CONTROL OF BRONTISPA BEETLE (*BRONTISPA LONGISSIMA*) ON CCOCONUT BY INUNDATIVE RELEASE OF ASECODES WASP (*ASECODES HISPINARIUM*)

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Abstract

Brontispa beetle, Brontispa longissima, being an introduced species, is problematic on coconut and other palms. A biocontrol agent, Asecodes hispinarium has been used in other countries, and found effective against the brontispa beetle. This biological control project is part of the national programme, which was implemented by the Department of Agriculture in Kuala Lumpur in 2009. This paper reports on the progress of the mass rearing of the host (brontispa beetles) and its biocontrol agent (asecodes wasps), field release of the wasps and their effect on the brontispa population. The techniques employed by the Department of Agriculture in Bangkok, Thailand for the mass rearing of the brontispa beetles and asecodes wasps and field release of the wasps were adopted. 50 pieces of asecodes mummies were obtained from the Department of Agriculture in Kuala Lumpur on 1st November 2009. 18 farms were selected for the assessment of the wasps' effect on the pest population, which was based on the reduction of pest infestation level. A total of 26,825 asecodes mummies have been produced. Out of these, a total of 25,000 were released in 40 farms in Kuching, Lundu, Asajaya, Samarahan, Simunjan, Betong, Miri and Bintulu districts. A mean reduction of 82.8 percent in the infestation levels was obtained nine months after the wasps' first batch of release. This method has effectively reduced the pest infestation and subsequently, reduced the use of insecticides in the affected farms. The newly established farms of Matag, Pandan and Local tall coconut have benefited from this biocontrol programme.

INTRODUCTION

Brontispa longissima (Coleoptera: Chrysomelidae / Hispinae) or commonly known as brontispa beetle is a serious pest of coconut and other palms in the South East Asian region and the Pacific (Waterhouse and Norris, 1987). It is native to Indonesia and Papua New Guinea. This pest has made its way into many other countries in the South East Asian Region and the Pacific, since 2000 (Liebregts *et al*., 2006). In Malaysia, it could have entered the country via various palm planting materials around 2001 – 2002 (Yusuf Othman, Department of Agriculture, Kuala Lumpur, personal communication, 14 July 2009). Both adult and larva inhabit the developing unopened spears of the palms, where they feed on the leaf tissue from the leaflets and thus destroying the growing points of the palms. This pest attacks palms of all ages, although it is most damaging to young palms in nurseries and during the first four or five years after planting out in the field.

In Vietnam and Thailand, inundative release of the beneficial hymenopteran wasp, *Asecodes hispinarium* (Hymenoptera: Eulophidae) has resulted in effective control of the pests (Liebregts *et al*., 2006; Sindhusake and Winothai, 2004). *A. hispinarium* or commonly known as asecodes wasp is a gregarious larval endoparasitoid, that attacks the third and fourth instars of the brontispa beetle.

The biological control of brontispa beetles involves five main activities. These include detection survey, mass rearing of brontispa beetles, mass rearing of asecodes wasps, field release of asecodes wasps and monitoring their effect on the pest population. A state-wide detection survey to determine the pest distribution and severity of infestation was carried out in August – October 2009. 119 farms of various sizes were surveyed. All the major coconut growing areas were affected and the pest was found in most farms. The seriously affected farms were in Kuching, Lundu, Asajaya and Bintulu districts (Megir,

2009). The infestation levels varied from farm to farm. The pest infestation was more severe in newly established farms of Matag and Pandan coconut.

This paper reports on the progress of the mass rearing of the host (brontispa beetles) and its biocontrol agent (asecodes wasps), field release of the wasps and their effect on the pest population.

