

Orchard Cover Crops

Reseeding annuals to improve soil, fix nitrogen and reduce run-off

For centuries, farmers planted cover crops to rejuvenate the soil and control erosion in their fields. By the 20th century, this practice was abandoned with the emergence of inexpensive and easy-to-apply commercial fertilizers and herbicides.

Today, the use of cover crops is regaining popularity because of increased interest in soil quality and the high cost of nitrogen fertilizer. Managing the orchard floor and ground cover can play a key role in improving production and maintaining healthy and fertile soil.

A cover crop is a non-cash crop that isn't harvested for feed or for sale. It is grown between tree rows and in some cases between trees.

This guide outlines the steps for planting and maintaining a successful reseeding annual cover crop under no-till orchards in Sutter and Yuba county orchards.





Seeds are planted in the fall after harvest, and buried between 1/4 and 1/2 inch deep.



Seedlings should emerge within two weeks and grow very slowly as the weather and soil cools.



Mow to about 2 inches high in the early spring for frost protection and to reduce competition for clovers. Be sure not to leave a smothering mulch on top of the growing cover crop.



The cover crop should become quite dense in the spring and may look overgrown. Resist the urge to mow too early.



Late in the spring, the cover crop will set seed and die down. It is safe to mow when clover seeds have hardened and grass seed has matured.

What are the benefits of a cover crop?

A cover crop improves soil quality by adding organic matter and nutrients such as nitrogen from legumes. The benefits are:

- Protecting the soil from erosion, which is important in the Sacramento Valley;
- Better fall and winter orchard access due to firmer ground;
- Improving water infiltration into the soil, resulting in less storm water run-off, more efficient irrigation and better water quality downstream;
- Suppressing winter weeds with competition and summer weeds with a thick mulch after late-spring mowing;
- Saving labor and diesel fuel costs over tillage systems because the crop is usually mowed only a couple times – once in the early spring and again in early summer at maturity.

ments in soil quality components such as better soil water holding capacity and better soil water infiltration. In addition, the late-spring mowing will leave a mulch that may reduce evapotranspiration in the early summer.

Frost threat. A winter cover crop reduces the amount of heat absorbed by the orchard floor during the day, which can increase the risk of frost damage after leaf-out in the spring. This problem can be minimized by mowing the plant cover down to about 1½ – 2 inches during frost sensitive periods.

Impact on pruning. Removing and shredding orchard prunings left on the floor is difficult once the cover crop grows around them. To avoid this problem, you should prune and remove brush before cover crop seeding in the fall or plant the crop in every other middle and prune in the areas that are unplanted.

Gophers and voles. Pocket gophers feed on the roots of annual clovers and cover crop stands hide the mounds that signal the presence of gophers in the orchard. The crop also can become a protective habitat for voles.

What is the best choice for a cover crop?

Annual reseeding clover mixes are most effective for no-till orchards. These mixes will typically contain a variety of annual clovers and may have a grass included. The clovers you will see in these mixes include crimson clover, rose clover, Persian clover, subterra-

nean clovers (which come in many named varieties with differing maturity periods), barrel medic and burr medic, otherwise known as “burr clover.” If a grass is included in a mix, it is usually soft chess, also known as “Blando” brome. Avoid medics in peach orchards as they may attract plant bugs.

These clovers and medics are able to capture their own nitrogen from the atmosphere and contribute to improved soil fertility. While this may take care of some of the nitrogen needs for your trees, always use summer leaf monitoring to check the trees’ nitrogen needs.

How do I prepare the soil and plant the seeds?

Ground preparation depends on the seeding equipment. When finished, you want to have a flat, level surface that is ready for harvest, especially in nut orchards, without requiring any further ground work. You can apply a contact herbicide treatment at, or before, seeding to prevent weed competition. Your equipment options include:

- No-till drill. This equipment requires little or no ground preparation and generally will allow you to plant directly into most surfaces.
- Grain drills and broadcast seeders require a soft surface to place the small seeds. Work up the top two inches of soil with a harrow or disk until the surface is fairly fine. Plant or spread seed right away to avoid any trouble with rainfall or weed growth. Follow the broadcast seeder with a ring roller to push the seed into the soil.

