

**INTEGRATED PEST MANAGEMENT OF  
MACONELLYCOCCUS HIRSUTUS,  
PINK HIBISCUS MEALYBUG  
IN JAMAICA**

**Michelle Sherwood**

**Senior Plant Protection Officer (Acting)  
Ministry of Agriculture and Lands  
Research and Development Division**

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# Introduction to Jamaica

- First detected in June, 2007 In Portland affecting areas North East and North West Portland
- In December, 2007 confirmed in Kingston in th Queensbury area

# Some hosts with PHMB

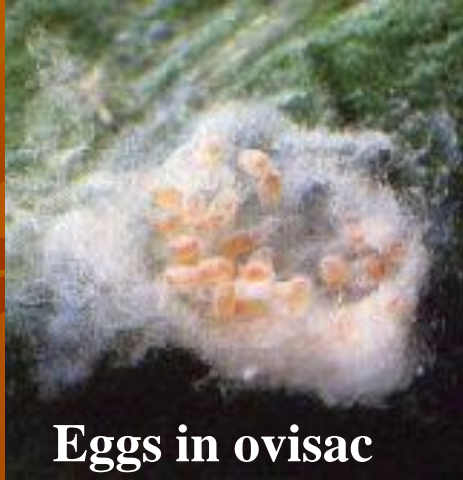


# Some hosts with PHMB



**Hibiscus curling (left) and dieback of hibiscus hedge (Right)**

# Life stages of PHMB



Eggs in ovisac



PHMB adult females and egg sac showing eggs

Photo: Lisa Myers



Adult female



Adult Male

# MANAGEMENT TEAM

## Plant Health Coordinating Committee

- Ministry of Agriculture (R & D, PQ)
- RADA
- CARDI
- University of the West Indies (Mona)
- Consultations with NEPA and PCA

# ACTION PLAN

## GOAL

- To contain PHMB infestations within Eastern parishes and reduce populations below economic levels.

## OBJECTIVES

- To monitor the distribution and spread of PHMB through surveillance activities
- To Implement a classical biological control programme using *Anagyrus kamali* (Hymenoptera: Encyrtidae)
- To strengthen the competence of technical and extension personnel in biological control
- To promote public awareness on the PHMB

