

A Tale of Two Lettuces

Evaluating the Sustainability
of Two Winter Vegetable
Production Systems



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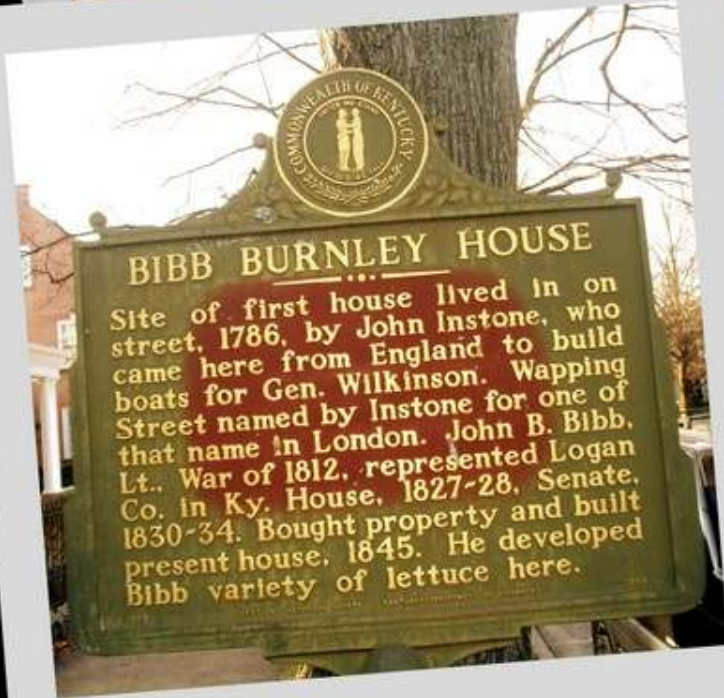


Lettuce: Best fresh

- Cool season crop
- Won't freeze, can, dry
- Short shelf life
 - especially, soft butterhead varieties
- Nutritious (Except iceberg)
 - Vitamin A
 - Vitamin C
 - Folate
 - Potassium

