

Stem Borer Found on Safflower

infestation discovered in planting at Davis may be first recorded attack on safflower by known pest of other plants

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A fly stem borer—*Melanagromyza virens* (Loew)—of wide tastes, showed 100% infestation of late-planted experimentally grown safflower at Davis during 1958.

Although the stem borer attacks many other hosts throughout the United States this appears to be the first record of the insect on safflower. Among the hosts the stem borer attacks—occasionally as a crown or root borer—are chrysanthemum, clovers, cornflower, guayule, ginseng, peas, pigweed, ragweed, spinach, sunflowers, and verbena.

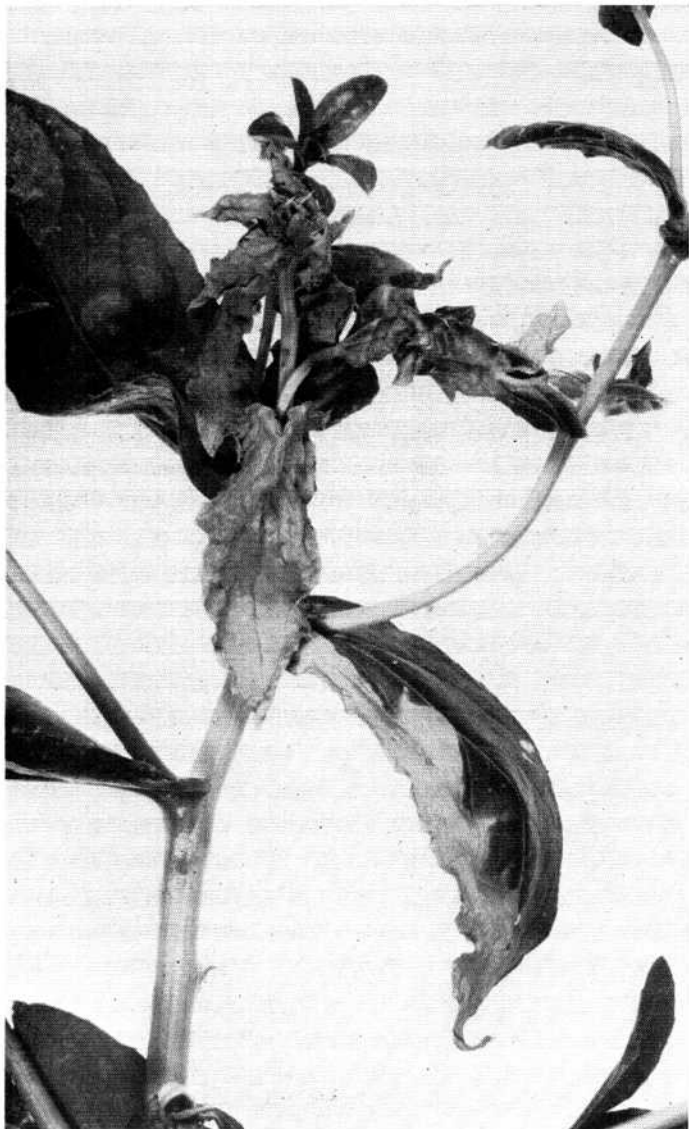
The eggs of the fly are apparently inserted in the young terminal and lateral branches of the plants by the adult females. Upon hatching the maggots burrow into the central portions of the shoots and then proceed downwardly into the main stems and eventually reach the area of the stem near the ground level. It appears that the woody portion of the stem prevents further penetration by the maggots. Pupation occurs inside the stems, usually at the ground level zone, after the maggots have made exit holes through the stem to the outside so

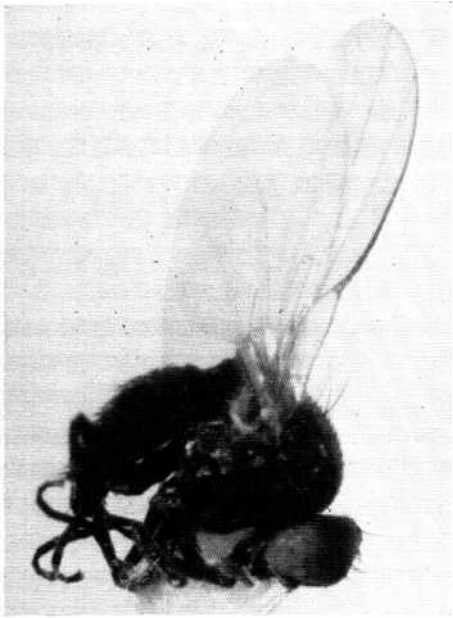
that the adults may escape. Adults are a uniform greenish-black with a metallic cast and are about one fifth inch long.

The first indication of attack is wilting of the terminal and lateral branches, particularly in the afternoon. Severely wilted branches usually die and those which do not die may eventually show chlorotic or necrotic areas on the leaves.

The tunnels of the newly hatched maggots are difficult to see but as the maggots increase in size and migrate downward in the stems, borings are easily seen by the naked eye. The maggots are

Death of terminal branch—left—and lateral branch—right—of safflower caused by the stem borer.

