

## THE MEXICAN FRUIT FLY— A THREAT TO CALIFORNIA

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The finding of Mexican fruit fly this year at Tijuana, and the capture of a single adult fly at San Ysidro in San Diego County has caused a great deal of concern to California fruit growers, quarantine officials, and entomologists.

The first fly was trapped near Tijuana, January 22, 1954, in an orchard of mixed fruit trees, 5/2 miles southeast of Tijuana and 3/2 miles south of the international border. This fly was an old, battered female and it was first thought to have been a hitch-hiker or perhaps a fly that had emerged from a fruit carried into the area. A second fly was trapped April 9th in a yard in Tijuana, 5 2 mile south of the border, and a few days later 3 empty pupal cases were found under a tree in the same yard. These findings were 5 miles from where the first fly was found, so that it was realized that we probably had a light infestation of Mexican fruit fly knocking at our door.

During 1954, from January 22, until November 23, a total of 29 fruit flies were caught in traps including one in San Ysidro, California, on August 9, one in Mexicali and a single specimen of another species, *Anastrepha mominpraeoptans*, taken at Ensenada. Intensive trapping and fruit inspection have turned up no more flies in California.

We might review briefly the history of the fly in Mexico and Texas. The Mexican fruit fly was known prior to 1850 in Mexico and was described in 1873. It is a native of northeastern Mexico and builds upon a native host, *Sargentia greggi*, or yellow chapote. This plant is related to citrus and grows in canyons, usually where there is water, as far south as Valles. The flies spread out in the late fall and winter, and move with the prevailing winds in a northeasterly direction looking for host fruits. They can move as far as 150 miles and move to grapefruit orchards in the lower Rio Grande Valley of Texas. They infest the grapefruit and it is required that fruit found in infested areas be sterilized before it can be shipped. The flies disappear in May and June and probably go out into native brushland in search of their native host, the chapote. Here in California we might have an entirely different situation, due to our succession of acceptable host fruit. The Mexican fruit fly has followed sapota and mango fruits over most of Mexico and was found for the first time on the West Coast in 1953 in Hermosillo. Adults and larvae were taken in white sapota so that there is an established infestation there. The USDA has been trapping at Ensenada and Tijuana for two years and caught flies for the first time

this year. We are not sure of the La Paz area at the tip of the lower California peninsula, but hope that the Federal government will do some trapping there soon.

**LIFE HISTORY.** The flies lay their eggs in host fruits in bundles of 5 to 35. The larva work first in the rag, then work out into the flesh. After a certain length of time the infested fruit falls to the ground, after which the mature larvae crawl out of the fruit and pupate in the soil.

The young flies emerge from the soil, develop their wings, and after about 10 days to 2 weeks are ready to lay their eggs. In Mexico there is an average of 4 generations a year.

The preferred hosts of the Mexican fruit fly are mango, sapota and citrus fruits such as sour orange, grapefruit, mandarin, satsuma, sweet orange and sweet lime in that order. Sour lemons and sour limes are not hosts. There are certain other hosts which are acceptable in the laboratory, but apparently have not been found infested in the field. These are fig, walnut, peppers, tomatoes, and squash.

According to Dr. A. C. Baker, who is an authority on Mexican fruit fly, avocados are a secondary host. One field instance of infestation has been found in Mexico but there is apparently a lack of observation. Fruits of avocados have been found infested at the Texas border and apparently thin skinned varieties are more susceptible. Recent laboratory tests in Mexico indicated that avocados are very suitable laboratory hosts. Avocados are prohibited from Mexico because of the avocado seed weevil.

As soon as the first fly was trapped at Tijuana, County, State and Federal trapping and survey was increased and intensified. When the second fly was caught, a spraying program was started on both sides of the border. We will try to describe this cooperative program for you.

The U.S. Department of Agriculture has been carrying on a cooperative Mexican fruit fly and citrus black fly program in Mexico for several years using both American and Mexican employees and as a general rule, the cooperation of the Mexican government and the Mexican citizens has been excellent.

Research under the direction of Dr. A. C. Baker is carried on at Mexico City and we will mention this part of the work later.

Control is under the direction of N. O. Berry at Harlingen, Texas, who is also in charge of the control program against citrus black fly along the border and in northern Mexico. They have been protecting California and Arizona by trying to keep fruit fly and black fly out of Baja California and upper Sonora. Mexico has some quarantine laws and there are several quarantine stations maintained by Mexican and American inspectors. It is very difficult to prevent movement of host fruits by air, rail, truck and private auto between Mexico proper and Baja California. There will be a continual danger as travel increases and it looks as though California will continue to be exposed to infestation from northern Mexico unless the fruit fly can be controlled down in Mexico. As of February 15, 1955, all mangos coming through Benjamin Hill will be fumigated and plans are underway to build a fumigation chamber at Ensenada to fumigate mangos arriving there by boat. Part of the funds to build these fumigation chambers were raised by the California fruit-growers committee on Mexican fruit fly.

Control work in Tijuana was begun after the first fly was found in January and consists of treating host plants with a tartar emetic bait spray in the Tijuana Valley from Rodriguez Dam to the border. All favorable host trees, including deciduous fruits until close to harvest, are sprayed every three weeks with a formula consisting of 4 pounds of tartar emetic, and 20 pounds of granulated sugar in 100 gallons of water.

