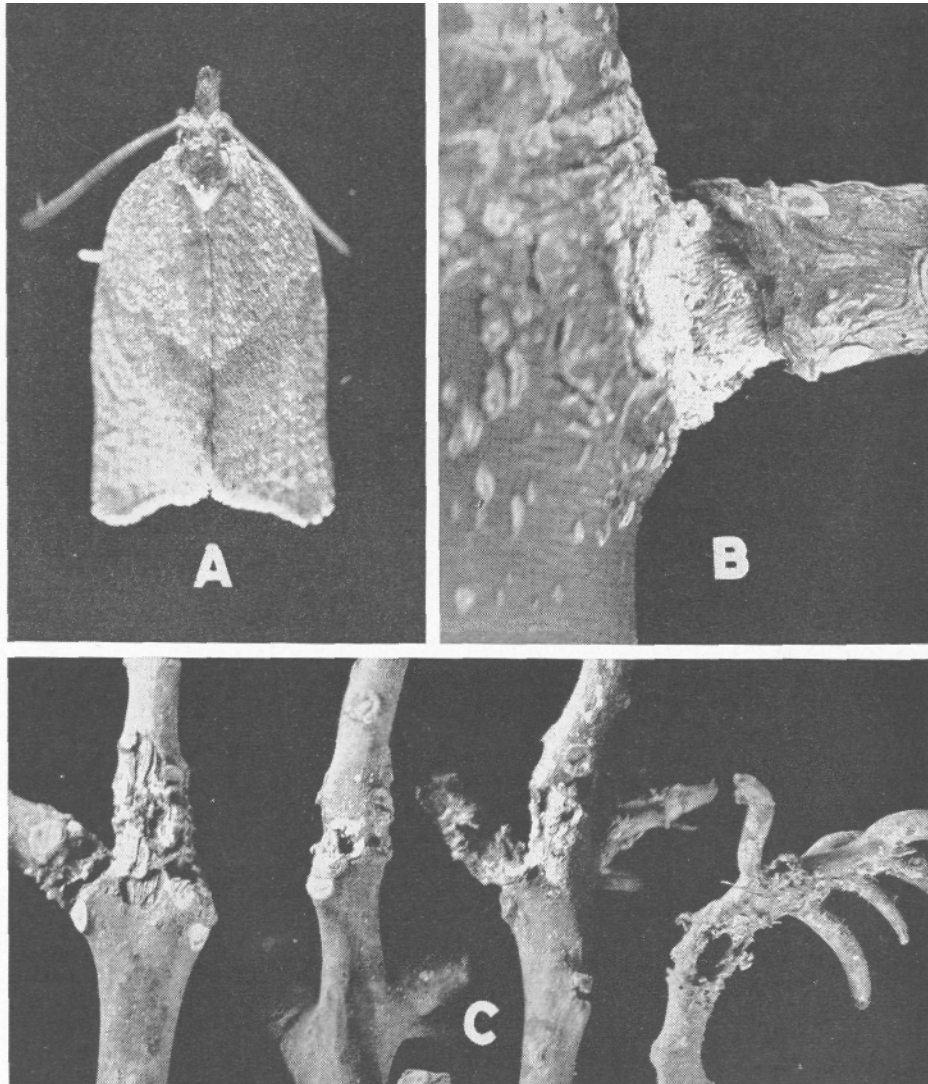


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Orangeworms on Avocados

Orange tortrix feeds on bark, flowers, and buds or on shoots of immature trees

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The orange tortrix on avocado. A, adult moth magnified five times; B, girdling of the bark at the base of a twig revealed after dulcidol has been removed; C, damage to bark of peripheral twiglets.

The orange tortrix and *Holcocera*, two small moths attacking oranges in southern California, were discovered to be avocado pests in 1949.

Their larvae infest avocados in all coastal areas, and the intensity of their attack seems to

be increasing.

Definite commercial damage has resulted from the moths on newly planted and even mature avocado trees.

The Orange Tortrix

The orange tortrix—*Argyrotaenia citrana* Fernald—is believed to be native to southwestern United States.

At first it was known only on the orange crops, on which it is a major pest in coastal and certain intermediate areas. It feeds on the peel and into the pulp, as well as on foliage.

