## **SCAPES Progress in 2021-22**

Sustainably Colocating Agricultural and Photovoltaic Electricity Systems (SCAPES) will provide a comprehensive analysis of the transformative potential of "agrivoltaics." The goal is to maintain or even increase crop yield, increase the combined (food and electricity) productivity of land, and diversify and increase farmers' profits with row crops, forage, and specialty crops across a range of environments. Four-year, \$10M funding from the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) began in 2021. Some FY 21-22 updates:

The team has concentrated on addressing the issue of breaking the barrier of adaptation of agrivoltaics in Illinois, Colorado, and Arizona. Team members have developed plans for plants, measurement types, modelling etc. Due to shortages in supply chain of solar panels, and increased tariffs, SCAPES increased its negotiations to come up with a reliable partner. More on the issue can be found at <u>https://www.forbes.com/sites/kensilverstein/202</u> 2/07/11/high-energy-prices-and-supply-shortagesare-reason-to-lift-solar-paneltariffs/?sh=6f59a4fc301e



The team has met with roughly 20 different solar companies, more than 20 local farming entities,

national and local environment, and sustainability- and conversation-oriented groups to address the necessary information from SCAPES research to benefit those who need it the most. Team members have learned that some groups, farmers, and solar companies have a hard time to find a space to freely talk about the limitations, risks, benefits, and different agrivoltaic options available. Stakeholder working group meetings have become a platform to allow for those conversations to happen.

The SCAPES Arizona group was able to research different crops and their benefits both on the land and the energy production. Biosphere 2 is already testing all the plant functional groups: basil (herb), tomato (fruiting shrub), potato (tuber), squash (vegetable), and lavender (perennial), to research the yield. Meantime, Jack's Solar Farm in Colorado has been testing the water savings potential of agrivoltaics. Thanks to Colorado State University and Jordan Macknick, researchers are able to measure soil moisture in AV systems. And discussions are happening about a potential farm to table dinner with solar-grown and -produced ingredients. SCAPES was unable to test the planting method and success rate this year in Illinois both due to weather and legal roadblocks. However, researchers have found out about the limitations for crops, machinery used for planting, maintenance and safety of panels and staff. Illinois team members hope to implement changes next year to prepare their own field for the first planting.

They have calculated the design needed for the best efficiency of AV systems, and therefore decided to go with our own design of solar panels, rather than using the commercially available ones. Continental Energy Solutions was selected to perform installation at all three sites (the site in Illinois has been visited and quoted; designs have been shared. Depending on the demand and the volatility of solar market, the hope is that the installation won't be delayed however SCAPES is still on track with Year 1 plans.



The AV code in development will include the information about crop species, crop height, growing area, and irradiance sensitivity. Each team is working to create more robust data that can be applicable to many more species than currently available on the market to help forecast the crop yield and visualize more real-life scenarios.

Moreover, an open-sourced tool for farmers and photovoltaic companies is being developed to allow for custom designs to be created with AV technology in mind. Currently, the modeling calculations have been found to follow real-life scenarios.

From an economic standpoint, the team is developing different scenarios in AV adoption to allow for benefit-cost analysis, which in turn will help SCAPES researchers understand the social aspects of AV technology. More surveys are in development to test willingness of landholders to incorporate AV into their farmland.

The SCAPES education sector has been developing a first agrivoltaic game, where we can test the technology in a virtual world. The prototype will be released in museums in late September, and some high school STEM programs are also interested in testing the app.

The first SCAPES annual retreat is set for Fall 2022.

## SCAPES-RELATED PUBLICATIONS:

- Khanna, M., Miao, R. (2022). Inducing the adoption of emerging technologies for sustainable intensification of food and renewable energy production: insights from applied economics. *Australian Journal of Agricultural and Resource Economics*, 66(1), 1-23. <u>https://doi.org/10.1111/1467-8489.12461</u>
- Gomez-Casanovas, N., Blanc-Betes, E., Moore, C.E., Bernacchi, C.J., Kantola, I., DeLucia, E.H. (2021). A review of transformative strategies for climate mitigation by grasslands. *Science of The Total Environment*, 799. https://doi.org/10.1016/j.scitotenv.2021.149466