Season Extension In Michigan's Upper Peninsula

Collin Thompson
The North Farm – Upper Peninsula Research & Extension Center

MICHIGAN STATE UNIVERSITY | Extension

MICHIGAN STATE UNIVERSITY | AgBioResearch

190

8,336

8:06

83

190 inches

8,336 sq.ft.

8:06 of daylight

83 frost free days

About Me

- River Root Farm – Decorah, IA
- Seed Savers Exchange – Decorah, IA
- Four Season Tools – Kansas City, MO
- Michigan State – Chatham, MI

About The North Farm

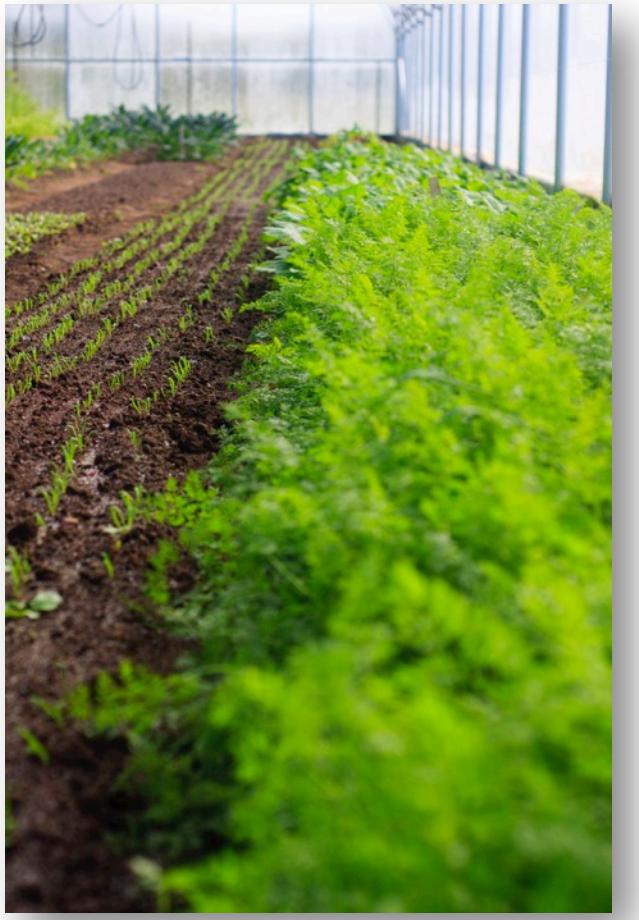
- Established 1899/2014
- Research, Education, and Production
- Organic vegetable production
- Season and Market Extension

The NORTH FARM
Chatham, Michigan

MICHIGAN STATE UNIVERSITY | Extension

MICHIGAN STATE UNIVERSITY | AgBioResearch

Season Extension vs. Market Extension



Terminology

- **Hoophouse** – Structure glazed with polyethylene (greenhouse plastic) that is used to extend the growing season

- **High Tunnel** – Same as hoophouse. Term used to emphasize importance of low tunnel use inside high tunnel

- **Greenhouse** – Typically a more permanent structure, often with supplemental heat

Why Consider Season Extension?

- Extend the growing season
- Increase marketing/cropping opportunities
- Increase revenue per square foot
- Increase crop quality & yield
- Enhanced environmental control
- Reduce incidence of plant disease
- Protection from weather (i.e. frost & hail)
- Labor efficiency (work regardless of weather)

