BIOLOGICALLY INTEGRATED ORCHARD SYSTEMS IN WALNUTS

COSTS and BENEFITS of COVER CROPS

BACKGROUND

Cover crops are a valuable tool in orchards which can help growers achieve many goals. Tom Johnson, licensed PCA and CCA with 25 years of experience in the cover crop industry sums it up best by noting that, **"if you can get over the mental hurdle of planting a crop that isn't bringing in revenue, you can reap many benefits in the future."**

Cover crops are planted in the off-season and are either mowed, knocked back with a roller/crimper, grazed or chemically terminated. With the use of flowering species, you can increase the amount of beneficial insects on your property, and foster greater biodiversity in general. Some mixes that produce a lot of biomass can also create habitat on the orchard floor for predatory insects, while also helping to cut down on dust and mites.

Some common cover crops for walnuts are: triticale, mustard, vetch/peas, clovers, and rye/oats/barley. Using a combination of multiple species will help you achieve various goals

BEST PRACTICES

There is a steep learning curve when planting a new crop, which is exactly how cover crops should be treated. You will want to plant at the right time, ideally between harvest and leaf drop, and before the soil gets too wet. Johnson recommends starting with a single grain such as triticale, until you get the hang of it. Once you're confident in managing cover crops you can move on to multi-species mixes with grains, legumes and brassicas. The key to a good establishment is using strong emerging seeds, as the seedlings will often face cool, saturated soils and a deep leaf layer to come up through.

Your goals will help you determine which species to use. (see figure 1 below)

Lastly, you will need to determine when and how to terminate. It can be better to terminate earlier than later to be sure you aren't stuck with a really tall or dense cover crop that is hard to manage and takes a long time to break down, but that all depends on your larger goals. If mowing, you might not get the intended benefits of weed suppression, moisture retention from biomass, , etc. You may use a roller/crimper to knock down the cover crop and leave the orchard floor covered, but you'll need to determine how to ensure it decomposes.

INSIGHTS FROM A PROFESSIONAL: TOM JOHNSON SHARES TIPS

TIPS FOR GREATER SUCCESS

- **Start with a single species:** Triticale is often recommended until you get the hang of growing and managing a cover crop, then move on to a mix.
- **Create a mulch:** Use a mix that will make a moderate amount of long-lasting biomass, which decomposes on the orchard floor. That mat of vegetation shades the soil, which can reduce dust (mites) and provide shelter for predatory insects. With enough of a mat, an emerging husk fly can be intercepted by predators living in the mat, provided the predators are present.
- **Maximize utility:** Remember, the cover crop is a production tool, so it has to fit into your production cycle with minimal disturbance.
- **Terminate it:** Manage cover crop early enough in spring so orchard floor is clean for harvest. Cover crops can be perceived as leaving the floor "dirty" - growers will have to alter their expectations and shift industry standards over time.

"The benefits become savings over time, in the form of fewer fertilizers needed, fewer insecticide sprays, and less horse-power/fuel usage to cultivate."
- Tom Johnson

"It's not necessarily going to affect the property value, except for the really hard to extrapolate benefit of what you're getting. You know, the better soil, better trees. But how do you put a price tag on that?"
- Tom Johnson

BARRIERS AND CHALLENGES

- **Access to seed:** This may be challenging, especially at a smaller scale.
- **Equipment**: Potential equipment purchases/modifications may be needed - no-till drill or modified drills or broadcast seeder, roller/roller crimper if not mowing.
- **Harbor pests:** Cover crops can be host to virus vectors or exacerbate soil borne disease if not managed well.
- **Dollars and cents:** It can be hard to financially quantify soil and water co-benefits.
- **What to plant?:** Knowing the correct mix to purchase will take time.
- **Rodent pests:** Increased gopher/vole pressure, since it's harder for predators to see rodent pests through a healthy stand of cover crop.
- **Extra passes:** You may need 1-3 more mowing passes than if just managing resident vegetation.

FIG 1. COVER CROP GOALS AND SUGGESTED MANAGEMENT STRATEGIES

What is your goal?	Management Strategy
Attract beneficial insects	Plant a variety of crops that provide flowers and nectar. To reap the benefits of these cover crops, you will need to let them flower in the field before terminating. Consider which insects you are wanting to attract and which you are aiming to control when creating your cover crop mix.
Weed Suppression	Higher seeding rates of fast growing grasses will best outcompete weeds. Brassicas can create a canopy which outcompetes weeds as well. Spring cover crops can also slow summer weeds from getting established, which take water and get in the way of harvest.
Build biomass/Increase soil organic matter	For maximum benefit, leave plant residue in the alleys or incorporate it.
Increase fertility	Legumes should be inoculated with Rhizobia bacteria to maximize nitrogen fixing properties, and terminated just as they begin to flower in order to lock nutrients in the soil.
Reduce compaction	Allow deep rooted plants such as mustards or tillage radish to stay in the ground to open up compacted soils. You can let these plants go to seed and they will reseed every year, if you prefer to save on seeds costs. In this case, they may be more difficult to manage as the stems become more woody.
Increase water infiltration	The fibrous, deep roots of brassicas and annual grasses will encourage water to settle into deeper soil layers. Most effective with dense planting and mowed or grazed, with minimal tillage.

