



TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA



Agrivoltaics Action Group **Global Development and Future Outlook of Agrivoltaics**

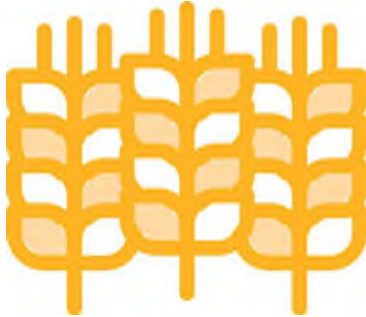
Parallel event at the 42nd European Photovoltaic Solar Energy Conference and Exhibition | Bilbao | Spain
24.09.2025

Agrivoltaics from a research perspective

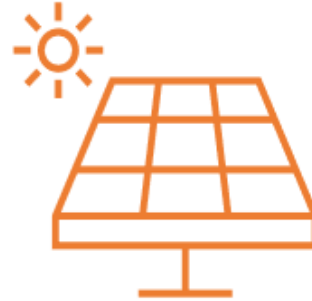
Cristina Cornaro | University of Rome Tor Vergata | Italy



Agrivoltaics concept



Farmland availability



Land occupation

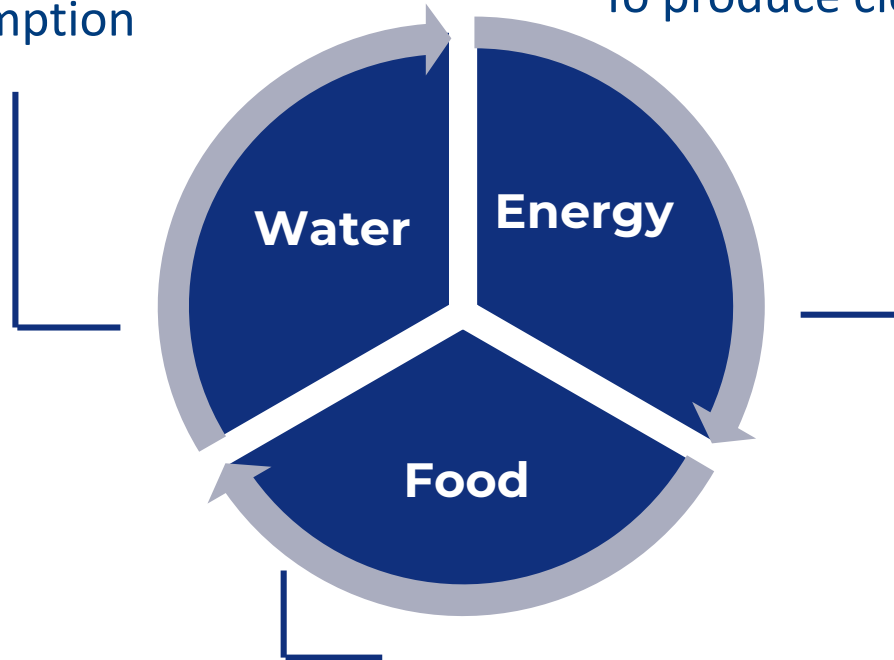
Agri-Photovoltaics (Agri-PV) consists in the simultaneous use of land for both **solar photovoltaic power generation** and **agricultural production**.

