

Using Biochar to Save Water in California Agriculture



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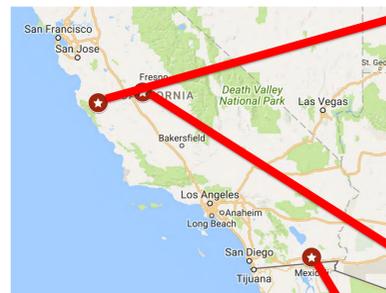
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Introduction

Biochar is pyrolyzed biomass. As a soil amendment, biochar provides a carbon rich matrix with high porosity, and therefore, high water holding capacity¹. Research has indicated that biochar could be used to increase water savings as well as improve crop growth². Long term droughts are common in California, and likely to be exacerbated by climate change³. Improved water holding could reduce water costs in California agriculture and reduce strain on water resources. This project aims quantify water savings achieved through using biochar as a soil amendment in different crops, soil types and climates.



Map of the American Southwest. Red stars indicate the field sites.

Methods

The experimental sites were chosen for a variety of climatic and soil conditions and the crops chosen are water intensive. The 3 conditions are:

- 1) **Desert:** in the Imperial Valley, sugar beets are grown in clayey, saline soils.
- 2) **Valley:** near Fresno, tomatoes were grown in a productive loam.
- 3) **Coastal:** in the Salinas Valley, 'Pinot Noir' grapes are grown in a sandy soil.

The fields were amended with biochar and compost prior to planting. Watermark sensors were installed at two depths to measure soil water potential.



Water mark monitor being installed at the vineyard.



Pinot Noir field from above. Weed growth shows regions with poor sandy soil.

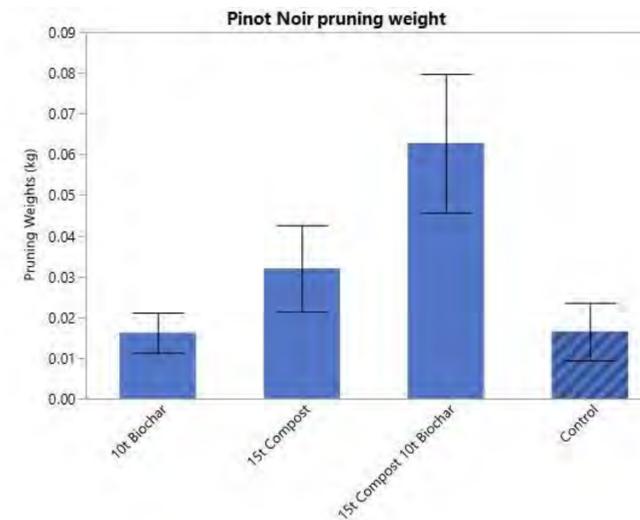


Tomato harvest near Fresno..



Water mark monitor in field of sugar beets

Results



Our grape are less than a year old, so many vines have little or no growth above the cordon wire to be pruned. Therefore, the values are very preliminary and not very reliable. However, the estimates collected show the biochar-only treatment having the same growth as the control, while the compost-only treatment showed about 100% increase, and the compost and biochar treatment showed a 280% increase.

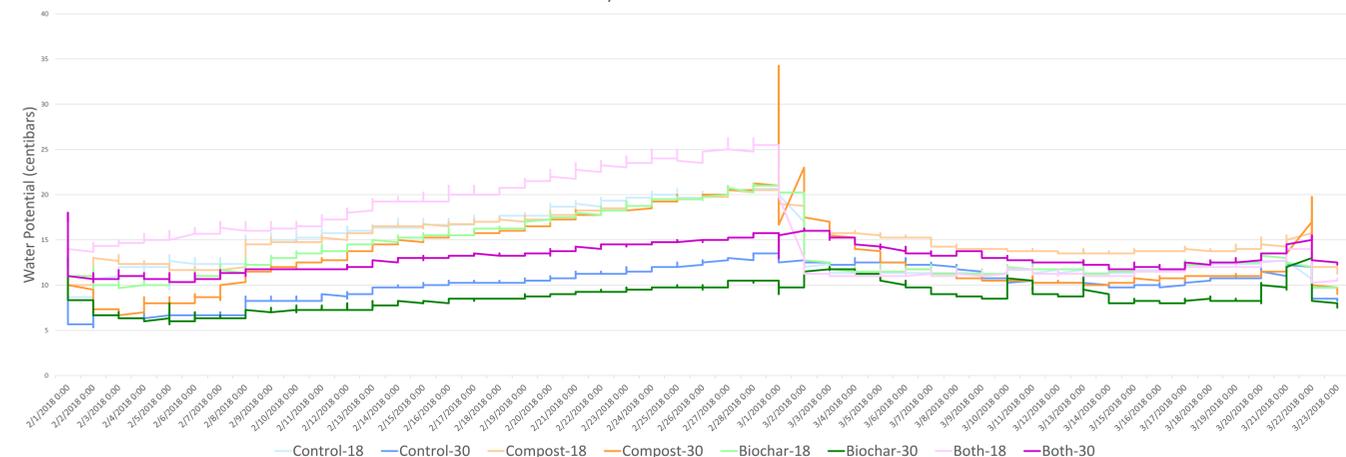
References

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Acknowledgements

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Monterey Pacific Soil Water Potential



A preliminary look at the Watermark data shows that the biochar treatments have more water near the sensors than the control, while the compost and the compost+biochar treatments have less. Assuming the pruning weights are truly indicative of growth, it makes sense that there would be less water in the root zone of the compost and compost+biochar plots (and more in the plant itself), but if the biochar treatment has approximately the same growth as the control, then that would indicate that the biochar is holding more water than the control.