

# Verification of the Absence of Oriental Fruit and Melon Fruit Fly Following an Eradication Program in the Mariana Islands <sup>1</sup>

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The Oriental fruit fly, *Dacus dorsalis* Hendel, and the melon fly, *Dacus cucurbitae* Coq. have been reported in the Mariana Islands of Guam, Rota, Tinian and Saipan. The Oriental fruit fly was first reported on Saipan in 1935 (Esaki, 1952) and it then spread to other islands. Maehler confirmed its presence on Guam in 1948. The melon fly was first recorded from Guam in 1940 by Swezey but Esaki believes it probably had been there since 1932. The melon fly had spread to Rota, Saipan and Tinian by 1943 (Esaki, 1952).

Farmers on Saipan, Tinian and Rota have for many years commercially produced fruits and vegetables for export. The presence of these species of fruit flies required specific commodity treatments before export shipments could be made.

In 1960 the US Department of Agriculture, US Navy and the Trust Territory of the Pacific initiated a cooperative fruit fly eradication program against both species utilizing the male annihilation, sterile fly release techniques and spot treatments with protein bait sprays.

The Oriental fruit fly was eradicated from Guam, Rota, Agiguan, Tinian and Saipan in 1965 (Steiner et al., 1965a, 1970). It has not been observed or trapped in the Mariana Islands since 1965.

The melon fly is present on Guam but was eradicated from Rota in 1963 (Steiner et al., 1965b). It has not been observed or trapped on Tinian, Agiguan or Saipan since 1963. Rota being the closest island to Guam, 37 miles to the N.E., has experienced reintroduction of melon fly eight times up to June 1971. Each time the development of a melon fly population was prevented by prompt release of sterile flies (Chambers et al., 1969). Melon fly traps and host fruit collections to monitor the islands are being continued by Trust Territory personnel.

The reintroductions of melon fly to Rota may have occurred in one of the following ways:

- a. Fruit infested with eggs was carried from Guam to Rota, and escaped detection by quarantine officials.
- b. Melon fly can fly to Rota on calm days.
- c. Favorable winds carried the fly to Rota.

During the dry season (January-June) winds are predominantly E.N.E. trades. During typhoon season (June-January) the counter-clockwise winds could carry flies from Guam to Rota. During the eradication program (1961-1963) dye-marked Oriental fruit flies were picked up in traps on Rota following such counter-clockwise winds.

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This study was conducted in 1976-77 to ascertain if the Oriental fruit fly and melon fly were present on Rota, Saipan and Tinian.

*Materials and Methods.*—Paired sticky paper, Jackson traps (Harris et al., 1971) were utilized in this study. Oriental fruit fly traps were baited with 5 ml of methyl eugenol (Steiner, 1952) containing 0.5 percent naled applied to a 2.5 cm × 8 mm diameter dental roll. Melon fly traps were baited with 10 ml of cue-lure (Beroza et al., 1960) containing 0.5 percent naled applied to the dental roll. Eighty-six Jackson traps were installed on Saipan, 50 on Tinian and 100 on Rota. Traps were examined at least every 2 weeks and lure was replenished as needed. Available trap records of the Trust Territory, Department of Agriculture, Mariana District were examined.

A common non-economic tephritid, *Dacus ochrosiae*, is also attracted to cue-lure. Female Oriental and melon fruit flies are also attracted to their respective male lures in the relative absence of males (Nakagawa et al., 1970) Trapping of *D. ochrosiae* was an indication that cue-lure was dispersing throughout the area.

Fruit fly host plants producing fruit were examined for melon fly stings and larvae. Past records of host fruit sampling by personnel of the Mariana District, Department of Agriculture, were examined.

*Results and Discussion.*—Since the eradication of the Oriental and melon fly from the southern Mariana Islands of the Trust Territory of the Pacific, a regular melon fly trapping and host fruit sampling program has been carried on by personnel of the Trust Territory of the Pacific, Department of Agriculture, Mariana District. Traps were placed in fruit host producing areas, as well as around the airports and harbor facilities. The numbers of traps and months in operation varied with the availability of lure and traps (Table 1). Personnel conducting the monitoring program had preserved and plastic mounted specimens to assist them in positive identification of the melon and Oriental fruit fly.