In California, the work consists of precautionary treatments and survey. The first line of defense is a strip 4½ to 5½ miles wide north of the border from Tecate west to the ocean, a distance of about 30 miles, which is sprayed every three weeks with tartar emetic spray and sugar. A similar protective belt is being treated in Imperial County near Calexico. A coarse spray is used and the plants sprayed are all hosts and other favorable trees and shrubs where flies might seek shelter. Adult flies are attracted to foliage and if they reach the foliage would feed on the poison bait. This treatment is to arrest and control any flies which might fly into or might emerge in this area. Up to February 14, nineteen applications had been made in San Diego County and eight applications in Imperial County. On February 14, the bait spray used on both sides of the border was changed from tartar emetic and sugar to malathion and protein hydrolysate. This new spray was recommended by the U.S.D.A. people who found in tests in Mexico that it killed the flies much Quicker and more effectively than tartar emetic.

The second line of defense is an intensive trapping and fruit cutting program to pick up as soon as possible any infestation which might, occur on this side of the border. Many traps are run in San Diego and Imperial Counties by federal, state, and county men and the federal people have traps around Yuma, Arizona.

In addition to San Diego and Imperial Counties, the following Southern California counties are running fruit fly traps and cutting fruit: Orange, Riverside, San Bernardino, and Los Angeles.

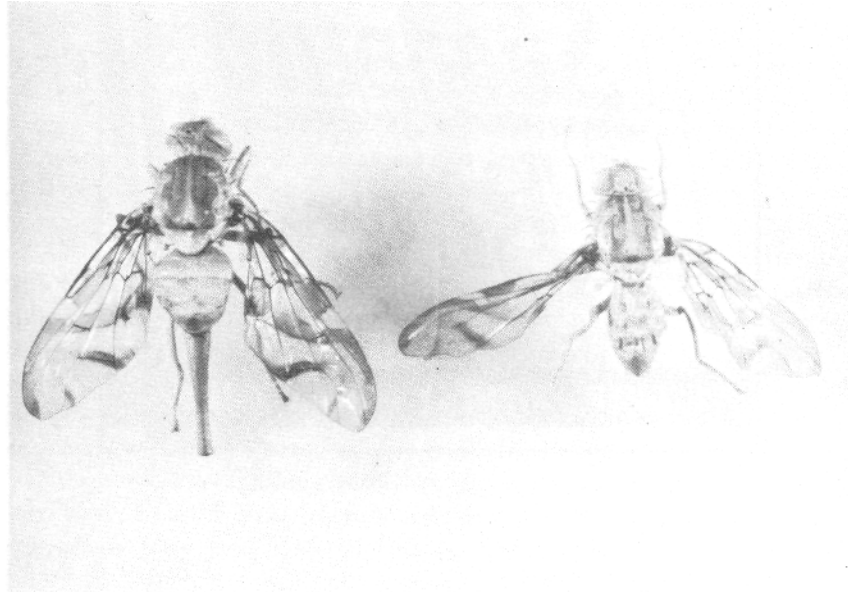
Following the trapping of a female Mexican fruit fly on August 9, in a yard at San Ysidro, a Mexican fruit fly quarantine was adopted by the California Director of Agriculture as Quarantine Regulation 20. A Quarantine area was established in San Diego County extending 12 miles east from the ocean along the border, and four miles into the county. The quarantine line runs more or less westerly from lower Otay Lake to the ocean and south to the border. This area is mostly residential except for vegetable and livestock production; neither of which is affected by the quarantine regulations. Quarantined hosts are citrus (except sour lemons and sour limes) deciduous and miscellaneous subtropical fruits. Avocados and tomatoes were not included in the quarantined list.

If the fruit fly becomes established in California in fruit growing areas, hosts of the fruit fly would probably have to be treated before movement out of the quarantine area. A great deal of work has been done in the Hawaiian Islands and in California on treatments of oriental fruit fly hosts and the University of California is continuing this work. This information will be very valuable if we have to use treatments in this state.

Ethylene dibromide has been approved for treatment of mangos from Mexico at a dosage of 1 pound per 1000 cu. ft. for 2 hours at 80° F. and this fumigant looks like about the very best fumigating material so far, as most California fruits and vegetables are tolerant to this dosage. An EDB dip, 1 to 20,000 in water at 115-116° F. for 20

minutes looks promising. It looks like the required amount of methyl bromide would be too high for the fruits.

So far biological control of Mexican fruit fly is very poor. In Mexico the most common larval parasite is *Opius crawfordi* but the percentage parasitized is relatively low.



*Fig. 1. Mexican fruit flies photographed by McKenzie. Female at left, male at right.*

## Summary

1. The Mexican fruit fly is considered by those who should know as being of far greater concern to California and to Arizona than the Oriental fruit fly, which recently has received such intensive attention. This thought is due to the former's believed greater adaptability to our climatic conditions and equally wide range of hosts, together with the fact that it is literally knocking at our door in Lower California.
2. Malathion gave very good results without red spider buildup in a few field tests and its use with protein hydrolysate has been substituted for the use of tartar emetic and sugar as a bait spray in Baja California and in San Diego County.
3. The Federal laboratory staff in Mexico City, under the leadership of Dr. A. C. Baker, had fully met the research needs of the problem in Mexico and Texas up to 1944. At that time, further studies were discontinued to permit taking over the more pressing problem of citrus black fly control. Since 1944, there has been neither time, funds or purpose, until now, to continue such studies. The University of California is now aiding in research and D. L. Lindgren recently spent several weeks in Mexico City working on fumigation tests.
4. The threatened entry of the Mexican fruit fly into California by natural flight, due to its

recent finding in the Tijuana Valley within less than one-half mile of the border and the finding of a fly on this side of the line, presents an entirely new set of factors. It is believed that these require and merit immediate research and control attention for which adequate new funds, over and above those currently established, need to be made available if this problem is to be successfully met.

Basically, studies involved pertinent to the new situation differ little from those presented by the appearance of the Oriental fruit fly in the Hawaiian Islands. The fruit industry of California through its Mexican fruit fly committee has aided greatly in seeking new funds to carry out a successful research and control program.