

Demonstrate the Effectiveness of Blue Orchard Bees as a Pollinator of Almond

Annual Report

Project No. 82-KA3 - Tree and Crop Research Pollinator

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Objectives: To demonstrate the effectiveness of Osmia lignaria propinqua (blue orchard bee) as a pollinator of almond.

Interpretive Summary: Previous research with this native bee species studied in almond orchards demonstrates: (1) Bee populations can be managed to fly in synchrony with almond bloom; (2) both sexes of this species visit almond bloom; (3) individual blue orchard bees cross-pollinate almond bloom more effectively than other pollinator species studied; (4) population sizes have been increased within commercial almond orchard environments; (5) daily flight periods of the blue orchard bee are initiated at lower temperatures than other pollinator species; (6) and, entire populations can be used as a pollinator force on particular properties because individuals have a limited flight range.

Research in 1981-1982 was designed to determine; the survivorship of blue orchard bees retained in almond orchards throughout the year, and natural emergence periods of bees exposed to those orchard climates. Therefore, populations of the blue orchard bee were established in the Santa Clara and Sacramento Valleys of California and in Cache Valley, Utah in 1981. The progeny of these populations were monitored through 1982 from which the following conclusions were developed: (1) Bees retained in Santa Clara Valley climate overwintered successfully and emerged during almond bloom; (2) the progeny of bees retained in the Sacramento Valley throughout the year died as adults throughout winter months; (3) when progeny of Sacramento Valley reared bees were winterized in a temperature cabinet (39°F from July to October) and returned to the field, adults overwintered successfully and emergence was synchronized with almond bloom; (4) and, Utah-reared bees wintered in the Sacramento Valley emerged 10 days following emergence patterns of California-reared populations. These results demonstrate that blue orchard bees reared in the central valleys of California must be managed through summer months to assure their survival and proper emergence.

Experimental Procedure (1983 research): We are placing 550 nest traps (each with 48 nesting holes) within a limited area in each of two orchards followed by the mass release of known numbers of blue orchard bees in both orchards. Data on numbers of flowers visited/minute, flowers visited/tree, trees visited/row, etc. will be gathered for both the honeybee and blue orchard bee. In addition, nesting success of the blue orchard bee will be measured, and data on nut yield/row/variety will be gathered in both experimental orchards.

Results: These data (1982) are summarized above under Interpretive Summary.

Discussion: Based on work already completed, the blue orchard bee appears to be a manageable species that is an effective pollinator of almond and other orchard crop species. The degree of its effectivity is reflected in the minimum numbers of individuals required to adequately pollinate almond (300 females/acre) and apple (250 females/acre) crops. In addition, the blue orchard bee is a native species having a wide distribution throughout the U.S., and it can be

field-trapped in large numbers in various locations. These facts suggest that commercial populations can easily be obtained to supplement pollination requirements of almond and other orchard crop species.

With the field demonstration of the blue orchard bee completed in 1983, we will be in a position to establish permanent colonies of this pollinator species in almond orchards by managing the progeny of bees used in this demonstration.

Publications:

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