

ADVANCED AGRIVOLTAICS RESEARCH AND EXTENSION IN COLORADO

ARDEC- SOUTH, FORT COLLINS

Graduate Intern: Dewanshi Kumari (M.S. Horticulture)

Mentorship Committee:
Lyndsay Gonzalez (Extension Specialist)
Mark Uchanski (Associate Professor)
Jane Davey (Research Associate)

PROJECT INTRODUCTION

AgriVoltaics = Agri (Agriculture) + Voltaics (Photovoltaics)

Agrivoltaics—combining agriculture with solar energy production—has gained momentum in recent years as available land for traditional solar projects declines and demand for renewable energy grows in Colorado. These systems, still in the early stages of research, aim to determine whether farmers can successfully produce crops or livestock alongside solar power. Benefits include reduced temperature fluctuations from panel shading and improved solar efficiency through plant-driven evaporative cooling.



Fig. 1. Visit to extension office, Boulder county.



Fig. 2. Vertical bifacial agrivoltaics site at ARDEC-S, Fort Collins, CSU: 2025 sweet corn crop.

INTERNSHIP GOALS

1. Evaluate sweet corn performance in a CSU trial comparing vertical bifacial solar panels with an open-field (i.e., full sun) control at the Colorado Agrivoltaics Testing Grounds, Fort Collins, CO.
2. Provide Colorado farmers with a current, local, science-based fact sheet to guide agrivoltaics adoption decisions.

HOW DOES THIS APPLY TO YOUR EDUCATION

1. The project and internship directly supported my master's research by providing hands-on training with various solar panel installations across northern Colorado.
2. The internship also offered opportunities to engage with ongoing agrivoltaics research and build professional relationships with landowners, mentors, and researchers.

WHAT YOU DID

1. Installed HOB0 sensors in sweet corn fields to monitor microclimate conditions (temperature, wind speed, and photosynthetically active radiation; Fig. 2).
2. Conducted field scouting for pest incidence and documented crop growth across vegetative and reproductive stages.
3. Compared sweet corn development under different shading treatments: west side, east side, center and unshaded control plots (Fig. 7).
4. Participated in site visits to explore agrivoltaics research and practices:
 - Jack's Solar Garden (Longmont): Solar Grazing and Growing – Front Range Agrivoltaics Demo Day (Fig. 3).
 - Pfaltzgraff Farms (Haxtun): Research field day and shelterbelt projects with Longboard Power (Fig. 4).
 - Longroots Ranch (Longmont): Observed sheep grazing under Kyndryl solar array on a rotational system (Fig. 5).
 - Boulder County Extension: Visited with Extension Specialist Lyndsay Gonzalez and toured grassland farm in Lafayette (Fig. 1).



Fig. 3. Jack solar garden: solar tracking panels.



Fig. 4. Longboard Power: shelterbelt installed in camelina field.



Fig. 5. Longroots ranch: sheep grazing.