# Integrated Pest Management of PHMB

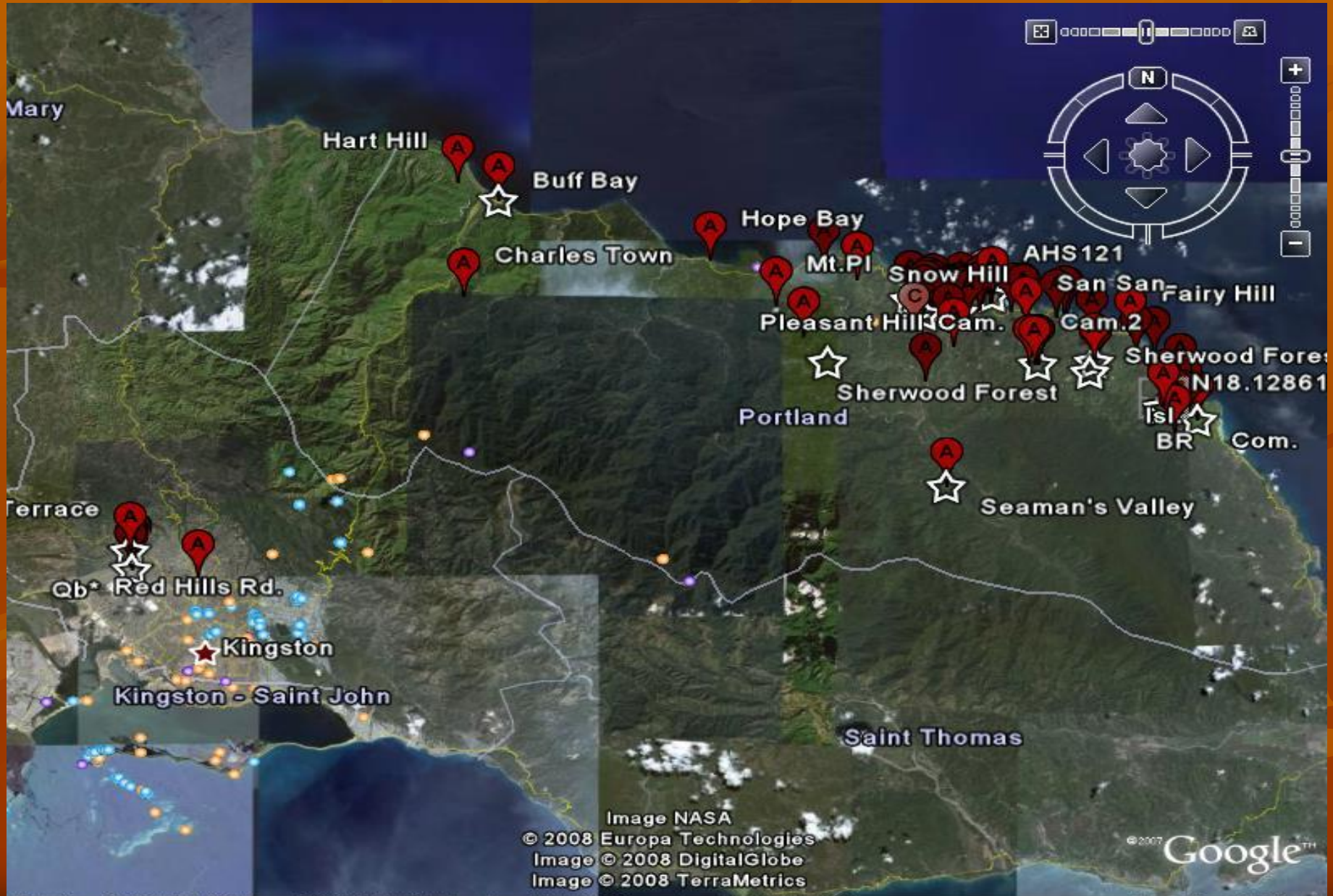
- Surveillance activities
- Legislation (PHMB Order, 2007)
- Cultural/Physical control
- Biological control: main focus
- Regular monitoring: impact of natural enemies
- Public awareness and participation



# Surveillance activities:

- RADA extension officers through out the island have been carrying out surveillance activities to report early detections
- Delimiting surveys were conducted along a 5 km radius of the initial find. For each new adjacent finding, the radius was redrawn and the area surveyed.