Agrivoltaics concept



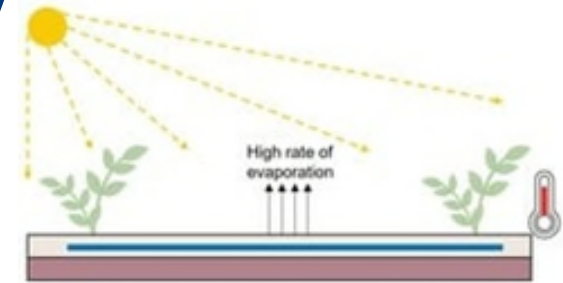
To reduce water
consumption

To produce clean energy

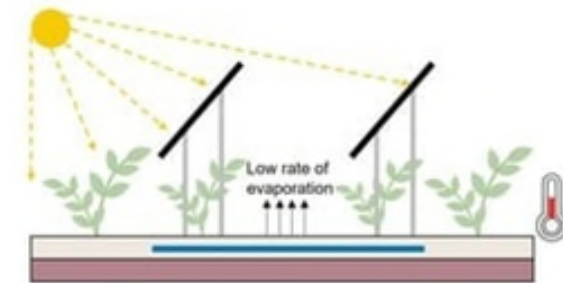


To improve the crop yield

Without Agri-PV



With Agri-PV



Agrivoltaics trend

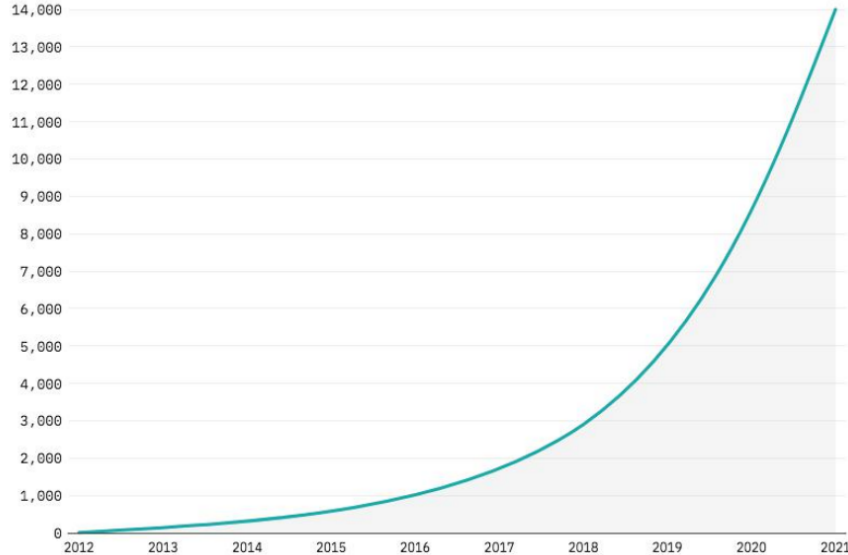


Since 1982 [1]

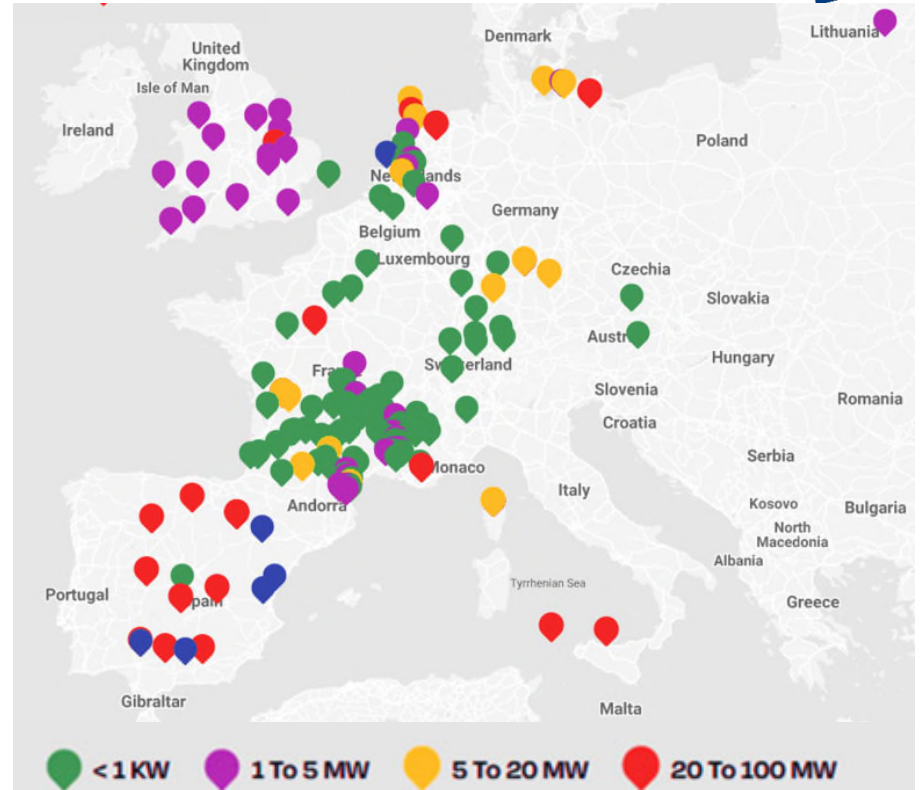


2011 [2]