Occasionally the orange tortrix attacks lemons. In recent years it has caused considerable damage to prunes and apples in Santa Cruz, Santa Clara, Sonoma, and Napa counties. It has become a major pest on apples, as well as a destructive moth on avocados.

The adult females are about 10 mm— millimeters—long. They have a wing spread of about 16 mm. The males are somewhat smaller.

The moths are brownish or buff colored, with bell-shaped wings lying almost flat over the body. Usually each wing has a dark diagonal band. Masses of pale green or cream-colored eggs, overlapping like shingles, have been found on leaves or on smooth green bark.

Five to seven larval molts may occur. When full grown, the larvae are about 12 to 14 mm long. The head and body forepart, and usually the body, are straw colored, although occasionally the body may be light tan, greenish, dark, or smoky-colored.

The pupae are 8 mm long and light brown. The posterior is pointed and bears a cremaster, with eight small booklets, which serves the pupa as a means of suspension.

Orange Tortrix Injury

On avocados, orange tortrix damage may appear as masses of the white, powdery dulcidol that exudes from any wounded area on the twigs and branches. If this secretion is scraped away, areas may be found where the bark has been eaten by the larvae. Larvae are often found in these shallow channels in the bark.

The interior of the tree is damaged most often where a twig or small branch is attached to a larger branch. The smaller twig is sometimes completely girdled. In some orchards, girdling is responsible for many dead twigs in the interior of avocado trees.

Near the periphery of the tree orange tortrix larvae are generally found in crude nests of plant debris on the smallest peripheral twiglets that grow in clusters at the end of the twigs. Large patches of green bark may be eaten away and the twiglet girdled. Holes may be eaten in the tender twigs.

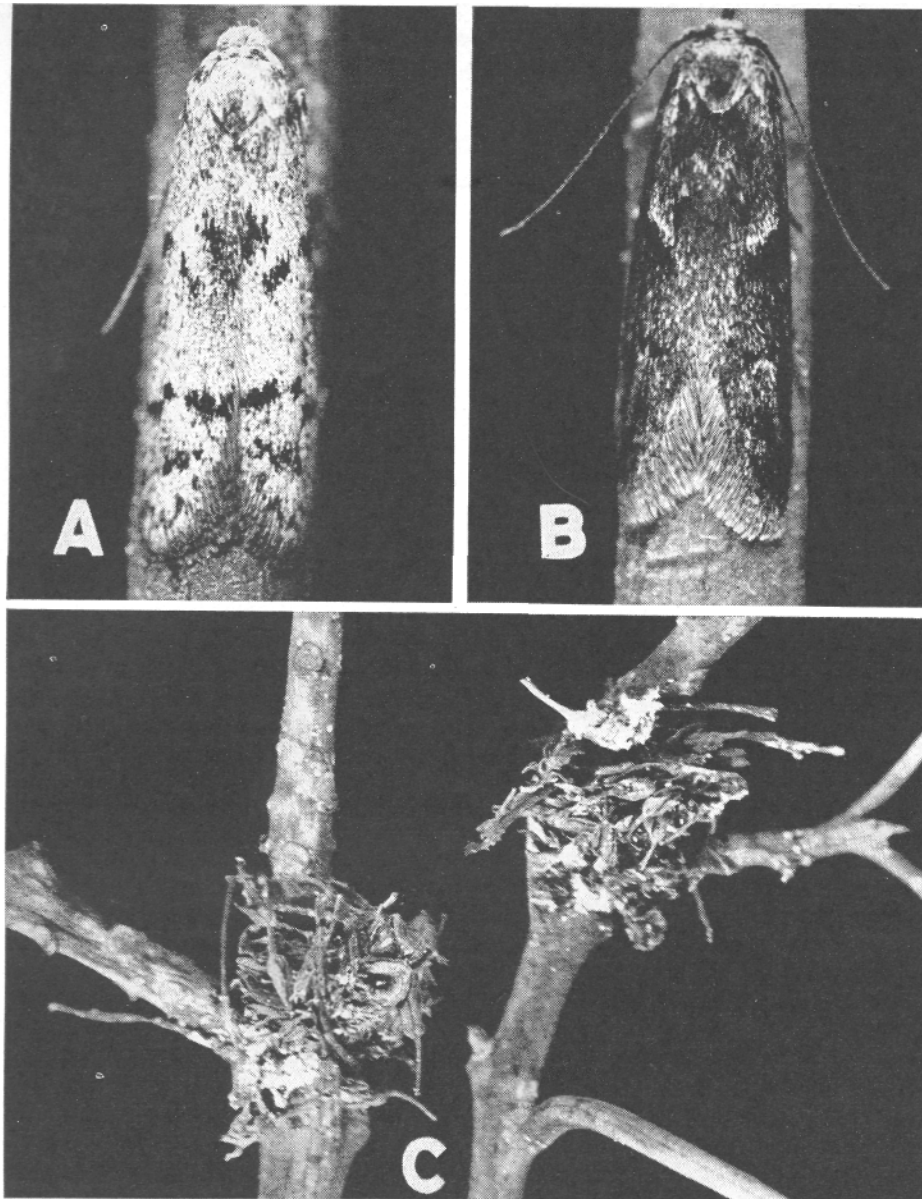
During the blooming period the tiny orange tortrix larvae are sometimes found inside the flowers, where they may feed on the developing embryo or the calyx. Later the same larvae may form a nest of several flower heads and feed on the bases of the flowers or further down in the long stems of the flower clusters.