# DISTRIBUTION OF PHMB



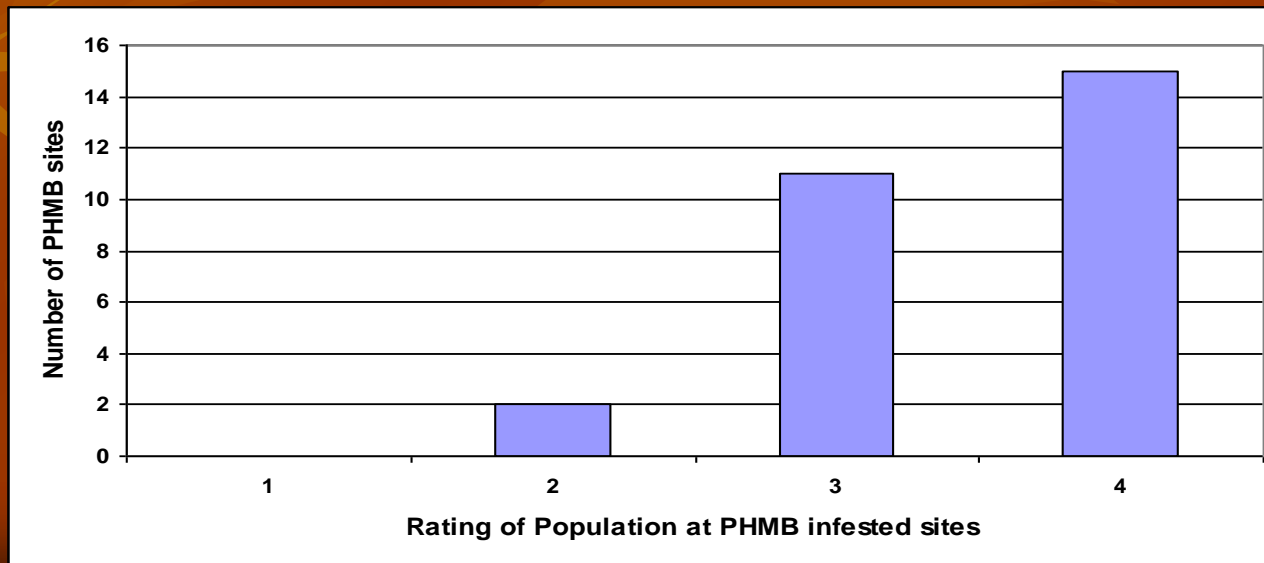
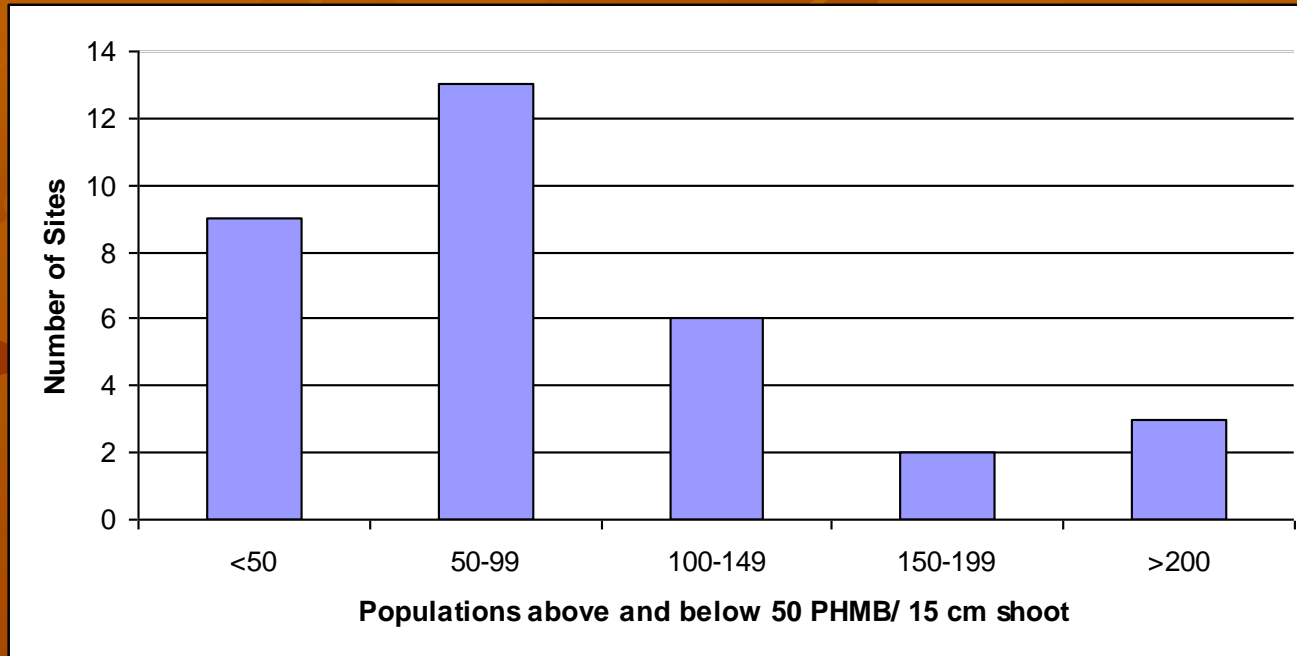
# DISTRIBUTION

- PHMB infestations have been contained within the boundaries of Portland and a one km radius within Kingston (May, 2008).
- The infestation however is approaching the borders of St. Mary and St. Thomas and moving out of the 1 km radius in Kingston (August 2008)