Installed agrivoltaic capacity worldwide, 2012–21 (MW)



Source: Fraunhofer Ise



Source: Agrisolar Digital Map by SolarPower Europe <https://share.google/me3TU6gldDhOidEMv>

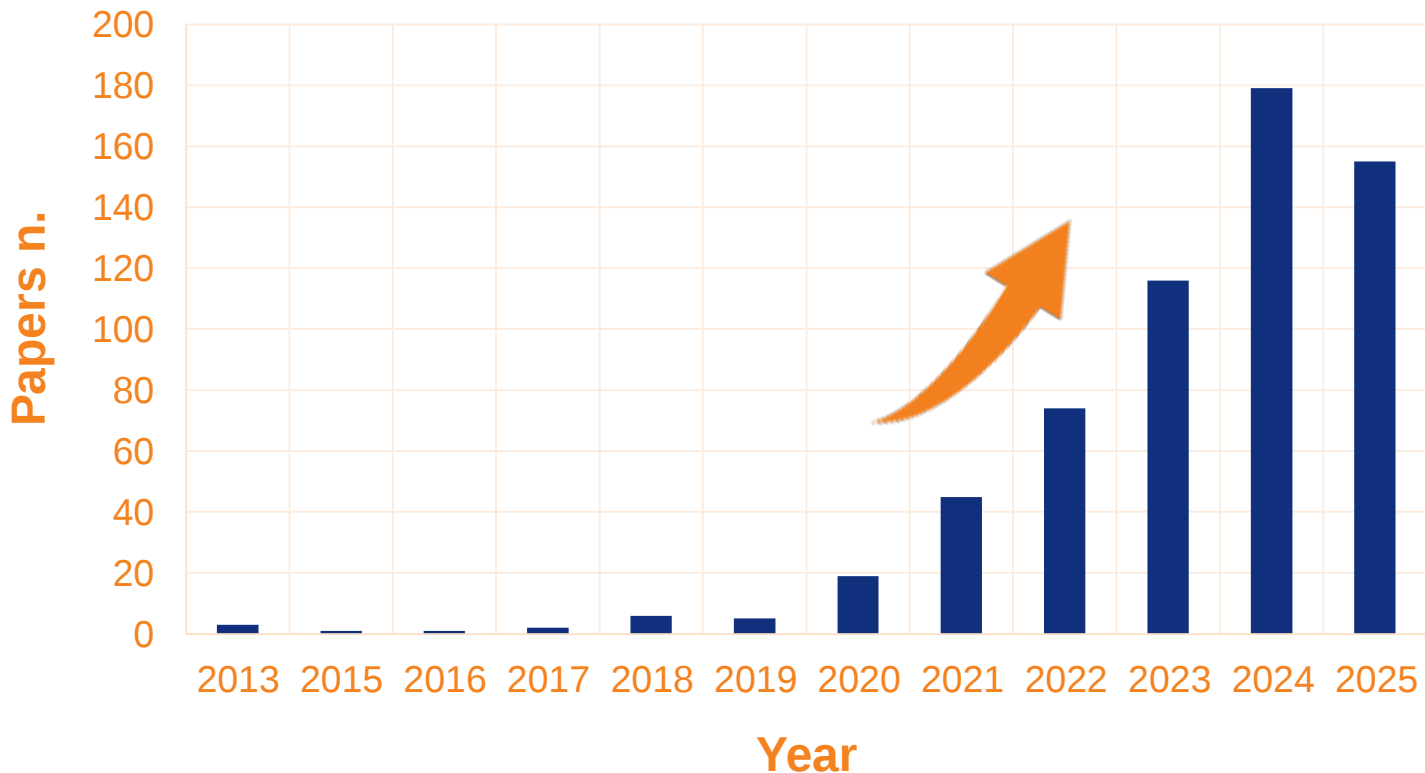
[1] Goetzberger, A.P., & Zastrow, A. (1982). On the coexistence of solar-energy conversion and plant cultivation. <https://doi.org/10.1080/01425918208909875>

[2] Dupraz, C. et al. (2011). "Combining Solar Photovoltaic Panels and Food Crops for Optimising Land Use: Towards New Agrivoltaic Schemes. <https://doi.org/10.1016/j.renene.2011.03.005>

