

Floral Predation of *Yucca whipplei* (Agavaceae)
by the Sap Beetle, *Anthonaenus agavensis*
(Coleoptera: Nitidulidae)

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Abstract.—Female sap beetles, *Anthonaenus agavensis*, oviposit in the flower buds of *Yucca whipplei*. The larvae destroy both pollen and ovaries, causing premature abortion of buds and flowers.

Adult sap beetles, *Anthonaenus agavensis* (Crotch) (Nitidulidae), are often found on the flower stalks of *Yucca whipplei* Torrey (Agavaceae) in southern California. They occur in large numbers at many of the sites where I have been studying the pollination biology of *Y. whipplei* (Udovic, 1981, MS), particularly in coastal sage scrub (Munz, 1973) south of the Los Angeles basin. Parsons (1943) reported that the adults of this species occur in the flowers of *Agave*. However, of the 18 samples of specimens with host-plant information in the collections of the University of California, Berkeley, and the University of California, Riverside, 11 were found on *Y. whipplei*, 2 others were probably on *Y. whipplei*, and 4 were on undetermined species of *Yucca*; none were reported from *Agave* (Powell, pers. comm.; Frommer, pers. comm.). Since the larvae of many of the other members of its subfamily (Cateretinae) live in seed capsules of various plants, Parsons (1943) conjectured that the larvae of *A. agavensis* are associated with seed capsules of *Agave*. Here I report observations showing that the beetle larvae are floral predators of *Y. whipplei* that may significantly affect the plant's floral display.

I observed adult and larval behavior during the spring of 1981 on the Ryan Oak Glen Reserve northeast of Escondido, CA, in a coastal sage scrub community. This site corresponds to CSS4 in Udovic (1981). Adults congregate in the open flowers of *Y. whipplei* and are often found mating inside the flowers. The developing branches of yucca inflorescences, together with their primordial flower buds, are covered by protective bracts. Female *A. agavensis* are able to crawl beneath the bracts, where they oviposit on the developing flower buds. Although I was unable to determine how many eggs are placed in each bud, I never observed more than one larva in a bud or flower. Inside the bud the larva feeds on the anther sacs and burrows into and excavates the floral ovary, causing significant damage. Completion of larval development takes approximately one week. If the flower has not opened before the larva completes development the larva drills an exit hole through the petals and drops to the soil. Since the duration of the flowering season for *Y. whipplei* is usually two months or less, *A. agavensis* is probably univoltine.

Many of the attacked buds are aborted by the plant before they open. Open flowers that have been attacked by beetles typically wilt and abscise more rapidly

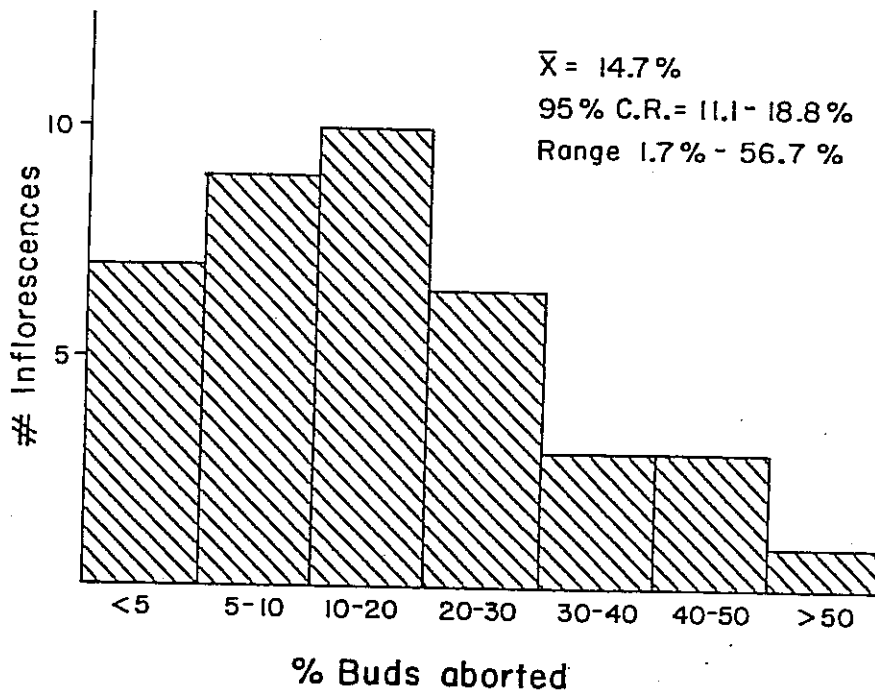


Figure 1. Frequency distribution for the percentages of flowers which aborted as buds among plants flowering at Ryan Oak Glen in 1981. Aborted buds are a measure of the extent of floral predation by *Anthonaenus agavensis*.

than neighboring uninfested flowers. The flowers are invariably too severely damaged to serve as pollen donors or to produce mature fruits. Furthermore, the specialized pollinators of *Yucca whipplei*, the yucca moths, *Tegeticula maculata* (Riley) (Lepidoptera: Incurvuriidae; Powell and Mackie, 1966; Aker and Udovic, 1981), apparently avoid damaged flowers. I have never observed female moths, which also oviposit in floral ovaries, pollinating, ovipositing, or resting in damaged flowers.

Damage to yucca inflorescences resulting from floral predation is quite variable both within and between populations. I determined the total number of flowers produced, the height of the flower stalk, and the number of buds aborted for each of 40 plants at Ryan Oak Glen in 1981. Floral predation was the major cause of abortion, although occasionally buds aborted for other reasons. The percentage of aborted buds ranged from 2% to 57% (Fig. 1) with a mean value of 14.7% and a 95% confidence range of 11.8%–18.8% (obtained using the arcsine transformation and then backtransforming). Regressions of the percentage of aborted buds on either the total number of flowers or on stalk height yield no significant relation. At Pinyon Flat, CA, in the evergreen chaparral (corresponding to CH4 in Udovic, 1981), infestation rates in 1981 were much lower than at Ryan Oak Glen. Only a few plants showed any signs of beetle attack with damage never exceeding 5%. Although plants at this study site often abort buds, particularly near the end of the flowering season (Aker, 1982), only a few of the aborted buds which I examined showed any signs of beetle infestation. Perhaps the heaviest

infestation I've encountered was on the Elliot Reserve, east of San Diego, in 1979 (corresponding to CSS3 in Udovic, 1981). Although at that time no attempts were made to quantify the extent of damage, most plants probably lost over 25% of their flowers to beetle predation.

The extent of coevolution between *A. agavensis* and *Y. whipplei* deserves further investigation. The beetle may be highly specialized, and may be an important agent of selection on the plant's floral display. Its interaction with yucca's specialized pollinator, the yucca moth, which competes with it for suitable oviposition sites, also deserves further study.

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