

## Cover Cropping Considerations in California Annual Crop Rotations

Cover cropping is a management practice primarily performed for soil health benefits and usually replaces fallowing in California’s annual crop systems. The benefits and challenges of cover cropping may vary over time, location, and grower experience.

### Benefits of Cover Cropping

**Soil.** Compared to a fallow field, cover crops can improve soil health by keeping the soil covered to prevent erosion, maintaining living roots in the soil, and increasing soil carbon (C) and nitrogen (N) when their biomass is incorporated. Soil C and N may not change with short-term use (Fig. 1), but over multiple years, cover crop biomass may increase soil organic matter (SOM). Increasing SOM can improve soil aggregation and structure, cycle nutrients that are critical for crop productivity, and improve soil resiliency to living and non-living stressors, like pests and climate extremes. Soil benefits will vary depending on species selection, cover crop management, and baseline soil conditions.

**Weeds.** A productive cover crop stand, where the canopy closes rapidly, can outcompete weeds and prevent them from establishing, thus reducing the need for herbicides. Cover cropping helps to manage weeds that grow in the same season as the cover crop. Species selection, seeding rate, and timing of planting are important considerations to ensure competitive ability. Legumes are generally less competitive against weeds compared to grasses and brassicas. High seeding rates will help ensure

more competition and faster canopy closure.

**Water.** Cover crops can improve soil-water dynamics. In the short term, cover crops create root channels that increase water infiltration (Fig. 2). In the long term, improved SOM and soil aggregation can increase soil-water storage. Cover crop roots may also scavenge nutrients that could leach below the root zone, potentially impacting water quality.

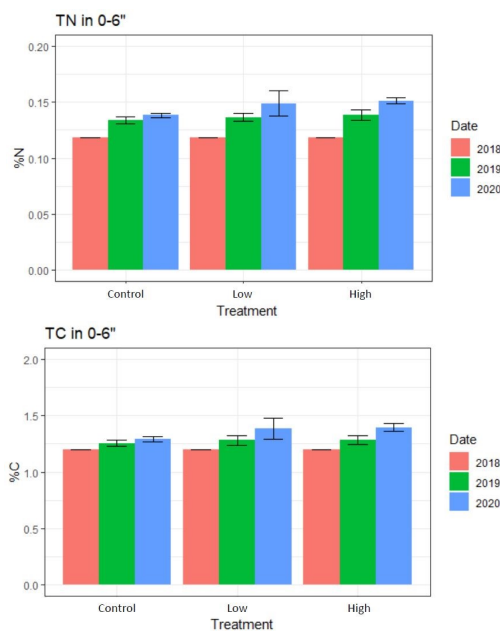


Figure 1. There were no significant changes to total soil carbon (TC) or nitrogen (TN) in the top 6 inches of soil after three years of a purple vetch winter cover crop planted at two seeding rates compared to fallow (control). (Light and Vinchesi-Vahl, UCCE Colusa County. Graphs by Veronica Suarez Romero).

**Wildlife.** Cover crops can provide habitat (i.e., shelter, food, and nesting) for beneficial insects, birds, and other wildlife. Winter cover crops are particularly important because much of the agricultural landscape is barren.

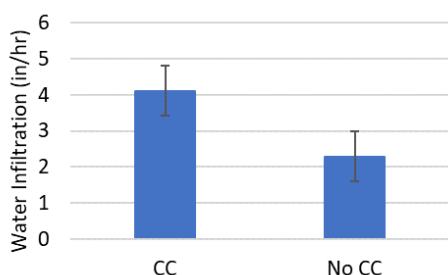


Figure 2: Water infiltration improved with a mixed cowpea and triticale summer cover crop (CC) compared to a standard dry fallow treatment (No CC) after three years. (Leinfelder-Miles and Aegerter, UCCE San Joaquin County.)

## Challenges and Considerations

**Timing.** Planting and termination timing are critical to ensure the cover crop does not interfere with crop rotations. For a winter cover crop, planting should occur before the first rain of the season to help it establish before winter. Cover crops are usually drill-seeded after ground preparation for the next year has been completed. Cover crop growth may be minimal in the winter months. Growth will increase rapidly when the weather and soil warm, but this may coincide with the timing for spring tillage operations. Cover crops should be terminated before seed set, or they can be mowed to cut off flowers if termination is delayed. The optimum termination date may be earlier during a drought year to conserve soil moisture for the subsequent cash crop. Termination methods can involve chemical termination, mowing, crimping, and discing to incorporate biomass. It is common to wait between 10 and 30 days between cover crop termination and planting of the next crop to allow for cover crop residue to break down. Late-season rains can hinder the timing of these operations.

**Costs.** A study of operations and costs is listed in the references. Notably, cover crop seed is an additional cost compared to fallowing, and for some species, the seed may be more expensive than cash crop seed. While cover crops are usually grown with few inputs, they may grow more productively with irrigation. For example, winter droughts can inhibit growth of cool-season cover crops, and warm-season cover crops will be more successful if planted into moisture, which may necessitate a pre-irrigation.

**Pests.** While a good cover crop stand can help with weed suppression, weeds may emerge ahead of and shade out the cover crop, compromising the stand. If weeds produce viable seeds, this increases the weed seed bank. In addition to weeds, some cover crops may attract insect pests, like aphids, and others may be allelopathic to subsequent crops.

### For more on this topic:

- ✓ UC Agronomy Fact Sheet “Selecting cover crops for California annual crop systems”. <https://agric.ucdavis.edu/fact-sheets>.
- ✓ Estimated costs for winter cover crop in an annual crop rotation. <https://coststudyfiles.ucdavis.edu/uploads/pub/2022/09/28/2022covercropsbenefits.pdf>

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