

Biological Control Investigations on Lantana

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Lantana (*Lantana camara aculeata*) is a tropical American shrub of the family Verbenaceae which has become a very serious pest of rangeland and other agricultural land in Hawaii, Fiji, Australia, Africa, and many other tropical regions. The science of biological control of weeds was begun by Albert Koebele, Government Entomologist of Hawaii, who in 1902 introduced more than 20 species of insects into Hawaii from Mexico against *Lantana*. Eight of these species were established in the islands and a fair degree of control of the plant was obtained in some areas, especially in the drier regions. In 1952 the author began work on this problem in Cuba, and since that year has carried on investigations from time to time in various parts of tropical and subtropical America from California, Texas, and Florida to Argentina, and in other regions. Some of the insects found are briefly discussed in this paper.

Selected insects were dispatched to Hawaii by air and the work of propagation, testing of food habits in a quarantine insectary, and liberation of approved species was carried on there by Q. C. Chock, C. J. Davis, P. W. Weber, H. K. Nakao, Mabel Chong, and other entomologists of the State Department of Agriculture (formerly Board of Agriculture and Forestry). A great deal of useful assistance was given me by entomologists in the countries visited. Most of the identifications of insects was done by specialists of the Entomology Research Division, U.S. Department of Agriculture, and of species of *Lantana* by Harold Moldenke, Yonkers, New York. John Mann, Entomologist of the Queensland Department of Public Lands, joined the author in Mexico in July 1953 on the lantana project and worked there until January 1954. The governments of Fiji, Australia and Queensland provided support for the project part of the time.

HEMIPTERA

***Teleonemia scrupulosa* Stål.** This tingid leaf-bug was introduced into Hawaii from Mexico by Albert Koebele in 1902. It became established and has been one of the most important of Koebele's lantana insect introductions. In 1954 strains sent by the author from Brazil, British Honduras, and Trinidad were released on various islands.

***Teleonemia vanduzeei* Drake.** This leaf-bug was collected on *Lantana* in Cuba in 1952 and was released the same year on Oahu, Hawaii, and Maui. It was also collected at Coral Gables, Florida in 1954 and liberations were made from these introductions. This species resembles *T. scrupulosa* but has more slender and less pilose antennae. It is not definitely known to be established.

LEPIDOPTERA

Hypena strigata F. This phalaenid (previously referred to as *Hypena jussalis* Walker in the PROCEEDINGS) was sent by the author to Hawaii in 1957 from Umtali, Southern Rhodesia and Diani Beach, Kenya where it was found feeding on the introduced *Lantana camara*. At Diani Beach the larvae were also seen feeding on *Lantana trifolia*. The first releases in Hawaii were made in September 1957. This insect has become very abundant, causing heavy defoliation and die-back of the plants. It is one of the most important of the lantana insects.

Diastema tigris Guenée. In December 1953 the writer shipped this phalaenid, which feeds on lantana leaves, to Honolulu from collections made at Summit and Gamboa in the Panama Canal Zone and the Bejuco area of Panama. Releases in Hawaii were made beginning in July and August 1954 but the moth apparently failed to become established. In November 1961 further collections were made in Merida, Yucatan, Mexico and propagation in Honolulu has been begun with these.

Diastema morata Schaus. Caterpillars of this moth were found feeding on lantana leaves in Mexico at Merida, Yucatan in October 1954 and Tehuacan, Puebla, July 1955. The small number collected precluded propagation.

Catabena esula Druce. The author collected this phalaenid on lantana plants near Exposition Park in Los Angeles, California in September 1954. The first releases were made in Hawaii in April 1955. The first field recoveries were made in August 1957 and the moths have since become very abundant in some areas. I have found this species in Mexico, but never in large numbers.

Syngamia haemorrhoidalis Guenée. In September-October 1955 larvae of this pyraustid taken on lantana at Coral Gables, Florida were sent to Honolulu, and during the following month more were forwarded from Santiago de las Vegas, Cuba. The first liberation was made in April 1956. The species is well established and causing considerable defoliation of lantana.

