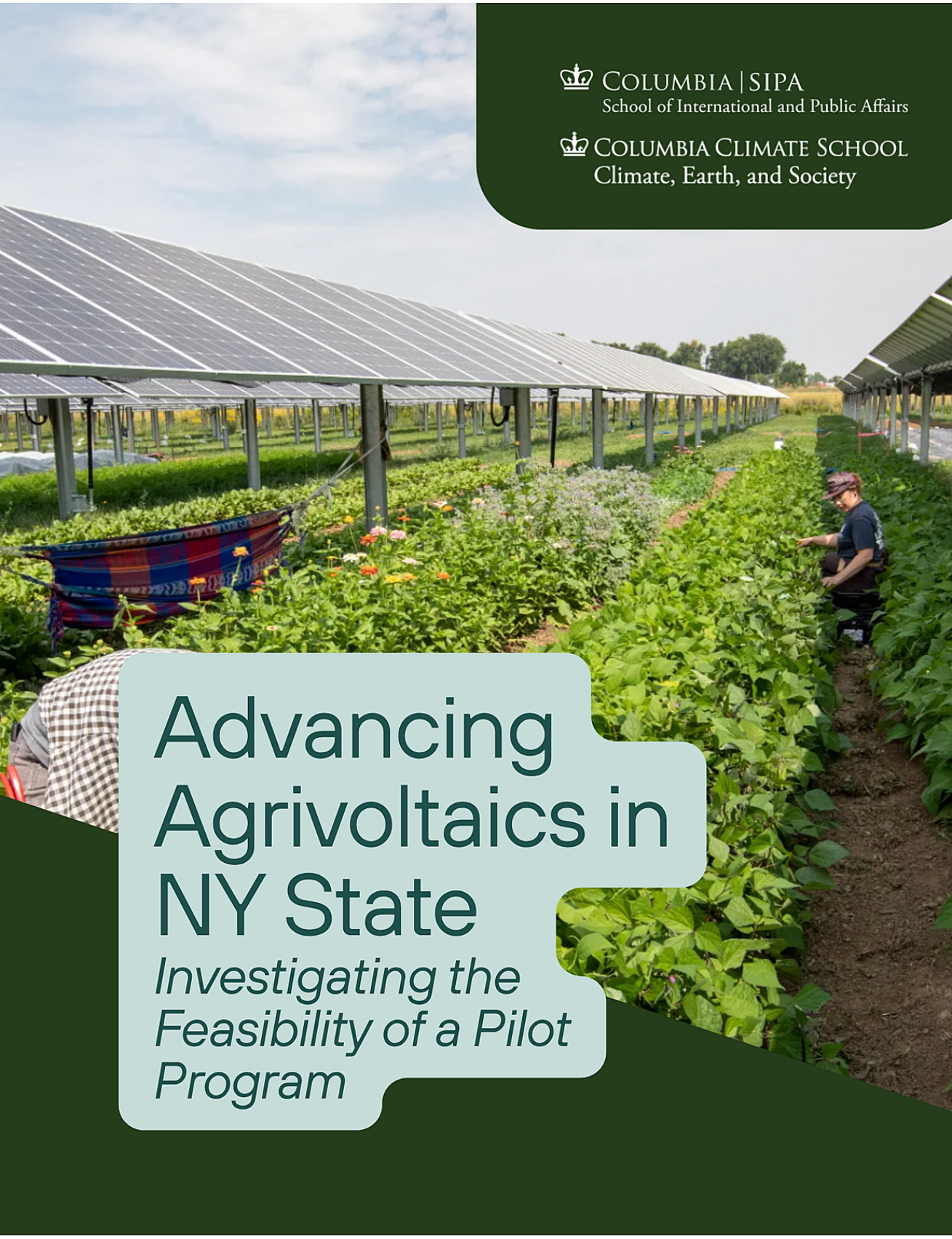

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Advancing Agrivoltaics in NY State

Investigating the Feasibility of a Pilot Program



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Can agrivoltaics help New York expand renewable energy while maintaining agricultural productivity?