*Fruit Fly Trap Catches.*—The Rota District Agriculturist had an average of 66-100 melon fly traps in operation each month of the year on Rota. For the periods of 1974-76 and the first 3 months of 1977 43,437 *Dacus ochrosiae* were captured. No melon fly were trapped or observed on the island during the same period. On August 25, 1976, 100 melon and Oriental fruit fly traps were put in operation. The sites were the same as utilized in the eradication program. In six months operation no melon or Oriental fruit flies were trapped and 2,283 *Dacus ochrosiae* were captured. The District Agriculturist personnel are continuing to monitor the island with melon fly traps.

Saipan agriculture personnel operated on the average of 28-30 traps 4 to 9 months of the year. For the years 1971-76 a total of 11,260 *D. ochrosiae* and no melon fly were captured. In August-December 1976, 86 melon and Oriental fruit fly traps were installed on the island. During this 4 month period of operation 408 *D. ochrosiae* were trapped and no melon or Oriental fruit fly captured.

Tinian District Agriculturist personnel have periodically operated 40 to 50 melon fly traps 2 to 9 months each year. Melon fly has not been observed or trapped since 1963 on Tinian. From 1971 through 1973

Table 1.—*Fruit flies captured in traps baited with male lures<sup>1</sup>, Mariana Islands, 1971 to April 1977.*

Year	Months trapped	Average #traps/month	DO <sup>2</sup> -males captured	
			Per trap/month	Total
Rota Island				
1974	12	66	41.5	32,860
1975	12	66	5.6	4,441
1976	12	83	5.9	5,890
1977	3	100	0.8	246
Saipan Island				
1971	4	28	1.2	143
1972	9	28	17.7	4,478
1973	9	28	7.7	1,939
1974	8	28	9.4	2,109
1975	6	30	8.0	1,453
1976	12	39	2.4	1,138
Tinian Island				
1971	9	39	10.0	4,702
1972	3	50	67.7	10,157
1973	9	50	51.5	23,210
1974		Data not available		
1975	2	50	45.2	4,517
1976	2	50	3.1	308

<sup>1</sup> 5 ml methyl eugenol—male Oriental fruit fly lure  
10 ml cue-lure—male melon fly lure

<sup>2</sup> DO = *Dacus ochrosiae*. No oriental fruit fly, *D. dorsalis*, or melon fly, *D. cucurbitae*, were captured during the same period.

48,783 *D. ochrosiae* were trapped. Fifty Oriental and melon fruit fly traps established in August 1976 in fruit producing areas and the sites utilized during the eradication program trapped 308 *D. ochrosiae* but no melon or Oriental fruit fly during a 2 month period.

The trap catches of *D. ochrosiae* indicated cue-lure was dispersing over the area.

*Host Fruit Collections.*—The visit to the Islands in August 1976 was 3 months after typhoon Pamela, with winds of 100-130 knots that destroyed many of the fruit and vegetable farms. Papaya trees were without leaves; a few small fruit were left hanging. The most common wild host for melon fly, *Momordica charantia*, was blossoming and small fruits forming. Mature yellow-orange fruit with red seeds were difficult to find. Many cucumber, cantaloupe and watermelon plantings were destroyed by the typhoon. Examination of the fruit and vines for melon fly ovipositional punctures (stings) and larvae was possible even under the wet conditions.

*Rota.*—*Momordica* vines were growing in areas along Talaghaya Road, Isang, Gampapa and Dugi. Vines were blossoming and 200 green to greenish-white fruits were examined. No stings or larvae of the melon fly were present. Twenty-five mature *Momordica* fruit examined were not damaged by melon fly. Also examined were 5 watermelon, cantaloupe and cucumber plantings. No misshapen, stung fruit or vines were found in any of the plantings. Farmers reported no fruit fly injury in years. Fifty

to one hundred fruits were examined in each planting.

*Saipan.*—*Momordica* vines were growing in many areas. The plants were blossoming and producing young fruit. Examination of 150 young fruits and 20 mature fruits showed no fruit fly injury. The cucumber patch at the Chacha Experiment Station area was heavily damaged by the typhoon and salt water spray. The few remaining green vines and cucumbers in the field were not damaged by melon fly. A small patch of watermelon and cantaloupe, heavily damaged by the typhoon, with a few vines and fruit remaining were free of melon fly injury.

