



Adapting to Extreme Temperatures in the Islands Region

Small Greenhouse Systems

Hoophouse © Media Mike Hazard, CC BY 2.0

Greenhouse vegetable production systems within the Vancouver Island and Coastal region have increased by 76% from 2016 to 2021.¹ These systems help buffer crops from extreme weather and extend the growing season.²

As climate change advances, longer growing seasons and more extreme events are expected in the Islands Region.³ Increased use of greenhouse systems, from large, climate-controlled, glass structures to simple plastic hoophouses, may be a practical way for producers to adapt. However, simple greenhouse structures may need adaptations to remain productive during extreme temperature events.³

You can plan for heat and frost events in greenhouse production with the following management strategies:

HEAT MANAGEMENT

Passive Methods

Select appropriate cultivars – Reduce risk of heat stress by selecting the best suited crop and cultivar based on climate conditions of the greenhouse (year-round for perennial crops).

Use shading and reflection – Many shading options are available to partially block sunlight and radiant heat during the summer. They differ somewhat in cost and efficacy in temperature reduction. These options include:

- Black shading screens⁴
- Calcium carbonate (chalk)⁵
- Transparent radiative cooling (T-RC) film⁶

Invest in backup water storage – Increase available water sources during periods of water shortage by investing in dugouts or cisterns.

→ Learn more about [water storage](#)

Monitor temperature and humidity levels – Install automated climate control systems that can be controlled remotely by a smart phone app.

Active Methods

Install internal air circulation – Exhaust fans can circulate air through greenhouse chambers, reducing air temperatures in the structure.⁴

Install ventilation curtains or windows – Use ventilation by opening roof or side vents on a greenhouse.⁷

Use evaporative cooling –Mists, swamp coolers and fogging systems increase humidity and lower temperatures during extreme heat events.⁴

Irrigate in the morning or evening – Use soil moisture monitors and sensors to determine water needs.



Greenhouse with natural and forced cooling. Source: Creative Commons.

COLD MANAGEMENT

Passive Heating Methods

Select appropriate sites – Consider south-facing slopes for your greenhouse, as they warm up faster in the spring and remain warm for longer in the fall.⁵

Add insulation– Add soil-based or snow-based berms or walls around the structure to reduce heat loss from cold drafts and improve insulation. Be careful not to allow too much snow to pile up on the sides or the roof or it may cause damage or collapse.⁴



Greenhouse with snow berm. Source: Red Wagon Plants.



Greenhouse with additional heating. Source: iStock.

Active Heating Methods

Use a blower for double-layered high tunnels – An inflated double-layered wall can reduce heat loss by around 40%.⁸

Use heaters – Install a convection heater to deliver hot air during extreme cold nights – these are typically powered by natural gas or electricity.⁴ Electric soil heating cables or seedling mats can protect against freezing.

Use hot water or hot air heating – Install a water or air recirculation system and pipes that can move heat through the greenhouse soil or air, similar to a radiator system.⁴



Pipes recirculating warm water. Source: Prins Greenhouses.

Additional Resources



A Guide to On-Farm Demonstration Research
<https://www.bcclimatechangeadaptation.ca/app/uploads/Fl03-On-Farm-Demonstration-Research-Guide.pdf>



AgriService BC
1-888-221-7141
<https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agriservice-bc/agriservice-connect>



BC AgriWeather
<https://dashboard.bcagriweather.ca/>



BC Agriculture Water Calculator
<https://bcwatercalculator.ca/agriculture/welcome>



Greenhouse Practice Guide
https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/strengthening-farming/farm-practices/870218-17_greenhouse.pdf



Heat Stress Information Sheet
<https://agsafebc.ca/download/heat-stress-information-sheet/>



BC Irrigation Management Guide
<https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/water/irrigation/>



Farm Irrigation Fact sheets: Scheduling basics
<https://www.bcclimatechangeadaptation.ca/app/uploads/OK11-Farm-Irrigation-Fact-Sheets-Set5-Scheduling-Basics-2023.pdf>



Greenhouse Checklist
https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/programs/indigenous-agriculture-development/greenhouse_checklist.pdf



Health and Safety for Greenhouses and Nurseries
<https://www.worksafebc.com/en/resources/health-safety/books-guides/health-and-safety-for-greenhouses-and-nurseries?lang=en>



**Extreme Heat:
Community Care
Facilities Factsheet**
<https://www.islandhealth.ca/sites/default/files/environment/documents/Factsheet-Long-Term-Care-Heat.pdf>



FireSmart BC
<https://firesmartbc.ca/farm-and-ranch-wildfire-preparedness/>



Greenhouse Vegetables
<https://www2.gov.bc.ca/gov/content?id=BACEFCF8C2224575BE59D1DC67E67E0A>



Greenhouse Floriculture
<https://www2.gov.bc.ca/gov/content?id=D172FB909CBC4E7EB6F6D666D67A5D10>

References

1. [2021 Agriculture in Brief](#)
2. [Influence of climate change on protected cultivation: Impacts and sustainable adaptation strategies - A review](#)
3. [Regional Strategies- Vancouver Island](#)
4. [The Greenhouse and Hoophouse Grower's Handbook](#)
5. [Shading greenhouses to improve the microclimate, energy and water saving in hot regions: A review](#)
6. [Eliminating greenhouse heat stress with transparent radiative cooling film](#)
7. [Protected Cropping in Warm Climates: A Review of Humidity Control and Cooling Methods](#)
8. [SARE High Tunnels - University of Vermont Center for Sustainable Agriculture](#)

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