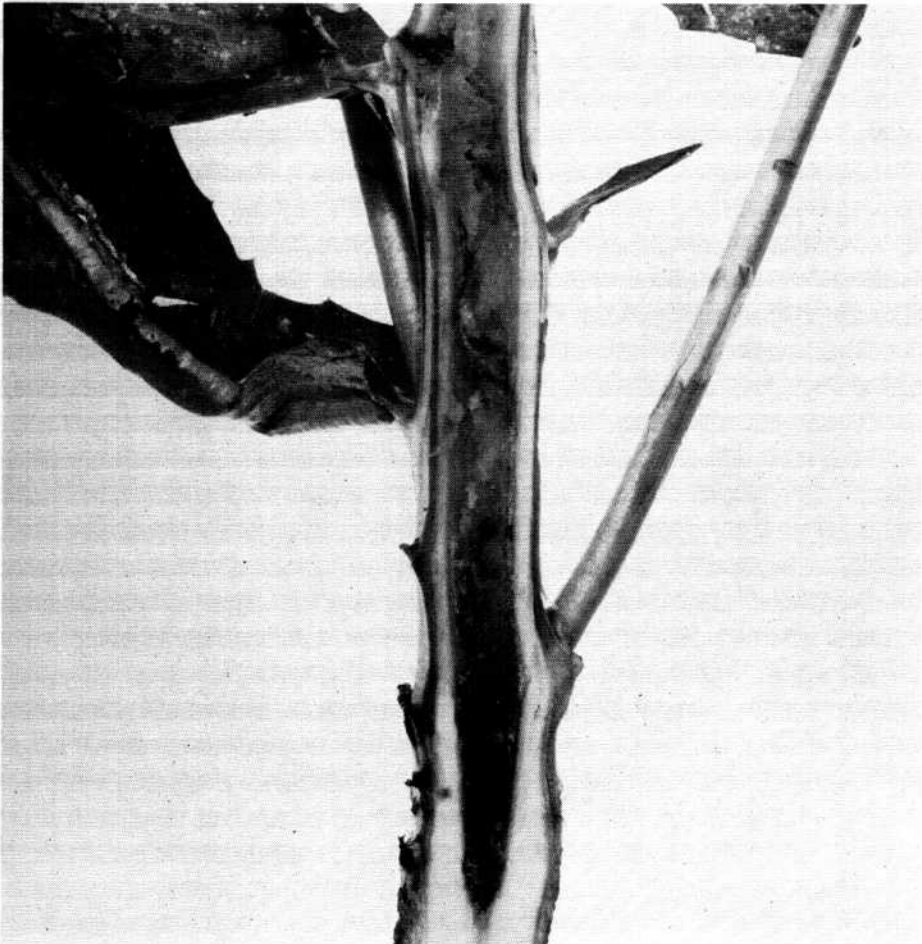




Adult of the stem borer, enlarged 20 times.

white, elongate, and attain a length of about two fifths inch. Often many maggots concentrate at the bases of individual stems causing damage to the central portions of the stems. As many as 10 maggots and puparia have been removed

Internal damage to central portion of lower stem of safflower by stem borer maggots, showing tunnels and cessation of damage at woody root tissue.



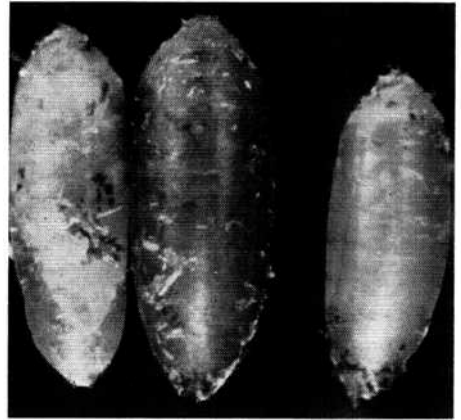
from the lower portion of the stem of a single plant. The lower portions of the stems often show a darkening of the tissues due to maggot activity. The puparia are of the typical muscoid type, about one fifth inch long, and vary from light brown when newly formed to dark brown. Just prior to emergence they appear black due to the presence of the adults inside the puparial cases.

The biology of the insect on safflower has not been fully explored, but unlike certain hosts only a single generation a year would be expected to occur under most conditions. On young guayule plants there appears to be at least a summer generation with adults emerging in June, July and August, and a fall generation with adults emerging in October through December. Often puparia overwinter. Inasmuch as young succulent plants are preferred for egg deposition it is believed that there is a rotation of hosts during the year according to their availability and nature of growth.

Yield losses to safflower caused directly by this insect can not be accurately estimated at this time. Experimental dryland plantings made at Davis on April 17, 1958, gave infestations ranging from less than 0.5% to 17%. Losses in these

earlier plantings were probably negligible. Late plantings—on June 18—and later irrigated at 10–20 day intervals, gave 100% infestation. In the late plantings numerous lateral and terminal shoots were killed and some lodging was noted. Some degree of loss was sustained but an accurate evaluation was made difficult by concurrent losses from *Verticillium* wilt and *Phytophthora* root rot.

To date there is little evidence of economic damage in commercial fields grown under dryland conditions. However, stem borings were found in a few early plantings and puparia were removed from plants grown later in the season. Observations indicate that dryland plantings mature rapidly and thus escape serious damage.



Puparia of stem borer, enlarged 15 times.

No chemical control was attempted during 1958 as it was the first year of attack from the fly.

Time of planting should be important in averting serious damage as early planted dryland safflower matures rapidly and escapes attack. There is every indication, however, that the later the plantings are in the spring the more susceptible they will be to attack and survival of the fly. Plants grown under irrigation will probably remain succulent longer and will be more susceptible to damage than plantings made at the same time under dryland conditions.

Two small parasites—Family Pteromalidae, *Halticoptera aenea* (Walker) and *Syntomopus americanus* Ashmead—appear to be very effective in reducing stem borer populations. Both parasites presumably parasitize larvae and the adults emerge through the puparia. Some collections of stem borer puparia—particularly those overwintering—have shown as high as 80% parasitism from the combined attacks of both species of parasites.

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