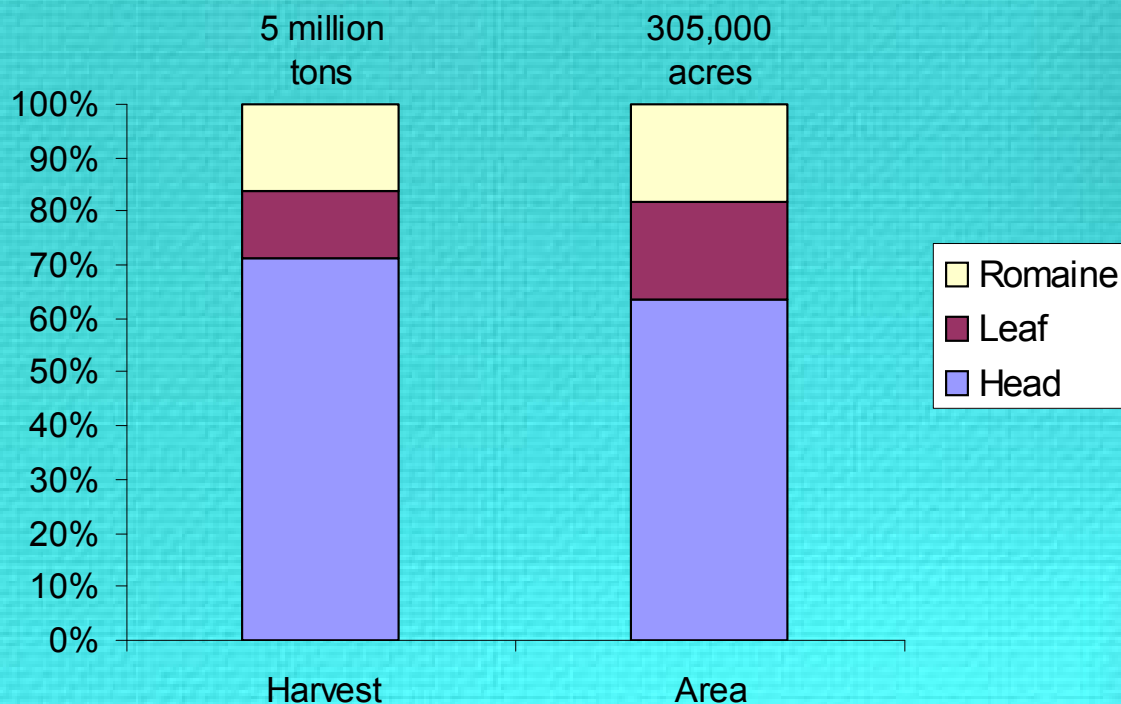


Frankfort lettuce

