

# Cover Crops in Almond Orchards

irrigation &  
weed  
suppression



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→ **Cover crops outcompete weeds** through exploitative competition. This effect has been well-studied in annual systems (Bybee-Finley and Ryan, DOI:10.3390/agriculture8060080). Few studies have applied cover crops to orchards in Mediterranean climates.

Almond growers could potentially replace some cool season weed management by adding winter cover crops to orchard alleys. Our **objective** was to evaluate the efficacy of cover crop mixes for weed suppression in California almond orchards. This project was part of an ongoing study of cover crop ecosystem services in almond orchards.

**Methods.** We planted two 5-species mixes of cover crops in commercial almond orchards at 3 locations across the Central Valley (see sidebar)

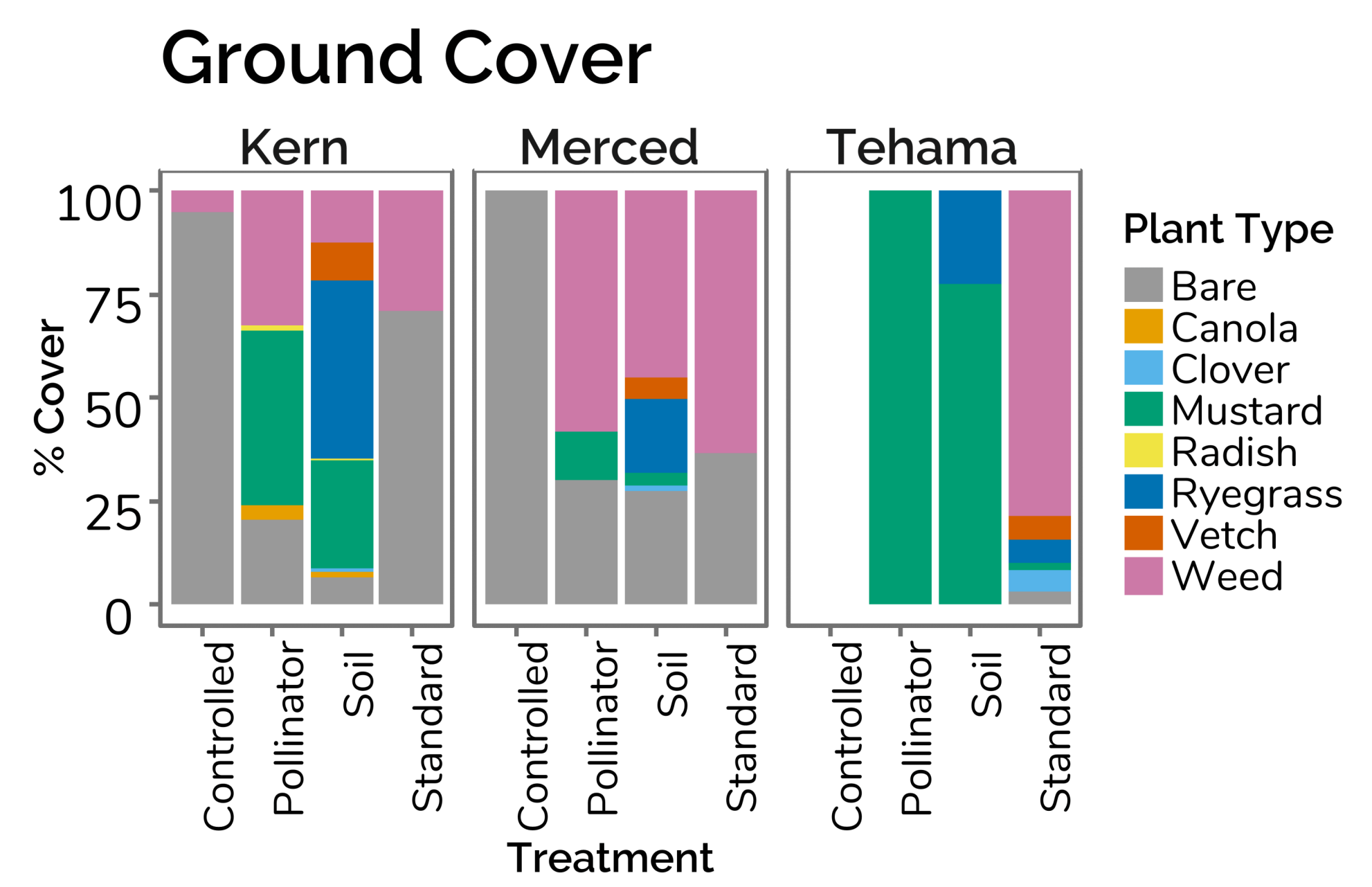
in the fall of 2017.

