



Deep Winter Greenhouse

CONSTRUCTION, PRODUCTION, AND ENTERPRISES ANALYSIS

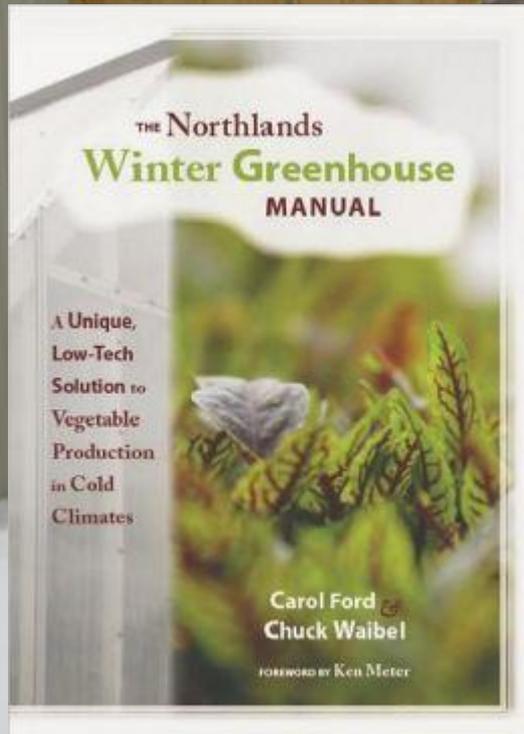
AGENDA

- Deep winter greenhouse production system
- Building
- Growing
- Profiting

LIDA FARM



Elements of Deep Winter Greenhouses

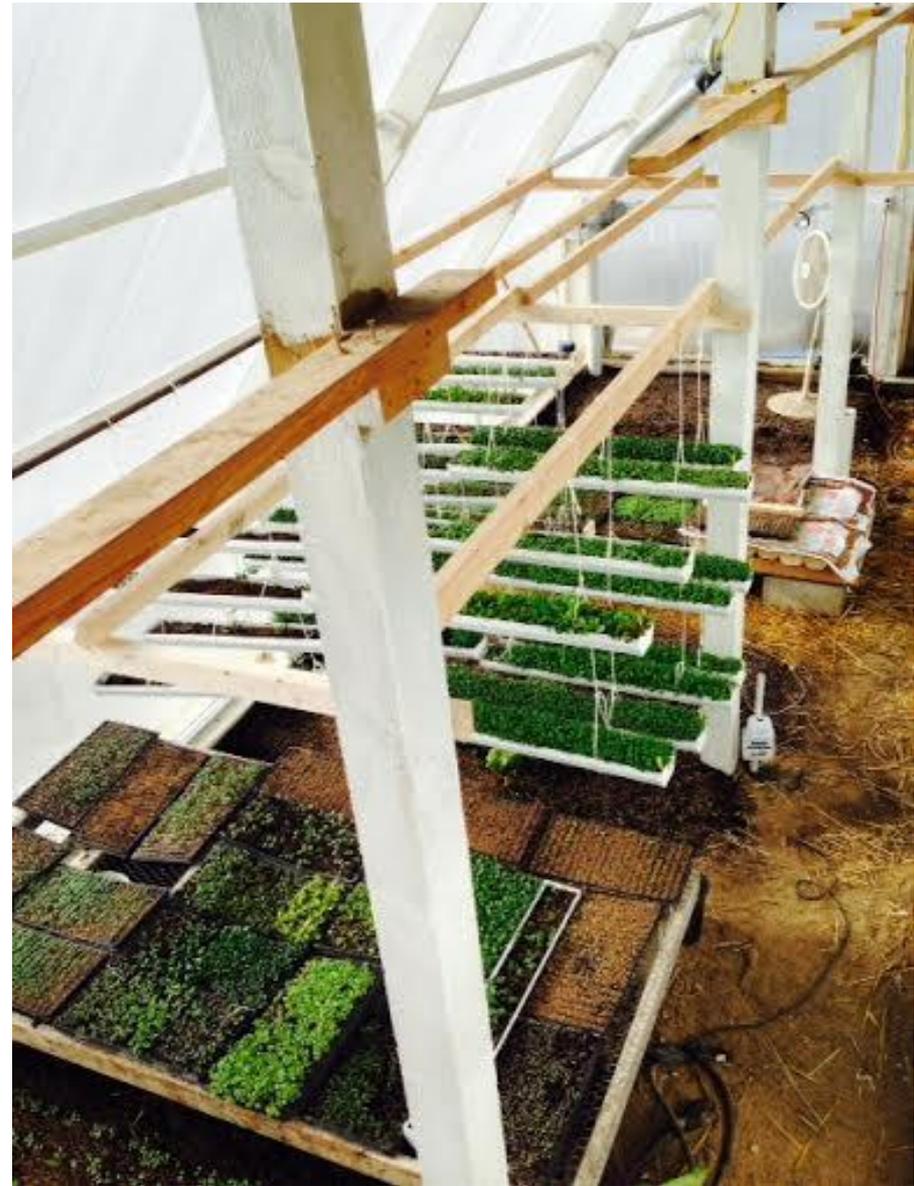


Passive solar



PRODUCTION SYSTEM

- Continuous planting
 - Oct thru Feb
- Cold-season greens
 - Brassicas / Asian
- Vertical growing



LIDA FARM PROJECT



LIDA FARM PROJECT

- 3 elements
 - Root Cellar
 - Cottage
 - Winter Greenhouse
 - Passive solar
 - Solar thermal
 - Radiant floor heat
 - Wood boiler integration
 - Hillside construction

WHY WINTER GREENHOUSE

- **Fit into farm goals**
- **Complementary enterprise**
 - Propane
 - Organic onions anyone?
 - High tunnel starts
- **Off-season revenue**