Executive Summary

New York's agricultural sector faces increasing pressures from climate change, including heat stress, variable precipitation, water stress, as well as increasing economic pressures, while the transition to renewable energy is increasing competition for agricultural land.
Agrivoltaics may address both challenges by combining solar energy generation with agricultural production.

This report examines the scientific mechanisms underlying both the problem and the proposed solution, including interactions among light, temperature, water, soil, crops, and solar systems.

Understanding these interactions will be essential to determining whether, where, and under what conditions agrivoltaics can provide a viable solution for New York State.



A Dual-Use Future for New York Farmland

Climate change poses challenges not only to New York City residents but to farmers across the state. New York's agricultural sector stands to absorb some of the most severe consequences: extreme precipitation, short-term drought, heat stress, warmer winters, late spring freezes, mounting pest pressures, and rising production costs (New York State Climate Impacts Assessment, 2026). At the same time, the State has committed to an aggressive decarbonization timeline that will demand a substantial buildout of renewable energy generation, much of it necessitating siting on open land. Agrivoltaics offers a way to answer both pressures at once.

An agrivoltaic system is a ground-mounted photovoltaic array designed by agricultural producers and industry experts to achieve the integrated and simultaneous production of solar energy and marketable agricultural products. Also referred to as agrisolar or dual-use solar, these systems treat farming and energy generation as complements rather than competitors, jointly advancing environmental and economic sustainability while easing the transition to a renewable energy economy. Shared land use is the key feature: panels are elevated and spaced so that cultivation and grazing can continue below and between the rows, allowing a single parcel to yield both clean electricity and agricultural output while preserving biodiversity.

New York's existing policy framework further encourages adaptations of this nature. The Climate Action Council's Final Scoping Plan of 2022 outlines how the State will satisfy its requirements to limit greenhouse gas emissions and transition to a carbon-neutral energy economy, mandating that 70 percent of statewide electricity come from renewable sources by 2030 and that the State achieve a zero-emission electricity system by 2040 (NYSERDA, 2022). Because the Scoping Plan anticipates that annual electricity demand will more than double by 2050, it organizes its strategies under three themes: Transform Power Generation, Enhance the Grid, and Invest in New Technology. Meeting these targets will require siting solar at a scale that makes competition with farmland difficult to avoid unless dual-use approaches are intentionally invested in.



A7584A: Agrivoltaics Viability Pilot Program



Introduced by New York Council Member Donna Lupardo (District 123), Assembly Bill A7584A. This bill develops a practical framework for implementing agrivoltaic (dual-use energy) systems across New York State. Goals such as building alliances between the energy sector and local farmers to conserve rural farming communities, providing farmers supplemental income, and expanding siting access for renewable energy projects are advanced through the creation and funding of pilot programs.

Section 1: Adds § 1885 to the Public Authorities Law, directing NYSERDA to establish and administer an Agrivoltaics Viability Pilot Program as an extension of the existing farmland viability program.

Section 1.2: Defines qualifying agricultural activities as crop production, animal husbandry, and livestock/cattle grazing.

Section 1.3: Directs NYSERDA, in consultation with relevant state agencies, to award grants supporting best practices in soil health, sustainable agriculture, economic viability, and stakeholder engagement.

- NYSERDA must report findings to the Governor and legislative leaders one year after grants are distributed and every two years thereafter.

Section 2: Establishes an effective date six months after signing, with required amendments completed before implementation. Rulemaking may begin immediately.

Why New York Is Considering Agrivoltaics Now?