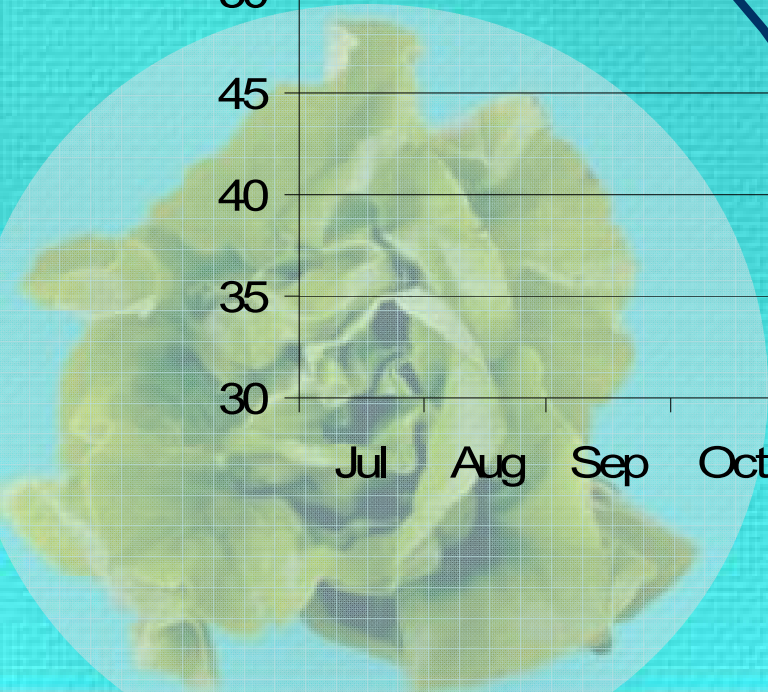
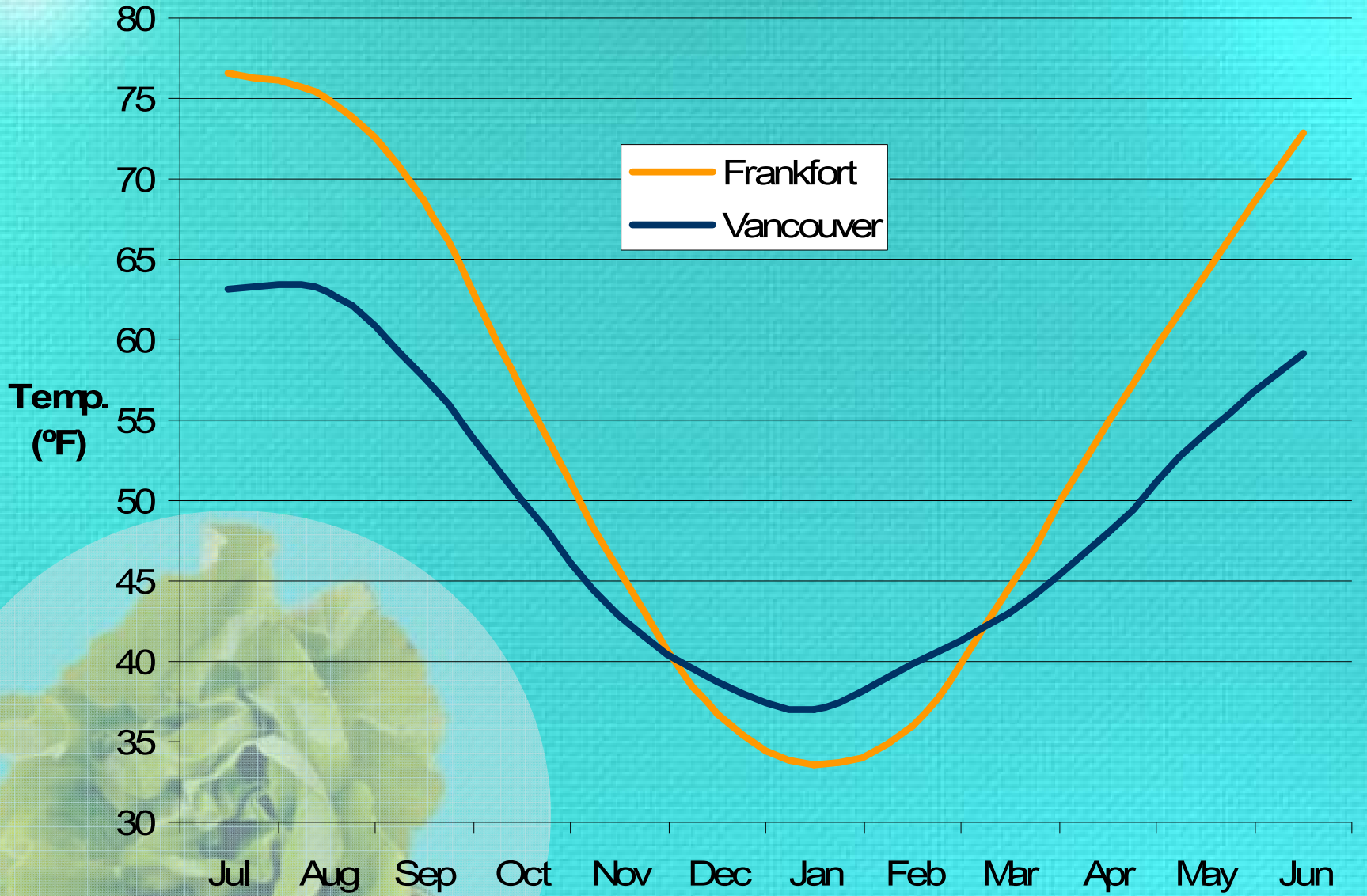