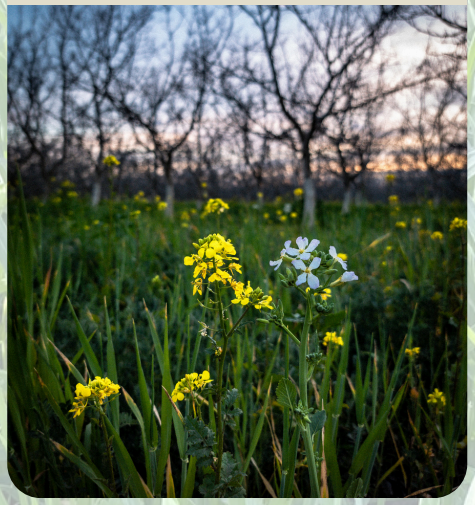
GROWER STORIES:
UNRUH WALNUT FARMS

BACKGROUND

Daniel Unruh manages 193 acres of walnuts in Colusa County. He assumed management of the property in 2010 and planted his first cover crop in 2013, with the hope of mitigating his nematode problems. Unruh states, **"my goal is to bring more life onto my farm, not exterminate life, if possible."** While he started with the goal of nematode suppression, planting primarily mustards for this purpose, he appreciates the associated soil health benefits of sowing cover crops and chooses mixes based on his soil health concerns.

He notes that using Green Cover Seed's Smart Mix Calculator to refine his mixes has been very helpful. Unruh uses a Monosem 7-row precision crop planter to sow his cover crop mixes, but started with just broadcasting seed. His mix will vary year to year depending on his goals and his management practices. For example, the mix will differ if he will terminate the cover crops by grazing sheep as opposed to using a roller crimper. And sometimes he will mow after using a crimper to help with decomposition.

"I have found that the Brassica family (mustards) gives me the best results... in doing substantial damage to nematodes."
- Daniel Unruh



"The more species you can grow in the ground at one time, the greater your nutrient cycling capacity is and the less inputs you'll need. ***In 2013 I had 1.5-1.7% [soil] organic matter, and currently (2025) I'm up around 4.5%.*** *"*
- Daniel Unruh

COSTS AND BENEFITS OF COVER CROPS AT UNRUH FARMS

Unruh often spends **$20-45 per acre for seed** when planting 40 lbs per acre. He feels he could plant less and still get the results he wants.

A **diverse flowering blend** to attract **beneficial insects** costs him about **$15 per acre at 1 pound per acre** as a supplement to his standard cover crop mix.

Savings of **120 units of N per acre** with the use of cover crops, and less inputs overall with increased nutrient cycling from the use of multi-species cover crops.

Unruh notes that **he doesn't have to start watering until late June,** while his neighbors (who don't use cover crops) start in mid-April to early May.

GROWER STORIES: RIVERDANCE FARMS

BACKGROUND

Cindy Lashbrook farms about 60 acres in Merced County at Riverdance Farms. Lashbrook has been managing her certified organic operation since 1991, so is no stranger to integrating practices such as cover crops. Due to her experience as a pest control advisor, or PCA, she notes the value of combining cover crops with other IPM strategies such as mating disruption and/or predator release. She feels this can **"create a cacophony of inhibitions to confuse (pests) and decrease pressure"**, with blooming cover crops inviting in beneficial insects and providing habitat for natural enemies.

"The diversity is usually more helpful than not... If a critter gets in, they're gonna eat the only thing they can find, and if all that's in there is the crop, they're gonna eat the crop."
- Cindy Lashbrook

"Weeds, for organic folks, are the number one cost to take care of. So, a good cover crop planted at the right time and kept up until the right time can almost eliminate the weed problems."
- Cindy Lashbrook.

"The first year, if you have really dead soil, it's hard to get it established. It will take more to break it down, and it will take more water. So, that first year is an investment."
- Cindy Lashbrook

COSTS AND BENEFITS OF COVER CROPS AT RIVERDANCE FARMS

$80-100/acre
for seed and labor, sometimes extra water in the first few years.

2 extra mowings
to terminate compared to resident vegetation.

Cindy notes a **reduction in herbicide** use due to decreased weed pressure.

Cover crop implementation **added 80-100 units of N per acre**

FOR MORE INFORMATION

Cover Crops for Walnut Orchards (UCANR publication)
Cover Crops in Orchards (CAFF publication)
September- Time to Think About Cover Crops in Walnuts featuring Unruh Farms (SVO/UCAR)
CAFF's Cover Crop Decision Guide for Perennial Cropping Systems
Green Cover Seed's Smart Mix Calculator

Triticale cover crop at Machado Family Farms in Linden, CA. Densely planted grasses help with infiltration and can out-compete weeds.

This resource was created by CAFF staff and Berkeley Food Institute interns Magaly Santos and Jenny Rocha, with funding from CDFA's Biologically Integrated Farming Systems (BIFS) Program. Special thanks to Daniel Unruh, Cindy Lashbrook and Tom Johnson for their time and contributions.

All cost information and recommendations included in this cost study were collected in 2025.

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