

A Perspective on the Release of *Anagyrus kamali* (Hymenoptera: Encyrtidae) for the Biological Control of the Hibiscus or Pink Mealybug, *Maconellicoccus hirsutus* (Green) (Hemiptera: Pseudococcidae) by the Ministry of Agriculture, Land and Marine Resources

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Abstract

The Hibiscus or Pink Mealybug (HMB), *Maconellicoccus hirsutus* (Green) is an exotic pest recently introduced into the Caribbean. It was first reported in Trinidad in August 1995. This pest, in the absence of its natural enemy complex, together with its wide host range, has the potential to cause extensive damage to agricultural and horticultural plants as well as plantation and natural forest trees. In an effort to control this pest and as part of its long-term management programme, the Ministry of Agriculture, Land and Marine Resources (MALMR) has embarked on a classical biological control programme with the International Institute of Biological Control - Caribbean and Latin American Station (IIBC-CLAS). In this project, *Anagyrus kamali*, an endolarval parasitoid of the Hibiscus Mealybug (HMB) was imported into Trinidad from China. This encyrtid wasp is known to be the most common and effective control agent of the HMB in Egypt. Its attributes of good searching ability, short generation time and high fecundity are those usually found in successful biological control parasitoids. The MALMR and IIBC-CLAS will be involved in the importation, large-scale production and field release of the parasitoid. Monitoring and evaluation of the parasitoid will also be undertaken. A status of the project is hereby presented.

Introduction

The Hibiscus or Pink Mealybug (HMB) *Maconellicoccus hirsutus* (Green) (Hemiptera: Pseudococcidae) was first reported in the Caribbean in October 1994 when it was positively identified in Grenada. By August 1995 it was reported in Trinidad. It was known as a polyphagous pest throughout other tropical and subtropical regions with the potential to cause extensive damage to important trees, shrubs, fruits and vegetables.

Biological control was the best long-term option for suppression and control of the HMB. The exotic nature of this pest and the known effective natural enemy complex from its probable area of origin suggested that classical biological control would be the most appropriate long-term strategy. Thus this approach was undertaken by the Ministry of Agriculture, Land and Marine Resources (MALMR) together with the International Institute of Biological Control - Caribbean and Latin American Station (IIBC-CLAS).

Several natural enemies of the Hibiscus Mealybug are known, however it was proposed that the host specific parasitoid *Anagyrus kamali* be the first agent released. This parasitoid is known to be the most common and effective control agent of the HMB in Egypt where it was released in the 1930's. Its attributes of good searching ability, short generation time and high fecundity are those usually found in successful biological control parasitoids. The biology and behaviour of *A. kamali* are so specifically adapted for attacking mealybugs that there should be no risk to other non-target organisms (Cross et al 1995).

The programme established by the MALMR and IIBC-CLAS therefore entailed the importation, large scale production, field release and monitoring of the wasp, an endolarval parasitoid. To this end, in February 1996, the first shipment of *A. kamali* was imported into Trinidad following the stipulations in the FAO Code of Conduct. Of the 1,500 parasitoids imported, some were utilized for trial field releases on host plants mainly hibiscus (*Hibiscus rosa-sinensis*) and the rest were used to establish laboratory cultures at IIBC-CLAS.

A second shipment of 1,000 parasitoids was imported in March 1996; again some were placed in sleeve cages on hibiscus plants in the field, and the rest were used for the first mass production cycle of parasitoids at the IIBC-CLAS laboratory (Lopez et al, 1996).

Status of joint project between the MALMR and IIBC-CLAS

1. Already achieved

a) Initiation of hibiscus mealybug cultures at IIBC-CLAS.

The programme began in December 1995 with culturing of HMB in the laboratory on pumpkins and sprouted potatoes. *A. kamali* did not survive long on the HMB produced on these hosts and so HMB cultures were then initiated on five hibiscus and other Malvaceae hosts plants.

b) Importation of *Anagyrus kamali*

c) Training of staff of the MALMR

Bertrand Cooper (Entomologist) and Petal Ram (Agricultural Officer I) are working with IIBC's Biological team assigned to the HMB control project, Project Scientist - Vyjayanthi Lopez and Curator - Michael Morais, thus gaining hands on experience in biocontrol techniques. Although members of the team are involved in all activities, training programme for M^s. Ram focuses on laboratory rearing, and for Mr. Cooper on field releases and monitoring.

2. On-going activities

a) Evaluation of different host plants for laboratory rearing of HMB

b) Large scale rearing of *Anagyrus kamali*

Two systems are currently operating simultaneously - a routine rearing system for culture maintenance, and a large scale production system for

effecting field releases. For large scale production of both HMB and *A. kamali*, multiples of the routine culturing system are used.

c) *Field releases and monitoring*

The first release was done in sleeve cages on hibiscus plants utilizing parasitoids imported in February 1996. Build up of populations in these cages was very good and first generation adults were released directly into the field.

Detailed monitoring is being undertaken at one site in Bamboo Village No.3 on a 14 m hibiscus hedge from which three samples are collected at 1m interval every three weeks, taken to the laboratory and various stages and means of HMB are calculated.

3. Follow up activities

a) *Continued releases of Anagyrus kamali.*

b) *Preparation of laboratory facilities at the Research Division of the MALMR, Centeno.*

In order to increase mass production of the parasitoid, *A. kamali*, the MALMR will be producing the organism at its laboratory at the Central Experiment Station (CES). Construction of the MALMR laboratory will soon be completed and the multiplication of the parasitoid for field release will begin.

c) *Monitoring Programmes*

Monitoring of the efficacy of the released parasitoids will be conducted following three approaches:

- i) at the areas where releases are made, samples will be collected and taken to the laboratory for calculating the various stages and means of HMB.

- ii) observations of field collected material for the presence of *A. kamali* and other exotic and indigenous natural enemies of HMB.
- iii) observations on dispersal of *A. kamali* from the original release sites.

d) Training of Extension Personnel - North and South Regions

Training of officers will be undertaken to enable them to understand and appreciate all aspects of biocontrol with emphasis on utilizing the endolarval parasitoid, *A. kamali*, in an Integrated Pest Management system.

All of the above mentioned activities should be initiated by the end of 1996.

Conclusion

The past successes of *A. kamali* in other countries and preliminary observations here in Trinidad indicate that the main aim of the programme which is long-term, sustainable, biological control of the Hibiscus or Pink Mealybug can be attained.

Since *A. kamali* is itself an insect, it is susceptible to broad spectrum pesticides commonly used by farmers. Education of the public is therefore of paramount importance for the success of this biocontrol initiative. An integrated approach, which emphasizes conservation of biocontrol agents and reduced use of chemical pesticides, should be adopted.

In conclusion, it should be noted that both *A. kamali* and exotic coccinellids evolved along with the Hibiscus Mealybug in its area of origin and locally they co-exist with many other natural enemies, keeping populations of the pest below economic threshold levels. The introduction of exotic natural enemies, like the wasp *A. kamali* and exotic coccinellid predators, can achieve sustainable control of the Hibiscus Mealybug in Trinidad.

References

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