

Recent Introductions for Biological Control in Hawaii XIV

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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 Chong, 1969) and gives a few notes on the status of pests and their purposely introduced natural enemies.

SNAIL PEST CONTROL

Achatina fulica Bowdich (giant African snail)

Populations of the giant African snail continued at pest levels in the Hana District, Island of Maui and have spread considerably since their first discovery on this island in December, 1960. Eradication measures of incipient infestations on Hawaii and Kauai are continuing.

Elsewhere in the state *A. fulica* is under partial to substantial control in many localities by the purposely introduced carnivorous snails, *Gonaxis quadrilateralis* (Preston), *G. kibweziensis* (Smith) and *Euglandina rosea* (Ferussac).

The introduced carabid predator, *Tefflus zanzibaricus alluaudi* Sternberg has not been observed since 1963.

Lymnaea ollula Gould (liverfluke snail)

The purposely introduced snail predator, *Sepedon sauteri* Hendel from Fukuoka, Japan was recovered for the first time at Wainiha Valley, Kauai on May 16th. This is a natural spread from Hanalei where it was first liberated on January 18, 1968. Additional recoveries in good numbers were made at Hanapepe and Wailua, indicating firm establishment of this species on Kauai.

On October 2, 1968, *S. sauteri* was recovered for the first time at Keanae and Waihee, Maui. Subsequent observations indicate that this sciomyzid fly is now well established in localized areas on this island.

WEED PEST CONTROL

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

Lepidopterous foliar insects, particularly the noctuid, *Hypena strigata* Fabricius were generally at very low population levels throughout the year on most islands of the State. As a result, considerable "comeback" of lantana was observed in some localities. Field egg parasitism of *H. strigata* by *Trichogramma semifumatum* was confirmed on Maui and Hawaii.

Foliar beetles, however, namely *Uroplata girardi* Pic and *Octotoma scabripennis* Guerin continued to build up and spread on Hawaii and are expected to exert considerable stress on lantana in some areas within the next 3-5 years.

Melastoma malabathricum L. (Indian rhododendron)

Caterpillars of the arctiid moth *Selca brunella* Hampson, introduced from Kuala Lumpur and Singapore in 1964 caused much foliar, fruit and twig damage over extensive areas on Kauai and Hawaii. In heavily infested localities considerable dieback resulted and a complete absence of flowers was noted.

A braconid parasite, *Meteorus* sp. has been reared from *Selca*.

Bocchoris fatualis (Lederer) and *B. adipalis* Zeller from Paete, Philippine Islands and Kuala Lumpur are now established at low population levels on Kauai and Hawaii. The caterpillars are leaf rollers.

Rubus spp.

Apotoforma sp. and *Schreckensteinia festaliella* Hubner, foliar feeding lepidopterous caterpillars, are now established at low population levels on Hawaii and are expected to increase and exert stress on wild blackberry in 3-5 years.

Host specificity tests with *Chlamisus gibbosa*, Fab., a chrysomelid from Tucker's Prairie, Missouri were completed in November, 1968 and their liberation is pending approval. This insect may become an important foliar and stem feeding insect of *Rubus penetrans*.

Hypericum perforatum (Klamath weed)

The purposely introduced gall midge from New Zealand, *Zeuxidiplosis giardi* (Kieffer) has spread extensively from the release point (6700 feet elevation) on Mt. Hualalai and is heavily infesting young seedlings one to two miles from the liberation site. A count of 186 galls was recorded on a recumbent seedling measuring six inches and numerous dead and dying young plants were observed and documented.

Many of the Klamath weeds at the release point of the introduced leaf feeding chrysomelid from California, *Chrysolina quadrigemina* Suffrian are dead and the beetle has spread to Bishop Estate Experimental Plot #7, about .4 of a mile below the release point. As many as 7 beetles were observed in July, 1968 on a single plant and many flowering plants averaged 2 beetles per plant. A newly emerged beetle was found in the soil at the base of one plant and this together with earlier adult beetle observations, suggested that the beetles ranged from one to 60 days old.

