

# Wildflowers to support bees for almond pollination



Neal M. Williams<sup>1</sup>, K. Ward<sup>1</sup>, C.A. Brittain<sup>1</sup>, S. Peterson<sup>2</sup>, T. Pitts-Singer<sup>3</sup>, D. Artz<sup>3</sup>, G. Wardell<sup>4</sup>  
 University of California - Davis, 2. Ag Pollen LLC, 3. USDA Bee Lab Logan Utah, 4. Paramount Farming

## Background

Almond production relies on robust populations of bees. Its early bloom season combined with current orchard management practices mean that few forage resources are available to bees before or after almond bloom and little forage diversity exists at any time in these landscapes. Both the amount and diversity of pollen resources are critical to maintaining high quality nutrition and colony health for honey bees. Sufficient duration of bloom (past that of almonds) can greatly enhance the populations of non-*Apis* bees, both wild and managed.

Development of reliable wildflower mixes to support almond pollinators is part of an ongoing **Integrated Crop Pollination project (ICP)**.

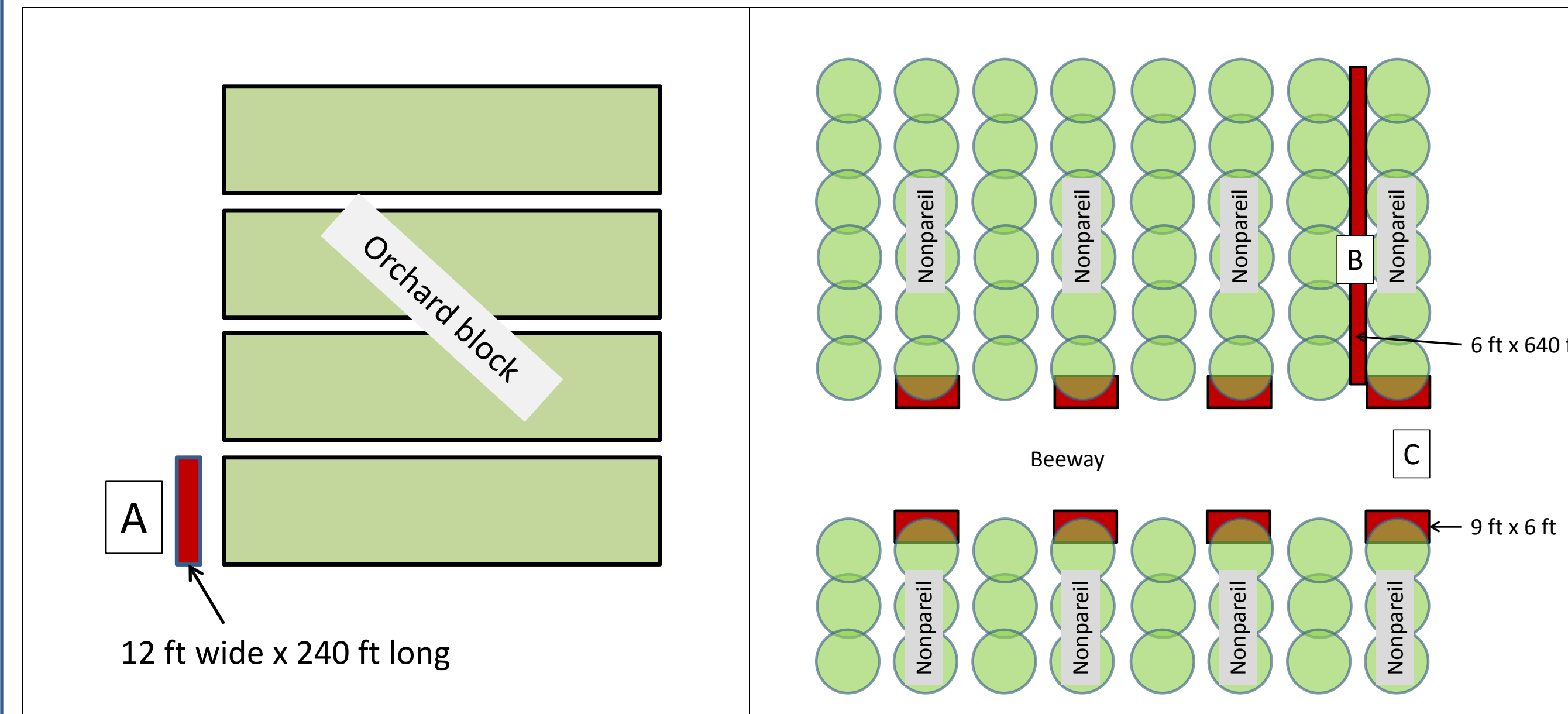
## Goals

1. Quantify bloom phenology of different wildflower species known to be attractive to honey bees and wild bees
2. Test performance of mixes in alternative planting contexts within the almond farm landscape
3. Measure honey bee and wild bees use of mixes and specific flower species before, during, and after almond bloom