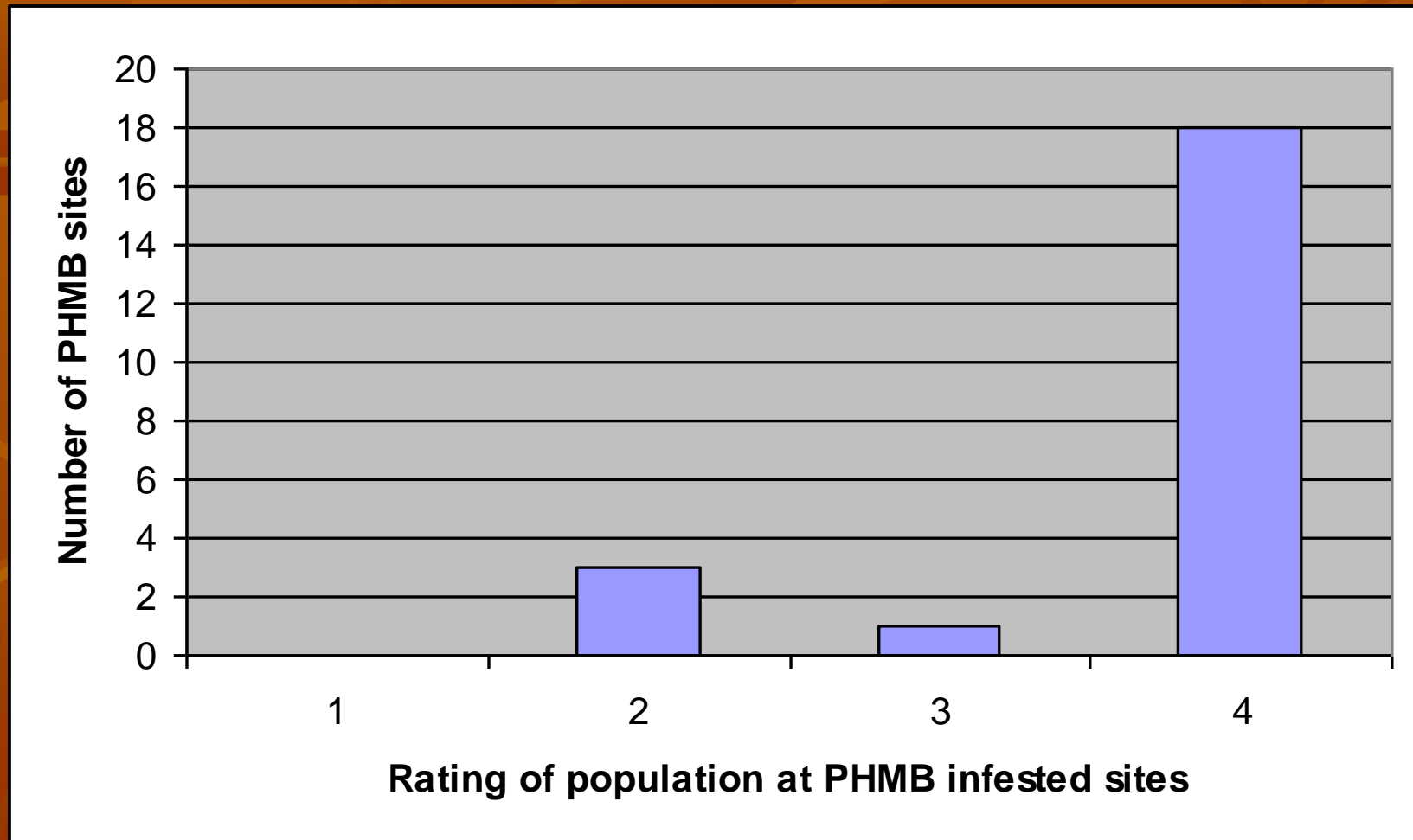
# Surveillance

- Initially at each site at least six shoots 15 cm long (6 inches) were collected from individual plants or hedge at one metre intervals and levels determined in the lab
- Rating system 0-4
  - 0 = No infestation present
  - 1 = No living stages, only remains from previous activity
  - 2 = life stages found with careful examination of terminals
  - 3 = life stages visually apparent without handling terminals
  - 4 = heavy infestations

# Surveillance (Portland as at March, 2008)



# Surveillance (Kingston as at March, 2008)



# BIO-CONTROL PROGRAMME

- Cultures of a parasitoid wasp *Anagyrus kamali* has been released at infested sites in both Kingston and Portland
- From August 15, 2007 – July 1, 2008 41 shipments of cultures of adult wasp were received from two insectaries in Puerto Rico (23 shipments = 101,400) and Gainesville, Florida (18 shipments = 144,000)
- In Portland a total of 185 parasitoid releases have taken place and in Kingston 51 (as at July 2008)