The future of New York State's agricultural sector is uncertain. Climate change continues to put pressure on crop yields in ways that decrease farmland productivity and put farmers in precarious financial situations. Warmer seasonal temperatures pull water from the soil and decrease humidity, creating new environments that crops struggle to adapt to. As climate variability puts pressure on crops, farmers no longer see predictable yearly yields necessary for household economic stability. Additionally, trade and regulatory jostling push input costs up, putting farmers' personal economic security at risk. To put this in perspective, only 41.7% of farmers in New York State report they work exclusively on their own farms, with more than half indicating that they have a secondary occupation (Office of the New York State Comptroller, 2024). The current situation is even more difficult for farmers who rent. 68% of farmers in NY state who rent land indicate that renting costs have increased due to competition with developers in other industries (Levy et al., 2022). With consistent pressure from climate, regulatory, and market volatility, the future of the agricultural sector in NY state is precarious.

Additional pressure on farmland comes from NY state's clean energy targets. The New York State Climate Leadership and Community Protection Act (CLPA) mandates 70% renewable energy targets by 2030 and 100% zero-emissions by 2040. With NY State having finite land, solar energy development will inevitably cross paths with current agricultural land. A Cornell University study concluded that 84% of New York State land considered suitable for solar energy development is already on agricultural land (Gashler, 2025). Thinking about land use monolithically would require the abandonment of agricultural land for solar energy generation; however, agrivoltaics provides a plausible solution to mitigate the effects of yield instability, increase clean energy generation, and maintain economic stability for farmers.

New York State's Agrivoltaics pilot program attempts to bridge the knowledge gap for dual-land use in the state.

The goal of the agrivoltaics pilot is to assess the viability of solar energy and agricultural production on the same land, hence addressing the finite land problem in two ways:

1. **Minimize land-use conflicts:** Via co-location, agrivoltaics reduce the amount of agricultural land that must be completely stripped for large-scale solar development.
2. **Maximize resource efficiency:** It maximizes the total output per acre of both agricultural and solar production.

While agrivoltaics is studied within other climate and agricultural settings around the world, there has yet to be a New York-specific study on its applicability. The bill attempts to garner the knowledge necessary for farmers and state energy infrastructure planners to make the best decisions on future land use.

Current Agricultural Challenges and How Agrivoltaics May Help

Irrigation

Since 1901, annual precipitation in New York State has increased by 10–20% (EPA, 2022). Despite increased rainfall, the demand for irrigation is heightened (New York State Office of the State Comptroller [NYSOSC], 2024). Under solar panels, air temperature reductions of 1.5–2.75 °C were seen in both temperate and arid regions (Martinez-Hernandez, 2026). Evapotranspiration by plants decreased by 14–19% (Kumdokrub, 2025), allowing plants and soils to retain more water. AV-shaded soils have been shown to directly increase moisture retention by 5–25% (Martinez-Hernandez, 2026). AV systems may thus reduce the need for irrigation by up to 20% (Kumdokrub, 2025)

Intensified Sunlight

Crops suffer when exposed to intense sunlight. Many shade-tolerant crops exist and thrive under the shade provided by solar panels. Crops most AV compatible include leafy vegetables, lettuce, chicory, aromatic herbs, apples and pears, and berries (Martinez-Hernandez, 2026). These are crops already under active cultivation in NYS. Other crops requiring high levels of sunlight are not be ideal for planting under panels; however, with adequate panel spacing, yields may improve.

Escalating Fertilizer and Pesticide Use

Recent increases in fertilizer use to boost decreased crop yields can lead to eutrophication of water bodies surrounding fields (Garcia-Vega, 2024). Studies are lacking to quantify fertilizer use in AV fields, but decreased eutrophication of 40–55% has been seen surrounding AV farms (Martinez-Hernandez, 2026), a possible indirect indicator of reduced fertilizer use.

In addition, beneficial insects provide biodiversity and natural pest control. AV panels have been shown to support pollinators and beneficial insects in their protective shade.

