

COVER CROPS IN ORCHARDS

Takeways from a Healthy Soils Demonstration collaboration between Community Alliance with Family Farmers (CAFF) and California nut growers in California

At a Glance

From 2019–2022 CAFF partnered with three farms to demonstrate the benefits of cover cropping for soil health in nut orchards. Through rigorous soil testing paired with grower observation and experience, we see the benefits, challenges, and major takeaways related to cover crops.

Double A Walnuts

Cover cropping as a nutrient management practice in organic transition

Farmer: Alan Siegle

Location: Colusa, CA

Crops grown: Walnuts

Key Benefits

- The main benefits Alan notes are nitrogen fixation, addition of soil organic matter, pest control, and habitat for beneficials.
- Cover crops provide a more economical way to manage soil nutrients, particularly nitrogen, in an organic system compared to compost.
- Cover crops have played an important role in bridging from conventional to organic management in several blocks.

- Between cover cropping and hedgerows, they've been able to reduce sprays in their conventional and organically managed blocks.

Challenges & Lessons Learned

- Cover cropping limits their ability to get into the orchard in winter and spring, for example to remove dead trees or to prune. To better manage this challenge, they would plant the cover crop in every other row and alternate planted rows each year.
- Their biggest labor inputs are ground prep (light disking) before broadcast seeding. Otherwise, they are mainly no-till.
- Double A aims to suppress nematodes in several blocks with a mustard mix by mowing and immediately disking.

"Planting cover crops in our organic orchards has allowed us to meet our nutrient demands while using less compost."