# BIO-CONTROL PROGRAMME

- The Ministry has received its last shipment of parasitoids from Florida due to an increase in requests for *A. kamali* in Florida and reduced parasitoid production due to the use of old pumpkins in production



# A Tiny Parasitoid Wasp

## *Anagyrus kamali*



**Male**



**Female**



**Parasitized PHMB**

# Packaging of shipments



# Monitoring PHMB & Parasitism levels

- Fourteen release sites in Portland (12) and Kingston (2) at least 2km<sup>2</sup> apart in PHMB infested areas.
- Pre-release determinations were conducted by sampling six shoots 15 cm long (6 inches) from individual hibiscus plants or at one metre intervals (38.5 inches) along hibiscus hedges.
- The level of infestation was determined by calculating the mean number of egg sacs and the mean number of second instar to adult PHMB stages per 15 cm shoot.

# Monitoring PHMB & Parasitism levels

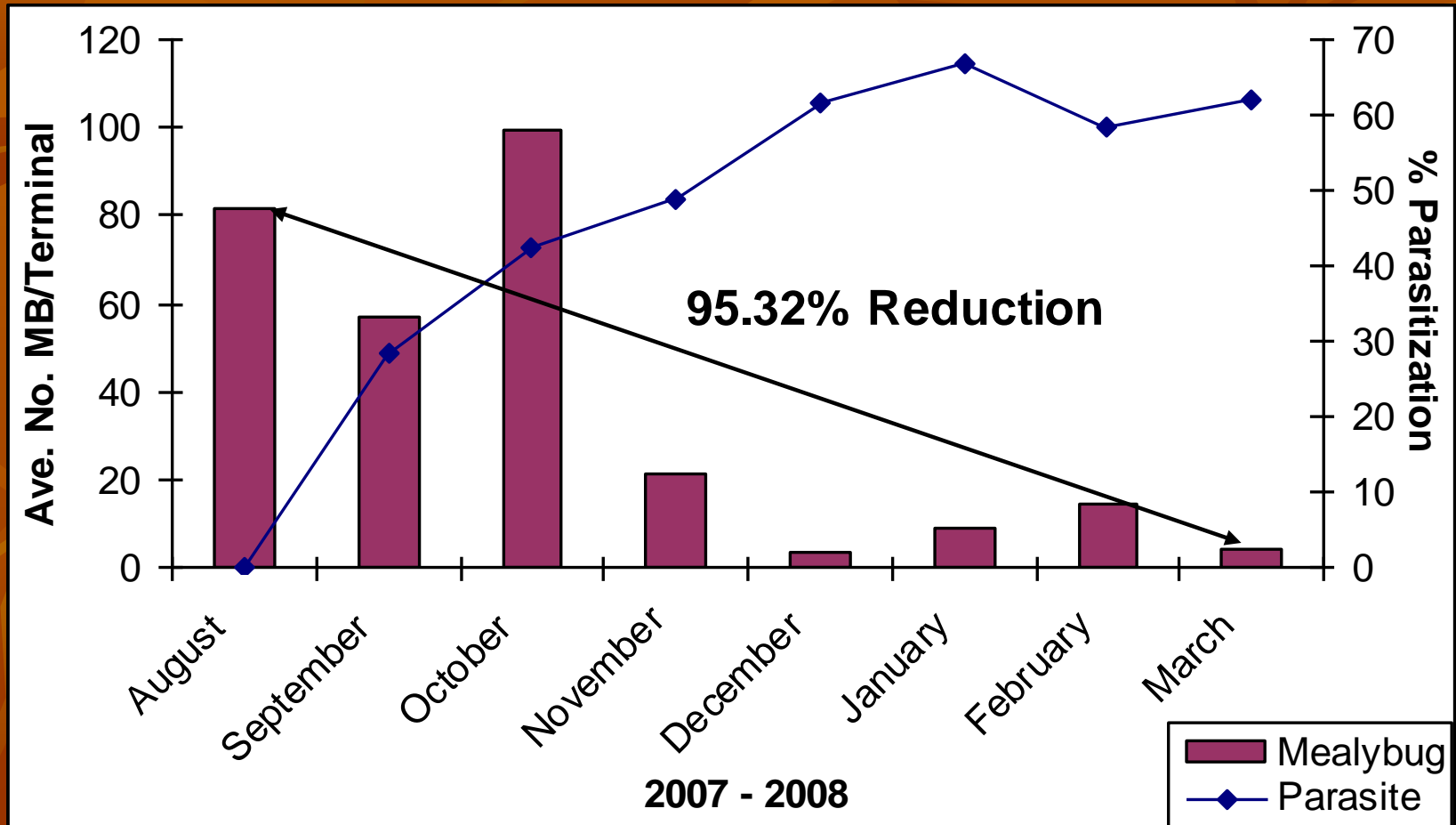
- 100 PHMB individuals including live late third and adult instars and mummies were also collected and incubated for 30 days in multi-welled plates to assess parasitism levels. Parasitism (%) was determined as follows:

No. of wasps emerging from plates + mummies with exit holes X 100

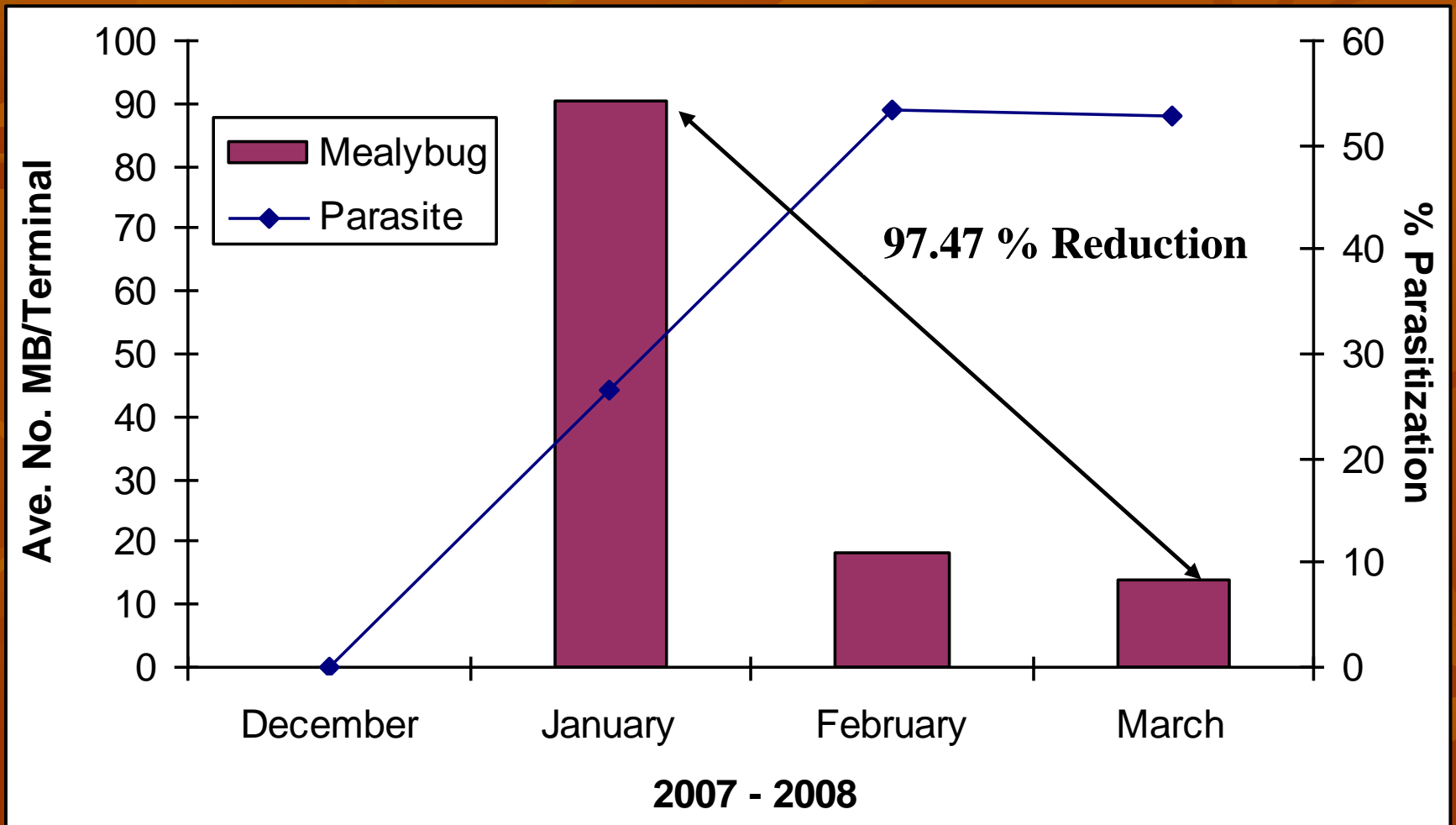
Total no. mealybugs & mummies in plates + mummies with exit holes