Decreased Productivity of Agricultural Fields

Agrivoltaics systems generate 60–85% of original crop yields (Martinez-Hernandez, 2026), but overall land productivity (crops plus electricity generation) may be increased by 60–70% (Lee, 2022 and Weselek, 2019). In addition, due to cooling by vegetative evapotranspiration under panels, evapotranspiration effects can improve PV efficiency by 2–5%, and solar panel electrical output may achieve 95–100% of capacity (Martinez-Hernandez, 2026).



What Makes Agrivoltaics Difficult

Central Scientific Challenge

While the biological understanding of plant–light–moisture interactions and the technological understanding of solar panel functionality are well established, uncertainty arises in how those variables interact and what impact those interactions have on outcomes such as crop yield, energy yield, land sustainability, and ecosystems. Agrivoltaic (AV) research still can't reliably predict how combining agricultural and solar practices will play out because the data needed to model those interactions simply hasn't been collected at scale.

I. Agricultural Variability

Crop response to AV systems is far from uniform, and it starts with the crop itself: yield and biomass gains under panels, measured via Land Equivalent Ratio (LER), shift depending on the plant species and even on its photosynthetic pathway (C3 vs. C4). Shade tolerance drives much of that variability. Panels reduce photoinhibition for some crops but simply cut available light for others, and researchers can't yet isolate whether the gains in measured crop productivity come from reduced photoinhibition, improved water-use efficiency, or both (Casanovas et al., 2023). Also, the most productive soils tend to sit under the crops with the most favorable plant-solar interactions. Vegetable crops tolerate some shade and integrate reasonably well with panels, despite the conflict over whether the productive soils beneath them should be kept for agricultural productivity alone, keeping only depleted soils for panel installation. Grains and corn on the other hand, sit on the most depleted soils (soils that would otherwise be the best candidates for solar), yet these crops are light sensitive and react poorly to panel shade (Maity et al., 2025). Water availability complicates the picture further: shade reduces soil moisture evaporation, which benefits some crops but has unclear downstream effects on soil microbiome emissions like nitrous oxide and methane (Casanovas et al., 2023).

Temperature cuts both ways. Panels cool crops during the day through added moisture and reduced sun exposure. But, the heat absorbed by the solar cells and metal components during the day re-radiates thermal energy at night, raising local temperatures by 3–4°C in what's called the photovoltaic heat island effect. The consequences of that added nighttime heat remain unknown. Plants also cool the panels during the day, improving energy production efficiency, though whether that cooling effect persists at night, and could help offset the heat island effect, is still uncertain (Ali, 2024). Humidity is also a key consideration. Elevating panels improves airflow but can also alter humidity profiles and disease pressure at the plant level. With no established guidance yet on the right tradeoffs or panel configurations by crop species, farmers implementing AVs are left to guesswork (Mehta & Zörner, 2025).

II. Solar-System Variability

Design choices on the solar side introduce just as much uncertainty as the agricultural variables do. Whether panels are fixed or tracking affects how much and when shade reaches the crop below. Similarly, whether systems sit low or elevated also changes airflow, humidity, structural exposure to wind, and disease risk, with no consensus yet on the optimal height for any given crop (Mehta & Zörner, 2025). Row spacing determines how much light reaches the ground and how equipment can move through the field. The same goes for panel tilt, which shapes the shading pattern crops experience with direct implications for productivity. Finally, panel layouts have to sustain long-term access for mechanized farm equipment. The trouble is that existing studies tend to treat these design parameters in isolation rather than testing how they interact with one another, leaving farmers to rely on subjective heuristics instead of data-backed configurations.