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

Biological control of *Tribulus* spp. by *Microlarinus lypriformis* (Wollaston) was substantial to complete on Oahu and Kauai; however, on Maui for some unexplained reason control was only partial.

The seed weevil, *M. lareynii* Duval was reintroduced through the cooperation of Dr. Richard Goeden, Department of Bio Control at Riverside, California but has not been recovered to date.

Clidemia hirta (Kosters curse)

This noxious weed pest is now widespread in the Koolau Mountain Range of Oahu. In 1953 a thrips, *Liothrips urichi* Karny was introduced from Fiji for its control but under forest conditions it has not proven very effective. Additional enemies are being sought.

INSECT PEST CONTROL

Nezara viridula (Linnaeus)

Southern green stink bug populations were higher than usual during the year but for the most part were confined to wasteland areas, occasionally overlapping into backyard and crop plantings.

A number of observations were made of *Nezara* at higher elevations, the highest being recorded on wild mullein growing at 10,000 feet, Mauna Kea. No extensive crop losses were reported however, and the introduced parasites, namely, *Trissolcus basalis* (Wollaston) and *Trichopoda pennipes* var *pilipes* and *T. pennipes* (Florida strain) gave partial to substantial control.

Rhabdoscelus obscurus (Boisduval) New Guinea sugarcane weevil

The New Guinea sugarcane weevil, *R. obscurus* occurred at economic levels on some sugar plantations in Hawaii, particularly on the Island of Kauai.

A tachinid fly, *Lixophaga sphenophori* (Villeneuve) which was introduced in 1910 for the control of the weevil is ubiquitous throughout infested areas in the state but it is suspected that modern management practices have interfered with its effectiveness.

In a cooperative effort between the Experiment Station, Hawaiian Sugar Planters' Association and the State Department of Agriculture, additional strains of *Lixophaga* were sought by Entomologist Fred Bianchi in New Guinea and resulted in the importation of three strains from Wau, Popondetta and Garaina respectively during 1968. Of these, initial releases of the Wau and Garaina flies were made on Kauai and the latter on Hawaii in a 3-5 year statewide program.

Xylosandrus compactus Eichhoff (black twig borer)

The black twig borer was found infesting wild coffee in Iao Valley, Maui on October 29, 1968. This is the first record of this pest on Maui.

On Oahu the following new host records were recorded: thimble berry, *Rubus rosaeifolius*; lantana, *Lantana camara* var *aculeata*; butterfly bush, *Buddleja asiatica*; olomea, *Perrottetia sandwicensis*; manono, *Gouldia* sp.; pilo, *Coprosma* sp.; alani, *Pelea* sp.; and mehame, *Antidesma platyphyllum*, all at 2,210 feet elevation, Mt. Kaala.

Through the cooperation of Dr. Bruce Kennedy, Northeastern Forest

Experiment Station, U. S. Forest Service, a braconid parasite, *Dendrosoter protuberans* Nees was received for trial on *X. compactus*. Although the braconid did not parasitize the black twig borer in the insectary direct releases were made in the field. No recoveries have been made to date.

Sphenophorus venatus vestitus (Chittenden) (hunting billbug)

Culturing and liberations of the egg parasite, *Patasson calendrae* (Gahan) Missouri strain, for the control of the hunting billbug, *S. venatus vestitus* continued at State Department of Agriculture facilities on Maui. No recoveries have been made up to the present time.

The Florida strain of *P. calendrae* was obtained from a single parasitized curculionid egg found by Harry Nakao and Richard Suzukawa in lovegrass stalks at Ft. Lauderdale, Florida in June, 1968. A total of 11 mymarid wasps emerged on June 22nd, and from these, thousands of progeny have been cultured at the Hilo insectary facilities, Hawaii. Liberations are continuing and no recoveries have been made to date.

This was the first record of this mymarid egg parasite in Florida.

