed management

Countries that subsequently became infested showed that early detection and implementation of biological control slowed the spread of the pest and greatly curtailed damage. In Puerto Rico the economic impact was less dramatic than

the other islands of the Caribbean such as Grenada and Trinidad. This was attributed to the timely introduction of the parasitoids *A. kamali* and *Gyranusoidea indica* and possible involvement of coccinellid species. The US has estimated the cost of biocontrol, technology development and transfer to be approximately US$500,000 /year for 3 to 5 years. The expected economic benefit to cost ratio for a single year of this investment exceeds 1500:1.

In order for the infestation in Jamaica to be contained and reduced a similar biological programme would need to be implemented to protect the local agricultural production and export market. The management programme was designed, implemented and managed by members of the Pink Hibiscus Mealybug Sub-Committee of the Plant health Coordinating Committee, a multi-agency task force comprising the following agencies: Ministry of Agriculture and Fisheries (Plant Quarantine, Research and Development) Rural Agricultural and Development Authority (RADA), Caribbean Agricultural Research and Development Institute (CARDI) and the University of the West Indies (UWI, Mona).

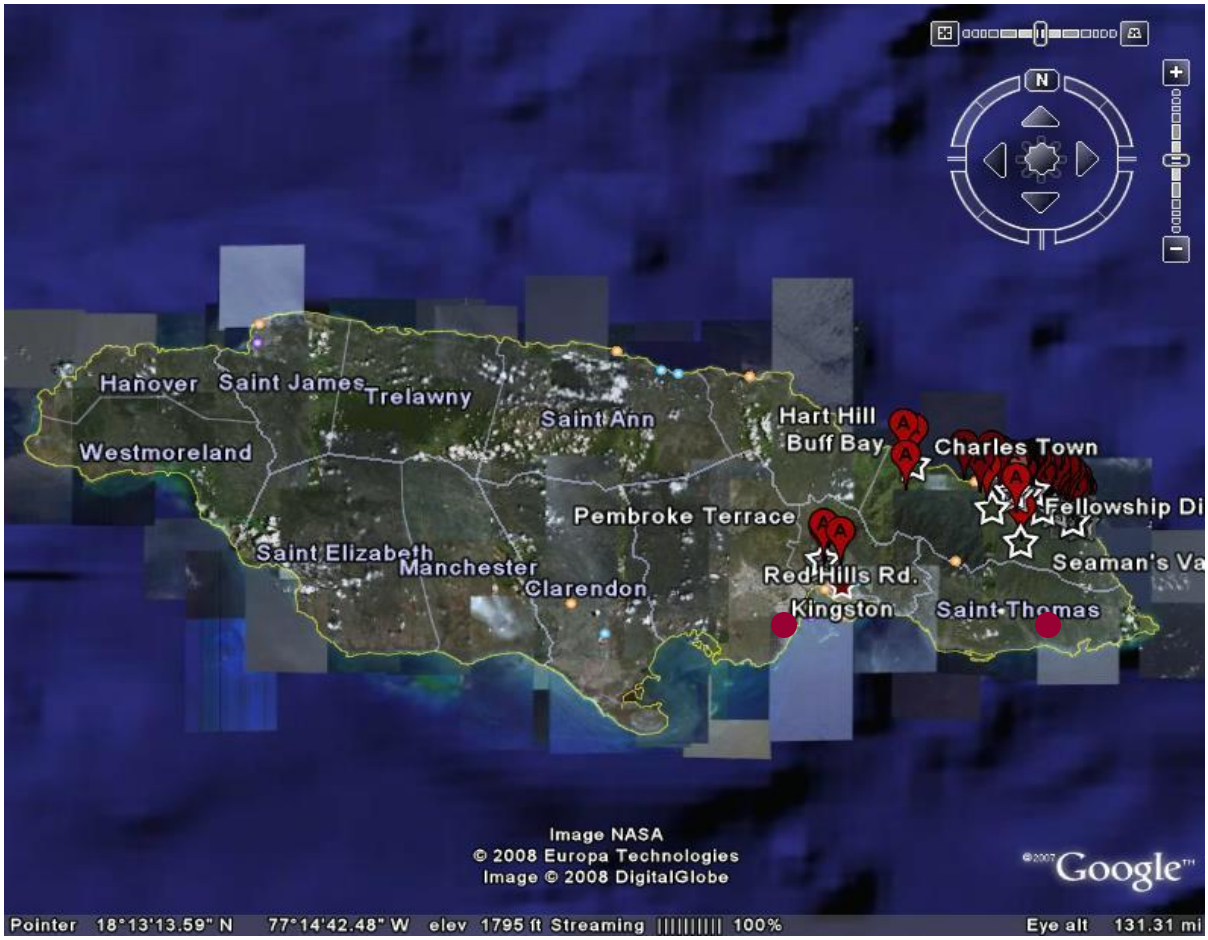
In collaboration with the USDA a biological control programme was implemented using *A. kamali* in infested areas. A summary of the status of the activities under the programme is presented in this report