For any planting method, the small seed of these mixes should be buried in the top one-quarter inch of soil.

Legume mixes are typically seeded at a rate of 25 to 30 pounds per planted acre. The planted acreage is only 60 to 80 percent of the orchard acreage because you won’t be planting into your tree row.

When do I plant my cover crop?

For any fall-seeded cover crop, the best results are achieved with the earliest planting possible. Any time from October to early November is suitable. By December the soil temperatures are too low to provide quick and consistent germination. If weeds are present at seeding, they must be controlled to avoid shading out the cover crop plants. A contact herbicide (not a pre-emergent) can be applied any time from just before seeding until a day or two after seeding the cover crop.

To ensure success, have your seed and equipment lined up before the harvest is over. This prepares you for the possibility of an early rain, which can stop any part of the seeding

process. If rain falls after ground preparation but before seeding, the weeds will get a head start on the cover crop and the ground can seal up, making it impossible to bury the cover crop seed with a roller or a standard grain drill.

How do I manage the cover crop?

Normal fall and winter rainfall is sufficient for the seeds to germinate and grow during the winter. A light irrigation may be needed by late November if there hasn’t been enough rain for seed germination.

If the cover crop consists of subclovers and/or medics, the height of the winter vegetation should remain below 2 feet.

In late February or early March, mow the clover cover crop at two inches above the ground to lessen competition from winter weeds. Try not to mow off too much top growth because a deep mulch will prevent the clovers from growing back. Mow any time there is the threat of a damaging frost, but never closer than one inch from the soil surface. Frequent mowing can delay flowering and seed maturity, and reduce biomass and nitrogen production.

The cover crop is not mowed again until the seed fully matures in early- to mid-June. Waiting this long to mow can take patience and a tolerance for messy-looking middles,



The cover seeds in this mix are coated with an inoculant that promotes nitrogen fixation. Even with the coating, they are very small and must be planted no more than 1/2 inch deep.



A subterranean clover emerging from under walnut leaves.

What are the challenges I might encounter?

Water use. Like any plants, cover crops need water to grow. In the spring, they can reduce soil moisture stored from the winter rainfall, decreasing what is normally available for your trees. Reseeding annuals however, need no additional irrigations in late spring and summer. Over time cover crop water usage can be offset with improve-



Reseeding annual cover crops can sometimes look tall and messy, depending on the species, especially in the late spring. All this plant material represents nitrogen and organic carbon that will be contributing to the improvement of the soil. These plants need to fully mature to ensure complete reseeding, so resist the urge to mow too early.

especially where grasses and taller clovers are used, but it is essential to let the cover crop mature before final mowing to ensure good reseeding, and good biomass production. Holding off on mowing in the spring after the cover crop looks overgrown and ugly will maximize the benefit to soil and water quality. If managed properly, the crop will reseed annually and re-establish itself in the winter. The greatest cost comes from the initial seeds and planting.

When the dense crop dies back in the spring, it will leave a thick mulch layer on the ground that helps control noxious summer weeds such as puncture vine and bindweed.

Using a contact herbicide to control Johnsongrass or Bermuda during the summer will not harm the cover crop seed.

Fertilizing. While the clover cover crop does not require fertilizer, your orchard does. If at all possible, apply nitrogen fertilizer only in the tree rows. This will encourage the clovers to fix more atmospheric nitrogen.



Persian Clover grows vigorously and can contribute over 100 units of nitrogen per acre per year.

How much will the cover crop cost?

Seed costs range from \$15 to \$50 an acre with the average running around \$35 per acre. Soil preparation and planting usually adds another \$45 to \$65 per acre. However, the costs of reseeding annuals should be spread over many years.

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