THE SITE



TOURIST COTTAGE: 14 X 20



HILLSIDE CONSTRUCTION



INSULATED WALLS



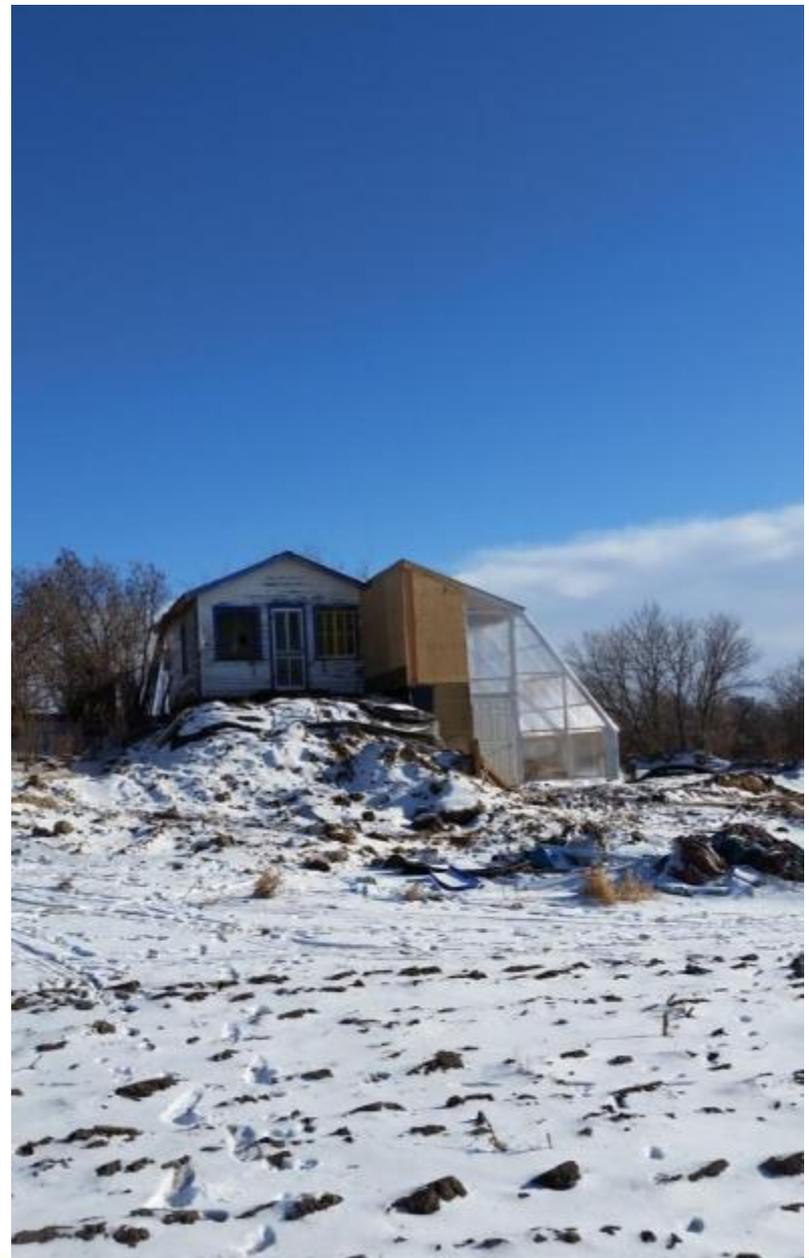
STICK CONSTRUCTION

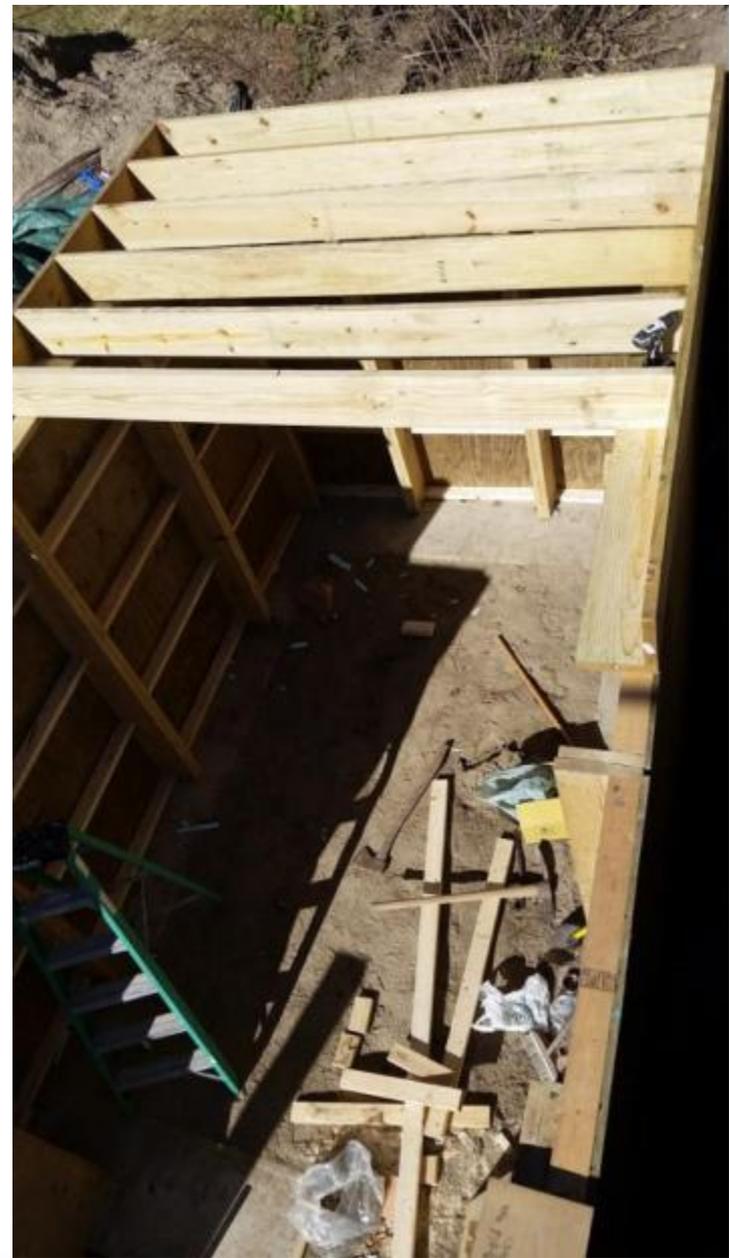






ROOT CELLAR





DIRT WORK











SOLAR THERMAL



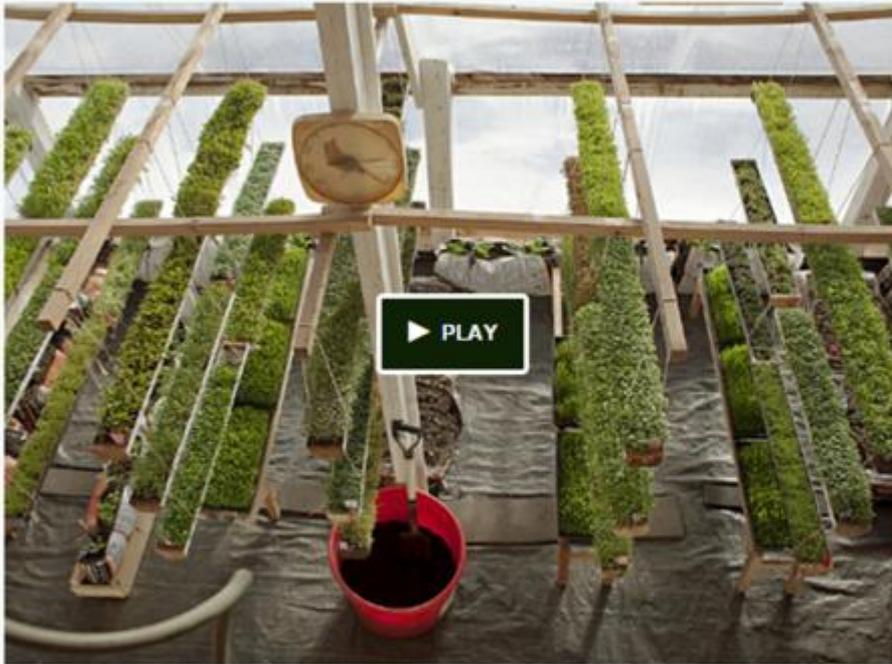
LIDA FARM PROJECT: COSTS

	<i>Greenhse</i>	<i>Root cellar</i>	<i>Cabin</i>
Apprentice Cabin			\$3,242
Excavating	\$ 1,841	\$ 789	\$ -
Labor	\$ 1,330	\$ 570	\$ -
Plumbing	\$ 1,837	\$ -	\$ -
Materials	\$ 4,273	\$ 649	
Lumber	\$ 7,589	\$ 2,710	\$ 542
Solar	\$ 7,057	\$ -	\$ -
	<u>\$23,928</u>	<u>\$ 4,719</u>	<u>\$3,785</u>
	<u>74%</u>	<u>15%</u>	<u>12%</u>

LIDA FARM PROJECT: FINANCING

Lida Farm Deep Winter Greenhouse and Root Cellar Project

by Ryan Pesch



74

backers

\$8,242

pledged of \$5,000 goal

0

seconds to go

Funded!

This project was successfully funded on September 25.

This deep winter greenhouse/root cellar project extends our growing year round to overcome terrible weather and bad food in Northern MN

📍 Pelican Rapids, MN

🌿 Farms

