

USE OF ALFALFA LEAFCUTTING BEES IN SAN JOAQUIN VALLEY, CALIFORNIA 1991

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The use of alfalfa leafcutting bees, Megachile rotundata, for pollination of alfalfa in the San Joaquin Valley of California in 1991 was highly successful. The bees emerged well, pollinated the crop efficiently in the vicinity of their domiciles, renested successfully, producing a second good emergence of adult bees. Only a small percent of bees emerged for the third cycle of adults and these renested successfully. Survival of immatures to adults from all bees renesting this year was high. There was little evidence of mortality due to parasitoids (Pteromalus), nest depredators (Tribolium spp.) or chalk brood (Ascosphaera aggregata) although all were present. However, the sampling methods I used were not designed to effectively measure mortality due to Pteromalus or Tribolium.

Much of the success was undoubtedly due to the unseasonably mild summer experienced throughout the valley in 1991. Temperatures only briefly exceeded 100°F for periods at the beginning of adult emergence, again in early July coinciding with the end of most first emergence nesting, and at the end of summer when most nesting had been completed. Very little effect of "pollen balls" or "unexplained mortality" was noted at the end of the season this year in contrast to reports from 1990. However, final figures will not be available until X-ray analyses and dissections are completed. The activity of the bees started later this year, the second emergence of adults was additionally delayed by the unusually mild summer temperatures, and very little third emergence was experienced. Most of the brood cells provisioned after the end of July produced overwintering larvae.

Since field temperatures did not reach high enough levels to contribute significantly to mortality this year, some controlled temperature studies were conducted in the laboratory at Davis with straws containing larvae of different stages of development. While these trials are not fully analyzed at this time, preliminary evaluations indicate that temperatures needed to be above 105°F and for prolonged periods of time to show detrimental effects and that later stages of development show less detrimental effects due to high temperatures.

Measures of tripping at different distances from alfalfa leafcutting bee domiciles showed about 80% or more tripped flowers within 30m (100 feet), dropping to about 40% between 40-53m (130-175 feet) in one data set and averaging 44.5% near a domicile versus 2.1% at 160m (530 feet). These figures for percent tripped flowers are confounded by the numbers of available flowers on a raceme. Measures of these show that flowers available for tripping at any time are about 5-6 near versus 12-15 flowers away from leafcutting bee domiciles. This reflects the rapid rate at which flowers are actively tripped and wilt near leafcutting bee domiciles versus the slow rate of turnover away from their influence.

However, data from racemes near and away from leafcutting bee domiciles and near and away from apiaries in bee drives without leafcutting bees did not produce consistent differences. Racemes were flagged at full bloom and collected a week or two later. Total flowers were estimated by presence of stipules, numbers of pods and seed set. Some inconsistency was due to Lygus damage, water stress due to heavy pollination, and time of season. Final yields in two fields in Kings County showed significantly higher seed production in strips with alfalfa leafcutting bees (M. Wadsworth, personal communication). These are supported by other comparisons made in Fresno County (S. Mueller, personal communication).