Summary status of activities under PHMB management programme

Surveillance and Distribution of PHMB

PHMB was first detected in June, 2007 In Portland infesting the Manchional area and in December, 2007 was confirmed in St. Andrew in the Queensbury area. By December 2008, it was again detected in the Morant Bay area of St. Thomas and recently, Portmore, St. Catherine June 2009. The infestation mainly resides on residential properties affecting mainly hibiscus plants, other ornamentals in back yard gardens.

Surveillance activities by RADA have been maintained throughout the reporting period in all parishes for early detection. One report in November, 2008 had stated that 912 visits had been conducted across the island of which there were only 53 confirmed sites (Figure 1).



Map of Jamaica showing distribution of *M. hirsutus* in four parishes as at June, 2009

Shipment and release of *Anagyrus kamali*

Parasitoids were imported via FedEx which were collected by Officers in the Plant Quarantine Unit or Research and Development Division and distributed to infested sites by RADA extension officers with assistance from Research and Development and Plant Quarantine staff.

Since August 15, 2007 Jamaica through the generosity of the US government, the USDA has contributed to the programme 47 shipments of adults Ana*gyrus* containing 271,000 out of rearing facilities in Florida and Puerto Rico. Five shipments of *Gyranusoidea indica* were also provided containing 13, 600 wasps. These wasps were released mainly in Portland and Kingston (Appendix 1). No releases have been made in St. Thomas and St. Catherine as the shipments ceased before the pest was detected in these parishes.

Monitoring PHMB populations and Parasitism levels

Monthly monitoring of the PHMB was conducted since August 2007 at 14 sites located in Kingston and Portland where determination pre- and post- release levels of PHMB populations and parasitism levels at selected sites were conducted.

Prerelease levels of PHMB were determined by collecting six 15 cm long infested hibiscus shoots at one metre apart along the hibiscus hedge at each selected sites. Samples were processed to determine population of PHMB as well as parasitism levels similiarly to Meyerdirk *et. al*, 1998; Kairo *et. al*, 1999.

Recovery was observed on the vegetation within three months of the release programme began in August 2007 (Figures 1 & 2). Compared to PHMB populations in 2007 there has been a 97.87% reduction in population in Jamaica with parasitism levels at 20 - 50 % during resurgent periods in January as experienced for the last two years and 80 - 100% for the rest of the year (Figure 3). No recovery has been made of the *G. indica* from the sites monitored. Samples collected form St. Catherine and St. Thomas showed parasitism by *A. kamali* which indicates that the wasp is moving with new infestations.

Figure 1: Hibiscus hedge damaged by M. hirsutus

Figure 2: Recovery of infested sites in Portland after three months of he programme