Share this project

Ryan Pesch

🕒 First created | 3 backed

🌐 lidafarm.com

[See full bio](#) [Contact me](#)



CONSTRUCTION: LESSONS LEARNED

- Skip the hillside
- Be prepared to shovel
- ICF blocks recommended
- Spray foam

PRODUCTION











Mustard S1
11-19

ARUGULA S1
11-19

MIZUNA S1
11-19

Reality Greenhouse at Paradox Farm



Reality Greenhouse at Paradox Farm



Cress

Reality Greenhouse at Paradox
Farm

Win-Win Choi



Reality Greenhouse at Paradox Farm

Tatsoi

Reality Greenhouse at Paradox Farm





Red Giant Mustard

Reality Greenhouse at Paradox Farm



Minuet Chinese Cabbage

Reality Greenhouse at Paradox Farm



Bulls Blood Beet

Reality Greenhouse at Paradox Farm



Red Russian kale

Reality Greenhouse at Paradox Farm



Ruby Streaks and Green Wave
Mustards

Reality Greenhouse at Paradox
Farm

A close-up photograph of a large, dense patch of Mizuna leafy greens. The leaves are bright green and have a distinctively serrated, pointed shape. The plants are growing closely together, filling most of the frame. In the background, other plants and the structure of a greenhouse are visible but out of focus.