MATERIALS AND METHODS

The techniques employed by the Department of Agriculture in Bangkok, Thailand for the mass rearing of the brontispa beetles and asecodes wasps and field release of the wasps were adopted and adapted to suit our local condition. 50 pieces of the asecodes mummies were obtained from the Department of Agriculture in Kuala Lumpur on 1st November 2009. The rearing of both brontispa beetles and asecodes wasps was carried out under laboratory conditions at 28 to 30 º C. It involved ten steps (Figure 1).

Rearing of brontispa beetles

The mass rearing of the brontispa beetles commenced in September 2009. It aimed at providing sufficient number of host, the fourth instars for the asecodes wasps to parasitise on. This is to ensure a sustained production of the asecodes wasps. The adult beetles were reared on young coconut leaves in plastic containers for egg laying. The eggs were collected every two days and transferred to leaf folds of young leaves. The newly hatched larvae were transferred to leaf folds of young leaves. These leaves were changed every three to four days until the fourth instars were ready for the introduction of the asecodes wasps. Decomposing leaf materials, faeces and frass were removed every two days, to prevent build-up of moisture and pathogens.

Rearing of asecodes wasps

The asecodes wasps were introduced into a plastic container containing the fourth instars, at a ratio of 2 – 3 asecodes mummies to 100 instars. The new mummies, newly parasitised brontispa larvae were collected after five to seven days from the introduction of the asecodes wasps.