Each site had 4 replicates in a randomized complete block design. The “**pollinator**” mix contained 5 mustard species, and the “**soil**” mix contained 1 grass, 2 legume, and 2 mustard species. Each site had a “**standard**” weedy vegetation treatment, and the Kern and Merced sites also had a “**controlled**” weed treatment.

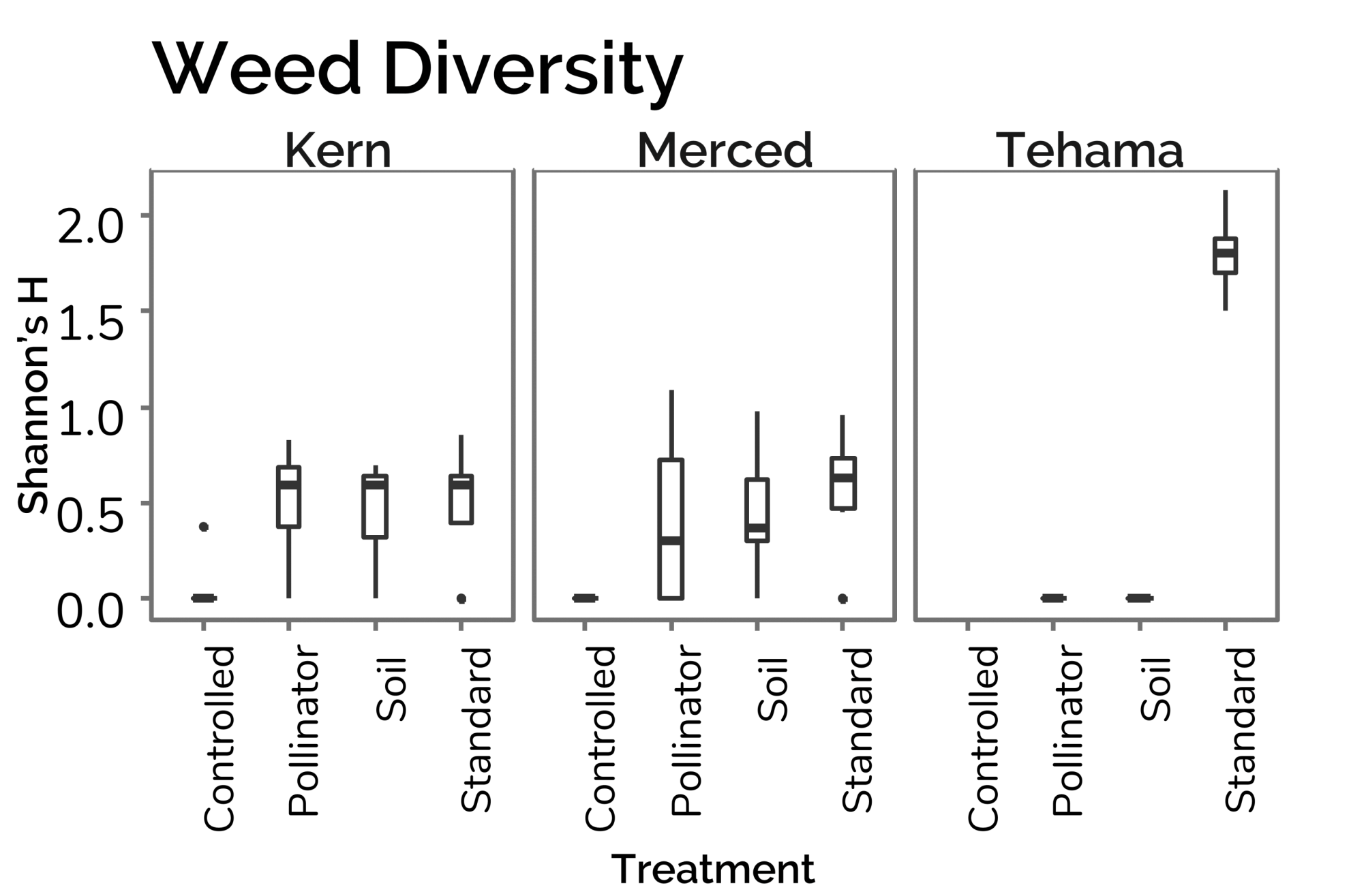
Plant surveys were conducted with 50 meter point-intercept transects. Though we performed surveys throughout the year, this poster displays winter weed data collected in March 2018.