Langsdorfia franckii Hübner. Caterpillars of this cossid were found in stems and roots of *Lantana scorta* in the Jalapa area of Veracruz state, Mexico. They are about 5 cm. long, red and have a strong persistent odor when injured. Propagation of this species has been very difficult in Hawaii and no releases have been made.

Phassus argentiferus Walker. The brown larvae of this hepialid moth are up to 7 cm. long. They were found at various places in the states of Veracruz and Morelos in Mexico, boring in stems and roots of *Lantana* spp. A damp sack of chewed wood fragments and silk is formed over the entrance to the burrow. In January 1955 adults were observed emerging from puparia in *Lantana camara mista* stems at Mocambo, near Veracruz. The females scattered small gray eggs about. A moth with a wingspread of 130 mm. issued from a puparium 65 mm. long. This insect attacks other plants and has not been released in Hawaii. I have found what is apparently this species in lantana in Costa Rica and elsewhere.

COLEOPTERA

Plagiohammus spinipennis Thomson. The young larvae of this cerambycid girdle the stems of *Lantana* causing a swollen area, and then bore down the stems and roots. Adults feed on the leaves. A few feeding tests were made in Honolulu with limited numbers sent by John Mann in 1953 and by the writer in 1954 and in later years from Veracruz state. In 1959 the writer sent many mature larvae from *Lantana scorta* in the Jalapa area, Veracruz, and the tests were completed. The first release was made in April 1960. There is some evidence that this insect is becoming established.

Arenicopsis championi Bates. This slim gray cerambycid is a borer in branches of *Lantana camara mista* at Veracruz and nearby Mocambo and Boca del Rio. The horntailed larvae work down the branches making occasional holes to the outer surface through which chewed wood fragments are ejected. The adults feed on the leaves. Adults were found on the plants from May to July. Two species of parasites were reared from this insect: the braconid *Heterospilus* sp. and the ichneumonid *Agonocryptus chichimecus* (Cresson). John Mann made shipments of larvae to Hawaii in 1953 and the author sent larvae, pupae, and adults in large number in 1954 and succeeding years. The first release in Hawaii was made in June 1955. This borer is not known to be established in the islands.

Octotoma scabripennis Guérin. The flattened yellow larvae of this chryso-melid mine leaves of *Lantana glandulosissima* at Cuernavaca, Morelos. The adults are about 7 mm. long, flattened and black with a brownish tinge to the thorax. Adults feed on the leaves, making a characteristic scarring. Large larvae, pupae and adults were observed in August and September. John Mann and the author sent this beetle to Hawaii in 1953, and the author sent many more in 1954 and later years. The first releases were made in November 1953. The beetle is not known to be established.

Octotoma sp. probably *plicatula* (F.). This is another leafminer in lantana. It was sent to Honolulu from Zamorano, Honduras in September 1953, and a small number were released in May 1954. It has not been recovered.

Octotoma gundlachi Suffrian. This *Octotoma* was found mining lantana leaves at the Bosque de Habana in Havana and Vinales Valley in Cuba. The adults feed on the leaves. A chalcid, *Spilochalcis odontotae* Howard, was reared from larvae. This species was sent to Hawaii in April 1953 but was not propagated successfully.

Uroplata girardi Pic. In July 1961 larvae, pupae and adults of this chryso-melid leafminer were found in lantana at Vitoria, Espirito Santo, Brazil. They favored shaded areas. A shipment was sent to Honolulu, and the first release in the islands was made in December 1961.

Uroplata fulvopustulata Baly. This leafminer was found in lantana leaves at Gamboa, Summit and Pedro Miguel in the Panama Canal Zone and Nata in Panama in December 1953. A braconid, *Bracon* n. sp., was reared from larvae at Summit. Adults were observed feeding on leaves at Revolcadero, near Acapulco, Guerrero, Mexico in July 1959. This chryso-melid has not been released in Hawaii.