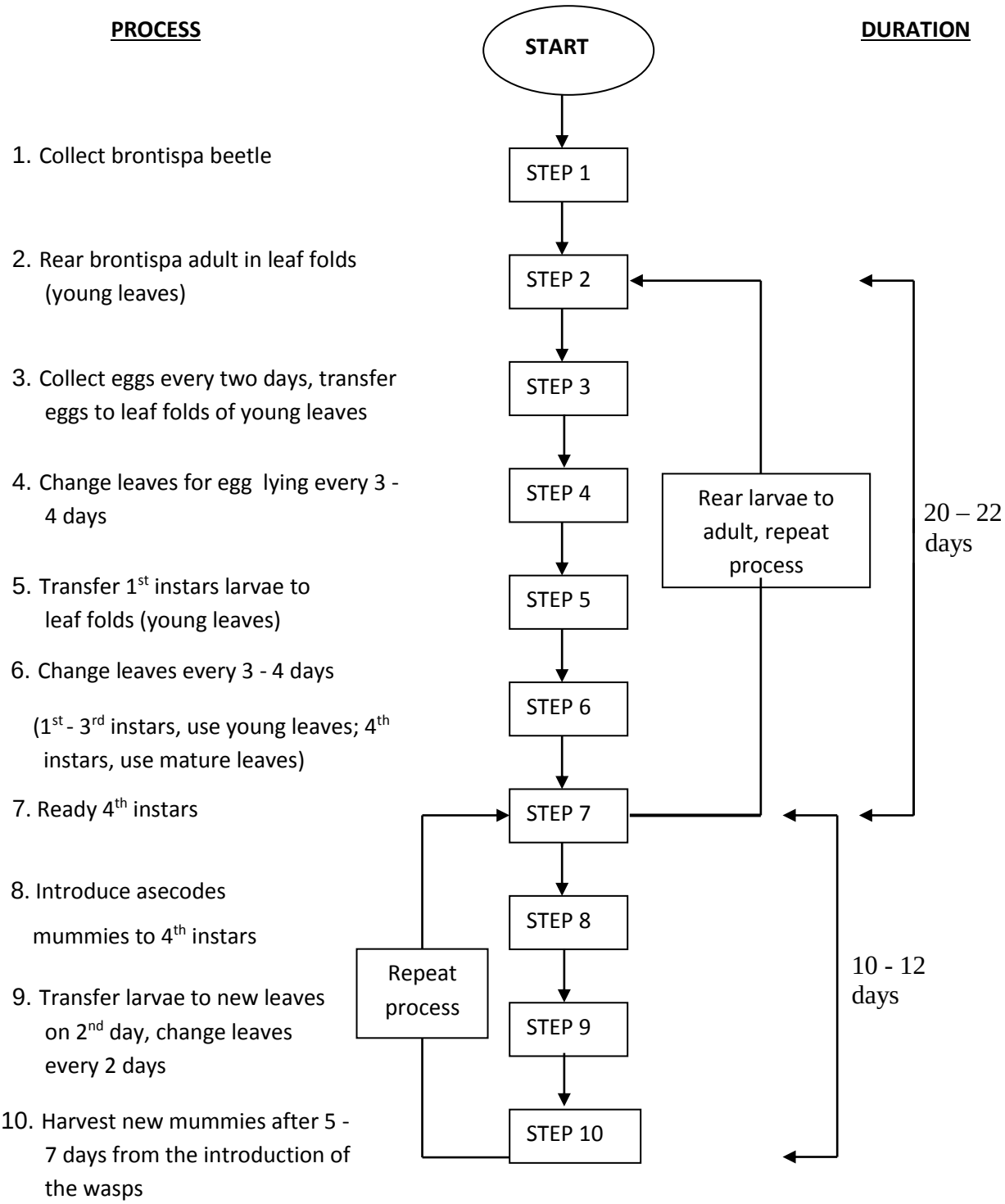
Field release of asecodes wasps

One week old mummies were placed in small plastic tubes, at a rate of 10 mummies per hectare plot. These tubes were hung on the fronds. Six rounds of release were made at bi-weekly intervals.

Monitoring effect of asecodes wasps against brontispa population

18 farms in Asajaya, Samarahan, Kuching and Lundu districts were selected for the assessment of the wasps' effect on the pest population. This assessment was based on the reduction of the pest infestation level.

Figure 1. Flow chart for mass rearing of brontispa beetles and asecodes wasps



RESULTS AND DISCUSSION

A total of 26,825 asecodes mummies have been produced (Table 1). Out of these, a total of 25,000 were released in 40 farms in Kuching, Lundu, Asajaya, Samarahan, Simunjan, Betong, Miri and Bintulu districts.

In 18 selected farms, which were monitored, a mean reduction of 82.8 percent in the infestation level was obtained, nine months after the wasps' first batch of release. The reduction in the infestation levels ranged from 54.1 to 95 percent (Table 2). The new spears and young leaves around the crown area of the affected palms were greener.

The percentage of parasitised mummies was high, around 90 percent. Problem of fungal infection was encountered when the leaves were not changed as scheduled. The affected cultures were immediately removed, to prevent further contamination. The field batch of release of the wasps in December 2009 – January 2010 was affected by the rain, as the adult wasps, being very tiny, were susceptible to drowning. The wasps were not released in farms where insecticides were used. Some farmers still prefer to use chemical control, instead of the bio-control method.

This method has effectively reduced the pest infestation and subsequently, reduced the use of insecticides in the farms. The newly established farms of Matag, Pandan and Local tall coconut have benefited from this bio-control programme. More asecodes wasps will be sent to 50 farms at Kuala Nyalau, Sg. Mas, Stulan, Smanok and Sg. Sebemban in Bintulu Division. These farms were surveyed in August 2010, and were severely infested by the pest. These wasps could spread within an area of 10 km radius (Amporn Winothai, Department of Agriculture, Bangkok, personal communication, 14 July 2009). Thus over time, the wasps are expected to spread to the other coconut farms.

CONCLUSION

The brontispa beetles and the asecodes wasps are easy to rear. The use of the asecodes wasps in controlling the brontispa beetles on coconut is effective. It has greatly reduced the use of insecticides in the affected coconut farms.

