Solution:

Protected Cultivation of High-Value Vegetables

Submitter: (ICRISAT)

Solution Overview:

Protected cultivation is the cultivation of the crops in specialized structures where temperature, humidity, light, etc. are managed depending upon the crop requirement. High value vegetables can be a good option for the farmers under protected cultivation as it offers several advantages like better growth, higher yields and effective pest and disease management.

Key Features & Benefits:

- Protected environment improves microclimate, enhancing photosynthesis, fruit set, and overall crop quality.
- This solution helps farmers in off seasonal production by tackling climate change impacts, soil-borne diseases, and low productivity.
- Yield increases by 40–150% under protected conditions compared to open field cultivation.
- It improves water use efficiency improves by 30–50% due to integration with drip and fertilizer use efficiency by 95% by using fertigation systems.
- Enables year-round and off-season cultivation of high-value vegetables.
- Reduces pest and disease pressure, especially soil-borne pathogens like bacterial wilt and nematodes.
- The three different model protected structures viz. fan and pad green house, naturally ventilated polyhouse and shed net are available at ICRISAT.

Where It Works and Where It Can Work:

The technology is ideal for regions vulnerable to climate change and those transitioning toward sustainable, high-value horticulture. It can be effectively adapted to diverse agro-climatic zones across India, from arid and semi-arid regions to high-rainfall areas, when localized appropriately.

Expansion Potential:
India: Across India.

Global: Sub-Saharan Africa and Southeast Asia for climate-resilient horticulture.

Evidence & Impact

- Protected cultivation offers yield enhancements of 40–120% compared to traditional vegetable cultivation practices.
- Strategic research by ICRISAT identified optimal management practices suitable for tomato, sweet peppers etc.
- The research effectively addressed crop-specific biotic and abiotic stresses, improving yield quality and reducing cultivation costs.
- The project significantly raised awareness among farmers, NARS partners, the Department of Horticulture, and GoAP on the benefits and potential of grafted vegetable technology.

Scalability & Adoption Support

Protected cultivation is highly scalable with increasing climate variability. Structures such as naturally ventilated polyhouses and shade nets can be customized in size and material depending on local climate, landholding size, and farmer investment capacity. Its proven success in diverse agro-climatic zones across India-from arid areas to humid regions demonstrates its broad applicability. The availability of government subsidies under schemes like MIDH, NHM, and RKVY makes the initial investment feasible for small and marginal farmers. Moreover, the technology aligns well with India's push for climate-resilient agriculture and high-value horticulture. With its ability to produce more with fewer resources and reduce climate vulnerability, protected cultivation presents a sustainable and scalable option for transforming India's vegetable production systems.

Partners & Contact Info
Contact Info

For key contacts and more information on scaling this solution, please email:

A team of scientists are involved in this initiatives at ICRISAT:

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