Lettuce in perspective

- Kentucky (2002)
 - 39 farms, 14 acres
- USA (2002)
 - 305,000 acres
 - 90+% CA, AZ
- Biggest organic product (2001)
 - 5% of lettuce acreage organic vs. 0.3% of all







Western Lettuce Now Inc., Langley BC



Western Lettuce

6 acres

8 acres

Wiediger
high
tunnel



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Point: 49°01'51.88" N 122°36'48.55" W elev: 59.0

Streaming 100%



Western Lettuce

- Bibb lettuce
- 12-18 plants / m²
- 12 weeks, seed to harvest
- 8 crops / year
- Hydroponic, tabletop
- Steel frame
- Single pane of glass
- Natural gas boiler heat

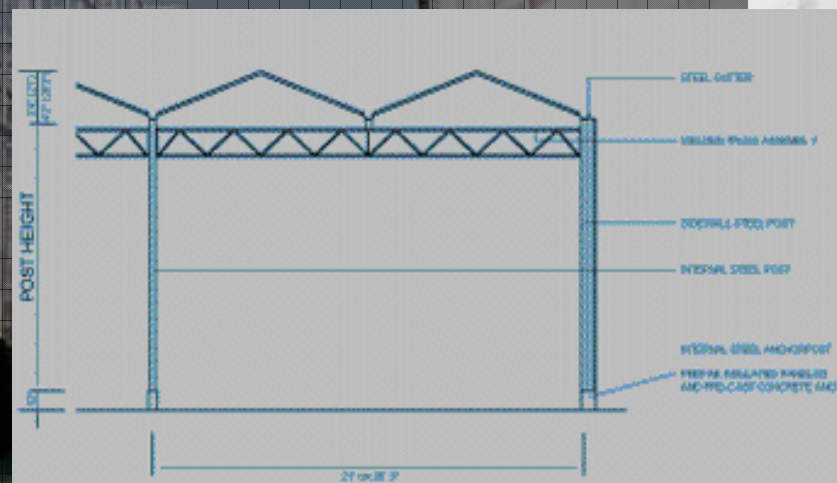
Yoshihiko Wada, PhD
Professor of Ecological Economics
Doshisha University,
Kyoto, Japan



