Introductions for Biological Control in Hawaii - 1977 and 1978

H. K. NAKAO, G. Y. FUNASAKI, S. Y. HIGA AND P. Y. LAI
STATE DEPARTMENT OF AGRICULTURE
HONOLULU, HAWAII 96814

The Plant Pest Control Branch (formerly Entomology Branch) of the Hawaii Department of Agriculture has maintained a beneficial organism introduction program for about 75 years. This paper includes a list of insects introduced and/or released for biological control during 1977 and 1978 (Table 1), with notes on the status of some pests and their purposely introduced natural enemies.

WEED PEST CONTROL

Ageratina riparia (Regel) K. & R. (Hamakua pamakani)

Evaluation surveys have shown appreciable reductions of Hamakua pamakani growths in several localities on the Big Island due to the activities of all three control agents (the gall fly, *Procecidochares alani* Steyskal; the plume moth or defoliator, *Oidaematophorus* sp., and the leaf spot fungus, *Cercosporella ageratinae*). In the Kona District, significant pamakani reduction is occurring at Kaloko (e.g., Palani Rance) where forageable grasses are replacing pamakani. Heavy defoliation appears to be the primary cause of pamakani dieback in the Volcano area where replacement by kikuyu grass is evident. At Onomea, in the Hamakua District, the reduction of pamakani has resulted in the resurgence of honohono grass.

INSECT PEST CONTROL

Carpophilus hemipterus (Linnaeus) and **Urophorus humeralis** (Fabricius) (Pineapple souring beetles)

A cooperative agreement, established in 1974, between the pineapple industry and the HDOA to carry out explorations and investigations for natural enemies of these perennial nuisance pests, resulted in the introduction of a staphylinid predator from the Commonwealth Institute of Biological Control, Trinidad, West Indies in April 1977. Field releases of *Philothalpus analis* (Erichson) were concentrated on the island of Lanai and to a lesser extent on Maui and Oahu. Since its initial release, approximately 8,000 predators have been liberated on Lanai and another 2,000 on Maui and Oahu. Efforts to recover this insect, thus far, have been negative.

Liriomyza spp. (Leafminers)

Since June 1975, a total of 17 parasites was introduced and released for leafminer control. Among the parasites released, *Chrysonotomyia punctiventris* (Crawford) and *Cothonaspis* n. sp., have been readily recovered in both Waianae and Waimanalo, Oahu. *C. punctiventris*, in particular, is becoming the dominant species on cucumber, surpassing the long established and previously dominant species, *Diglyphus begini* (Ashmead), in the Waianae area. Monthly surveys of bean, tomato, cucumber and squash have been conducted to evaluate the degree of parasitism and the efficiency of the parasites.

Keiferia lycopersicella (Walsingham) (Tomato pinworm)

During this period, four promising species of parasites, *Bracon* sp., *Campoplex* n. sp., *Parahormius pallidipes* (Ashmead) and *Sympiesis stigmatipennis* Girault were introduced. However, none as yet, has been recovered.

Tetranychus cinnabarinus (Boisduval) (Carmine spider mite)

A total of six species of predators has been introduced from California to aid in the control of the carmine spider mite. Among the six species, *Amblyseius californicus* (McGregor) has been transferred to the Department of Entomology, University of Hawaii, for future propagation and research. The remaining five species have been propagated in the Hawaii Department of Agriculture Insectary and liberated at various localities on Oahu.

Pineus pini (Macquart) (Eurasian pine adelgid)

Two species of chamaemyiid predators, *Leucopis nigraluna* McAlpine and *L. obscura* Haliday, which were earlier introduced, the former from Pakistan in 1972 and the latter from France in 1976, have become well established; the former on the island of Hawaii and the latter on Maui, Molokai and recently on Kauai. These two species have exerted effective control on this pine pest. New growths have since been observed on pine trees previously heavily infested with the pine adelgid.

ACKNOWLEDGEMENTS

Assistance by foreign and domestic collaborators and our staff is gratefully acknowledged. Determinations by specialists of the Systematic Entomology Laboratory, U. S. Department of Agriculture and the University of Hawaii were invaluable.

TABLE 1. *Introductions for Biological Control in Hawaii,* 1977 *and* 1978

Pest Needing Control	Organism Introduced	Source	Sender	Date Initial Release	No. Rel'd w/in Period	Localities Rel'd.
Chrysodeixis chalcites (Esper) (Green garden looper)	*Copidosoma truncatellum*(R) (Dalm.)	Texas	R. Burkhart	8/77	250	Waimanalo, Oahu
		Riverside, California	E. Oatman	10/77	320	Kapaia, Kauai
Keiferia lycopersicella (Walls.) (Tomato pinworm)	*Apanteles dignus*(R) Muesebeck	Texas	R. Burkhart	7/76	10,935	Various localities on Kauai and Maui
		Riverside, California	E. Oatman	11/77	350	Anahola, Waimea, Kauai
	Apanteles gelechiidivorus Marsh	Riverside, California	E. Oatman	11/77	470	Kahaluu, Oahu
	Apanteles scutellaris(R) Muesebeck	Texas-Mexico	R. Burkhart	10/76	793	Kauai, Oahu, Maui
	Bracon sp.	Sanarate, Guatemala	R. Burkhart	3/78	50	Anahola, Kauai
	Campoplex n. sp.	Actopan, Mexico	R. Burkhart	2/78	100	Kapahi, Kauai
	Parahormius pallidipes(r) (Ashmead)	Arizona, California Texas, Mexico & Guatemala	R. Burkhart	9/77	2,460	Kauai, Maui, Oahu, Hawaii
	Sympiesis stigmatipennis Girault	Riverside, California	E. Oatman	10/77	3,940	Kauai, Oahu, Hawaii
Liriomyza spp. (Leafminders)	*Chrysocharis clarkae* Yoshimoto	BIRL, Newark, Delaware	R. Hendrickson	6/76	15,550	Oahu and Hawaii
	Chrysocharis	BIRL, Newark,	R. Hendrickson	11.76	23,045	Oahu and Maui