III. Additional Concerns

Beyond the crop- and system-level variables, broader environmental and geographic uncertainties remain. On the soil side, it's still unclear whether combining solar infrastructure with farming helps, harms, or has a neutral effect on soil health, and whether that effect differs by farmland type: grain and vegetable systems versus pasture, for instance, already carry very different baseline soil health in NYS (Maity et al., 2025). Biodiversity is even less understood. Altering the microclimate beneath panels changes species assemblages and abundances in ways that haven't been well characterized, and layering in normal farm practices like pest management, crop rotation, and vegetation management only compounds that uncertainty (Schwarz & Ziv, 2024). Additionally, much of the existing AV literature comes from systems installed in other regions of the US, in other countries, or from controlled experimental settings that don't account for the natural variability of working farms. And since climate, soil types, terrain, insolation, and precipitation patterns in those studies often differ significantly from New York's conditions, it remains uncertain how well those findings would transfer to NYS specifically.



How the Pilot Should be Measured

A. Agricultural Performance

Measuring agricultural output is essential to understanding whether agrivoltaics is an effective strategy for attaining clean energy goals and farmer security. Photosynthetic Active Radiation (PAR) enables individuals to assess the benefit of crop shading and microclimates created by solar installation. PAR is ultraviolet radiation suitable for plant photosynthesis (around 400–700 nanometers of wavelength). Depending on the plant type, solar panels can play both a positive and negative role. For plants needing larger amounts of PAR, panel shading has the potential to decrease crop yield. Yet, some studies indicate that because climate change is increasing global temperatures, panel shading can provide a necessary buffer for plants less dependent on high PAR fluxes (Jadidi et al., 2023). PAR is typically measured in a daily light integral (DLI) of micromoles per day, with crops ranging from low-light necessity to high-light necessity (Torres & Lopez, 2025). Knowledge regarding NY state specific crop PAR necessities will aid program directors in which plants benefit from agrivoltaics and which do not.

Air temperature and humidity is also a necessary metric in determining agricultural performance while also providing a proxy for solar panel cell temperature. Air temperature remains a critical determinant for leaf enzyme function, where long-term temperature changes can trigger permanent alterations in crop development (Moore et al., 2021). Suitable air temperature is plant dependent. Additionally, air temperature helps measure the effects of microclimates on panel efficiency. Optimal solar cell temperature is 77 degrees fahrenheit (25 degrees celsius), where efficiency degrades by 0.30% to 0.40% per increase in panel temperature. Solar panels are suited for colder temperatures, meaning shaded, cooler microclimates under the panel could aid panel efficiency through cooling (Kaldellis et al., 2014).

B. Microclimate effects

Solar panels on farms create microclimates around themselves by absorbing solar radiation and cooling the air and soil beneath. Cool-season NY vegetables can benefit from panel shading which lowers soil/air temperature, reduces evapotranspiration, and heat/water stress. Panels can also offer frost protection to plants in early spring when frost descends from cooler, elevated air (Widmer et al., 2024). Reduction in water loss through transpiration is the consequence of increase in relative humidity in the shade of the solar panels; however this can have a detrimental effect by increasing the possibility of fungal infections (Priya et al., 2026).

C. Soil and Water Performance

The pilot program specifically looks to protect and maintain soil health through the process of decommissioning, commissioning, and the total lifespan of the solar panels. To do so, soil temperature acts as a vital indicator to monitor soil health.

Soil temperature drives seed germination, nitrification, moisture content, aeration, and nutrient availability: all important for crop health and agricultural production. Long-term monitoring of soil temperature changes can provide valuable insight into the decomposition of organic matter in soil, nutrient cycling, and the interactions between microorganisms and plants (NRCS, n.d.; Zhou et al., 2024). Because of the individual microclimates created by solar panels, it is essential to monitor temperature in multiple locations and multiple soil depths to garner a full perspective of the solar panel's effect on crop health.

Another metric is soil aggregate stability. This is particularly pertinent during the commissioning and decommissioning of solar panels. Aggregate stability can track how well soil can maintain health through periods of high stress (i.e., solar installation). Aggregate stability also tracks erosion resistance, water availability, content of organic matter, and nutrient cycling during these periods of high stress (NRCS, 2001). Measuring aggregate stability is commonly conducted using a 0–6 scale, where 0 indicates that soil disintegrates quickly during disturbance events, and a 6 indicates the majority of soil remains stable during disturbance events (Corcoran et al., 2024). Because of the bill's particular focus on the commissioning and decommissioning phase, this metric is imperative within the NY state pilot program.

