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Background

Cover crops are planted primarily to cover bare ground and bring a host of other benefits to farms, including improving soil health, enhancing water availability, and controlling soil erosion. They also help suppress weeds, pests and diseases, and increase biodiversity. Cover crops typically provide soils with seasonal protection from water and wind erosion and improve soil productivity. Above- and belowground biomass inputs from cover crops can add soil organic matter, which provides more food for microbial community. Increased microbial abundance and activity can lead to improved aggregation and soil structure, increased soil water storage and support crop production and sustainability of cropping systems.



The success of cover cropping in arid and semiarid environments depends on the selection of cover crops, timing of planting and termination, 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 drylands. We documented the following beneficial effects of cover crops in dryland, limited-irrigation, and fully irrigated conditions in a hot, dry environment of New Mexico.

Highlights

- Cover crops are primarily planted to provide a ground cover
- Cover crops benefit cropping systems in hot, dry, arid and semiarid New Mexico
- Soil organic matter increases with cover cropping
- Cover crops increase soil aggregates, biological activity and ultimately improve soil health and soil water conservation
- Cover crops may affect cash crop yield in dryland situations, but increase yield up to 22% under irrigation



Cover crops benefit agroecosystems

Drylands

- Cooler soil temperatures in cover cropped field compared to no-cover cropped field. Greater ground cover was associated with lower soil temperatures.
- Cover crops accumulated more soil organic matter than no-cover cropped field.
- Improved soil aggregates and wet aggregate stability, which means the soils are less prone to wind and water erosion with cover cropping.
- Reduced soil moisture and slightly reduced the subsequent cash crop yield.

Limited-irrigation conditions (supplemental irrigation to cash crop only)

- Cooler soil and surface air temperature in cover cropped

- fields than a summer fallow field.
- Increased weed suppression with cover crops. Greater biomass and ground cover was associated with better weed suppression.
- Higher nutrient utilization and faster recycling with brassica cover crops than other species.
- Increased microbial diversity with more diverse cover crops species in the mixture.
- Improved soil aggregation and aggregate stability with cover crops than the control without cover cropping.
- No difference in soil water at the time of cash crop harvest and comparable yields, specifically with grass cover crops.
- Soil biological health improved with all cover crop species.

Irrigated cash crop (no irrigation on cover crops)

- Cooler soil and surface air temperature in cover cropped fields than a fallow field
- Reduced greenhouse gas emissions with cover crops than with fallow field
- Increased macro and mesofauna activity with cover crops
- Increased microbial diversity with cover crops
- Increased corn and sorghum silage yield by 15-22%
- Cover cropping, along with minimum or no-tillage management, can improve water-conservation efficiency and provide other benefits such as erosion control.



Image credit: NMSU Innovative Media Research & Extension

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