Technologies and Type of Structures

- Low Tunnels/Row Covers
- Caterpillar Tunnels
- Hoophouses/High Tunnels

Low supports made of wire, conduit, or PVC for fabric or plastic covers

Offers frost protection in the field or hoophouse

Serves as a physical pest barrier and offers wind protection

Maximizes effect of hoophouse for season extension

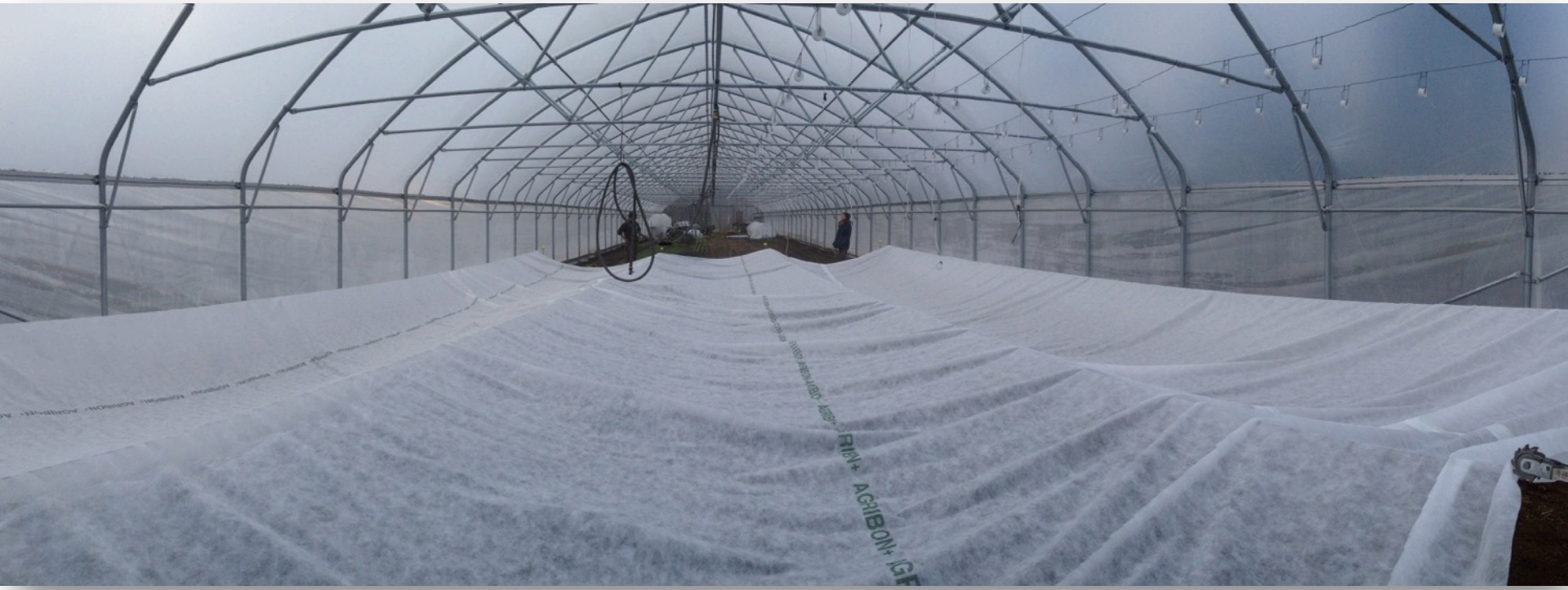
Different types of row cover

Relatively small investment

$0.136 / Square Foot Cost

Season Extension Structures

- Row Covers



Season Extension Structures

- Row Covers
  - Ag-19 (0.55 oz/yd^2) and Ag-30 (0.9 oz/yd^2)
  - Deep Winter vs. Fall/Spring
  - Overwinter vs. Winter Harvest
  - Field and Tunnels
  - Low Tunnels and Cables

Row Covers

Row Cover Impact on Greens Production (28 Days of Growth)

Inner Cover	Mizuna		Tatsoi		Salad Mix	
	Height (inches)	Weight (oz)	Height (inches)	Weight (oz)	Height (inches)	Weight (oz)
Plastic	7	5.9	5.5	6.9	4	2.8
Typar	4.75	3.7	4	0	2.5	0
None	2.75	0	4	0	1.75	0

Effects of row covers on plant

6 mil plastic

Typar (nonwoven polypropylene fabric)

No cover

CEFS

NCSU | NCA&TSU | NCDA&CS

www.cefs.ncsu.edu

Row Covers

Frost protection versus light transmission		
Product name	**Frost protection**	**Light transmission**
Covertan CP-17	4°	90%
Agribon AG-19 Agrofabric Pro 17	4°	85%
Covertan CP-30	6°	80%
Agribon AG-30 Agrofabric Pro 30 Typar T-518	6°	70%
Agribon AG-50 Agrofabric Pro 50	8°	50%
Tufbell	10°	95%