D. Ecosystem Performance

Biodiversity metrics can indicate whether solar installation is a positive or negative to the ecosystem as a whole. It can be a helpful metric in assessing crop health, while also indicating the ability for solar panels to provide good habitats for pollinators. Additionally, the majority of crops world-wide rely on insect pollination, highlighting the role of monitoring biodiversity can have on crop health. Prior monitoring includes the pollinator model, which tracks how many pollinators are in a given section of land. Using a scale of 0–1, where zero means a lack of pollinators and 1 means a plethora, this metric can highlight whether or not solar panel microclimates create positive conditions for biodiversity and overall ecosystem health (Ludzuweit et al., 2025). While prior studies underscore the benefit of tracking biodiversity, it currently is an underdeveloped metric.

E. Combined Land-Use Efficiency

From an overall systems perspective, the Land Equivalent Ratio (LER) monitors the aggregate effect of dual-use land. LER takes the sum of respective yields of both solar and agricultural production and quantifies the difference in production between single and dual-use. When LER is greater than 1, it indicates that dual-use land is more efficient than individualized solar or agricultural land. When it is less than 1, dual-use is less efficient. By combining both solar and agricultural production, LER can highlight which environments are suitable for agrivoltaics from an overall systems perspective, and which should remain in single-use. Importantly, LER may be greater than 1 despite a decrease in crop production. This greater overall yield despite lower agricultural yield is supportive of the bill's aim to supplement production losses due to agricultural volatility (Pelczar, 2025).

Altogether, these metrics form a holistic study that takes into account changes in soil, air, radiation, and crop health, and can systematically assess whether agrivoltaics is a viable option to address competing land needs. The pilot project will provide actionable advice to farmers in NY state and promote dialogue regarding solar generation on agricultural land, a partnership crucial to achievement of NY State's climate goals and viability of the agricultural sector.

IV. Why Agrivoltaics Might Be a Solution

A. Dual-Use Potential

By allowing both agricultural and solar activities happen on the same land, agrivoltaics may help address the competition between them. Instead of converting the entire farmland into traditional solar facilities, agrivoltaic systems are designed to have agricultural production beneath or between solar panels. This dual-use approach could allow New York to expand renewable energy generation while maintaining farmland and agricultural production (U.S. Department of Energy [DOE], n.d.; USDA Climate Hubs, n.d.).

Agrivoltaics may also provide farmers with an additional and potentially more predictable source of income. Agricultural revenue can vary because of weather conditions, changes in crop yields, and market prices. Revenue from solar energy could supplement farm income and reduce some of this financial volatility (DOE, n.d.; USDA Climate Hubs, n.d.).

B. Potential Solar Benefits to Agriculture

Solar panels can change the microclimate in which crops grow. By providing partial shade, panels may reduce direct heat exposure, lower evaporation, and help retain soil moisture. Previous research has found that agrivoltaic systems can reduce water stress and improve water-use conditions under certain environmental settings (Barron-Gafford et al., 2019). These effects could become increasingly valuable as farmers experience higher temperatures, variable precipitation, and more frequent periods of water stress.

Panels may also alter air temperature, soil temperature, and humidity beneath the solar array. These changes could protect some crops from excessive heat and reduce irrigation needs. Meanwhile, the effects are not automatically beneficial. Excessive shade may reduce photosynthesis, while changes in airflow and humidity could create unfavorable growing conditions for certain crops. The agricultural benefits of solar panels will therefore depend on local climate, panel height, spacing, orientation, and the biological requirements of the crop.

Agrivoltaics should consequently be viewed as a potentially beneficial but highly site-specific system. The relevant question is not whether solar panels benefit agriculture in every situation, but which combinations of agricultural and solar practices can produce benefits under New York conditions.