Mizuna

Reality Greenhouse at Paradox Farm



Mixed Lettuces

Reality Greenhouse at Paradox Farm





Reality Greenhouse at Paradox
Farm



Reality Greenhouse at Paradox Farm

Pea Shoots – The Gateway Green!



Reality Greenhouse at Paradox
Farm

PRODUCTION ISSUES

- Moisture!!
- Timing



2015 ANALYSIS

- 2014 season
- 7 participants
- Find at <http://www.extension.umn.edu/rsdp/statewide/deep-winter-greenhouse/>





REVENUES

	<i>Range</i>	<i>Average</i>	<i>Median</i>
Gross Revenue	\$447-\$5,527	\$2,609	\$1,511
CSA	\$488-\$5,527		
Direct Sales	\$1,025		
Operating Revenue	\$(527)-\$4,491	\$1,717	\$688
Operating Revenue per Sq Ft of Growing Space	\$(1.88)-\$17.34	\$6.96	\$4.79
Gross Margin	(118%) -81%	34%	57%

DIRECT EXPENSES

	Range	Average	Median
Annual variable expenses*	\$443-\$1,166	\$892	\$974
Seeds	\$40-\$240	\$133	\$120
Propane	\$0-\$528	\$298	\$267
Soil Mix	\$28-\$340	\$199	\$276
Marketing costs	\$0-\$650	\$146	\$50
Utilities	\$15-\$165	\$92	\$95