Low Tunnels

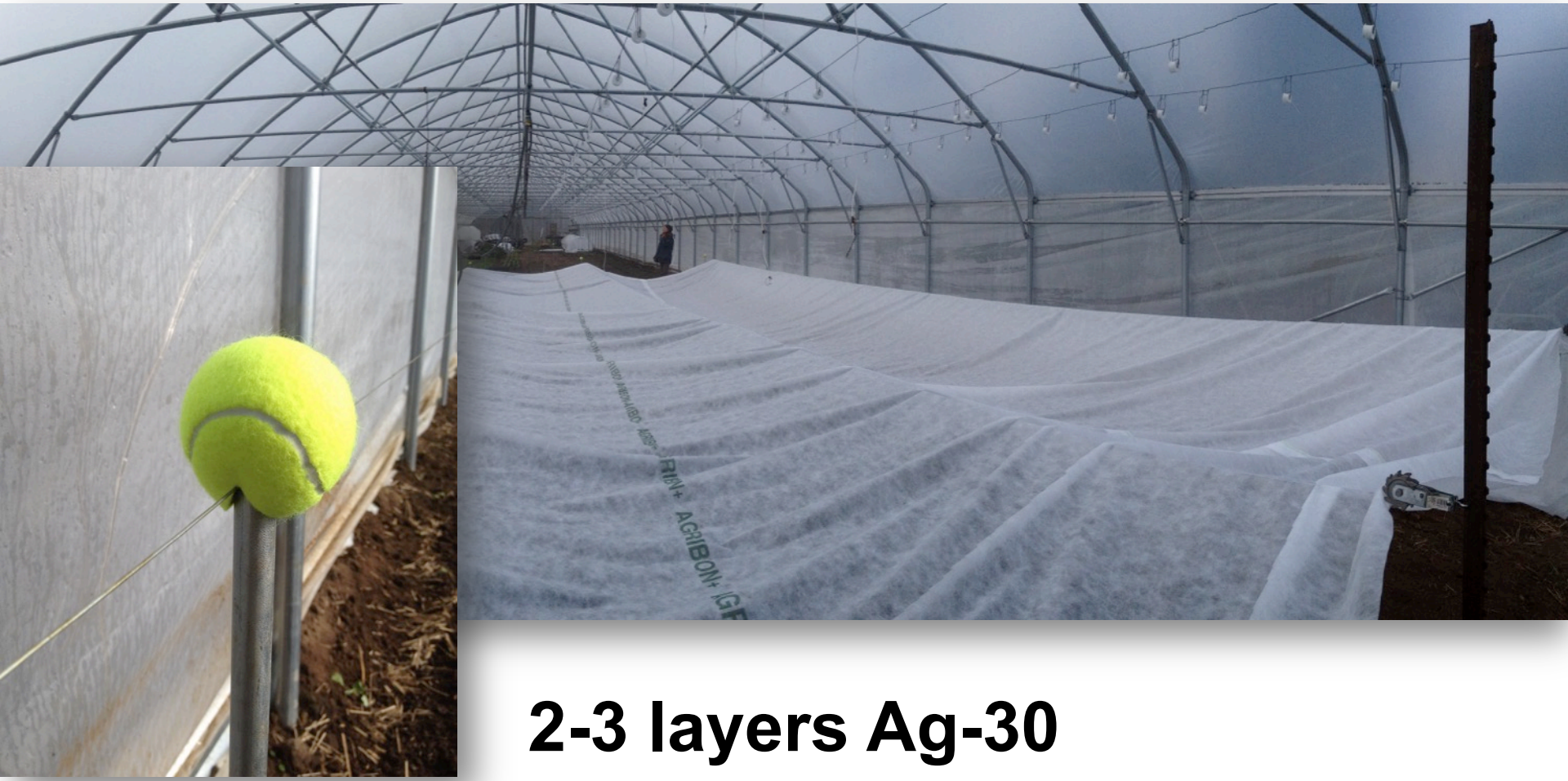
- Field

Low Tunnels

- High Tunnels

Cable System

Cable System



2-3 layers Ag-30

Technologies and Type of Structures

- Low Tunnels/Row Covers
- Field (Caterpillar) Tunnels
- Hoophouses/High Tunnels

Larger growing space meaning greater thermal gain and working environment

Typically uses very basic plastic attachment technology and ventilation

Often viewed as 3-season structures in area with snow

Can be bought as kits or bent on-farm

Slightly larger investment

$1.76 / Square Foot Cost

Season Extension Structures