Research in Agrivoltaics



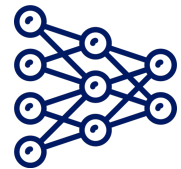
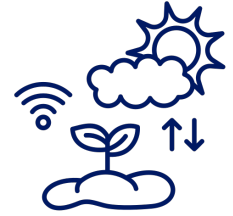
Keywords: agriPV, agrivoltaic/s, agrisolar, agrisolar power plant, agriphotovoltaic/s



Key aspects of Research



- **Beneficial Microclimates:** how solar panel **shading** can create a more favorable environment for certain crops
- **Crop & Livestock Benefits:** which crops and livestock thrive under these conditions, shading for sensitive crops, improving conditions for pollinator habitats and grazing.
- **Technical Integration:** designing specialized **elevated or spaced-out PV** panels, **algorithms** to optimize light and energy.



Key aspects of Research

- **Economic & Social Opportunities:** how AgriPV systems can create new **revenue streams** for farmers
- **Sustainability & Environmental Benefits:** how AgriPV can contribute to **broader sustainability goals** by reducing the need for pesticides and heavy machinery and promoting biodiversity.
- **Policy & Framework Development:** developing clear **definitions, guidelines, and policies** to support its growth and integration into existing socio-technical systems.



What is needed?



