Public Perceptions of Agrivoltaics in Canada: Social Acceptance, Land Use, and Rural Implications

Introduction

Agriculture and energy production are two of the most land-intensive human activities, and they frequently compete for space. Agrivoltaics offers a solution by enabling dual land use, where the same land supports both agricultural production and solar photovoltaic (PV) electricity generation. In the Canadian context, the promise of agrivoltaics is significant: research shows that only 1% of Canada's agrivoltaic potential could entirely replace fossil-fuel-based electricity generation. At the same time, agrivoltaics could enhance agricultural resilience and provide new revenue streams for farmers.

Despite these opportunities, agrivoltaics adoption in Canada remains limited. Unlike in European countries where supportive policies and regulatory frameworks are accelerating deployment, Canada's regulatory environment has slowed adoption. Moreover, social acceptance – the willingness of communities to adopt and support renewable energy systems – plays a critical role in determining whether agrivoltaics can scale effectively. This study addresses this gap by investigating Canadian public perceptions of agrivoltaics. Specifically, it examines which agrivoltaic configurations are most supported, how acceptance varies by region, and what underlying factors contribute to opposition.

Methodology

The study employed a nationwide survey distributed in December 2023 through Qualtrics' Panel Service, targeting a representative sample of Canadian adults (n = 1,595) across all ten provinces and three northern territories. Respondents were shown images of five agrivoltaic configurations and asked whether they supported each: 1) Solar grazing (solar farms with livestock integration), 2) Stilt-mounted agrivoltaics (raised modules shading farm workers/crops), 3) Vertical or single-axis tracking agrivoltaics (accommodating farm machinery), 4) Greenhouse-integrated agrivoltaics (modules on greenhouse roofs), and 5) Agrivoltaics over trees or perennial crops.

In addition to yes/no responses, participants who expressed opposition were asked to explain their reasons, generating qualitative data that revealed deeper concerns. The survey was designed to capture both regional variation in acceptance and drivers of resistance, providing a multidimensional perspective. Quantitative results were analyzed to rank configurations and provinces by support levels, while qualitative responses were coded into themes such as resistance to change, aesthetic objections, environmental concerns, and knowledge gaps.

Results

The survey produced several key insights:

- **High overall support:** 85.8% of respondents supported agrivoltaics in general. This suggests broad public acceptance and interest in dual land-use renewable energy projects.
- **Preferred configurations:** Stilt-mounted systems received the highest support (92.6%), followed by greenhouse-integrated systems (93.6%) and solar grazing (88.3%).

Agrivoltaics over trees and perennial crops received the lowest support, though still above 80%.

- **Regional differences:** Support was highest in Nova Scotia (95.6%), Manitoba (93.0%), and British Columbia (92.9%). Yukon showed the lowest support (53.3%), with the Northern Territories also lagging behind national averages. Importantly, even Alberta, with its strong fossil fuel economy, showed support levels near 90%.
- **Drivers of opposition:** Resistance was primarily linked to personal opinions and resistance to change, aesthetic and land-use concerns, and lack of knowledge or misunderstandings. Secondary concerns varied by configuration – for example, animal welfare in solar grazing, or technical issues in vertical/axis tracking systems. Economic concerns were the least cited, indicating that opposition was rarely grounded in cost-related arguments.

Discussion

The findings underscore several important implications for the future of agrivoltaics in Canada:

1. **Broad potential for acceptance** – Widespread support suggests agrivoltaics could be a socially viable pathway for renewable energy expansion, complementing Canada's agricultural sector.
2. **Importance of configuration design** – Public preferences favor configurations that align with familiar agricultural practices (stilt-mounted, greenhouse-integrated), while those perceived as more intrusive (perennial crops, vertical tracking) generate more concern.
3. **Role of education and awareness** – The most common source of opposition was misinformation or lack of knowledge. Educational campaigns, community engagement, and transparent communication about can significantly increase acceptance.
4. **Regional tailoring** – Acceptance varies by province, reflecting differences in local economies, landscapes, and cultural values. Tailoring agrivoltaics deployment to regional contexts will improve adoption prospects.

These insights align with broader sustainability goals, as agrivoltaics directly advances SDG 2 (Zero Hunger), SDG 7 (Affordable and Clean Energy), and SDG 13 (Climate Action) by simultaneously addressing food, energy, and climate concerns.

Conclusion

This research provides the first nationwide survey of public perceptions of agrivoltaics in Canada. Results demonstrate high levels of support across the country, with important differences by configuration and region. Opposition, while present, is largely driven by misconceptions or resistance to change rather than substantive technical or economic barriers. The findings emphasize the need for policy frameworks and outreach strategies that incorporate public perceptions into agrivoltaic planning and design. By doing so, Canada can unlock agrivoltaics' potential to displace fossil-fuel electricity, strengthen rural economies, and build more resilient and sustainable agricultural systems.