COLORADO STATE UNIVERSITY
EXTENSION

AGRIVOLTAICS: FROM FARM FIELDS TO ROOFTOPS
LARIMER, KIT CARSON, LOGAN COUNTY

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PROJECT INTRODUCTION

Agrivoltaics (AV) is the co-location, or dual use of land for solar energy (photovoltaics) and crop production. Dual usage or even triple land usage (shelter, energy, garden) may alleviate competition for land as the solar energy market expands in response to climate change and increasing demand for energy. Examples of triple use cases include rooftop AV and grazing systems.

Early research has shown that crops and solar production in AV systems is optimized due to mutually beneficial conditions. Solar panels provide protection for crops from extreme weather events such as extreme heat, hail, or snow. Plant transpiration cools solar panels, improving their performance. Crops grown under AV systems have seen increased yields, reduced crop loss, and improved plant water use efficiency.

The body of research on this subject is relatively new, as are innovations in implementing AV in different settings (such as semitransparent solar panel greenhouses and “Floatovoltaics” in aquaponic systems). The current project investigates the feasibility of producing a variety of crops in AV systems both in the field and on rooftops.

INTERNSHIP GOALS

- Gain hands-on experience in extension, agriculture, green roof, and solar industries
- Learn about information dissemination through extension, via fact sheets, media, and field days
- Assist in HLA graduate research into AV

HOW DOES THIS APPLY TO YOUR EDUCATION

This project relates directly to my education in the College of Agricultural Science. I am focused on studying agricultural production through the lens of sustainability and environmental responsibility.

WHAT YOU DID

- Establish experimental AV plots, carry out data collection

1. Built a green roof plot at grade at the CSU Foothills Campus for conducting experiments
2. Experiments also conducted at the Hort Farm at CSU ARDEC

- Attended Wheat Field Days, and shadowed extension mentors in the field and assisted with on-farm agricultural research activities

- Developed an Agrivoltaics Fact Sheet

1. Searched, reviewed and compiled information from academic literature related to AV
2. Applied information from the academic literature, experiences in the field, and faculty mentors towards writing a CSU Fact Sheet to inform stakeholders about AV

Figure 1.

Field AV plot at ARDEC South in Fort Collins. Experiment comparing plant growth, productivity and microclimate conditions in plots underneath a variety of solar panels and control plots with no solar panels.

WHAT YOU LEARNED

When I began this internship, I had not heard of agrivoltaics. Since experiencing the effectiveness of these systems firsthand, I believe that agrivoltaics could play a substantial role in modern agricultural practices. Currently, agriculture is a main contributor to greenhouse gas emissions, while simultaneously being under major threat from rising temperatures. Agrivoltaics offers a solution for off-setting demand for energy through renewable energy production, while offering benefits to agricultural production.

Figure 2.

Rooftop AV plot at CSU Foothills Campus. Experiment comparing similar metrics to the field plot in a green roof system. Analyzing plant performance in relation to solar panel/position.

NEXT STEPS

- Research at the rooftop and field experimental AV plots will continue
- The AV fact sheet will be finalized and made available to stakeholders