## Methods

- Two study sites Modesto and Paramount Farming
- Establish replicated plots of "almond" wildflower mix at three locations within the almond landscape (see figure)
- Additional mustard and clover mix planted at border plot only
- Assess bloom every two weeks from late January through early April.
- Measure honey bee and other bee visitation to each plant species within plots and to adjacent almond

## Next steps



Test plot layout. Three plot locations (red blocks) within orchards

- A. Border planting spanning 1 sub-block
- B. Within row planting
- C. End row planting, at edge of bee way

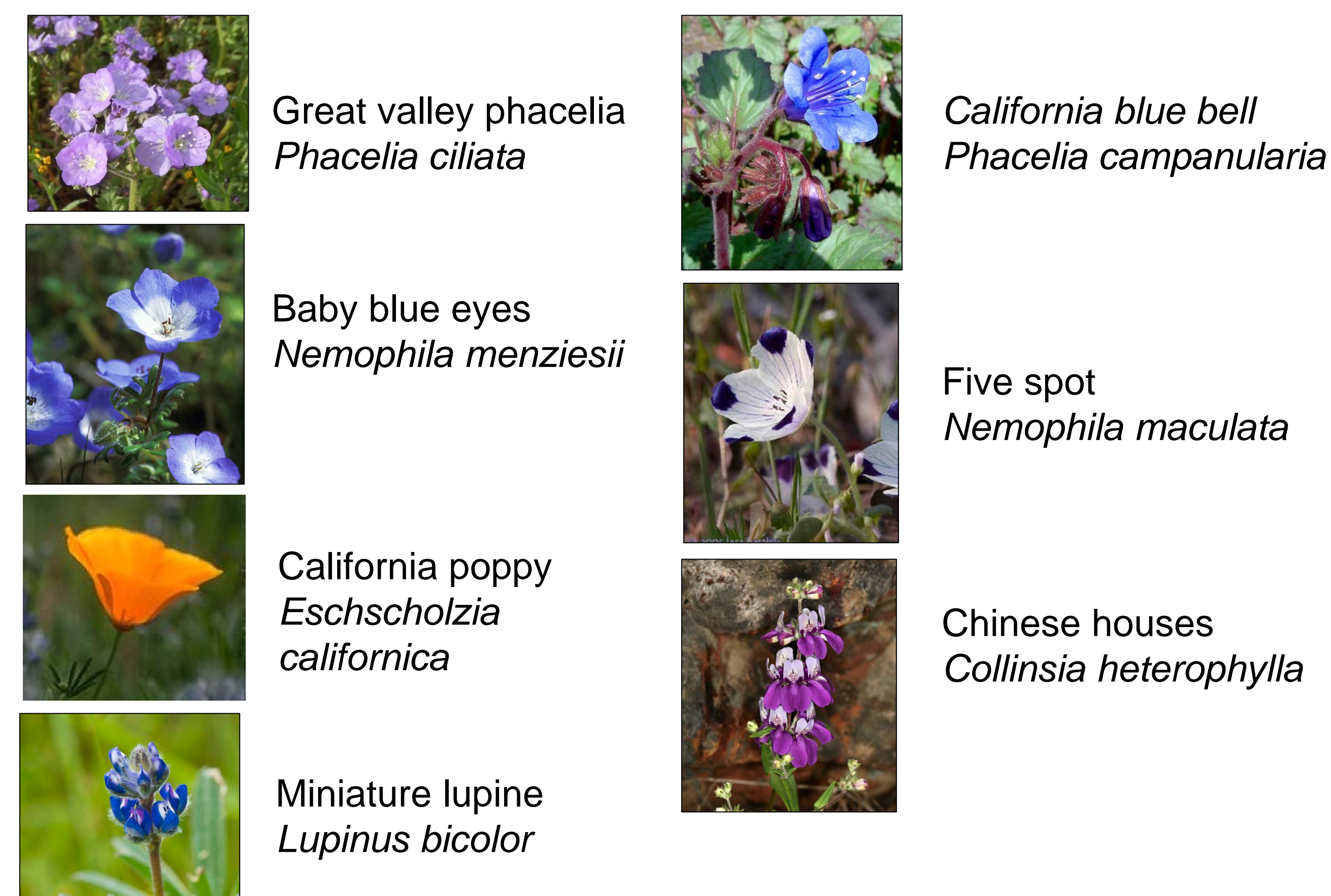


Preparing to seed border planting



Sampling wildflower bloom

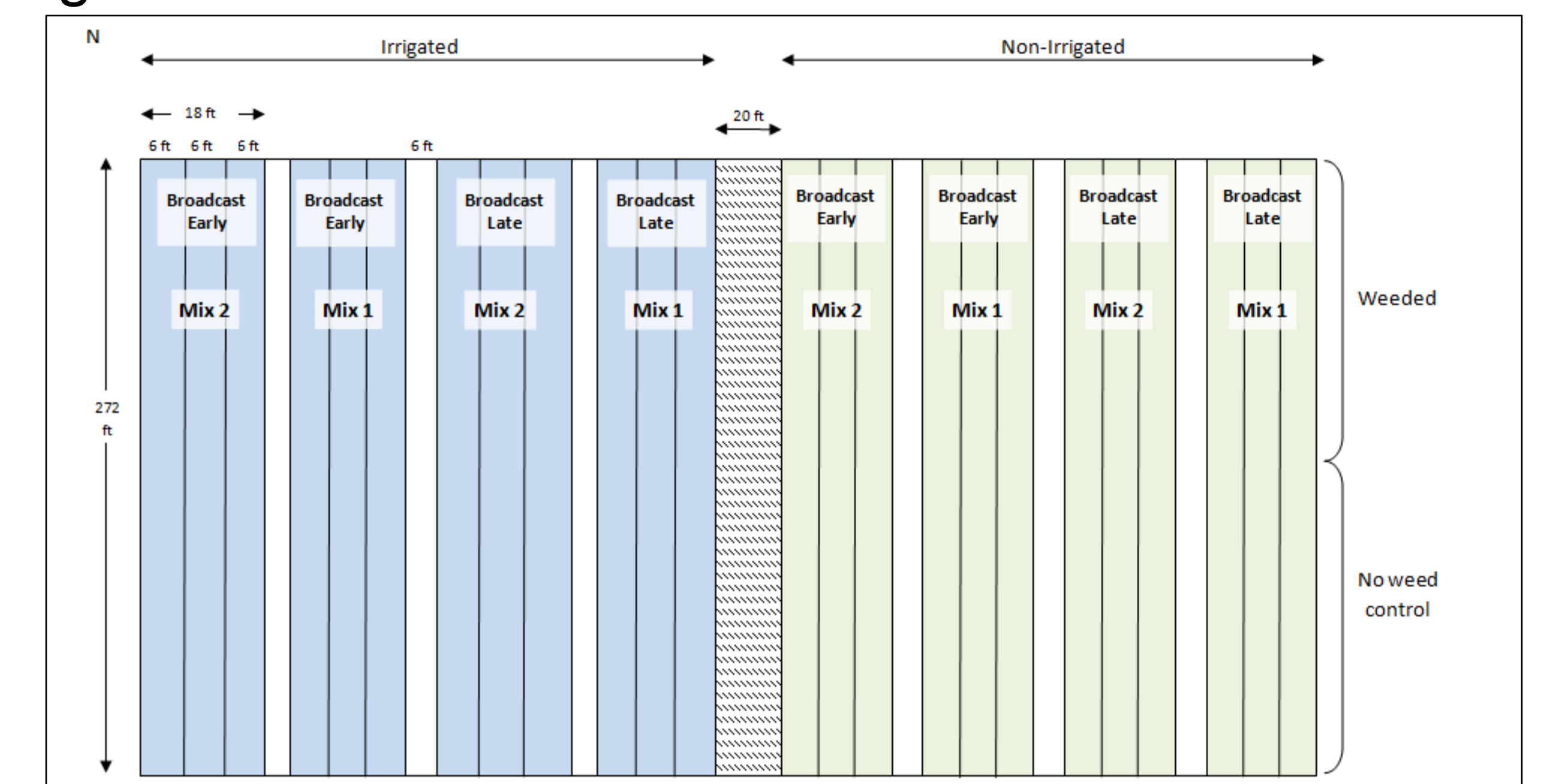
## Almond test Mix



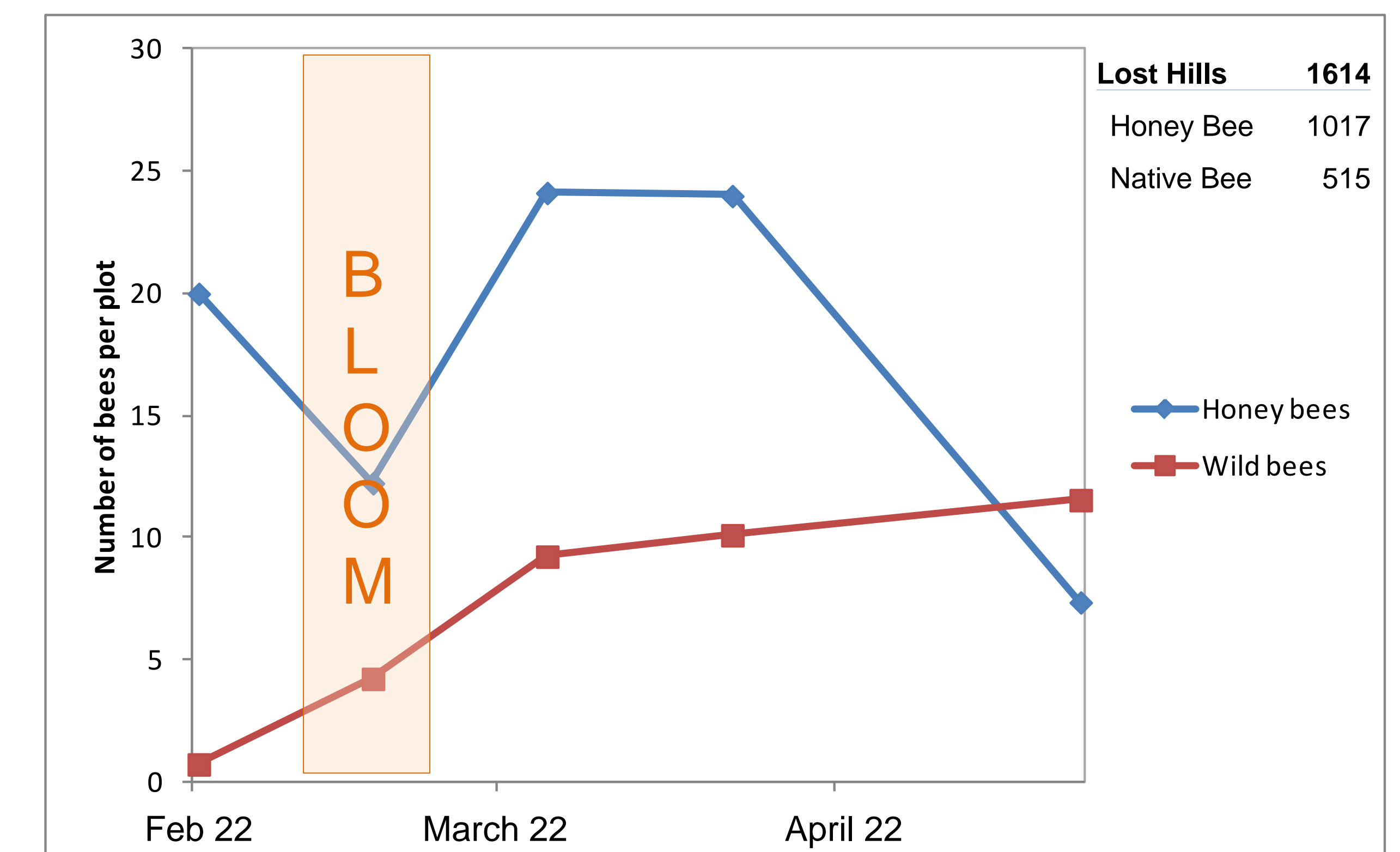
We gratefully acknowledge support of the *Almond Board of California* for our next steps in the research program.

## Preliminary Results (2012-13)

**Plot configuration** at Losthills test site. Quantified effects of timing of seeding, seeding density, and irrigation on bloom.



**Bee visitation** to wildflower plantings at Losthills site. Almond bloom indicated by shaded orange region. Pooled over all treatments.



**Honey bee visitation** to various plant species in the mix at Losthills test site. Lines shows visits per sample period and are pool over all treatments.