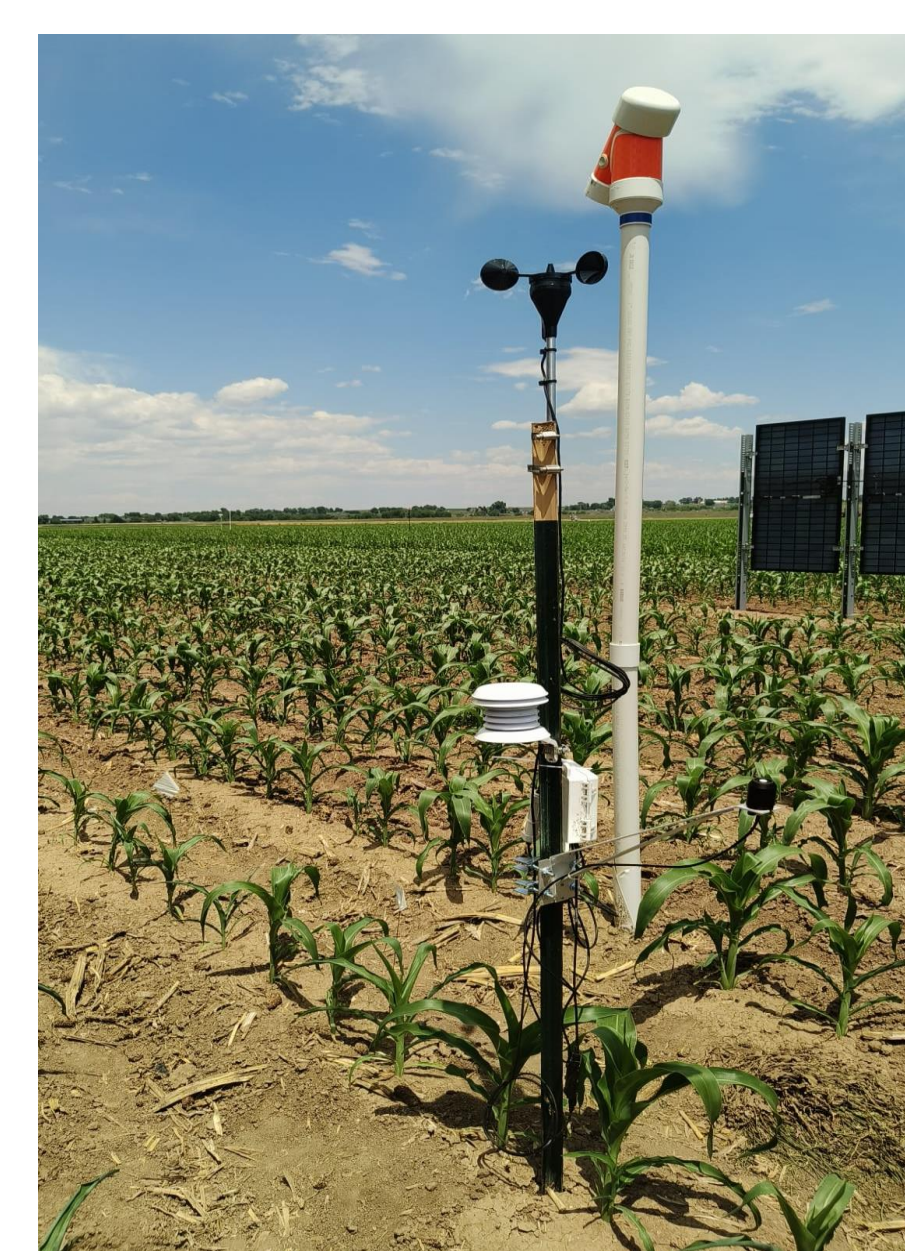


Fig. 6. Installation of HOB0 sensors at ARDEC-S.



Fig. 7. Working with Licor 6800 in the sweet corn field.

WHAT YOU LEARNED

1. Gained hands-on experience with sweet corn growth stages through weekly data collection, pest scouting, and harvest.
2. Expanded knowledge of agrivoltaics systems by visiting sites across Colorado and engaging with professionals in the field (Fig. 8).
3. Learned how the Boulder County Extension Office supports local farmers through an in-person visit.
4. Hand harvested the sweet corn and found the difference in the developmental stages of the crop on the east and west side of the solar panels compared to unshaded controls and center treatments.



Fig. 8. Working with mentor (Jane Davey) in sweet corn field at ARDEC-S, CSU, Fort Collins.

NEXT STEPS

1. Collaborate with the extension personnel to publish a fact sheet about agrivoltaics in Colorado, including a visual inventory infographic, to disseminate to growers interested in expanding their existing operations.
2. The intern and the mentor(s) hope to present our findings at the conference like the World Agrivoltaics Conference in the following year (2026).

ACKNOWLEDGEMENT

1. I am thankful to Lyndsay Gonzalez, Mark Uchanski and Jane Davey for their constant support and wonderful mentorship.
2. A big thanks to Andy Clark and Rebecca Lampl for their help in the sweet corn field.