Prototypes

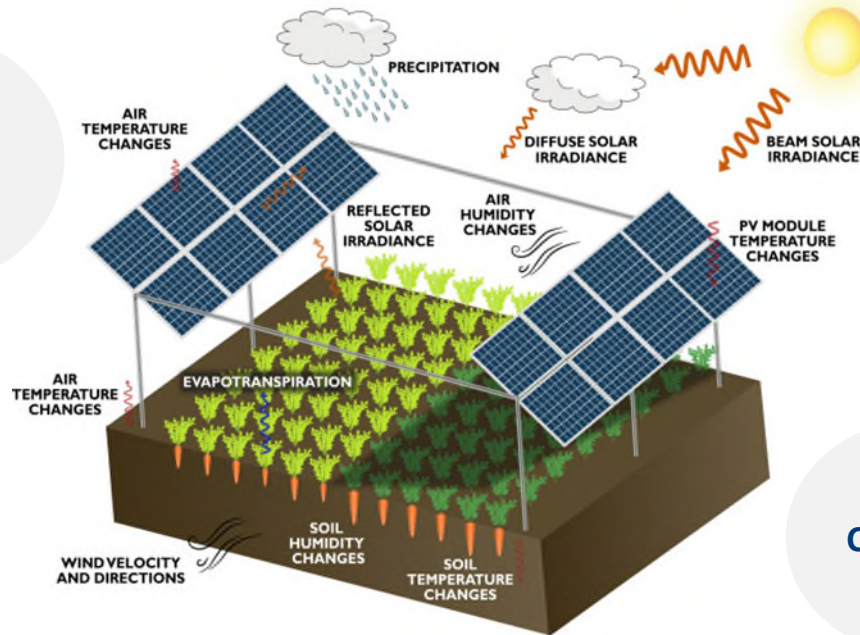
Multi
disciplinary
Research

Research
Network

Modelling

DATA

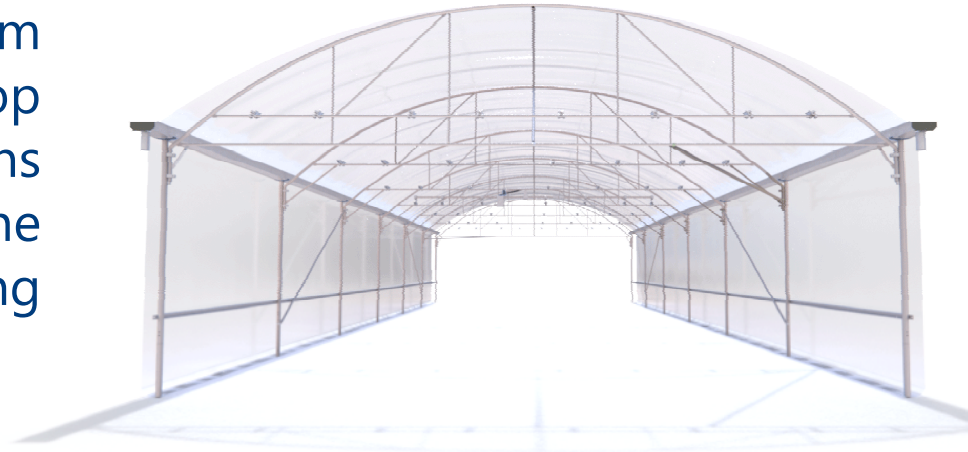
Co-design



Sebastian Zainali, Silvia Ma Lu, Álvaro Fernández-Solas, Alejandro Cruz-Escabias, Eduardo F. Fernández, Tekai Eddine Khalil Zidane, Erlend Hustad Honningdalsnes, Magnus Moe Nygård, Jonathan Leloux, Matthew Berwind, Max Trommsdorff, Stefano Amaducci, Shiva Gorjian, Pietro Elia Campana, Modelling, simulation, and optimisation of agrivoltaic systems: a comprehensive review, Applied Energy, Volume 386, 2025, <https://doi.org/10.1016/j.apenergy.2025.125558>.



Responsive tracking PV system in the greenhouse driven by a **PLC controller** that changes the tracking angle according to the plants' needs. A system using **CO₂ enrichment** increases crop production in low light conditions optimizing electricity production of the **bifacial PV panels** in the tracking system.



