



**New Jersey Agricultural Experiment Station** 

# No tales opportunities and challen ges for Agriculture

April 24, 2025

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## "Farmer First" Agrivoltaics System Design

- 1. Can be used for multiple types of crop and animal production
- 2. Fairly uniform light levels at ground level over a day
- 3. Minimal ground space used for solar panel mounting systems (racking)
- 4. Minimal restrictions on Farm Equipment height and operation
- 5. Minimal cost increase over traditional ground-mounted photovoltaic systems



## **Agrivoltaics at Rutgers/NJAES Farms**



Note: All arrays have bifacial panels. All arrays are connected to a utility.





Note: Dots indicate means of 12 plots. Error bars indicate 95% confidence intervals.

#### • RAREC, Upper Deerfield, NJ



100 100 10.

**Bifacial panels** 

Blue: experimental block Red: control areas

**View looking East** 

255 kW<sub>DC</sub> installed, single-axis trackers with a pivot point 2.4 m (8 feet) above ground level: Staple and vegetable crop production. Three randomized blocks, each with a control area, three rows with single rows of panels, and three rows with double rows of panels. Row spacing: 10.4 m (34 feet).







#### Soybean Yield in 2024

Note: Our first year was the driest Sept. and Oct. in all history



Note: Dots indicate means of 12 plots. Error bars indicate 95% confidence intervals.

## Highlights of Research in Other Regions of the US

- Studies in the US include forage and animals (sheep, dairy cows, rabbits), lettuce, tomatoes, peppers, kale, basil, native pollinators and grass
- Oregon, Texas, Colorado, Arizona, Michigan, Minnesota, Indiana, Illinois, California, Massachusetts, New York, New Jersey, Pennsylvania
- Southwest
  - Less water use and heat stress, Increased yields of tomato, Beneficial for biodiversity, Season extension for lettuce, Increased pasture productivity and quality, Animal shelter
- Northwest
  - Increased water use efficiency, cooler microclimate for sheep, increased biomass production, decreased tomato yield
- Northeast
  - Less heat stress on dairy cows and sheep, beneficial for shade tolerant vegetables, doubling land use efficiency for sheep, no yield impact on cool season hay production
- Southeast
  - Lower carbon emissions in pastures, Increased energy efficiency, Reduced global warming potential over ground mounted solar

Advances and challenges of agrivoltaic in the Americas: a look at its current situation <u>https://link.springer.com/article/10.1007/s10457-024-01121-4</u>

The Dual-Use Solar Energy Pilot Program







DEPARTMENT OF AGRICULTUR

- The Dual-Use Solar Energy Act requires Board of Public Utilities (BPU) to develop rules and regulations for dual-use solar in New Jersey.
- BPU's process for developing new programs typically involves developing a Staff Straw Proposal, Draft Rules and Final Rules for public stakeholder input.
- BPU has contracted with the Rutgers Agrivoltaics Program (RAP) to assist with **New Jersey** implementation and monitoring.
  - Stakeholders have provided their input, BPU is finalizing the program, including eligibility criteria, operational requirements, and processes.

## Dual-Use Solar Pilot Program: A program to advance and study agrivoltaics in New Jersey



#### **Rutgers Animal Farm**

# In order to participate in the program, applicants:

- Must apply and be selected through a competitive process.
- Must commit to keeping farmland with dual-use solar *in active* agricultural/horticultural use
- May propose a monetary incentive in the form of an "adder" to the SREC-II

## Pilot Program Research Requirements



- Management and collection of the data for the first three (3) at no cost to the participant. Participants may choose to contract with a non-Board appointed entity to collect the data at their own cost.
- The Board's designee in this case is the Rutgers Agrivoltaics Program (RAP) at Rutgers University.
- RAP will contact the Project Team of an EOI application after it has been encouraged to apply for the full application to discuss the details of the research program.

Dual-use solar can provide benefits to farmers... and New Jersey

- Farmers derive new revenue, or reduced costs, from generating electricity
- In addition to existing solar incentives, farmers may receive an added economic incentive from being part of the Dual-Use Pilot Program
- Crop yield and performance can continue to be strong with dual-use solar
- All while producing 100% clean energy for New Jersey



Rutgers Snyder Farm



New Jersey Agricultural Experiment Station

## Thank You!

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