1.6 acres

Greenhouse Assumptions

- 2-9 acre Venlo-style house
- Steel and aluminum frame, concrete foundation, plastic moisture barrier, glass cladding
- Whole structure lasts 20 years
- High-input system
 - Heat through steel water pipes
 - Plastic ground cover and irrigation lines
 - Hydroponic fertilizers, CO₂
 - Machinery:
 - Electric carts
 - Fork lift
 - Pallet jacks





Au Naturel Farm

- Mixed varieties
- 9 plants / m²
- 10 weeks, seed to harvest
- 3 crops per winter
- Soil-based system
- Steel, wood frame
- Double layer plastic
- Solar heat only

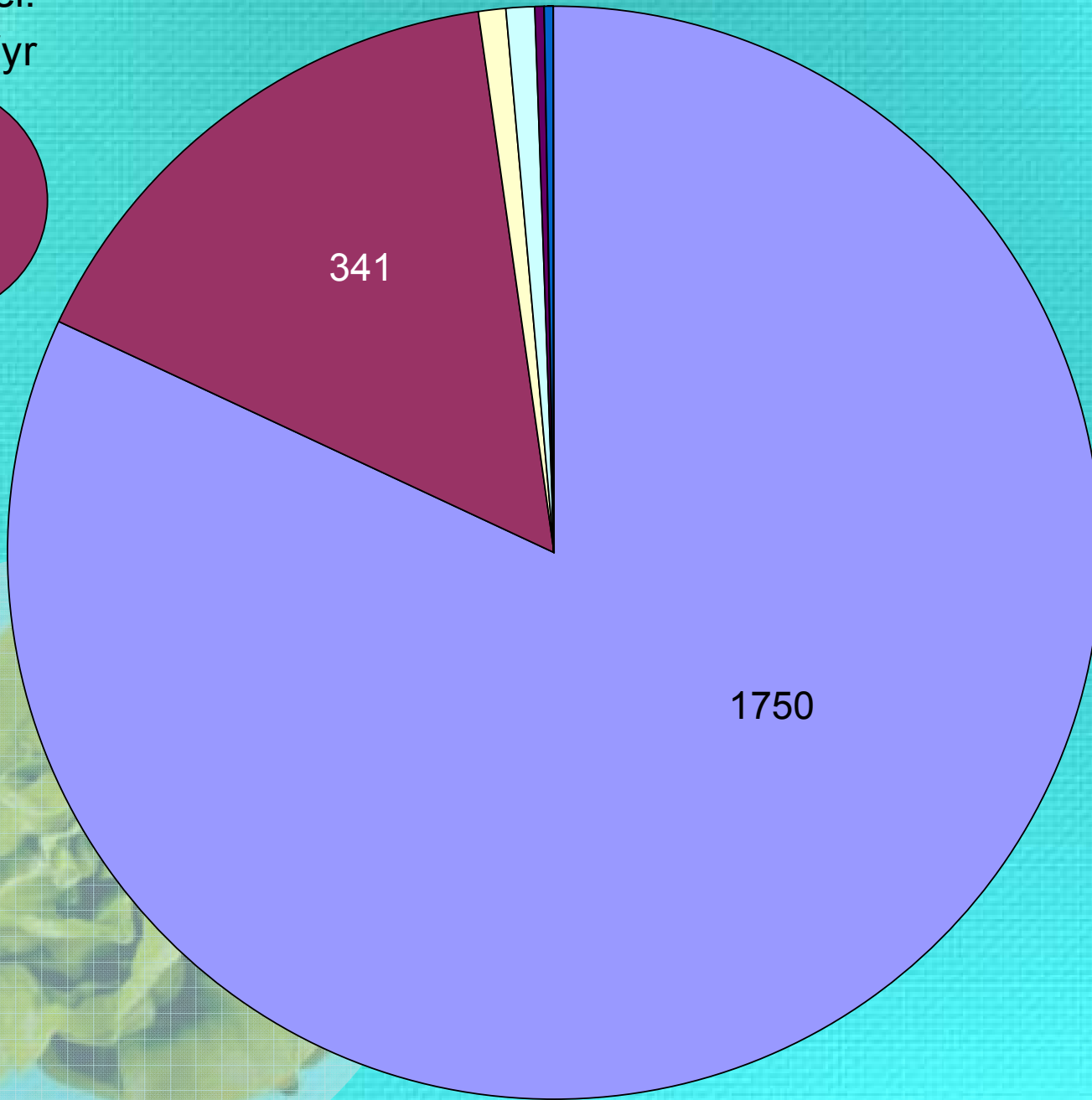
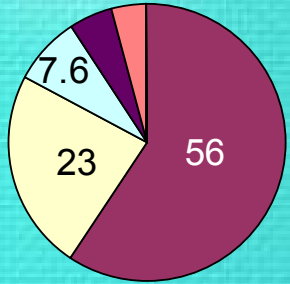
High Tunnel Assumptions



