

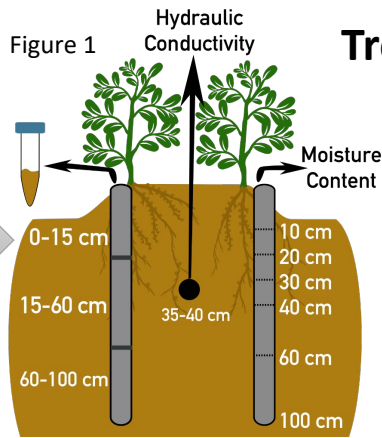
Cover Crops affect Water and Carbon Movement at Russell Ranch

Background

Cover crop use is being encouraged in California partly due to their ability to *increase carbon in the topsoil*, *encourage microbial growth*, and *prevent erosion*. Despite this, it is still not clear whether cover crops improve infiltration and storage of water in the soil, especially after decades of use.

Since water movement through the soil is the main method of transport for carbon and nutrients, improved infiltration and storage due to cover crops can also result in more carbon being transported deeper, where it is less likely to be degraded by microbes and more likely to be stored.

Could the application of cover crops increase the movement and storage of carbon and water in soils?



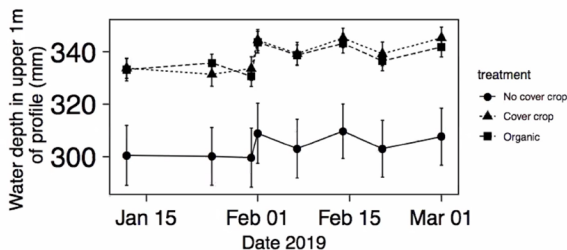
We measured dissolved carbon and nitrogen at 3 depths, hydraulic conductivity at 1 depth and moisture content at 6 depths.

Treatments

Table 1

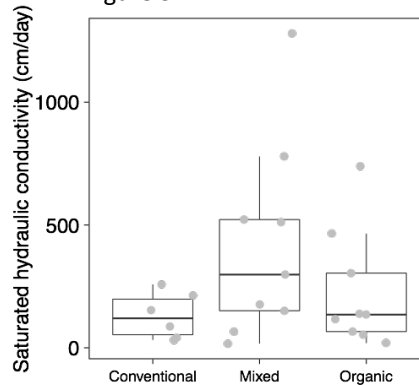
Management	Conventional	Mixed	Organic
Cover Crop		X	X
Compost			X
Carbon Input (lb/acre/yr)	3,800	4,600	6,600
Fertilizer N Input (lb/ acre/yr)	180	180	0
Organic N Input (lb/acre/yr)	0	~200	~360

Figure 2



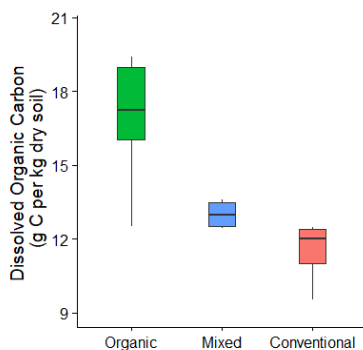
There was 10% more water in cover cropped soil profiles at the end of the 2019 winter.

Figure 3



Infiltration was more variable in cover cropped plots, likely due to preferential flow channels allowing more water to move faster.

Figure 4



There was 20% more dissolved organic carbon (DOC) deep in organic plots after the 2019 winter. Compost applied to organic plots is rich in highly mobile DOC. (Data shown is from 60-100 cm).

Take-Home Message

- During a wet year, cover cropped plots *stored more water and had greater infiltration*.
- Along with increased water storage, organic plots had *more organic carbon* deeper in the soil profile
- However, water storage *may be decreased* during a drier winter due to CC evapotranspiration