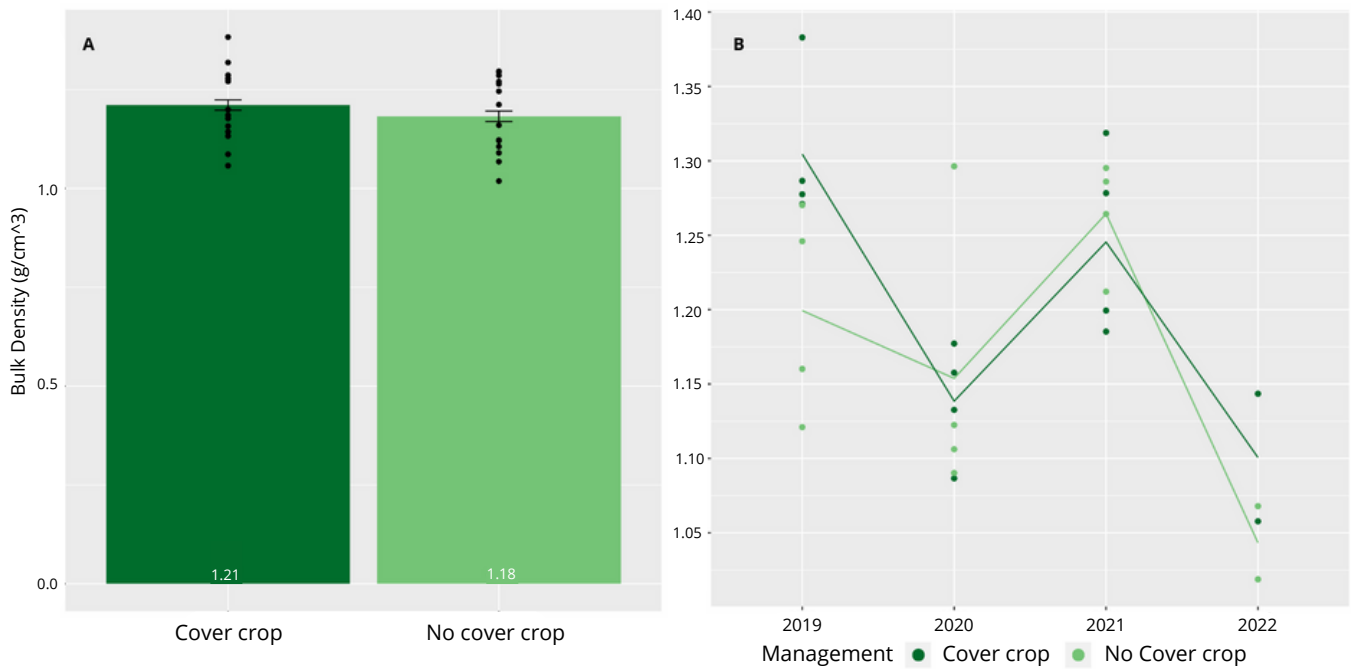


– **Alan Siegle**
Double A Walnuts



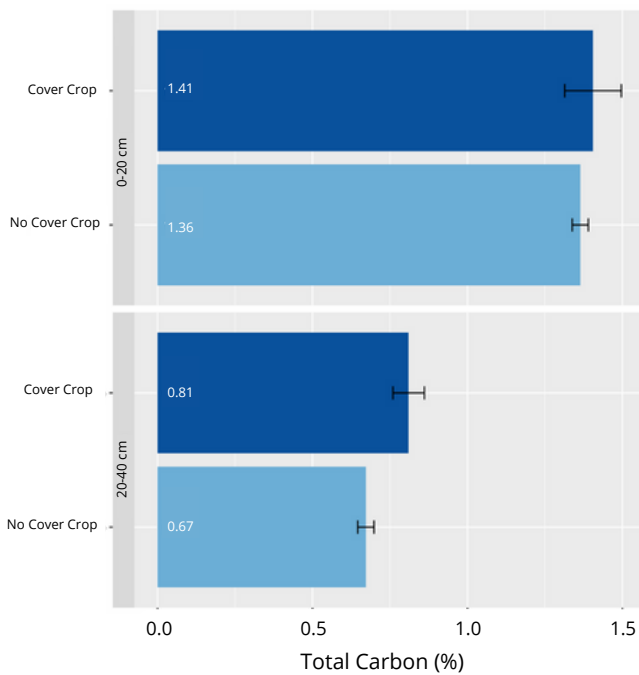
Double A Walnuts Soil Health Findings

Bulk Density

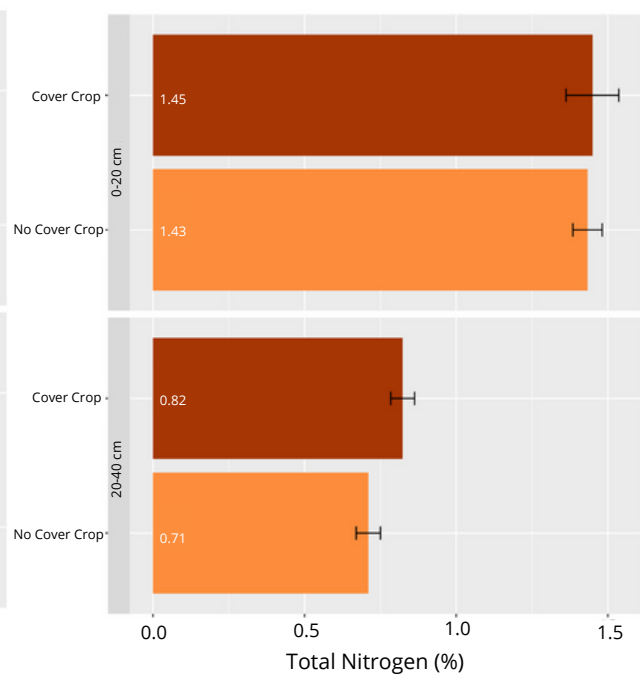


We observed oscillating concentrations of carbon and nitrogen as well as bulk density measurements in both Double A Walnuts' cover cropped and non-cover cropped orchards. This observation demonstrates the high variability that can be found in soil health data.

Total Carbon



Total Nitrogen



Of our three partner farms as a part of this demonstration project, Double A Walnuts' cover cropped orchard generally had the greatest concentrations of carbon, nitrogen, and microbial biomass. We also observed fewer root-lesion nematodes in their cover cropped orchard relative to the non-cover cropped orchard with each consecutive year.

Bullseye Farms

High acreage cover crops in nuts and vegetable systems

Farmer: Nick Edsall

Location: Woodland, CA

Crops grown: Pistachios, almonds, walnuts, and tomatoes

Key Benefits

- Notable benefits Bullseye have observed are improved soil health, pollination, and pest control.
- In terms of monetary costs, cover cropping is \$50 or less per acre. How this breaks down:
 - ▶ Labor and fuel: \$15 / acre
 - ▶ Seed: \$10-12 / acre (triticale) up to \$30-35 (multispecies mix)
 - ▶ No-till drill at 7 mph; seeding rate can be reduced to lower cost
- Overall, less water is required in the orchards in the summer as the cover crops help moderate the temperature. Compared to before planting cover crops, the trees show less water stress and there's less soil cracking with the same irrigation.
- Herbicides have been significantly reduced as cover crops have provided weed suppression.