Some nests of flower parts are found at the point where several stems of the flower cluster are joined. Larvae may be found feeding on these stems under the nests.

In recent years increasing numbers of budded avocado trees have been damaged by orange tortrix.

The larvae make their way under the tape that is used to keep the buds in place. The type affords much the same protection as is ordinarily provided by the nests of debris. The larvae feed on the bark adjoining the inserted buds and on the buds themselves. They are sometimes joined in their depredations by larvae of the amorbia, *Amorbia essigana* Busck.

The orange tortrix may also attack the tender terminals. The insects feed inside the shelter formed by webbing the terminal leaflets together. Severe damage may result from this type of injury in newly planted trees. The amorbia is especially active in the process of webbing terminal foliage together.



Two species of *Holcocera* on avocado. A, *Holcocera* sp. (near *iceryaella*) magnified five times; B, *H. iceryaella* magnified five times; C, "nests" of *Holcocera* on avocado twigs, natural size.

Orange Tortrix Control

Cryolite spray or dust is the recommended treatment for control of orange tortrix on citrus. DDT spray applied for control of greenhouse thrips on avocados does not diminish the orange tortrix population.

Wettable ODD—dichloro diphenyl dichloroethane—at two pounds to 100 gallons—proved highly effective for control of orange tortrix on berries and apples. A 5% DDT dust also gave effective control on berries and apples. Other chlorinated hydrocarbons were ineffective. Sprays of rotenone, cryolite, or parathion were less effective than DDD when they were applied either as sprays alone or with oil.

On oranges, the parasites of the orange tortrix often control the pest. One observer found 12 species of parasites. On orange tortrix attacking the avocado, the parasite *Exochus* sp. is common.

Holcocera

Blastobasid moths—*Holcocera iceryaella* Riley—usually feed on dead or waste matter. They feed only secondarily on live plant or animal material. On California avocado trees, *Holcocera iceryaella* is accompanied by a more abundant and closely related, but as yet undetermined or unnamed species.

The adults of *Holcocera iceryaella* are small, slender moths, 6 mm to 8 mm long, of a grayish color with irregular black markings. The accompanying species is about the same size but is much lighter—a silver gray—with conspicuous black markings.

The larvae of the two species look about the same. They are 7 mm to 9 mm long when they are full grown. On avocado twigs they are brownish, with broken longitudinal stripes. The head and body forepart range from a brown to a shiny black.

The nests of *Holcocera* spp. are made of leaf and flower parts and are larger and more carefully formed than those of the orange tortrix. Nests are frequently found, with larvae under them, on the bark of branched twiglets where they can be held in place effectively. Nests are rarely found on leaves.

The larvae may feed only on the dead material of which the nests are composed, but sometimes they eat a shallow channel into the green bark. Occasionally the larvae feed rather deeply into a green twig.

Infestations of *Holcocera* spp. are not as severe on avocado as those of the orange tortrix.

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