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RECOVERY SURVEY OF SMALL SCALE FIELD RELEASES OF *BIOSTERES LONGICAUDATUS* ASHMEAD (HYM.: BRACONIDAE) IN BAI-CHI AREA, TAIWAN[1]

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An-Ly Yao (1989) Recovery survey of small scale field releases of *Biosteres longicaudatus* Ashmead (Hym.: Braconidae) in Bai-Chi area, Taiwan. *Bull. Inst. Zool., Academia Sinica* **28**(3): 211-214. The braconid, *Biosteres longicaudatus* Ashmead, was introduced from Florida and Hawaii in 1985 and 1986, and attempt to suppress the oriental fruit fly, *Dacus dorsalis* Hendel. A total of 1,694 females and 212 males was released in Bai-Chi area from January to December 1988. The first recovery of the wasps was obtained in 8 days after the initial release at the release site. No female wasps were recovered from fruit samples until 4 days after the twelfth release.

Key words: Biological control, Field release, *Dacus dorsalis*, *Biosteres longicaudatus*.

In Taiwan, the most serious threat to fruit crop is *Dacus dorsalis* Hendel. *D. dorsalis*, commonly referred to as the oriential fruit fly, has been known as a polyphagous species which attacks at least 32 genera and 89 species of fruit crops (Chu and Chen, 1985).

Given the polyphagous nature of *D. dorsalis*, effective biological control over a wide area supporting various host crops may depend on the introduction of different parasitoid species. The larger the number of species in the complex the greater the chances that it will efficiently regulate the population of the pest insects in the various and changing crop host habitats.

During late 1985, our laboratory decided to import parasitoids from Florida and Hawaii for laboratory studies. Of the 6 larval parasitoid species brought in during 1986-1987, we were successful in rearing *Biosteres longicaudatus* Ashmead in the laboratory.

B. longicaudatus is a solitary larval parasitoid and was recorded as one of the five native braconid parasitoid speices in Taiwan (Clausen *et al.*, 1965). During the past decade, only few numbers of *B. longicaudatus* were recorded in southern and eastern Taiwan (Yang, 1977; Yao and Lee, 1979). Baseline information on native parasitoid species in northern Taiwan was gathered from a 3-year, 1984-1986, survey of *D. dorsalis* infestation of Bai-Chi area and no *B. longicaudatus* was recorded (W. Y. Lee, unpublished data). Since we were able to increase the numbers of *B. longicaudatus* in the laboratory and it appeared to be an efficient larval parasitoid (Greany *et al.*,

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1977; Lawrence, 1981; Lawrence *et al.*, 1978; Yao, 1985), this species was selected for the first series of release in Bai-Chi area.

The objective of this preliminary study was simply to monitor the progress of *B. longicaudatus* establishment in release sites.

MATERIALS AND METHODS

Five to six days old host larvae confined in 13.5 cm diameter "sting unite," (Greany *et al.*, 1976), were exposed to *B. longicaudatus* in 30×30×30 cm cages for 24 hours. Adult parasitoids were supplied with honey, water and sugar cubes. Host larvae were removed after the exposure period and put into moist vermiculate to pupate. All insect colonies were reared at 25±2°C, 75±10% RH and 12:12 LD at the laboratory. The oldest parasitoids were 10 days old when liberated.

During January to December 1988, 24 releases were made. A total of 1,694 females and 212 males had been released in a guava grove in Bai-Chi area. Less number of males was released, because most of the released females have been already mated in the laboratory.

Bai-Chi is at about 30 km south of Taipei. The guava grove was about 6 hectares with a stand of about 4,000 guava trees of different varieties. The releases were made on the grounds near the center of the grove.

To determine if *B. longicaudatus* was established, the ripe fruits on the tree and freshly wind fallen infested fruits on the ground, if available, were sampled within a radius of 100 m around the release sites, approximately weekly after the initial release in January 1988. Procedures of handling the fruit samples brought back to the laboratory were similar to that decribed by Wong *et al.* (1984). Fruit samples were placed in plastic containers and held for 14 days. A layer of vermiculate was added to the bottom of containers to absorb the water from decaying fruits. Fruit samples were examined in 14 days. Mature fruit fly larvae and pupae were collected and counted, then put into moist verminulate to pupate. Records were kept of the numbers of *D. dorsalis* and parasitoids emerged from collected pupae. Parasitoids were identified to species and sex.

RESULTS AND DISCUSSION

The results of the releases of *B. longicaudatus* are given in Table 1. *B. longicaudatus* and *B. arisanus* (Sonan) were the two primary parasitoids recorded. *B. arisanus* is an egg-larval parasitoid and a native to Taiwan.