*Tinian.*—*Momordica* vines were growing rampant over the farming areas damaged by the typhoon. The vines were flowering and producing many young fruit. None of the fruit was damaged by melon fly. Plantings of cucumber, watermelon and cantaloupe had received damage from the typhoon. Over 300 fruits were examined and no melon fly injury to fruits or vines was evident. Papaya trees were without fruit and beginning to recover from the typhoon. Farmers had not seen fruit fly injury in the crops for many years.

*Summary*—Oriental fruit fly and melon fly traps operated on Rota, Saipan and Tinian from August through December 1976 did not catch any fruit flies other than *Dacus ochrosiae*. Traps operated by the Trust Territory Department of Agriculture personnel for the years 1971-1976 failed to catch any Oriental and melon fly. Field examinations of fruits and vines of the bitter melon (*Momordica charantia*), cantaloupe, cucumber and watermelon were free of Oriental fruit fly and melon fly injury. The Oriental fruit fly has been eradicated from Rota, Saipan and Tinian. The melon fly was not found on Rota, Saipan, or Tinian. The last record of melon fly on Saipan and Tinian was July 1963 and Rota June 1971. Trap and fruit sampling records by the Marianas District agricultural personnel through June 1977 have not produced a single melon fly (personal communication).

A continuing program of melon fly trapping and fruit host sampling is being carried on by the Trust Territory personnel. Traps are examined weekly or every 2 weeks on Rota and monthly on Saipan and Tinian. The number of traps and fruit samples increase following a typhoon to monitor the areas for a possible reintroduction from Guam. Inter-island plant quarantine measures are still enforced.

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## LITERATURE CITED

- Beroza, M., B.H. Alexander, L.F. Steiner, W.C. Mitchell, and D.H. Miyashita. 1960. New synthetic lures for the male melon fly. *Science (Washington)* 131 (3406):1044-5
- Chambers, D.L., N.R. Spencer, N. Tanaka, and R.T. Cunningham. 1969. Sterile-insect technique for eradication or control of the melon fly and Oriental fruit fly. Joint FAO/IAEA, Div. of Atomic Energy in Food and Agr., Vienna, Austria. Sept. 1-5, 1969. IAEA Panel Proceed. Series STI/Pub/278. pp. 99-102.
- Esaki, T. 1952. Notes and records on some important pests of Micronesia mostly introduced during the period under Japanese mandate. *Transactions Ninth International Congress of Ent.* Vol. 1. pp. 813-8.
- Harris, E.J., S. Nakagawa, and T. Urago. 1971. Sticky traps for detection and survey of three tephritids. *J. Econ. Entomol.* 64(1):62-5.
- Maehler, K.L. 1948. The Oriental fruit fly on Guam. *J. Econ. Entomol.* 41(6): 991-2.
- Nakagawa, S., G.J. Farias, and L.F. Steiner. 1970. Response of Mediterranean fruit flies to male lures in the relative absence of males. *J. Econ. Entomol.* 63(1): 227-9.
- Steiner, L.F. 1952. Methyl eugenol as an attractant for Oriental fruit fly. *J. Econ. Entomol.* 45(2): 241-8.
- Steiner, L.F., W.C. Mitchell, E.J. Harris, T.T. Kozuma, and M.S. Fujimoto. 1965a. Oriental fruit fly eradication by male annihilation. *J. Econ. Entomol.* 58(5): 961-4.
- Steiner, L.F., E.J. Harris, W.C. Mitchell, M.S. Fujimoto, and L.D. Christenson. 1965b. Melon fly eradication by overflowing with sterile flies. *J. Econ. Entomol.* 58(3): 519-22.
- Steiner, L.F., W.C. Hart, E.J. Harris, R.T. Cunningham, K. Ohinata, and D.C. Kamakahi. 1970. Eradication of the Oriental fruit fly from the Mariana Islands by the methods of male annihilation and sterile insect release. *J. Econ. Entomol.* 63(1): 131-5
- Swezey, O.H. 1940. A survey of the insect pests of cultivated plants in Guam. *Haw. Planter's Record* 44(3): 151-82, (p. 175).