Challenges & Lessons Learned

- In fields where the soil is in rougher condition or hasn't been planted before, they'll use a higher seeding rate.
- Many growers worry about residue for harvest. Nick has found the cover crop residue to be fairly easy to manage, and prefers it in blocks that would otherwise have heavy soil cracking and/or dust.



“We started using a systems approach after realizing that there were many benefits and that several common production problems could be overcome with consistent cover cropping.”



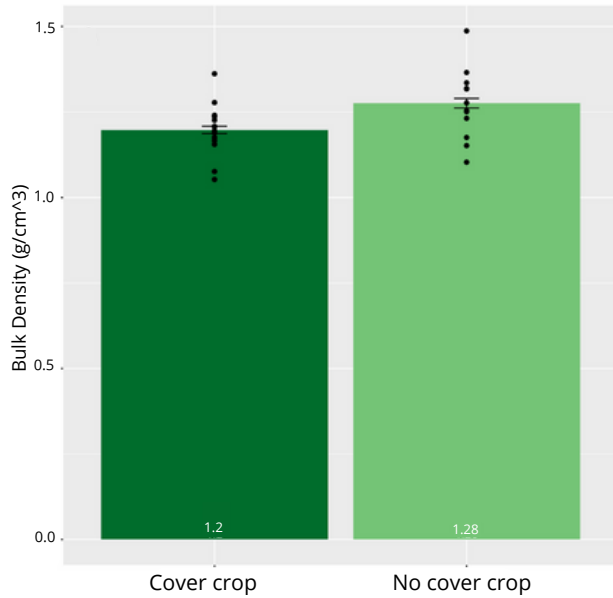
– **Nick Edsall**
Bullseye Farms

Bullseye has noted IPM benefits that build over time, including being able to reduce sprays, especially for mites as the cover crops help with dust reduction.