Pseudaletia unipuncta (Haworth) (Cosmopolitan armyworm)

The braconid, *Apanteles militaris* (Walsh) has extended its range considerably since its liberation at Kahua and Parker ranches in June, 1960. In addition to the summit of Mt. Hualalai (Proc. Hawaiian. Entomol. Soc. Vol. 19: 379), it was observed at 3500' elevation, Paaulo in January, 1968 in numerous cocoon clusters. This purposely introduced braconid from Riverside, California in May, 1960 is attributed to holding *P. unipuncta* populations below pest levels during the past six years in areas that were formerly plagued by the cosmopolitan armyworm pest.

Herpetogramma licarsisalis (Walker) (grass webworm)

This notorious grass pest has spread to all islands since it was first reported on Oahu in August, 1967.

Established parasites have been reared from *H. licarsisalis* include the following:

<i>Egg parasites</i>	<i>Larval</i>	<i>Pupal</i>
<i>Trichogrammatidae</i> :	<i>Ichneumonidae</i> :	<i>Chalcidae</i> :
<i>Trichogramma semifumatum</i>	<i>Casinarina infesta</i> (Cress.)	<i>Brachymeria</i> sp.
Perkins	<i>Cremastus flavo-orbatalis</i> (Cam.)	
	<i>Braconidae</i> :	
	<i>Meteorus laphygmae</i> Viereck	
	<i>Tachinidae</i> :	
	<i>Eucelatoria armigera</i> (Coq.)	

MISCELLANEOUS

Haematobia irritans (Linnaeus) (horn fly)

Bubulcus ibis L. (cattle egret)

Increased sightings of cattle egrets on the Neighbor Islands, particularly

TABLE 1. *New Introductions and additional releases for biological control in Hawaii 1968*

(All introductions by Entomology Branch, Hawaii Dept. Agr., and Hawaiian Sugar Planters' Experiment Station, Honolulu)

<i>Pest needing control</i>	<i>Organism introduced</i>	<i>Source</i>	<i>Collector</i>	<i>Date Rel'd</i>	<i>Number**</i>	<i>Release point</i>
<i>Weed Pests</i>						
<i>Rubus</i> spp. (blackberry)	* <i>Priophorus morio</i> (Lepeletier) (Hymenoptera: Tenthredinidae)	Albany, Calif.	C. J. Davis	Jul. 23	3	Wright Road, Volcano, Hawaii
<i>Insect Pests</i>						
<i>Pieris rapae</i> (L.) (imported cabbage worm)	<i>Apanteles rubecula</i> Marshall (Hymenoptera: Braconidae)	Columbia, Missouri	D. F. Parker	Jan. 8	53	Pulehu, Maui
<i>Xylosandrus compactus</i> (Eichh.) (black twig borer)	<i>Dendrosoter protuberans</i> Nees (Avignon & Kohn varieties) (Hymenoptera: Braconidae)	Delaware, Ohio	B. H. Kennedy	Jan. 9	40A 35K	Tantalus, Oahu
<i>Rhabdoscelus obscurus</i> (Boisd.) (New Guinea sugarcane weevil)	* <i>Lixophaga sphenophori</i> (Villeneuve) (Diptera: Tachinidae)	Wau, Popondetta & Garaina, New Guinea	F. A. Bianchi	May 29	26	Kilauea Plantation, Kauai
<i>Sphenophorus venatus</i> <i>vestitus</i> (Chittenden) (hunting billbug)	<i>Bracon</i> sp. near <i>sphenophori</i> Mues. (Hymenoptera: Braconidae)	Columbia, Missouri	Harry Nakao R. Suzukawa	Aug. 29	3	Kahua Ranch, Hawaii
	* <i>Patasson calendrae</i> (Gahan) Florida strain (Hymenoptera: Mymaridae)	Ft. Lauderdale, Florida	Harry Nakao R. Suzukawa	Oct.	1,108	Hilo, Hawaii

*Previously introduced

**Applies to initial release on each Island only.

Kauai were reported by Wild Life Biologists and others.

At Kawainui Swamp, Oahu, approximately 100 egrets have been observed frequently in various pastures.

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