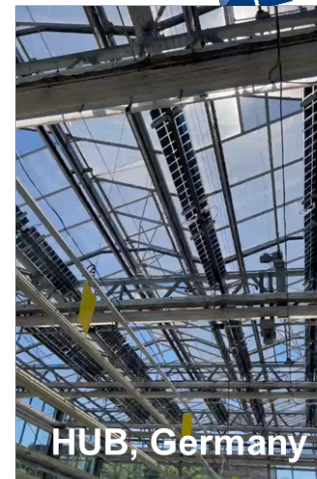
REGACE pilots



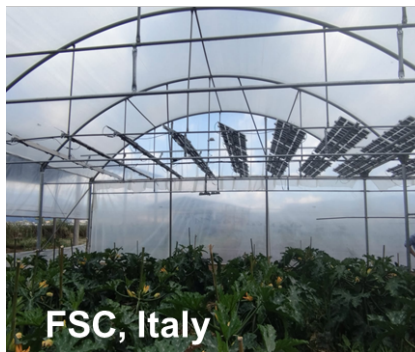
BOKU, Austria



BW, Germany



HUB, Germany



FSC, Italy

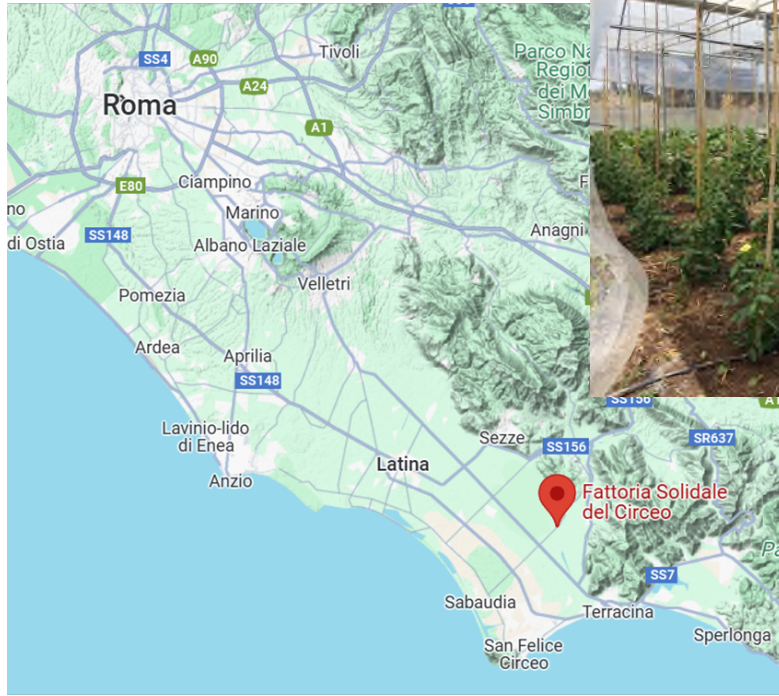


UTH, Greece



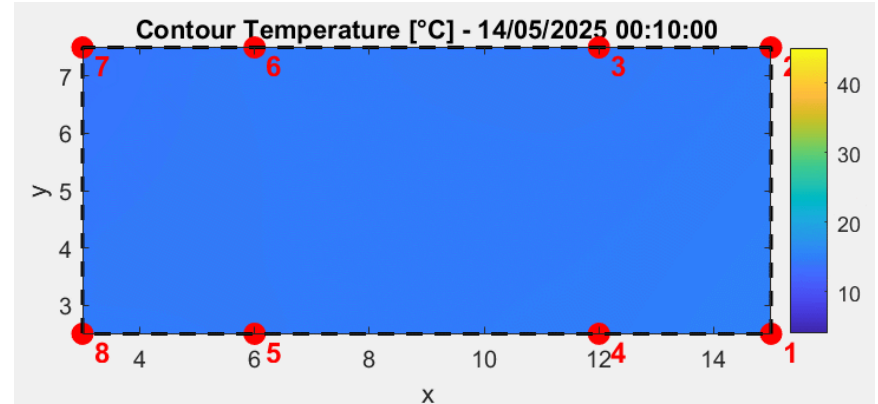
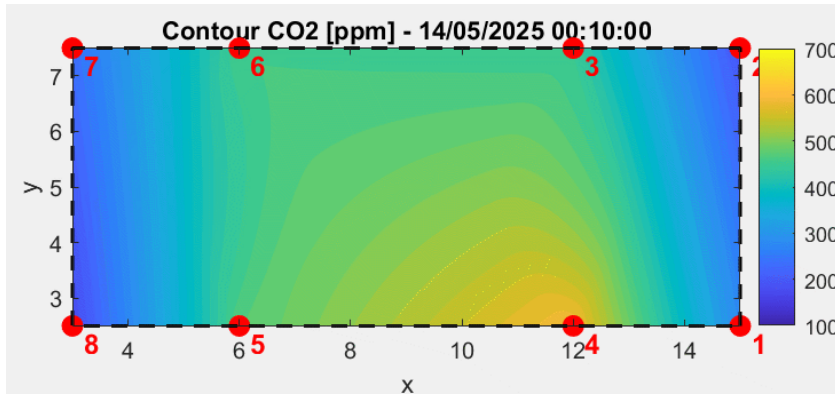
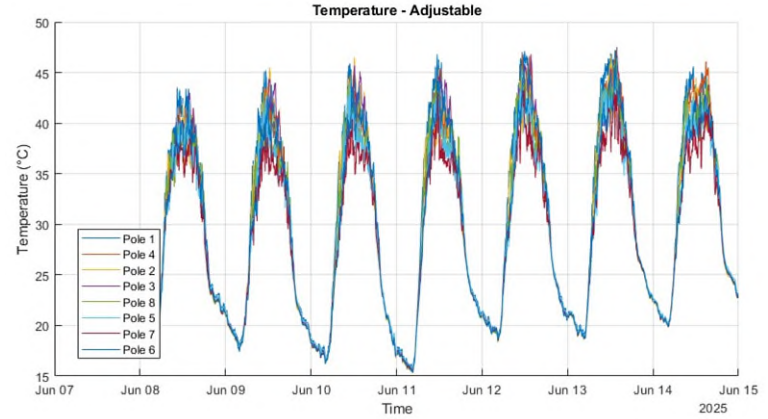
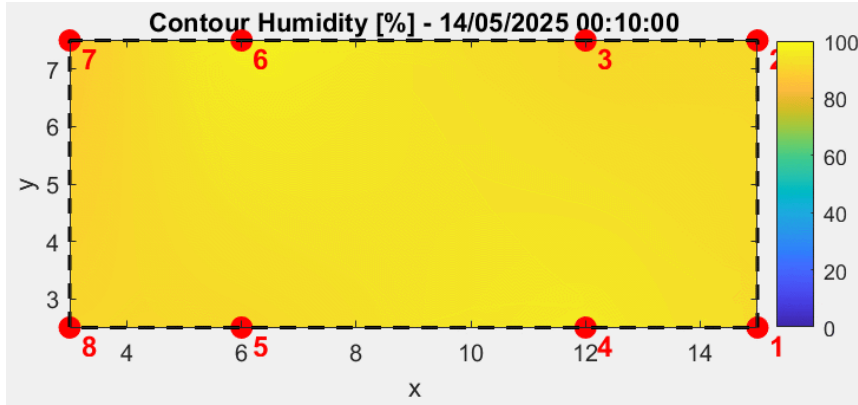
AZS, Israel