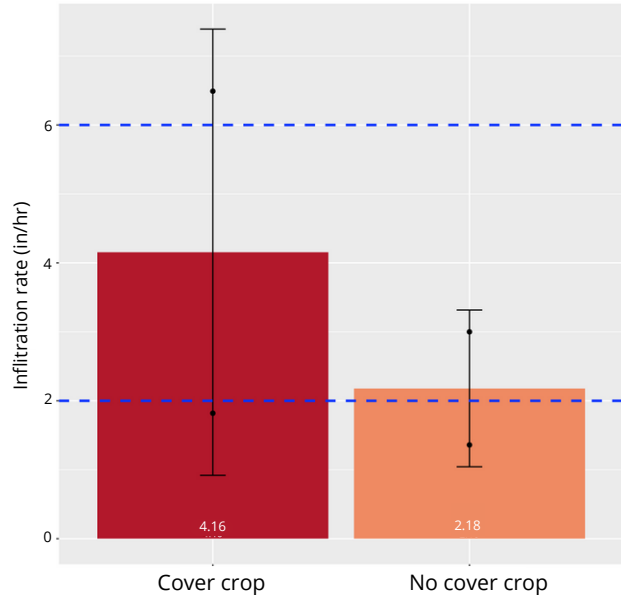


Bullseye Farms Soil Health Findings

Bulk Density

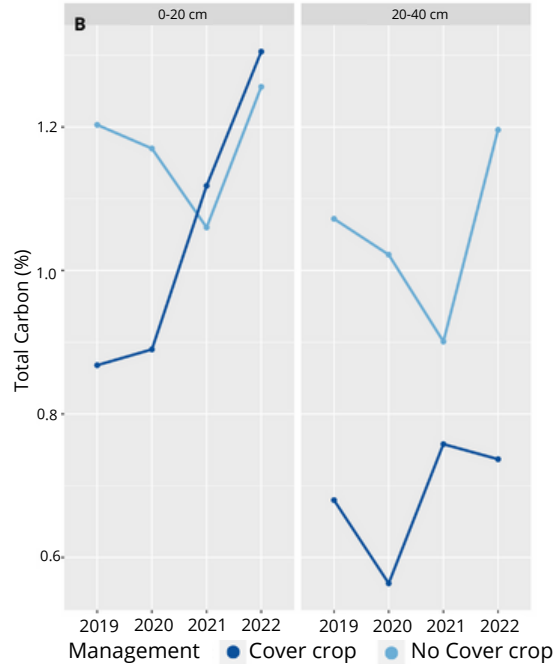
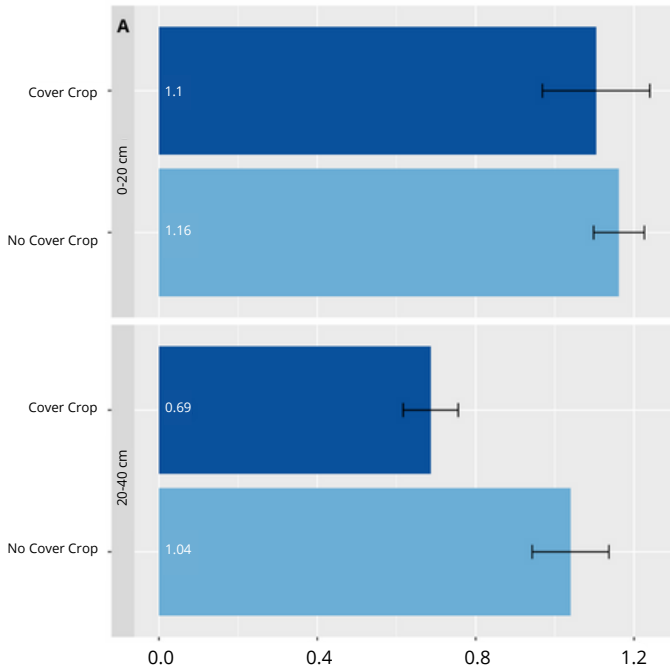


Infiltration



We observed lower bulk density measurements and faster water infiltration rates in Bullseye Farms' cover cropped orchard compared to the non-cover cropped orchard.

Total Carbon



Average carbon and nitrogen concentrations are greater in the non-cover cropped orchard than cover cropped orchard. However, in the top 0-20 cm of the soil, we observed annual incremental increases in these soil nutrients, eventually surpassing concentrations found in the non-cover cropped orchard in 2021 and 2022.

Valley Fresh Foods

Efficiently stacking soil health practices for production and economics

Farmers: Tanya Gemperle Goncalves and Richard Gemperle

Location: Turlock, CA

Crops grown: Almonds

Key Benefits

- Major benefits noted by Valley Fresh include habitat for beneficials and pollinators, improved soil health, better water penetration, and nitrogen fixation.
- They've found cover cropping to be fairly inexpensive, as it's integrated with other practices. By planting alternate rows and managing the non-cover cropped rows with compost applications and spreading prunings, they can achieve all necessary operations like sanitation and pruning.
- Planting before the post-harvest irrigation means that the cover crop doesn't require any additional water and helps achieve a good stand.



Challenges & Lessons Learned

- In their organic orchards, weed competition can be difficult, so cover crop seed selection is key. Reseeding perennial clovers have been successful in some blocks.
- They practice reduced tillage, and cover crops can create favorable habitat for gophers and voles, so leveling the orchard floor and relying on owls for pest control has been key.
- In one orchard with micro sprinklers, the cover crop stand can be patchy in years with dry winters.

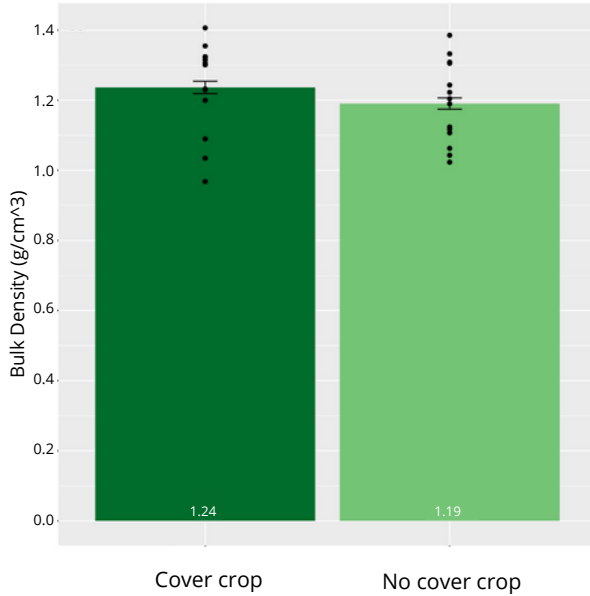
"Our system has been designed so that we integrate the cover crop into operations that we'd normally do anyways, so it's very efficient... over the years, we have decreased costs and increased efficiency."