Table 1. Monthly production of asecodes mummies

Month / Year	**Dates of harvesting**	**No. of Asecodes mummies**
Nov 2009	23.11.2009	450
Dec 2009	7.12.2009	1740
	10.12.2009	1240
	11.12.2009	1195
	21.12.2009	1200
	29.12.2009	2075
Jan 2010	4.1.2010	965
	11.1.2010	755
	18.1.2010	735
	22.1.2010	755
Feb 2010	2.2.2010	582
	11.2.2010	1110
	12.2.2010	215
	20.2.2010	1007
Mar 2010	1.3.2010	650
	8.3.2010	305
	19.3.2010	220
	23.3.2010	450
	30.3.2010	155
April 2010	9.4.2010	1735
	12.4.2010	2045
	28.4.2010	800
May 2010	3.5.2010	1268
June 2010	9.6.2010	1005
	14.6.2010	250
	28.6.2010	225
July 2010	21.7.2010	314
	27.7.2010	150
August 2010	1.8.2010	564
	11.8.2010	175
	16.8.2010	220
	19.8.2010	220
	23.8.2010	220
	26.8.2010	375
	30.8.2010	120
Sept 2010	3.9.2010	475
	9.9.2010	250
	15.9.2010	405
	22.9.2010	425
Total		26,825

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QUESTIONS AND ANSWERS:

Lai Kui Fong : This is a very cost-effective technique to control coconut pest. Is there any similar approach for biocontrol of infestation in the nipah / coconut leave manure? There is a need to establish similar control on nipah as well. I suggest that this biocontrol on *brontispa* method to be applied to the Northern Region. Regional AOs can send request to ARC for the wasps. Allocation for T&T for this purpose can always be added provided there is a request. Based on 1Azam, 5% of the total cost of the project can be used for this purpose.

Megir : Infestation of Nipah is by different parasite ie *Promoteca* sp.. Due to the availability of biocontrol, the infestation by Brontispa could be controlled and didn't spread despite the severe / high level of parasitism at 23 – 25% in coconut.

Table 2. Brontispa infestation levels at before and after release of asecodes wasps

No	Farmers name	Location of farm	Farm size (acre)	Coconut variety	Infestation levels (%)		Reduction in infestation levels (%)
					Before release	Six months after release	
1	Ibrahim Bin Lacho	Semera Ulu Sadong Jaya	4	Matag	24	11	54.1
2	Rubah Hj Wang	Semera Ulu Sadong Jaya	2	Matag	38	5	86.8
3	Mit ak Bengkang	Kpg. Bajong Ulu, Sebuyau	15	Local tall	29	7	75.8
4	Peter ak Abang	Sungai Buloh, Sadong Jaya	2	Matag	50	5	90
5	Junu ak Gabil	Sungai Buloh, Sadong Jaya	2	Matag	40	5	87.5
6	Misen ak Gabil	Sungai Buloh, Sadong Jaya	2	Matag	60	10	83.3
7	Hj.Wan Alkap B. Trusin	Semera Ulu Sadong Jaya	10	Matag	80	4	76
8	Julaihi	Semera Ulu Sadong Jaya	5	Matag	18	7	95
9	Man B. Lacho	Semera Ulu Sadong Jaya	3	Matag	18	5	72.2
10	Serong B. Lahian	Semera Ulu Sadong Jaya	2	Matag	70	12	82.8
11	Kambri B. Johari	Semera Ulu Sadong Jaya	2	Matag	65	4	61
12	Elaihi B. Sigon	Semera Ulu Sadong Jaya	7	Matag	60	9	93.8
13	Chai Tiam Foh	Sempadi Ulu, Moyan	23	Local tall	55	10	81.8
14	Asas Fajar Sdn.Bhd	Sg.Bako, Muara Tebas	4.5	Pandan	25	3	88
15	Adam ak Lawan	Sg.Buloh, Sadong Jaya	4	Matag	45	5	88.8
16	Chong Kian Fook	Sg.Bako, Muara Tebas	1	Pandan	40	3	92.5
17	Sadri B. Raee	Stakan, Samarahan	25	Local tall	35	3	91.4
18	Hamdan	Pandan, Lundu	3	Pandan	80	8	90
					Mean reduction of infestation level		82.8