Project No. 80-M1 (New)

Cooperator:
USDA/SEA
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Project: Tree and Crop Research
Pollination

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

Progress: Previous research with this pollinator species includes: (1) three years of field studies on almond where introduced populations of Osmia lignaria successfully nested in materials supplied; (2) five years of field studies in apple and apple-pear orchards; (3) completion of almond tree cage studies where pollination between O. lignaria and honey bees were compared; (4) a limb cage study on almond to compare pollination efficacy between individual honey bees and O. lignaria; (5) completion of a study where a small, commercial, apple-pear orchard was pollinated by O. lignaria to the exclusion of other pollinator species.

Results of these studies demonstrate that Osmia lignaria is an effective pollinator of almond in California where released populations can be increased during the short bloom period of that species. In addition, lignaria exhibits particular traits that are highly desirable in fulfilling specific requirements for successful almond pollination and, at the same time, serve to increase its potential for establishment in cultivated areas. Some of the more important traits are:

1. Daily flight periods initiated at 3-5 degrees F lower temperatures than that of the honey bee and flight is continuous through daylight hours if temperatures remain above minimum thresholds. Once flight is initiated, overcast conditions have little impact on continued flight activities.

2. Both sexes of lignaria effectively cross-pollinate almonds; thus, all individuals within an orchard are involved in pollination.

3. Unlike many pollinator species, O. lignaria flies limited distances when adequate bloom is adjacent to its nesting sites. This behavior better assures the grower full utilization of his pollinator force.

4. O. lignaria nests successfully in direct competition for bloom with honey bees in almond orchards.

5. Annual adult flight periods do not extend beyond bloom periods of the crop thus reducing the probability of bee kill from exposure to pesticide treatments.

6. Comparative field studies (orientation flights during cell provisioning, rapidity of flower visitation, methodology of pollen and nectar collecting, quantities of almond provisioned in cells,

germination tests of bee-collected almond pollen, numbers of cells produced by individual females, etc,) demonstrate that O. lignaria has outstanding potential for commercial use as a pollinator of almond.

Plans:

1. Procure a large, parasite-free population of Osmia lignaria during the 1980 flight season.

2. Construct approximately 500 nest traps each containing 50 drilled holes.

3. Place population of bees into constructed nest traps by inserting paper soda straws containing filled nests into those holes previously drilled.

4. Force-rear population of bees in 1981 and introduce nesting materials into an isolated almond orchard (ten acres) in California.

5. Determine pollination performance by O. lignaria and degree of nesting success using standardized techniques.

Almond Industry Participation $5,060

Project No. 80-L5 Pollination Thorp
(UC Davis)

As part of research to determine how many bee colonies per acre are needed and how they should be distributed for best yields, a survey of pollination practices and results for 1980 is being conducted. Survey forms will be available at the Annual Research Conference, December 8, at the Red Lion Inn. Prior to this, surveys will be sent out to research cooperators and other key growers in the industry. Cooperation from as many growers as possible is needed to obtain data on the entire range of practices in current use. These data also will provide a basis for selecting clusters of orchards for intensive field studies.

Studies this season show that minimum distances between tree canopy edges favor bee flight between trees. Previous studies have demonstrated that bee activity between cross pollinating varieties is increased when their bloom is coincident rather than overlapping. Therefore, cross pollination should be greatest in orchards where coincident blooming varieties are planted on a diagonal.

Project No. 80-M1 Pollination - Osmia lignaria Torchio
(USDA Logan, UT)

Enough Osmia lignaria (blue orchard bee) have been trapped for next season's field trials at bloom. As planned, one plot will have a density of 250 female bees per acre. The other will have 500 female bees per acre. As previously reported, one plot will be an almond orchard west of Yuba City and another plot was located 12 miles west of Corning. However, the Corning plot does not have past yield records and another orchard will need to be located. The orchards used for this project should be relatively isolated, and in which past honey bee activity was very low. The blue orchard bees will be the only pollinators placed in these plots.

A critical step will be cold storage manipulation of these bees so that they will be active in synchrony with almond bloom this next spring.