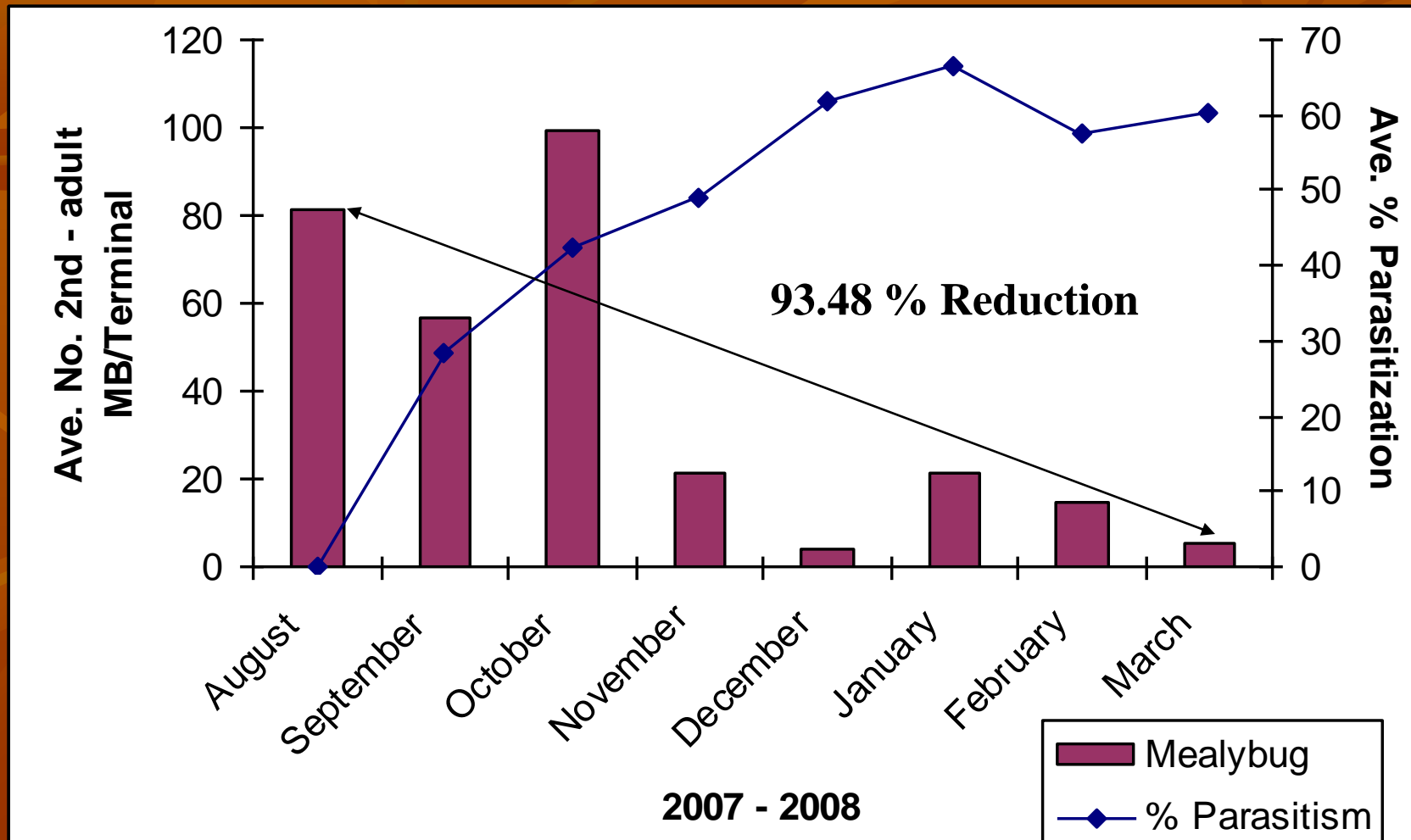
# PHMB and Parasitism Levels (Portland as at March 2008)