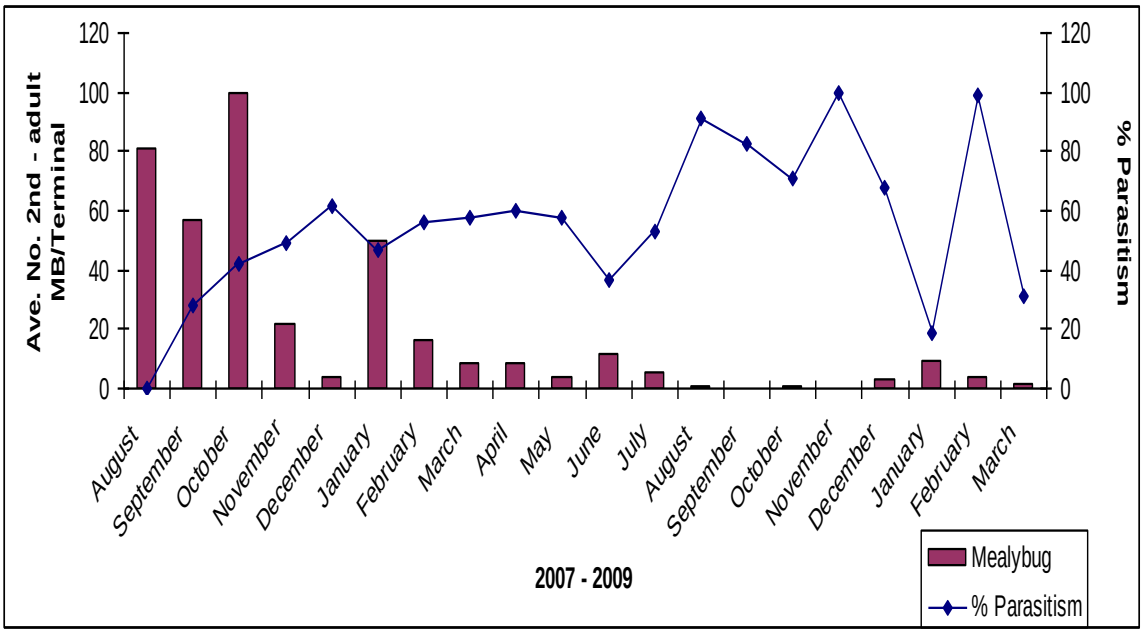


Figure 3: Impact of parasites on 2nd to adult Pink Hibiscus Mealy bug in Jamaica from August 15, 2007 to March 31, 2009

Other Natural Enemies

Twelve other species of natural enemies have been identified feeding on PHMB in Portland and Kingston, they include three species of lady bird beetles (*Chilocoris stigma* and two unknowns), six parasitoid species (undetermined) and one species of reduvid bug.

Local Rearing Facility

A local rearing facility is required in order to ensure self sufficiency in providing cultures of wasp to infested areas on a timely basis. A structure was renovated at the Veterinary facility in Kingston and is anticipated to help advance the success of the management programme

Public Eduction programme

a. Since 1996, technical training was received during the regional efforts to manage this pest which included Pink Mealybug detection and the rearing of its *natural enemies*.

b. Since August 2007 local training of extension officers, students, Hoteliers and homeowners have taken place within and outside infested parishes.

c. Updates via electronic and print media have been carried out

d. Participated in the 43rd Caribbean Food Crop Society in Florida in 2008 where a poster presentation was done on the programme

Comments

A. kamali was sourced and released within three months of confirmation of the establishment of PHMB in Portland. Releases continued into 2008 in an effort to contain and suppress the PHMB population in infested parishes. The continued recovery of A. kamali throughout the programme from various sites in Portland and Kingston is sufficient indication that the wasp *A. kamali* has established itself. Based on the three weeks cycle of the wasp (Kairo et. al, 1997) it was estimated that 28 generations of *A. kamali* had developed in Portland and 22 in Kingston as at March 31, 2009.

The level of reduction in PHMB infestation recorded for Jamaica after 20 months was 97.87 % which is comparable to similar programmes in Florida (USA), Haiti, Belize and Bahamas which recorded a 98.7 %, 97.2%, 86.6 % and 82 % reduction within the first year of implementing a bio-control programme for PHMB using A. kamali (Meyerdirk, 2005).

The parasitoid wasp *Anagyrus kamali* has been effective in impacting PHMB infestations at infested sites which has resulted in a low economic and environmental impact than experienced by other islands of the Caribbean such as Grenada and Trinidad (Francois, 1996; USDA-APHIS, 2003). Like Puerto

Rico, Jamaica has benefited from the outcome of early detection of PHMB and the timely introduction of *A. kamali* which had reduced the rate of spread (Michaud & Evans, 2000). Twenty months after the initial detection of PHMB in Jamaica the pest has been contained in residential areas within the borders of Portland and 1 km radius of Kingston and 5km radius of St. Thomas, and St. Catherine leaving the remaining ten parishes unaffected. Therefore the major agricultural and other natural areas have not been impacted due to the success of this classical biological control programme.

