Recent Introductions for Biological Control in Hawaii—X

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INTRODUCTION

This paper includes a list of new introductions and additional releases of beneficial organisms for biological control in Hawaii made since the last published listing (Davis and Krauss, 1964) and gives a few notes on the status of organisms recently introduced for the control of snail, weed, and insect pests.

SNAIL PEST CONTROL

Lymnaea ollula (Gould) (liverfluke snail).

The incidence of liver fluke, *Fasciola gigantica* Cobbold, an important parasite in Hawaii dairy and beef cattle, remained high (80 to 100 percent)[1] in areas inhabited by the intermediate host, *L. ollula.* Infested livers result in a loss of over $36,000 annually to the local cattle industry.

Although five sciomyzid predators of the liverfluke snail were introduced and widely liberated, only *Sepedon macropus* Walker has been recovered and is firmly established on Kauai, Oahu, and Maui.

Achatina fulica Bowdich (giant African snail).

Incipient infestations of the giant African snail were being successfully eradicated on Kauai and Hawaii, and biological control efforts in older snail populations on Oahu and Maui continued to make progress. Foremost of the introduced carnivorous snails is *Gonaxis quadrilateralis* (Preston) which continues to increase and spread in many snail-infested localities.

WEED PEST CONTROL

Lantana camara var. **aculeata** (L.) Moldenke (lantana).

Catabena esula Druce, *Hypena strigata* F. These introduced noctuids from California and east Africa respectively "exploded" on Maui in November and denuded approximately 10,000 acres of lantana between Kanaio and Alena. This was the most extensive outbreak observed on Maui since 1959, and the second in which *C. esula* has been of major importance in defoliating acres of lantana.

[1] Based on records of infested livers maintained by the Division of Animal Industry, State Department of Agriculture.

Table 1. New Introductions and Additional Releases for Biological Control in Hawaii 1964

Pest Needing Control	Organism Introduced	Source	Collector	Date Released (1964)	Number	Release Point**
Xylosandrus compactus (Eichhoff) (Black coffee twig borer)	New species near *Dendrosoter* sp. (Hymenoptera: Braconidae)	Los Banos and Lipa, Philippines	N.L.H. Krauss	July 28 June 15	86 100	Holualoa, Kona, Hawaii Nuuanu, Oahu
	Chaetospila frater (Girault) (Hymenoptera: Pteromalidae)	Los Banos and Lipa, Philippines	N.L.H. Krauss	Aug 28 Aug 25	50 40	Bingham Tract, Oahu Kailua, Kona, Hawaii
Gynaikothrips ficorum Marchal (Cuban laurel thrips or Banyan thrips)	*Montandoniola moraguesi* (Puton) (Hemiptera: Anthocoridae)	Manila, Philippines	N.L.H. Krauss	June 2 July	100 100	Pauoa, Oahu Port Allen, Kauai
	**Orius tristicolor* (White) (Hemiptera: Anthocoridae)	Tucson, Arizona	George D. Butler, Jr.	June 16 July 29	150 100	Moanalua, Oahu Port Allen, Kauai
Ceroplastes rubens Maskell (Red wax scale)	*Anysis alcocki* (Ashmead) (Hymenoptera: Pteromalidae)	Manila, Philippines	N.L.H. Krauss	Aug 28	12	Waianae, Oahu
Coccus viridis (Green) (Green scale and other soft scales)	******Metaphycus luteolus*** (Timberlake) (Hymenoptera· Encyrtidae)	Riverside, California	Don Chant	Oct 28 Oct 28	3,000 1,000	Tantalus, Oahu Makiki Nursery, Oahu
Dacus dorsalis Hendel (Oriental fruit fly)	**Opius incisi* Silvestri (Hymenoptera: Braconidae)	Kuala Lumpur and Singapore, Malaysia	N.L.H. Krauss	Nov	120	Makiki, Oahu
	Opius sp. (Hymenoptera: Braconidae)	Kuala Lumpur and Singapore, Malaysia	N.L.H. Krauss	Nov	52	Makiki, Oahu
Rubus lucidus Rydberg and other species of *Rubus* (Blackberry)	*Aptoforma* sp. (Lepidoptera: Tortricidae)	Jalapa, Veracruz, Mexico	N.L.H. Krauss	Aug 26	90	Olinda Forest Reserve, Maui

*Previously introduced
**Applies to initial release on each island only
***Introduced by Dr. Blair Bartlett, care of Department of Entomology, University of Hawaii

Octotoma scabripennis Guerin. Since the recovery of this blotch leaf mining chrysomelid in Kona on June 13, 1963, it has been found in many localities of this district. It was recovered on Makiki Round Top Drive, Oahu for the first time in October, 1964.