# PHMB and Parasitism Levels (Kingston as at March 2008)



# PHMB and Parasitism Levels (Jamaica as at March 2008)





# Recovery of infested sites after 3 months of the programme



Portland

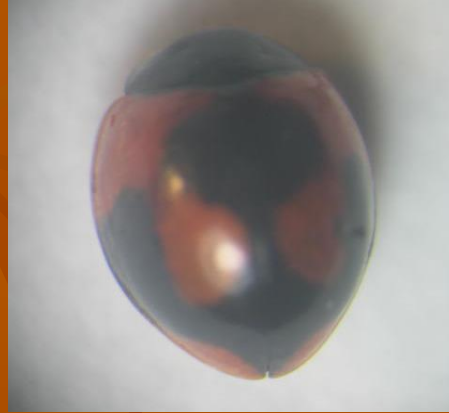
# Recovery of infested sites at six months



**Kingston**



# Local Natural Enemies

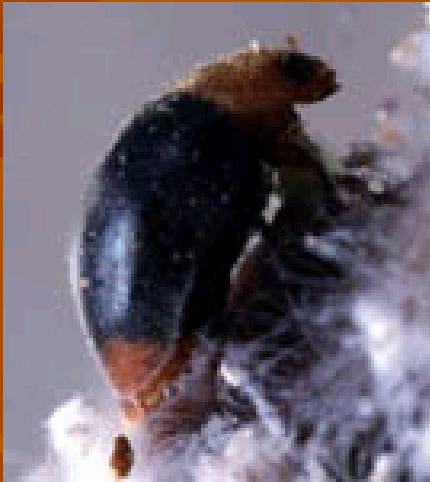


Portland



Pembroke  
Terrace

# Predator Lady Bird Beetle or Mealybug Destroyer *Cryptolaemus montrouzieri*



**Adult LBB**



**Younger Larval Stage of LBB**



**Older Larval Stage of LBB**



*Cryptolaemus montrouzieri*  
**(Australian Ladybird Beetle)**

eating the Hibiscus Mealybug



# Biological Control

- Two shipments of adult *C. montrouzieiri* received from Trinidad totalling 142 specimens
- Releases taken place only in three locations in Kingston (1) and Portland (2)
- Subsequent progeny releases taken place within Portland and Kingston

# Status of *C. montrouzieri*

- *C. montrouzieri* has been detected in Kingston in both Queensbury and Pembroke Terrace reducing infestations at both locations



# Rearing Facility



Fair Prospect  
Portland

Veterinary office,  
at Kingston





# Public Awareness

- Community meetings in Kingston and Portland
- Fact sheets
- Posters
- Television features



# Discussion

- The continued recovery of *A. kamali* throughout the programme is sufficient indication that it has established in PHMB infested areas in Jamaica
- Based on the three weeks cycle of the wasp it is estimated that eleven generations of *A. kamali* have developed in Portland and five in Kingston as at March 31, 2008.
- The parasitoid wasp *A. kamali* has been effective in impacting PHMB infestations in both Portland and Kingston.

# Discussion

- The level of reduction in infestation was 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 using *A. kamali*
- The programme has been successful in managing PHMB infestations by containing the pest within two parishes, reducing the infestations to acceptably low levels, thereby protecting the local agricultural sector and the environment.

# Recommendations

- Rearing of *C. montrouzieri* to supplement the bio-control programme (Plant Protection Unit)
- Seek cultures of *A. kamali* out of Puerto Rico
- Rearing of *A. kamali*

# ACKNOWLEDGEMENT

- The agricultural staff of the United States and Trinidad for providing the shipments of PHMB natural enemies.
- The members of the PHCC – PHMB sub-committee for continued management of the programme
- The staff within Ministry of Agriculture (Plant Protection, Plant Quarantine) and RADA for their role in implementing the field activities.



**THANK YOU**