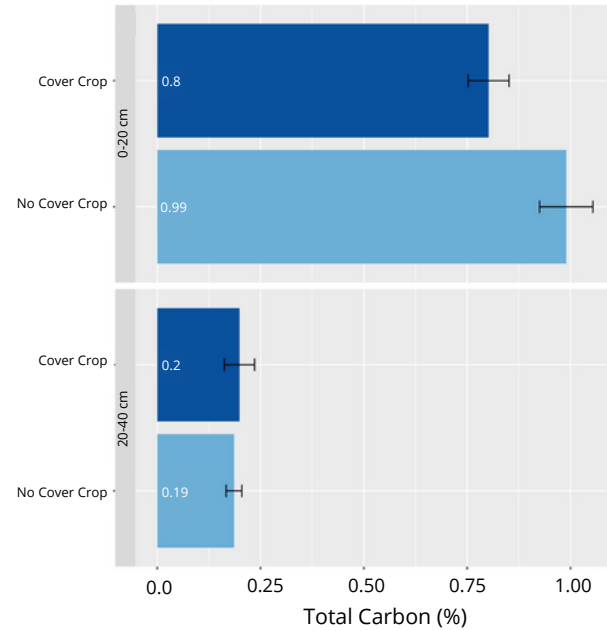
— **Tanya Gemperle Goncalves**
Valley Fresh Foods

Valley Fresh Foods Soil Health Findings

Bulk Density

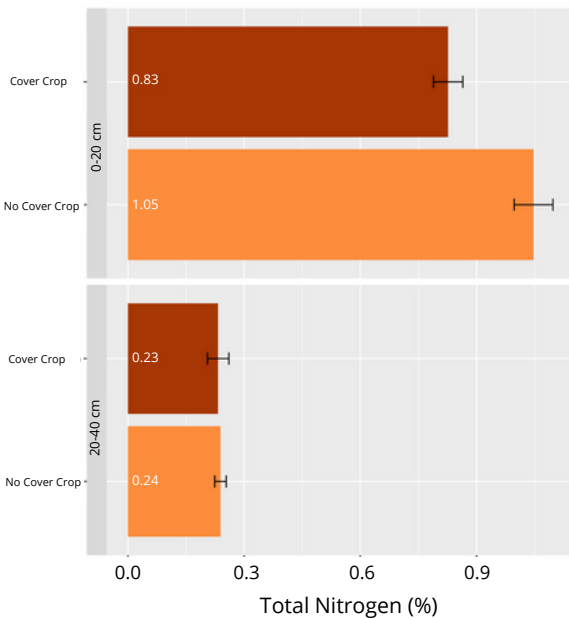


Total Carbon

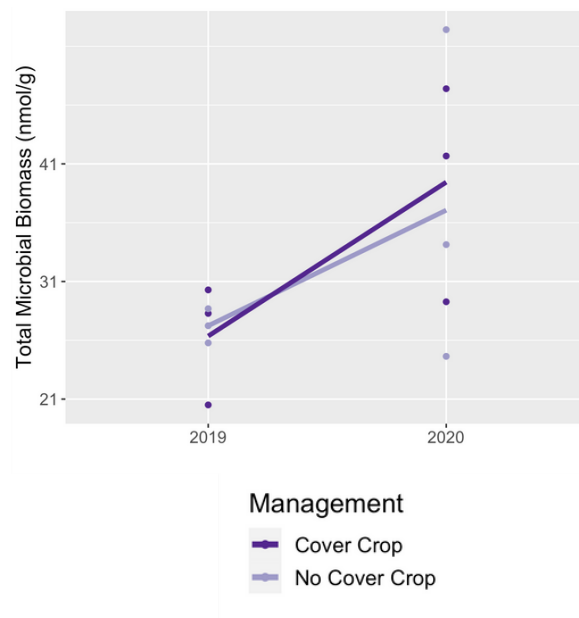


On average, we observed greater concentrations of carbon and nitrogen and greater bulk density in Valley Fresh Farms' non-cover cropped orchard compared to its cover cropped orchard; an observation we generally do not expect. Within the cover cropped orchard, increases in measured soil nutrients of carbon and nitrogen remain minimal.

Total Nitrogen



Total Microbial Biomass



Like Double A Walnuts, there is quite a bit of variability within the data set. At all farms, even amidst the fluctuation in physical and chemical properties of soil health, we consistently observed increases in microbial biomass in the cover cropped orchard from 2019 to 2020.



CAFF

COMMUNITY ALLIANCE
with **FAMILY FARMERS**



To learn more about CAFF's Ecological Farming Program, including resources and research updates on our cover crop work, visit www.CAFF.org/ecologicalfarming