

The variegated grape leafhopper in the San Joaquin Valley

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The variegated grape leafhopper, the principal pest of grapes in southern California and Arizona, was reported for the first time in 1980 on grapes in Fresno County, in the San Joaquin Valley. Its widespread distribution there, however, suggested that it had been present before then. This leafhopper has since been found also in Tulare County. A closely related species, the grape leafhopper, is the most common grape pest in central and northern California.

Both variegated grape leafhopper, *Erythroneura variabilis* Beamer, and grape leafhopper, *E. elegantula* Osborn, cause similar feeding injury to the grape foliage and excrete honeydew that mars the appearance of grapes. High populations also annoy pickers at harvest.

Because of the new variegated grape leafhopper infestations, we began studies on its phenology and control in the San Joaquin Valley. These studies included determining the role that *Anagrus epos* Girault, an important egg parasite of the grape leafhopper, may play in biological control of the variegated grape leafhopper. The tiny *Anagrus* wasp occurs naturally in many grape-growing areas and has been highly effective in reducing grape leafhopper populations.

Studies in 1982 were conducted in an untreated Thompson Seedless vineyard near Sanger, Fresno County. Sticky traps made from 5- by 15-inch thin metal sheets, painted yellow, coated with Stikem, and hung on trellis wires, were used to monitor leafhopper and *Anagrus* adults. The traps were replaced weekly, and the number of adults recorded.

Twenty leaves were collected weekly and examined for the number of normal and parasitized leafhopper eggs. Nymphs were also observed weekly on the leaves. Adult leafhopper females were collected and dissected in April and again from mid-August to December to determine when egg development began and declined.

Results

Sticky traps showed both the grape and variegated grape leafhoppers were present in the vineyard, but most were the variegated grape leafhopper (fig. 1). *Dikrella cockerelli* Gillette, a leafhopper species found on wild grapes in southern California but not previously reported on grapes in the San Joaquin Valley, was also trapped in small numbers.

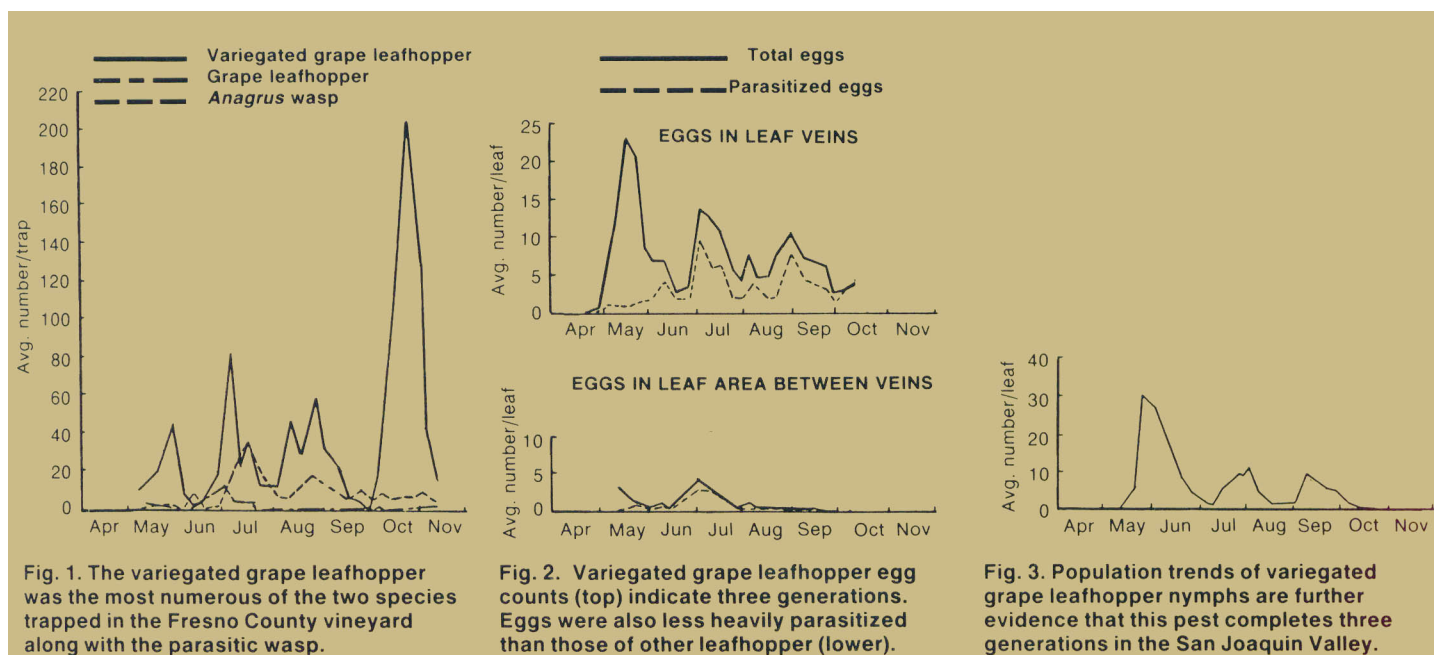
Variegated grape leafhoppers overwintered as adults on vegetation surrounding the vineyard. As grape leaves

appeared in the spring, the leafhoppers moved onto the vines. The most overwintered leafhoppers were trapped on May 27.

Although eggs of grape and variegated grape leafhoppers are indistinguishable, in the laboratory most of the eggs laid by the variegated grape leafhopper were found under the epidermis near or in the leaf veins (fig. 2). In contrast, the grape leafhopper eggs were laid under the epidermis in the leaf area between the veins. In the vineyard, eggs in or near leaf veins were not as highly parasitized by *Anagrus* as those found on the leaf surface. The higher rate of egg parasitism in the leaf surface area may account for the very low grape leafhopper population in the latter part of the season.

Observations of the variegated grape leafhopper adults, eggs, and nymphs indicated that three generations developed during the year in the San Joaquin Valley (fig. 1, 2, and 3).

Dissection of the variegated grape leafhopper females showed that visible development of the reproductive organs began in early April, and that 92 percent of the females were gravid by April 29, and 100 percent by May 6. From mid-August, dissections showed an increas-





THIRD CLASS
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Variegated grape leafhopper adult and nymph (far left, top and bottom) and grape leafhopper adult and nymph (center, top and bottom) were found in a Fresno County vineyard. Small numbers of *Dikrella cockerelli*, a leafhopper usually found only on wild grapes, were also present.



ing number of females with atrophied organs and a decline in the number of gravid females. No gravid female was found after October 7, indicating that most females of the third generation were incapable of reproduction.

Conclusion

These studies showed that the variegated grape leafhopper is able to complete three generations during the season in Fresno County. In southern California, this leafhopper is reported to have four generations in the grape-growing areas of San Bernardino County

and six generations in the Coachella Valley.

Previous studies of the grape leafhopper populations in the San Joaquin Valley showed that commencement and decline of the reproductive organ development depends on environmental temperature, the condition and maturity of grapevines, and photoperiod (daylength) during the season. The reproductive period of the variegated grape leafhopper is similar to that of the grape leafhopper and appears to be regulated by the same conditions.

Although *Anagrus* attacks eggs of

both leafhopper species, parasitism was less effective on the variegated grape leafhopper in these studies. *Anagrus* parasitism has also been observed previously in vineyards in Fresno and Tulare counties, where the wasp controlled the grape leafhopper but the vines were defoliated by the variegated grape leafhopper.

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