Twenty-five females and 10 males were released in Bai-Chi on January 13, 1988. Thirty-four pupae were recovered from the first week's sample. One male *B. longicaudatus* emerged from this sample, indicating that the laboratory-reared wasps were successful in seeking out infested fruit following rather small release. No wasps were recovered from fruit samples taken in Feburary. Seventeen pupae were collected on March 25, 1 male *B. longicaudatus* was recovered from a total of 11 emerged adults, a parasitization rate of 9.1% was achieved. No fruit samples were available during May, June, July, October, November and December. Two female wasps were obtained from fruit samples taken on August 23. It was the first time that the female wasps were ever recovered. In September, 9 female and 17 male wasps were obtained. Since we were able to recover *B. longicaudatus* during each month while fruit samples were available except February, it is conceivable that the multiple releases might bring the potential of establishment into relief. The data presented here are limited, and it is not clear whether *B. longicaudatus*

Table 1
Release results of the introduction of *B. longicaudatus* in Bai-Chi area (1988)

Date	No. *B. longicaudatus* released	No. pupae collected	No. fruit flies & parasitoids emerged	Fruit flies (%)	Parasitoids %	
					B. longicaudatus (No.)	*B. arisanus* (No.)
Jan. 13	25♀♀, 10♂♂	—	—	—	—	—
21	—	34	20	85.0	5.0 (1♂)	10.0 (1♀, 1♂)
27	50♀♀, 10♂♂	—	—	—	—	—
Feb. 5	40♀♀, 10♂♂	6	5	100.0	—	—
11	45♀♀, 10♂♂	—	—	—	—	—
25	50♀♀, 0♂♂	—	—	—	—	—
Mar. 10	44♀♀, 12♂♂	17	11	90.0	9.1 (1♂)	—
Apr. 27	90♀♀, 10♂♂	22	15	93.3	6.7 (1♂)	—
May 27	90♀♀, 10♂♂	—	—	—	—	—
June 17	45♀♀, 5♂♂	—	—	—	—	—
30	45♀♀, 5♂♂	—	—	—	—	—
July 8	90♀♀, 10♂♂	—	—	—	—	—
15	90♀♀, 10♂♂	—	—	—	—	—
29	90♀♀, 10♂♂	—	—	—	—	—
Aug. 23	90♀♀, 10♂♂	76	42	92.9	7.1 (2♀, 1♂)	—
Sept. 1	90♀♀, 10♂♂	210	162	98.2	0.6 (1♀)	1.2 (2♀)
8	45♀♀, 5♂♂	47	31	100.0	—	—
17	90♀♀, 10♂♂	32	2	100.0	—	—
23	90♀♀, 10♂♂	821	450	94.4	5.6 (8♀, 17♂)	—
30	90♀♀, 10♂♂	327	258	100.0	—	—
Oct. 11	90♀♀, 10♂♂	—	—	—	—	—
Nov. 4	90♀♀, 10♂♂	—	—	—	—	—
Dec. 14	45♀♀, 5♂♂	—	—	—	—	—
20	90♀♀, 10♂♂	—	—	—	—	—
30	90♀♀, 10♂♂	—	—	—	—	—
Total	1694♀♀, 212♂♂					

would establish in Bai-Chi permanently. The follow-up study of establishment progress will be continued. Establishment and detection are also hindered by the host's shift of host plants especially during the non-fruiting period of guava groves. The difficulty in establishing parasitoid caused by dispersal of the host population may be set off by releasing larger numbers of parasitoids and by distributing *B. longicaudatus* to locations where other host plants of *D. dorsalis* are occupied. These strategies could provide more hosts been searched and ensure the better chance of the parasitoid's establishment.

A more Intensive series of qualitative and quantitative data are needed to characterize the species proportions, sex ratios and phenology of *B. longicaudatus* among different major host plants of *D. dorsalis*. An integrated pest management strategy of *D. dorsalis* can not be implemented until more understood about the ecology of the introduced biocontrol insects.

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白鷄地區田間釋放 *Biosteres longicaudatus* Ashmead 之研究

姚 安 莉

自 1988 年 1 月起至 12 月止著者於白鷄地區共進行 24 次小規模釋放 *Biosteres longicaudatus* Ashmead，計釋放雌蟲 1,694 隻及雄蟲 212 隻。第一次於田間回收寄生蜂發現於第一次釋放後第八天所取樣的果實中。第一次回收到雌性寄生蜂則發現於第十二次釋放後所取樣的果實中。