

Cover Crops in the Semiarid Southern High Plains

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What is a cover crop?

A cover crop is a plant that is used primarily to cover the soil, typically as seasonal cropland protection from water and wind erosion. In many U.S. regions, cover crops have been shown to produce many benefits:

- Minimize soil erosion
- Improve [soil health](#)
- Help control pests and diseases
- Improve soil fertility and productivity
- Reduce weed pressure
- Increase biodiversity
- Enhance water availability

Which of the multiple benefits attributed to cover crops are most likely to be realized in the Southern High Plains?

Cover crops can provide multiple benefits to farmers in the Southern High Plains. The most significant benefit is minimizing wind and water erosion, particularly in fallow fields. Cover crops can also add soil organic matter, increase soil biological activity, improve soil structure, and minimize soil water loss from crop fields.

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Rajan Ghimire (New Mexico State University), left, in one of his mixed cover crop research plots. Cover crop residues feed earthworms, right, which play an important role in improving soil aeration, water infiltration, and plant nutrient availability. Left photo: Amy Kremen Right photo: Rajan Ghimire

A cover crop study conducted at the Agricultural Science Center at Clovis produced the following results:

1. Dryland corn-sorghum rotation

- Cooler soil temperature in a no-tilled cover cropped field than a conventionally tilled no-cover cropped field.
- More soil organic matter accumulated in strip-tilled and no-tilled plots with cover crops than conventionally tilled no-cover cropped field.
- Improved soil aggregates and wet aggregate stability, which means soils are less prone to wind and water erosion, in cover crops.
- Reduced soil moisture in cover crops, but crop yield was still comparable to no-cover cropped fields.

2. Limited-irrigation cover crop-winter wheat rotation

- Cooler soil and surface air temperature in cover crop fields than a summer fallow field. Cooler soil temperature was associated with greater ground cover.
- Increased weed suppression with cover crops. Greater ground cover was associated with better weed suppression.
- Higher nutrient utilization and faster recycling with brassica species cover crops than other cover crops.
- Increased microbial diversity with more diverse cover crops species in the mixture.
- Improved soil aggregation and aggregate stability with cover crops than fields without cover crops.

Soil moisture and soil nitrogen contents were significantly less under cover crops than under fallow fields at the time of cover crop termination, but moisture loss was recovered at the time of winter wheat planting (Fig. 1a). Nitrogen recovery occurred within three to six months, depending on cover crop species. However, labile soil organic matter measured as potentially mineralizable carbon (PMC) content was higher in cover cropped fields than fallow fields (Fig. 1b). The yield of the following cash crop was not significantly different between cover cropped and fallow fields.

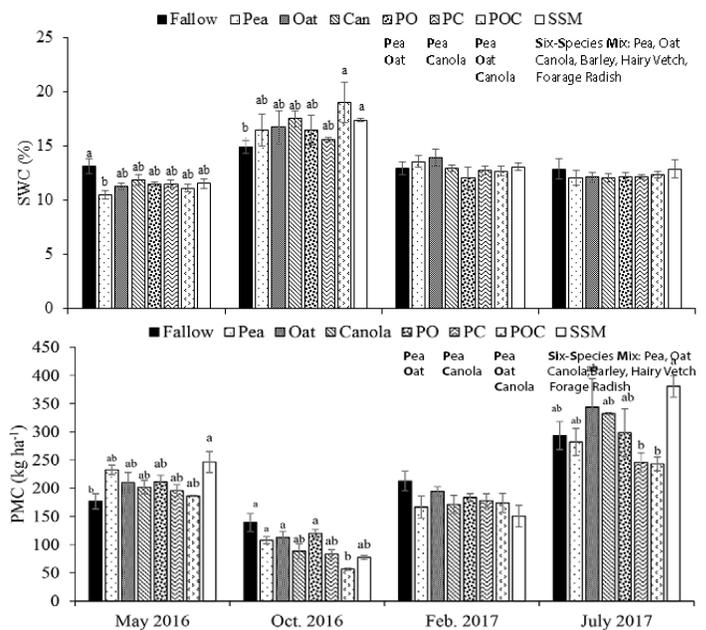


Figure 1a. Soil water content (SWC), and 1b. Potentially mineralizable carbon (PMC) at different sampling dates after cover crop termination in a limited irrigation cover crop-winter wheat rotation.

Is cover cropping feasible in semiarid regions?

The success of cover cropping in the semiarid Southern High Plains depends on the selection of cover crops, planting and termination timing, water use by various cover crop species, and nutrient use/cycling by cover crops and subsequent cash crops in a rotation. Finding a delicate balance between water use, nutrient cycling, and yield benefits is critical for cover crops adoption in this region. A few things to consider before planning cover crops:

- The Southern High Plains has greater evapotranspiration losses than the northern area of the High Plains, leading to very low water conservation efficiency. Cover crops use soil moisture for their growth and can affect the subsequent crop yield. Careful planning of planting and termination time, species selection, and management could minimize water loss while providing multiple benefits to the soil. (Visit ars.usda.gov/plains-area/mandan-nd/ngprl/docs/cover-crop-chart.)
- Cover cropping, along with minimum-till or no-till management, can improve water conservation efficiency and provide other benefits, such as erosion control.
- Properly managed cover crops can improve soil organic matter storage, increase nutrient cycling, and soil-water conservation, which in the long term can provide multiple environmental benefits without adverse effects on crop yields.