C. Crop Compatibility

Shade-tolerant vegetables, leafy greens, herbs, and some root crops may be relatively compatible with agrivoltaic systems because they can continue growing under reduced sunlight. These crops may also benefit from lower temperatures and reduced water loss beneath solar panels (USDA Climate Hubs, n.d.; U.S. Department of Energy [DOE], n.d.).

Other crops, including berries and selected fruit crops, may produce mixed or site-specific results. Their performance may depend on the amount and timing of shade, the design of the panel system, and regional growing conditions. Highly light-dependent crops, such as corn, may be less compatible with many agrivoltaic configurations because reductions in direct sunlight could substantially affect crop growth and yields (DOE, n.d.; USDA Climate Hubs, n.d.).

These categories should not be treated as universal conclusions. Much of the existing agrivoltaics research has been conducted in regions with climates and agricultural systems that differ from those of New York. Crop responses may also vary between farms and growing seasons. Agrivoltaics may therefore offer a viable solution only when crop selection and solar-system design are carefully matched to local agricultural and environmental conditions.

Core Scientific Relationships

The pilot's success depends fundamentally on understanding the physical and biological interactions between solar panels, crops, and soil.

Light Requirements for Photosynthesis



The amount of sunlight a plant receives is a key determinant of the biomass produced by the plant. The intensity and duration of the shade cast by the solar panels, influenced by the height, angle, opacity, and spacing of the panels, will affect crop yields in tandem with the light requirements of the plant species (Rakholiya, 2026; Zhang et al., 2025). Most crops experience little change in yield when shaded by 20% of full sun exposure, i.e., low-shade conditions. (Zhang et al., 2025). Some plant species are even tolerant of moderate shade (up to 50% shading); above 50% shading, crop yields for all plants have been shown to greatly diminish. However, moderate shading can be beneficial in regions with hot, dry climate; solar panels can protect the plants from heat stress and water loss, and possibly offset losses due to shading (Barron-Gafford et al., 2019).

Crop Suitability in New York State



It must be noted that berries and leafy greens (good candidates for agrivoltaics) can be highly profitable crops for NY farmers (given certain conditions are met).



Likely tolerant/well-suited:

Multiple studies have found that yields of leafy greens (spinach, lettuce, kale, chard, broccoli, cabbage, culinary herbs, etc.) show minimal reduction under moderate shading (20%–30%) (Maruyama et al., 2026). Root crops such as potatoes and sweet potatoes might be good candidates; several studies have shown that their yields do not change or even increase under moderate panel shading (up to 30%) (Widmer et al., 2024).



Likely poorly suited:

Corn/maize and sunflower, which are high-light, high stature crops, are poorly suited for agrivoltaics since they are shade-sensitive and require constant full sun exposure (Rakholiya, 2026).



Site-specific/promising:

Shade-tolerant plants such as strawberries, blueberries, raspberries , and blackberries can be a good fit for agrivoltaics with no yield loss in up to 35% shade (Hermelink et al., 2024). Apples, which are a top crop in NYS, can also benefit from low-to-moderate shading and the consequent heat stress reduction (Gashler, 2025).

Microclimate Effects



Solar panels on farms create microclimates around themselves by absorbing solar radiation and cooling the air and soil beneath. Cool-season NY vegetables can benefit from panel shading which lowers soil/air temperature, reduces evapotranspiration, and heat/water stress. Panels can also offer frost protection to plants in early spring when frost descends from cooler, elevated air (Widmer et al., 2024). Reduction in water loss through transpiration is the consequence of increase in relative humidity in the shade of the solar panels; however this can have a detrimental effect by increasing the possibility of fungal infections (Priya et al., 2026).

Soil and Water Dynamics



The reduction in evapotranspiration under the panels can lower irrigation needs provided systems are appropriately sited (Rakholiya, 2026; Priya et al., 2026). During heavy rain events, crops could be damaged because areas of soil at the edges of panels receive high volumes of water (Zhang et al., 2025).