TABLE 1. *Introductions for Biological Control in Hawaii,* 1977 *and* 1978 (Continued)

Pest Needing Control	Organism Introduced	Source	Sender	Date Initial Release	No. Rel'd w/in Period	Localities Rel'd.
	*girault*i Yoshimoto	Delaware				
	Chrysocharis parksi(R) Crawford	Indio, California	R. Burkhart	12/76	21,095	Various localities—Oahu
	Chrysocharis melaensis Walker	BIRL, Newark, Delaware	R. Hendrickson	7/77	1,785	Various localities—Oahu
	Chrysonotomyia agromyzae (Crawford)	Linares, Mexico	R. Burkhart	5/77	15,075	Oahu and Hawaii
	Chrysonotomyia punctiventris (Crawford)	Imperial Valley, California	R. Burkhart	10/77	21,625	Oahu, Maui, Hawaii
	Cothonaspis n. sp.	Texas	R. Burkhart	12/76	70,640	Oahu, Maui, Hawaii
	Diglyphus begini(R) (Ashmead)	Metzquititlan, Mexico	R. Burkhart	1/77	2,110	Various localities—Oahu
	Diglyphus n. sp.	Linares, Mexico	R. Burkhart	12/76	37,350	Oahu, Maui, Hawaii
	Opius dimidiatus Ashmead)	BIRL, Newark, Delaware	R. Hendrickson	5/76	19,220	Kauai, Oahu, Maui, Hawaii
	Opius montanus (Ashmead)	San Diego, California	R. Burkhart	10/77	3,440	Various localities—Oahu
	Opius sp.	Linares, Mexico	R. Burkhart	1/77	8,400	Various localities—Oahu
	Pediobius acantha (Walker)	Israel	D. Gerling	10/77	10,960	Oahu, Maui, Hawaii

TABLE 1. *Introductions for Biological Control in Hawaii, 1977 and 1978* (Continued)

Pest Needing Control	Organism Introduced	Source	Sender	Date Initial Release	No. Rel'd w/in Period	Localities Rel'd.
	Sympiesis n. sp.	BIRL, Newark, Delaware	R. Hendrickson	5/77	1,175	Oahu, Maui
Carpophilus hemipterus (L.)/ *Urophorus humeralis* (F.) (Pineapple souring beetles)	*Philothalpus analis* (Erichson)	C.I.B.C., Trinidad	F. Bennett	4/77	10,850	Lanai, Maui, Oahu
Pineus pini (Macquart) (Eurasian pine adelgid)	*Scymnus suturalis* Thunberg	EPL, USDA, France	J. Drea	11/76	66	Polipoli, Maui
Tetranychus cinnabarinus (Boisd.) (Carmine spider mite)	*Amblyseius californicus* (McGregor)	U.C., Riverside, California	J. McMurtry	3/78	1,700	Pearl City, Oahu; Hilo, Hawaii
	Iphiseius degenerans (Berlese)	U.C., Riverside California	J. McMurtry	8/78	200	Pearl City, Waianae (Oahu)
	Metaseiulus occidentalis(R) Banks	U.C., Riverside, California	J. McMurtry	5/78	100	Waimanalo, Oahu
	Phytoseiulus longipes (Evans)	U.C., Riverside California	J. McMurtry	6/78	345	Various localities—Oahu
	Stethorus loxtoni Britton	U.C., Berkeley, California	M. Hoy	10/78	630	Various localities—Oahu
	Stethorus picipes Casey(R)	U.C., Riverside, California	E. Oatman	11/78	170	Various localities—Oahu
Trialeurodes	*Encarsia*	Riverside,	K. Murai	7/78	15,550	Oahu and Hawaii

TABLE 1. *Introductions for Biological Control in Hawaii,* 1977 *and* 1978 (Continued)

Pest Needing Control	Organism Introduced	Source	Sender	Date Initial Release	No. Rel'd w/in Period	Localities Rel'd.
vaporariorum (Westwood) (Greenhouse whitefly)	*formosa*(R) Gahan	California				
	Encarsia **pergandiella**(R) (Howard)	Riverside, California	K. Murai	7/78	300	Mt. View, Hawaii
	Eretmocerus sp.	Woodlake, California	K. Murai	7/78	1,680	Oahu and Hawaii

(R) = Reintroduction of an established species.
(r) = Reintroduction of a chance immigrant that was reported established in 1943 but has since disappeared.