Tribulus terrestris L.; *T. cistoides* L. (puncture vine).

On June 4, and 10, 1964, colonies of the introduced puncture-vine weevils, *Microlarinus lareynii* Duval and *M. lypriformis* (Wollaston) were released at Barbers Point, Oahu and at Kihei, Maui, respectively. The weevils were reared from infested stems and seeds collected at West Kauai. By September 1964, all *T. cistoides* observed at Barbers Point had been killed by *Microlarinus* and the weevils had spread one-half mile from the release point. On Maui, fresh emergence holes were noted 38 days after release.

During the course of weevil population pressure on Kauai and Oahu which resulted in heavy puncture-vine mortality, it was observed that feeding scars[2] occurred on the stems of the following weeds: spiny amaranth, *Amaranthus spinosus,* lambs quarter, *Chenopodium album,* and cheese weed, *Malva parviflora.* These weeds were in close proximity to the puncture vine plants and there was absolutely no evidence of breeding.

Parasites reared from *Microlarinus* were *Eupelmus cushmani* (Crawford) (Eupelmidae) and *Euchalcidia* sp. (Chalcididae).

Rubus spp. (blackberry).

Schreckensteinia festaliella Hübner. This leaf-skeletonizing heliodinid was found established at Kokee, Kauai on February 19, 1964, and at Olinda, Maui on July 17, 1964.

Aptoforma sp. This Mexican leaf-feeding moth was released at Olinda, Maui in August 1964 but to date has not been recovered.

INSECT PEST CONTROL

Nezara viridula smaragdula (Fabricius) (southern green stink bug).

Introduced parasites of the southern green stink bug are well established and, in order of importance, are: *Asolcus* (=*Telenomus*) *basalis* (Wollaston) (Australia), *Trichopoda pennipes* var. *pilipes* Fabricius (West Indies) and *T. pennipes* (Fabricius) (Florida). Propagation of these parasites was discontinued on Oahu and Kauai as the stink bug populations were below economic levels. However, considerable damage to macadamia nuts occurred in Kona, Hawaii during the middle of the year, and propagation of *A. basalis* at the State Department of Agriculture facility in Hilo and the U.S.D.A. Plant Pest Control facility in Kona continued.

Gynaikothrips ficorum Marchal (Cuban laurel thrips).

The Cuban laurel thrips was discovered at Honolulu International Airport in January 1964 by Federal Plant Quarantine personnel and, within nine months,

[2] Although actual feeding was not observed, the stem scarring was typical of damage described by other workers.

had spread to the neighboring islands of Kauai, Maui, Hawaii, and Molokai. Only two breeding hosts have been recorded: Malayan or Chinese banyan, *Ficus retusa* and Benjamin tree, *F. benjamina.*

Because of their astronomical populations and their biting and swarming habits, the thrips became a public nuisance and natural enemies were sought for the control of this pest. Foremost of the introduced enemies was *Montandoniola moraguesi* (Puton), a predacious anthocorid from Manila, Philippines. This bug feeds on the eggs and nymphs of the thrips and was released for the first time at Pauoa Valley, Honolulu on June 2, 1964. It has since become well established on Oahu and is becoming established on Kauai since its initial release there on July 29, 1964.

MISCELLANEOUS

Bubulcus ibis L.

The introduced cattle egret, *B. ibis,* continued to increase in numbers, and by the end of the year, the population was estimated at 800 birds. The majority of the population preferred to remain in the Ewa District and nest in the mangrove thickets in the West Loch of Pearl Harbor.

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