Certainty and Maturity of the Science

We have a good understanding of the science of light-partitioning and the physiology of shade-tolerance. The classification of crops as shade-sensitive, shade-neutral, or shade-tolerant is thorough and the water-savings that result from shade from solar panels are firmly documented in drylands (Barron-Gafford et al., 2019; Zhang et al., 2025). What remains unclear is the effect of agrivoltaics on crop yields in New York State's climate. The findings of Jia et al. reinforce the idea that crop-selection strategy should be focused on shade-tolerant species. Most of the existing agrivoltaics data comes from controlled studies with ideal watering, fertilizer, and weeding management; therefore it is important to collect more data from experienced farmers using varied practices (Maruyama et al., 2026).

Photovoltaic Technology & System Design

Solar panel technology is mature and reliable, and open questions in agrivoltaics relate to design-integration with farming, not new inventions. Panel height is a key design consideration as elevated panels (3-5 m tall) allow more room for plant growth, more light penetration, greater air flow, and more space for passage of farming equipment compared to low panels (1-2 m tall) used in typical solar projects (Rakholiya, 2026; Zhang et al., 2025). However, the elevated panels are costlier to install and currently, more likely to be deployed in large-scale agrivoltaic projects (>1000 m2) (Zhang et al., 2025). Tracking panels can follow the sun throughout the day or be repositioned to allow more or less light as needed (Gashler, 2025). When solar arrays are densely packed and tilted at a fixed angle, they can cut understory light by 30-60% (and up to 80% at high density), whereas elevated or tracking layouts typically limit light reduction to 10-40%, leaving more usable light for crops (Disciglio et al., 2025). The additional cost of elevated and tracking systems is something to be studied.

Environmental Impact of the Solution

A major impact of agrivoltaics is on soil moisture retention and soil health, both of which can be affected throughout construction and decommissioning. Soil compaction as a consequence of the use of heavy installation equipment reduces soil quality and lowers crop yield (Rakholiya, 2026). It is possible for thoughtfully arranged solar arrays to deliver ecosystem-service co-benefits, such as supporting pollinator habitat and improving water quality. However, effects on wildlife and on-site biodiversity remain among the least-studied aspects of agrivoltaics, and can be difficult to predict for any given site (Schwarz & Ziv, 2024).

Conclusion



Agrivoltaics presents New York with an opportunity to address two competing land-use pressures: the need to preserve productive agricultural land and the need to rapidly deploy renewable energy generation. Our research suggests that understanding the scientific mechanisms that drive agrivoltaic success in New York State is essential to determining where and how this technology can be deployed. Its effectiveness depends on crop type, soil conditions, climate, panel configuration, shading intensity, and the economics of installation and operation. What remains uncertain is not whether agrivoltaics can work, but where and under what conditions it can work well in New York State. The proposed pilot program can help answer these questions by generating the New York–specific data needed to evaluate agricultural productivity, energy generation, environmental impacts, and economic viability.

Next semester, our research will focus on translating these findings into a framework for a successful Agrivoltaics Viability Pilot Program. We will first establish baseline conditions by measuring agricultural, soil, environmental, and economic conditions before solar installation, creating a point of comparison for changes observed throughout the pilot. We will then develop appropriate control plots to compare agrivoltaic production with conventional farming, while incorporating costs and revenues to evaluate the broader economic implications for farmers. Because agrivoltaic outcomes are highly site- and crop-specific, the pilot will also consider variation across crop types, soil conditions, climates, and solar-system designs. Finally, the research will examine outcomes across multiple growing seasons to distinguish short-term effects from longer-term changes in agricultural productivity, soil health, ecosystem conditions, and energy generation. Together, these considerations will help establish the evidence needed to determine not simply whether agrivoltaics works, but where, how, and under what conditions it can be a viable strategy for New York State.

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