- 14’W x 92’L Nifty Hoops Sidestep Field Tunnels

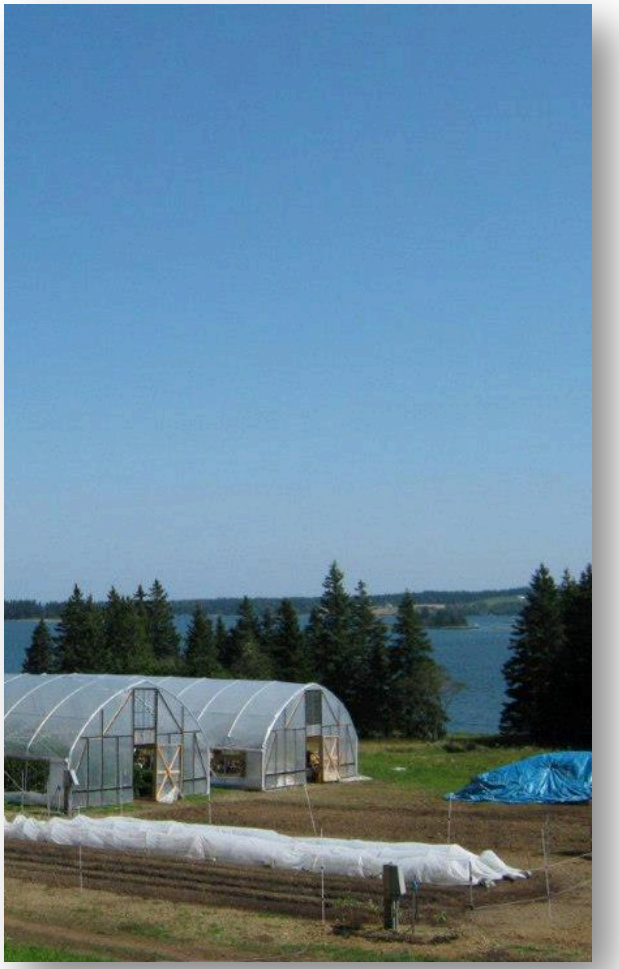
Season Extension Structures

- 14’W x 92’L Nifty Hoops Sidestep Field Tunnels
  - Manual ventilation
  - Light duty bracing kit
  - Quonset roof geometry
  - 3-season structures at The North Farm
  - Two position movable system

Movable System

Movable System

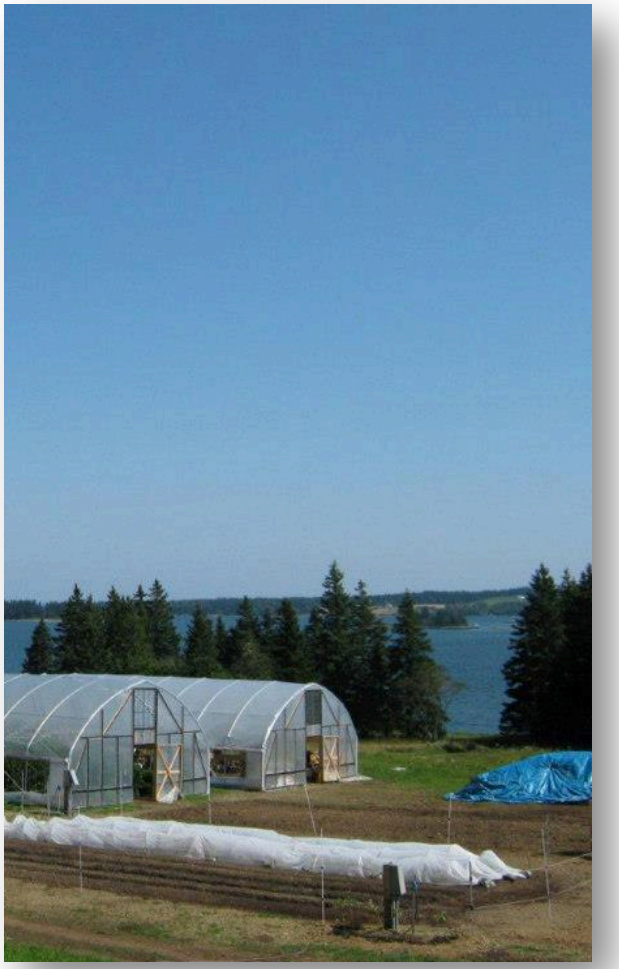
- Movable
  - Allows multiple plots to be covered per year
  - Allows for natural rotations
  - Plant-positive
  - Expensive
- Fixed
  - Permanent and simple
  - Minimizes weed pressure
  - Easier access to utilities
  - Limits rotations