Italian prototype



Fattoria Solidale del Circeo
Pontinia (LT) – Italy
(41°23'44.9"N 13°08'57.7"E)

Microclimate



PV production

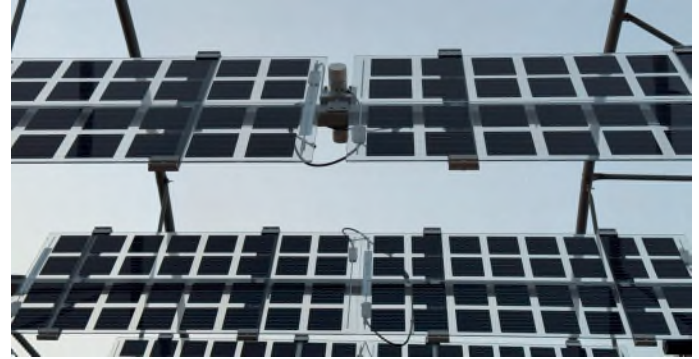
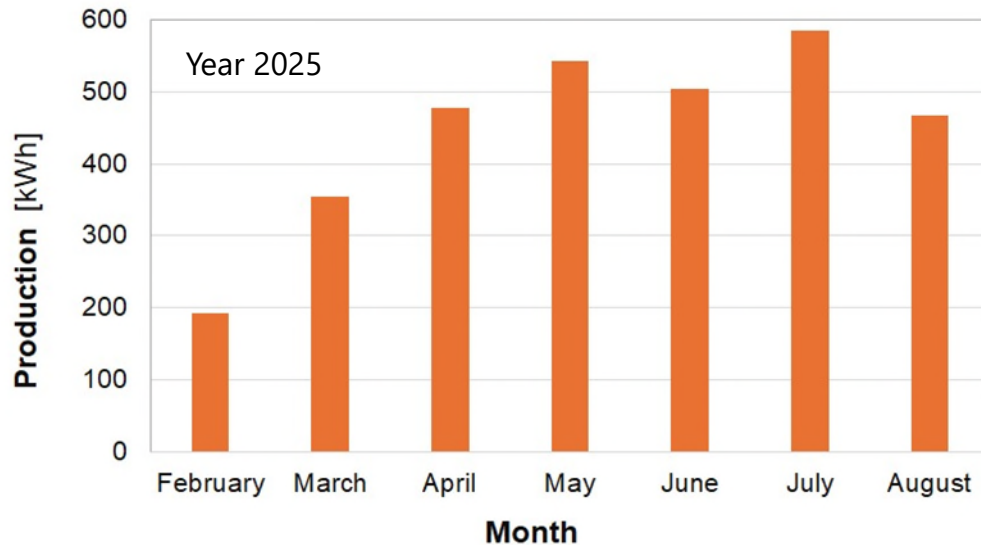