START-UP COSTS PER GREENHOUSE

	<i>Range</i>	<i>Average</i>	<i>Median</i>
Start-up cost	\$5,797-\$73,035	\$25,502	\$20,578
Cost per sq. ft.	\$20-\$172	\$61	\$47
Cost per sq. ft. of growing space	\$38-\$345	\$120	\$90

- Greenhouses 1 and 5 were most profitable (highest net revenue and ROI)

ROI AND PAYBACK TIME

	Grnhse1	Grnhse2	Grnhse3	Grnhse4	Grnhse5	Grnhse6	Grnhse7	Overall**	
ROI (Net Revenue /Start-up Cost)*	21.5%	8.9%	-3.6%	7.0%	15.6%	-6.3%	-0.1%	3%	
								Average	Median
Payback Time to Recoup Investment	4.0	8.4	NA	9.3	5.2	NA	28.4	11	8

* Low sales in Grnhse 6 and 7 and high capital costs in grnhse 3 explain negative ROI

RETURN TO LABOR

	Grnhse1	Grnhse2	Grnhse3	Grnhse4	Grnhse5	Grnhse6	Grnhse7	Average	Median
Total hours worked	630	111.5	205	127.5	233	97	167.3	224.5	167.3
Hourly wage*	\$7.13	\$6.17	\$1.07	\$20.24	\$17.10	\$(5.43)	\$3.48	\$7.11	\$6.17

* Operating revenue divided by hours

MARKET DOCUMENTATION

- Greens varieties have increased
- Opportunity for baby greens in winter
 - Microgreens are a thin market
- “Going” price in groceries for baby greens around \$10/lb
 - At a 40% margin, growers receiving \$6/lb

NOT IN THE MIX

- Household greens
- Summer transplants and cost decreases
- Sun-dried tomatoes / dried herbs
- Beautiful space

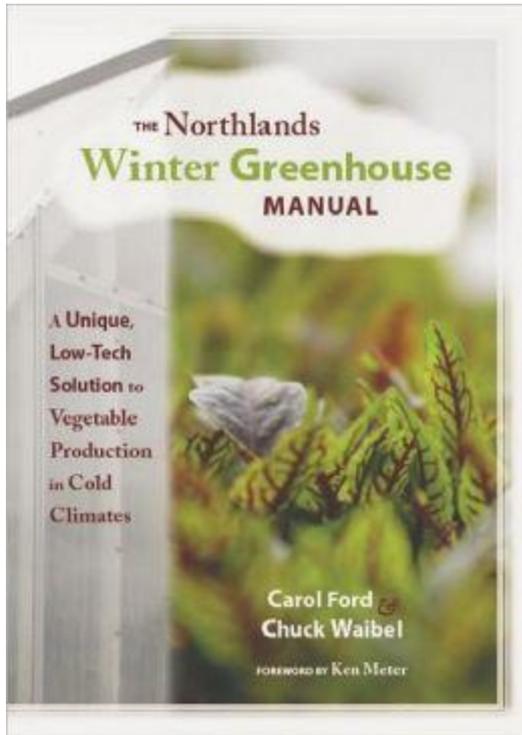
ECONOMICS

	Fall CSA Shares	Winter CSA
Sales	\$1,000 (10 shares)	\$4,500
Tools	Root Cellar, sheds, cooler	Root cellar, winter greenhouse
Marketing costs	Delivery (\$200 over 2 deliveries)	Delivery (\$400 over 7 deliveries w/dropsites)
Production costs	Not much	\$1,000
Capital cost	Not much	\$900/year
Net return	About \$800	About \$3,500
Time	Packing + late season clean-up	Packing + clean-up + 1 hour daily through winter

RECOMMENDATIONS

- Decide if DWG enterprise complements your goals and current production
- Should you go forward:
 - Maximize space
 - Consider Winter CSA
 - Keep start up costs low (under \$20k)

RESOURCES



**COLD-CLIMATE
GREENHOUSE
RESOURCE** A guidebook for
designing and building a
cold-climate greenhouse

Southeast Regional Sustainable
Development Partnership

UNIVERSITY OF MINNESOTA
EXTENSION

CSBR
Center for Sustainable Building Research

**Eagle
Bluff**
Environmental
Learning Center

Center for Urban and
Regional Affairs (CURA)
UNIVERSITY OF MINNESOTA



Thanks,
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