- 30' x 96' Budget Plus A-frame from Atlas greenhouses. Anchored in concrete
- Wood-framed end walls
- Double layer, 6 mil plastic cladding
- Frame lasts 20 years; plastic lasts 4
- Soil-based (organic); poultry compost & kelp for fertilizer
- 2400' of T-tape/yr
- 60W blower fan operates continuously
- BCS walk-behind tractor with 5 gallons of diesel fuel

Greenhouse: 2129 MJ/m²/yr

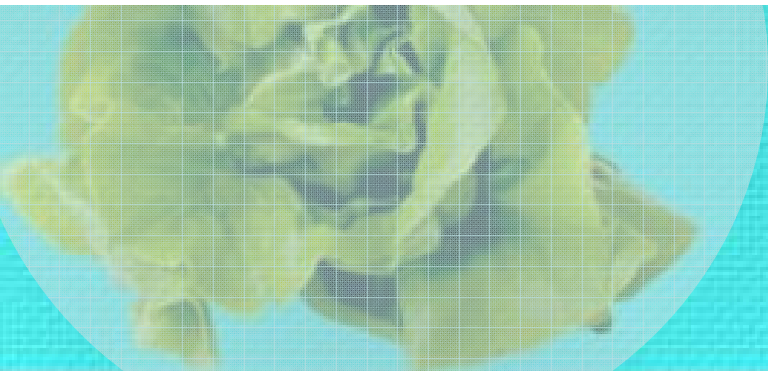
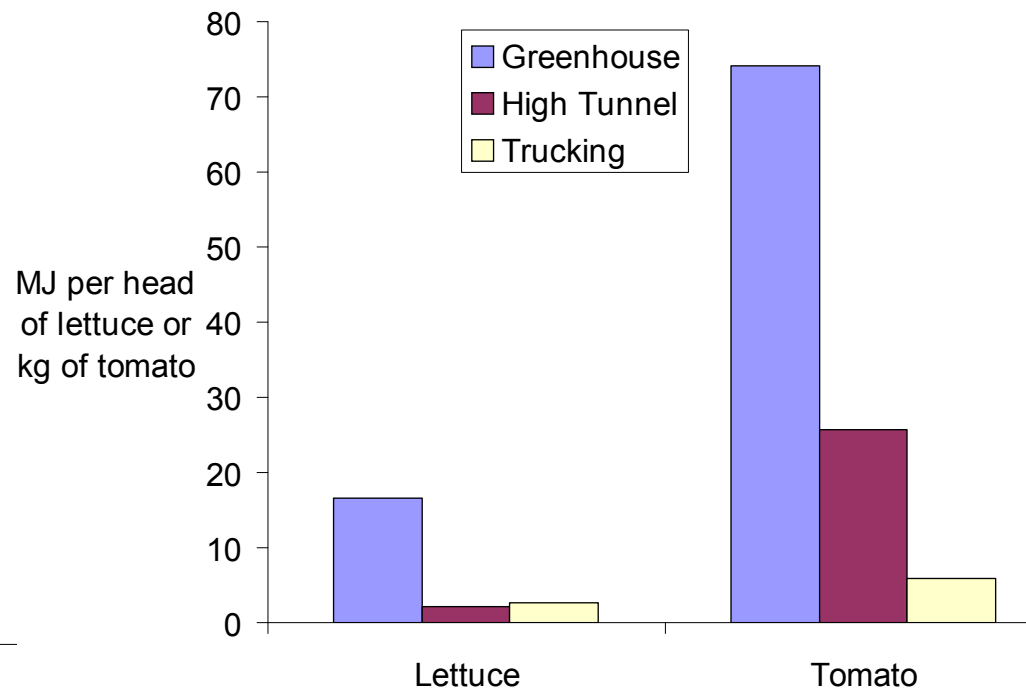
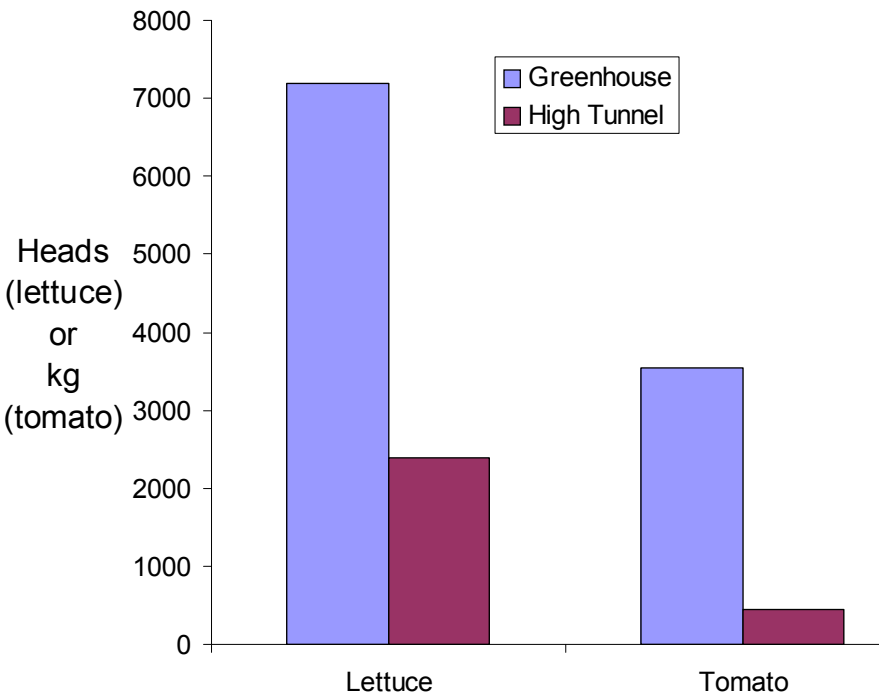
High tunnel:
95 MJ/m²/yr



- natural gas
- electricity
- plastic
- steel
- aluminum
- wood
- glass
- concrete