Data were analyzed with ANOVA using R 3.4.3. Each site was considered separately, because of differences in orchard maturity and natural rainfall. Shannon diversity was calculated using the `vegan` package.

**Results.** In Tehama County, where water and light were relatively abundant, both cover crop mixes effectively reduced winter weed populations compared to the standard treatment. Cover crop establishment at the Merced and Kern County locations, which had lower rainfall and more mature orchard trees, was not sufficient to reduce weed cover compared to the weedy standard, though cover crops did reduce bare ground at the Kern County site:



Cover crop competition did lead to reduced weed diversity at the Tehama County site, suggesting that vigorous cover crops can reduce overall weed diversity:

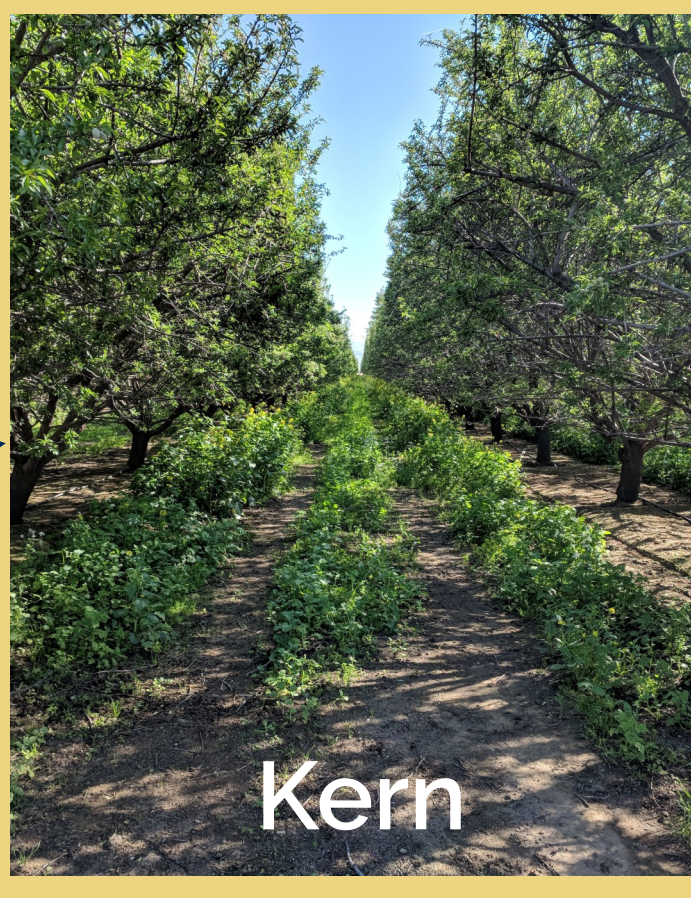
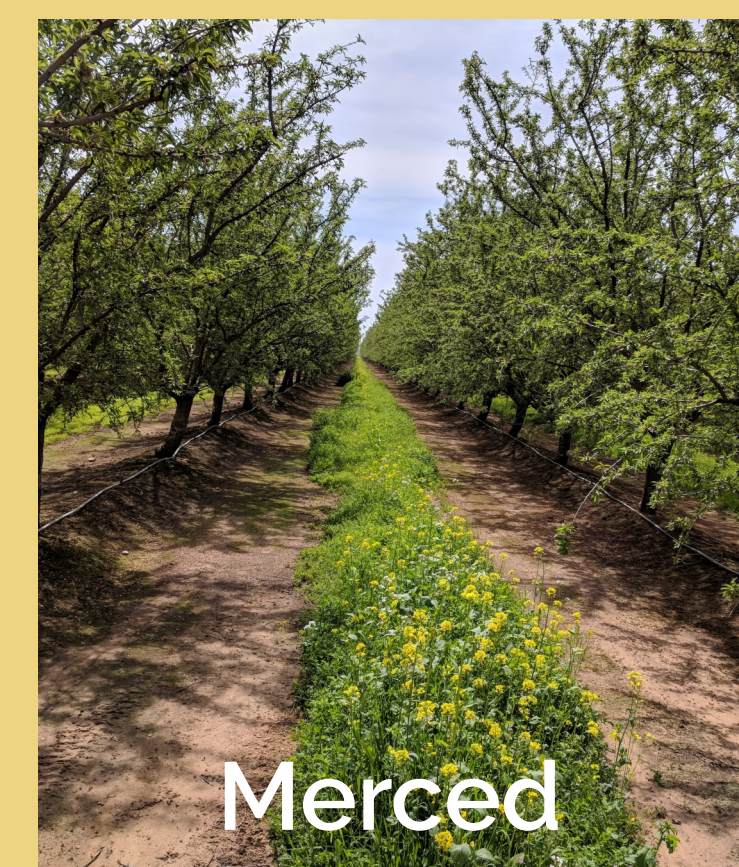
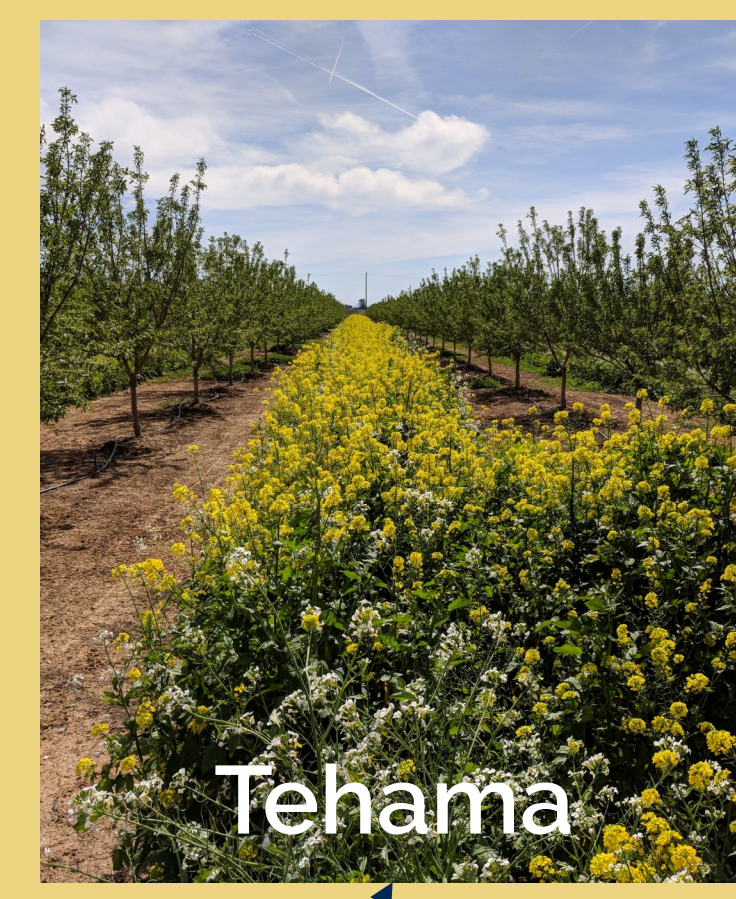


**Conclusion.** These results mirror a previous study that found that winter cover crops may be effective weed management tools in California perennial crops (Baumgartner et al., DOI:10.1614/WS-07-181.1), with the caveat that good cover crop establishment is essential. More research will help us determine management factors, such as planting date, that can help ensure effective establishment. ●



## Can cover crops **work** in California?

Cover crops provide ecosystem services by taking advantage of unused resources. In water-stressed areas of California, climatic conditions may limit the potential reliability of cover crops. This effect was evident at the two southern locations in this study:



In fact, irrigation can play a major role in cover crop establishment, as shown in the photo below. While cover crop proponents laud benefits to pollinator and soil health, many benefits remain unknown. Orchards provide a flexible system for cover cropping, but researchers must keep looking at the costs and benefits of cover crops in this unique environment.



This research was funded by the **Almond Board of California**  
Learn more about the project: [tiny.cc/CoverCrops](https://tiny.cc/CoverCrops)  
Download the poster: [tiny.cc/WSSA2019](https://tiny.cc/WSSA2019)