System of BFPV modules with single-axis tracking

Panels n. 64

Single module Pn: 75 W

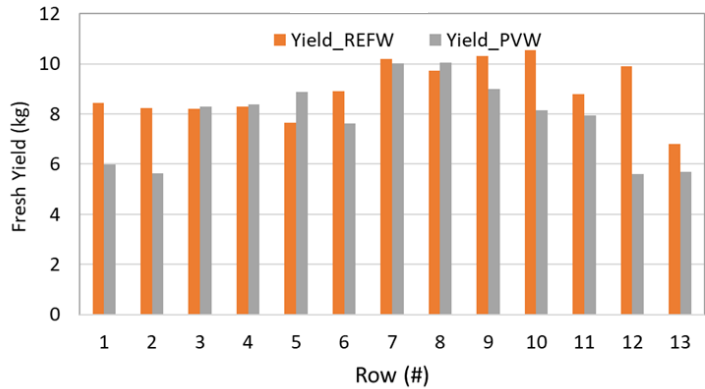
System Pn: 4.8 kW



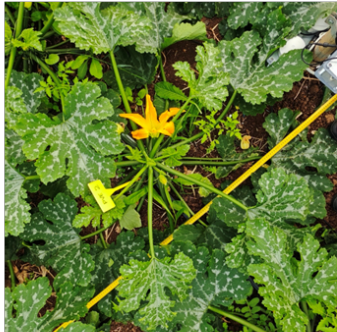
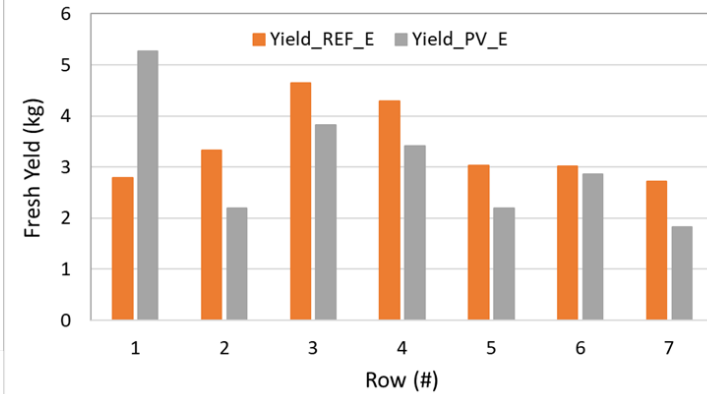
Crop production



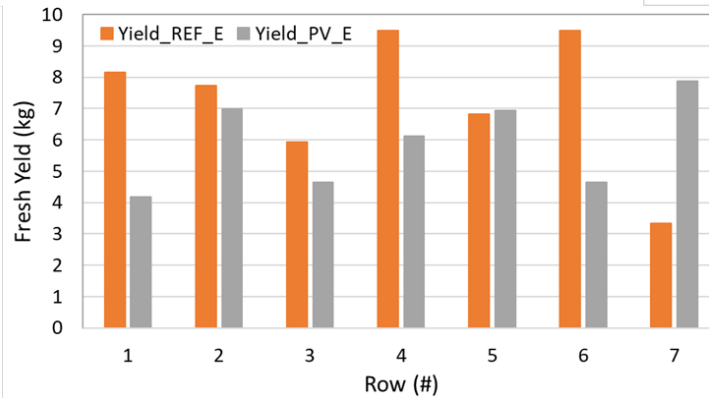
Lettuce



Tomato



Zucchini



Conclusions and future outlooks



- Agrivoltaics can become a **cornerstone of the energy transition and agricultural resilience** if supported by policies, innovation, and collaboration among stakeholders, research and industry.
- Projects such as the **REGACE project** demonstrates how **synergistic approaches** can improve the knowledge and understanding of both agricultural output and energy performance.
- The **Agrivoltaics Action Group** can contribute by fostering collaboration and facilitating the **exchange of knowledge** among researchers, industry, and stakeholders



Conclusions and future outlooks

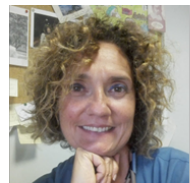


Looking ahead, the following actions will be crucial for AgriPV development:

- **Develop and scale demonstration prototypes** and real-world case studies to validate concepts.
- **Strengthen multidisciplinary research**, integrating agronomic, energy, economic, and social perspectives.
- **Enhance data collection and open sharing** to enable more accurate modelling and simulation tools.
- **Promote co-design with farmers** to ensure solutions are practical, effective, and widely adopted.
- **Expand research networks and European collaborations** to shape supportive policies, standards, and guidelines.



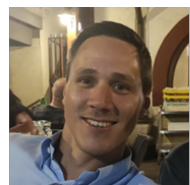
Ester lab group



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REGACE



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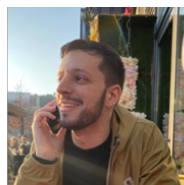
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RTDA
REGACE - Resilio



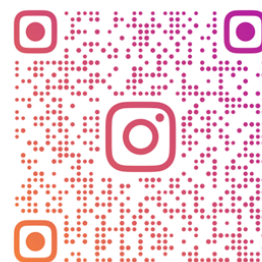
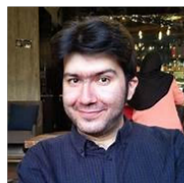
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Fellowship
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ESTERLAB.UNITOV



REGACE partners



<https://regaceproject.com>



trísolar



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TIMELEX



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Here comes the Sun on
strawberry fields!

THANK YOU!

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