The continued success of the programme will depend on the timely release of parasitoids in newly infested areas. The assistance of the USDA has been invaluable however in the long term the sustainability of he programme will be dependent on local production of the parasitoid. The facility is now completed and is expected to provide cultures of the wasp within the next 3 to 4 month period.

Acknowledgements

The authors acknowledge the contribution of the Unites States Department of Agriculture who had supplied shipments of two parasitoids, *Anagyrus kamali* and *Gyranusoidea indica* for control of the Pink Hibiscus mealybug, *Maconellicoccus hirsutus*. The contribution made by the Plant Health Coordinating PHMB sub-committee in planning, organizing and implementing the Action Plan is greatly appreciated. This committee is made up of individuals from the several organizations including the Ministry of Agriculture (Plant Quarantine, Research and Development), CARDI, UWI (Mona), and RADA which include Mrs. Marina Young and her team out of extension officers in the affected areas. Also importantly the team of research assistants who have faithfully collected nd processed the samples on a monthly basis, Mr. Oral James, Ms. Kimmoia Witter and Ms. Netalie Francis.

APPENDICES 1

	Record of Parasitoid Shipments aand Allocations(*Anagyrus kamali*)				
Shipment	**Date**	**Source**	**# Wasps Received**	**Allocation**	
				Kingston	Portland
1	11.8.2007	PR	6000	0	6000
2	29.8.2007	PR	6000	0	6000
3	13.9.2007	PR	5000	0	5000
4	20.9.2007	PR	5000	0	5000
5	27.09.2007	PR	6000	0	6000
6	03.10.2007	PR	5200	0	5200
7	24.10.2007	PR	8000	0	8000
8	31.10.2007	PR	6000	0	6000
9	7.11.2007	PR	6000	0	6000
10	15.11.2007	PR	5000	0	5000
11	28.12.2007	PR	5000	5000	0
12	2.01.2008	PR	6000	6000	0
13	10.01.2008	PR	5000	5000	0
14	17.1.2008	PR	4000	4000	0
15	24.1.2008	PR	5000	600	4400
16	1.2.2008	PR	3000	800	2200
17	5.2.2008	PR	3000	1000	2000
18	12.2.2008	PR	3000	0	3000
19	27.2.2008	PR	1800	0	1800
20	5.3.2008	PR	2000	0	2000
21	11.3.2008	PR	2000	2000	0
22	12.3.2008	Florida	8000	1400	6600

23	10.3.2008	Florida	8000	2000	6000
24	19.3.2008	Florida	8000	0	8000
25	25.3.2008	Florida	8000	0	8000
26	25.3.2008	PR	2400	0	2400
27	25.3.2008	PR	1000	0	1000
28	2.4.2008	Florida	8000	1200	6800
29	8.4.2008	Florida	8000	800	7200
30	15.4.2008	Florida	8000	0	8000
31	22.4.2008	Florida	8000	1200	6800
32	29.4.2008	Florida	8000	1400	6600
33	07.05.2008	Florida	8000	1000	7000
34	13.05.2008	Florida	8000	1400	6600
35	20.05.2008	Florida	8000	1400	6600
36	28.05.2008	Florida	8000	1400	6600
37	03.06.2008	Florida	8000	1400	6600
38	10.06.2008	Florida	8000	1000	7000
39	17.06.2008	Florida	8000	1200	6800
40	24.06.2008	Florida	8000	1400	6600
41	01.07.2008	Florida	8000	1400	6600
42	08.07.08	Florida	8000	1400	6600
43	20.08.08	PR	7000	1200	5800
44	27.8.08	PR	2200	2200	0
45	03.09.08	PR	4200	1000	3200
46	09.09.08	PR	2400	1000	1400
47	16.09.08	PR	1800	0	1800

TOTAL			271000	50800	220200
Record of Parasitoid Shipments (*Gyranusoidea indica***)**					
1	20.08.08	PR	5000	5000	0
2	27.8.08	PR	4000	0	4000
3	03.09.08	PR	0	0	0
4	09.09.08	PR	2400	0	2400
5	16.09.08	PR	2200	0	2200
TOTAL			13600	5000	8600