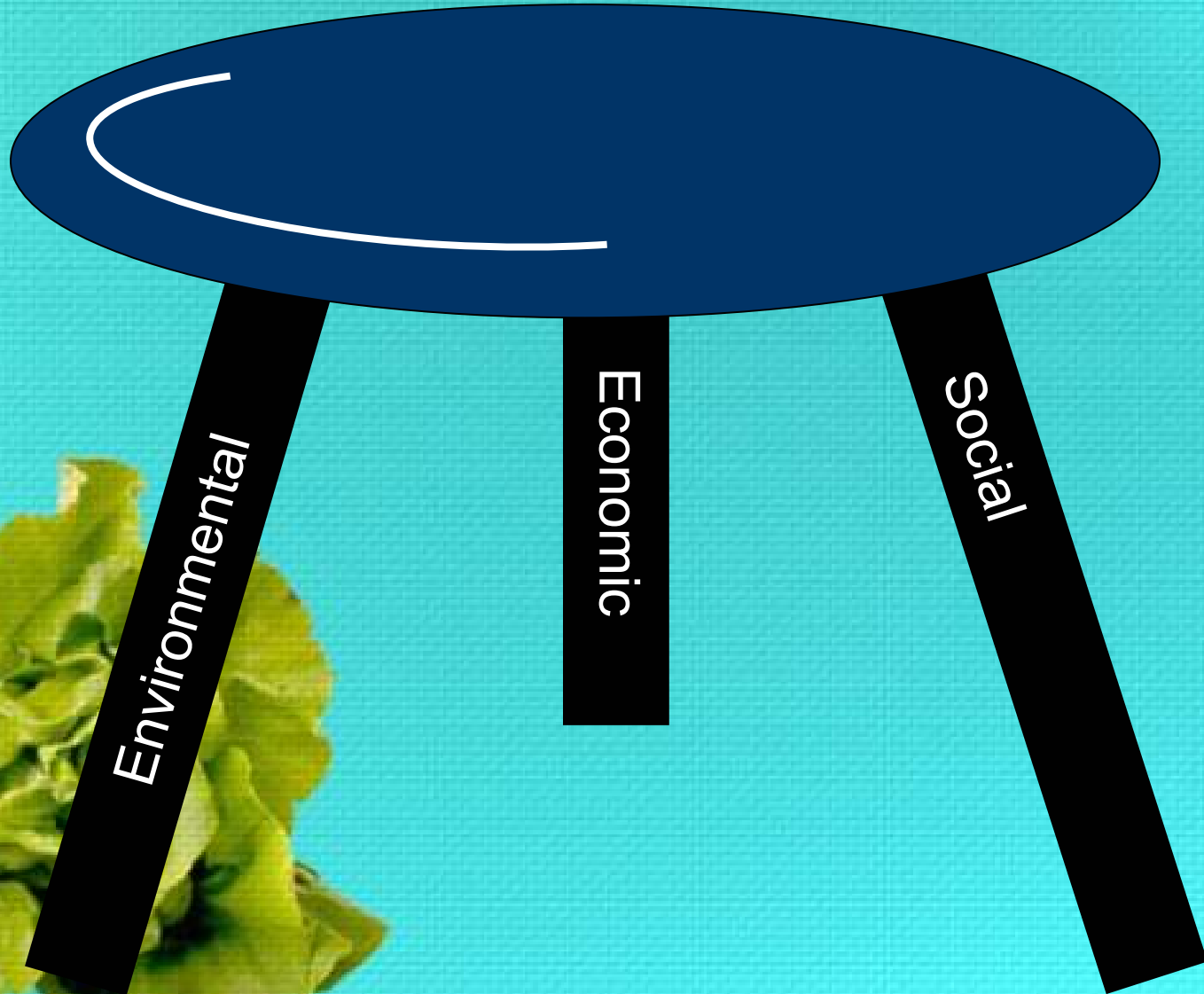
Yield /100 m²

Embodied energy (MJ/plant)



Energy extracted from a large head
of lettuce by human digestion:
318 J (76 cal)

Sustainability



Sustainability

	Greenhouse	High Tunnel
Environmental	High energy use = CO ₂ emissions, global warming, dependence on non-renewables. F	Lower energy use; fewer non-renewables. B+
Economic	Profitability depends on energy prices. D	Profitability depends on management, location, customer relationships. B-
Social	Workers have good salaries, safe, comfortable conditions. Consumers have access to fresh, nutritious food all year. NOT family farm, but good corporate citizens. B+	Varied, pleasant work. Family farm scale. Builds farmer-consumer relationships. A

Canagro Greenhouses Inc. Delta, BC



12 acres

12 acres

33 acres

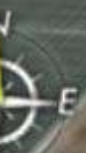


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9°05'30.33" N 122°59'51.17" W elev 7 ft

Streaming ||||| 100%

Thanks

- Paul and Alison Wiediger, Au Naturel Farms
- Atlas Greenhouse Systems Inc.
- Mark Bomford, UBC
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- Tony Silvernail, KSU
- Marion Simon, KSU
- Harold Benson, KSU



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