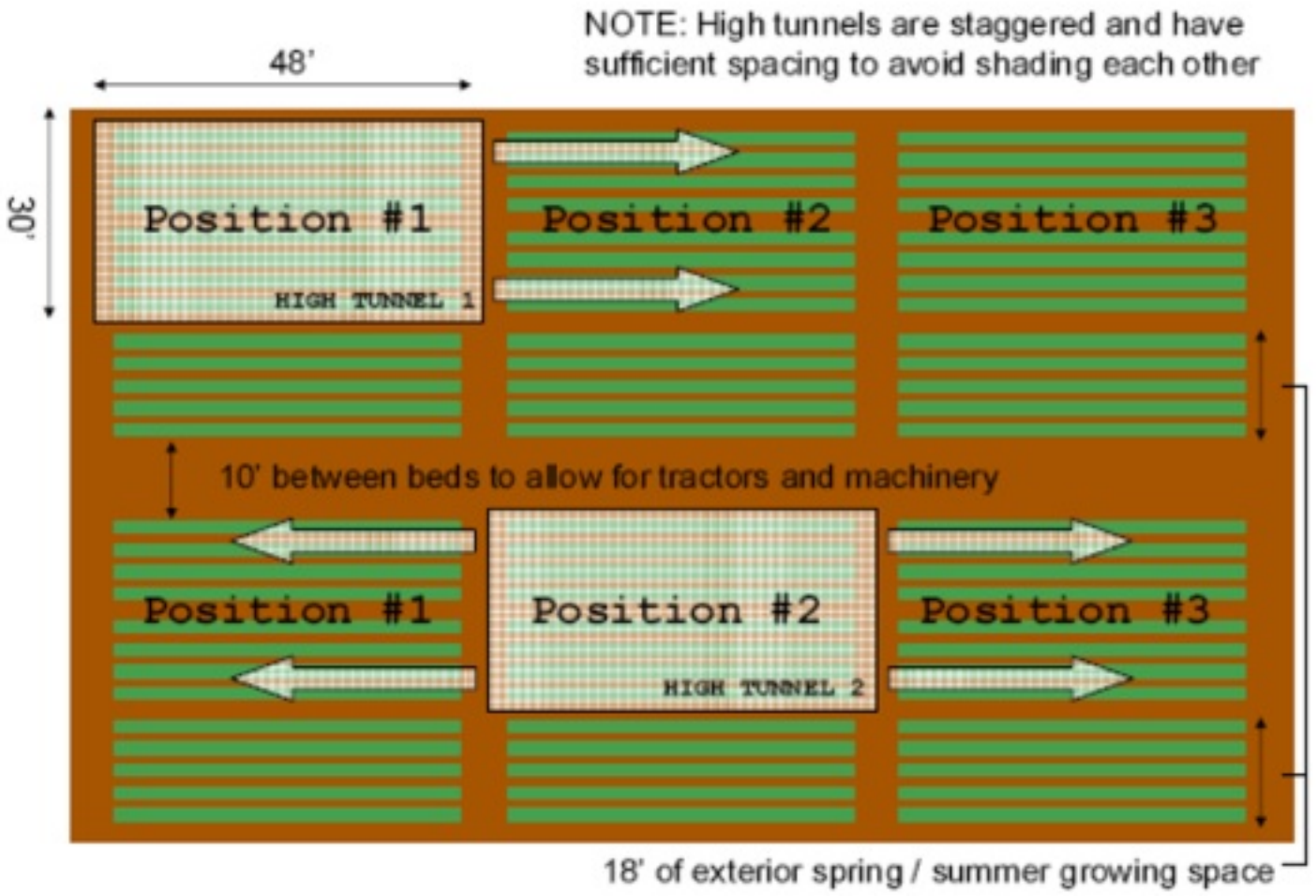
Movable System

Benefits of Movables:

- Multiple “season extensions”
- Enhanced soil management practices
- Diversified and simple crop rotations
- Minimize insect and disease pressure
- Eliminate high tunnel cooling needs
- Extend market availability
- “Plant positive” approach



THREE POSITION MOVABLE HIGH TUNNEL LAYOUT



Position 1	*Position 2*	*Position 3*
Feb. 1st – Plant and Cover Direct Seeded Carrots Dec. 1st – Cover Winter Leeks Planted Late Spring	Apr. 15th – Cover Transplanted Tomatoes (moved from "warm house" to ground)	Nov. 1st – Cover Fall Spinach Planted in Sept.

Technologies and Type of Structures

- Low Tunnels/Row Covers
- Caterpillar Tunnels
- Hoophouses/High Tunnels

Large structures designed for 3-4 season production

Maximum thermal gain and pleasant working environment

Varying materials, but generally galvanized steel frame

Pre-bent kits or bend-your-own

Varying levels of automation

Larger investment
$2.00+ / Square Foot Cost

Season Extension Structures

- 30’W x 192’L Four Season Tools High Tunnel

Season Extension Structures

- 30’W x 192’L Four Season Tools High Tunnel
  - Double layer, air inflated plastic
  - Polycarbonate endwalls
  - Fully metal construction
  - Gothic roof geometry
  - Enhanced bracing kit
  - Automated Ventilation

Roof Geometry

Quonset

Cathedral

Gable

Gothic

Season Extension Structures

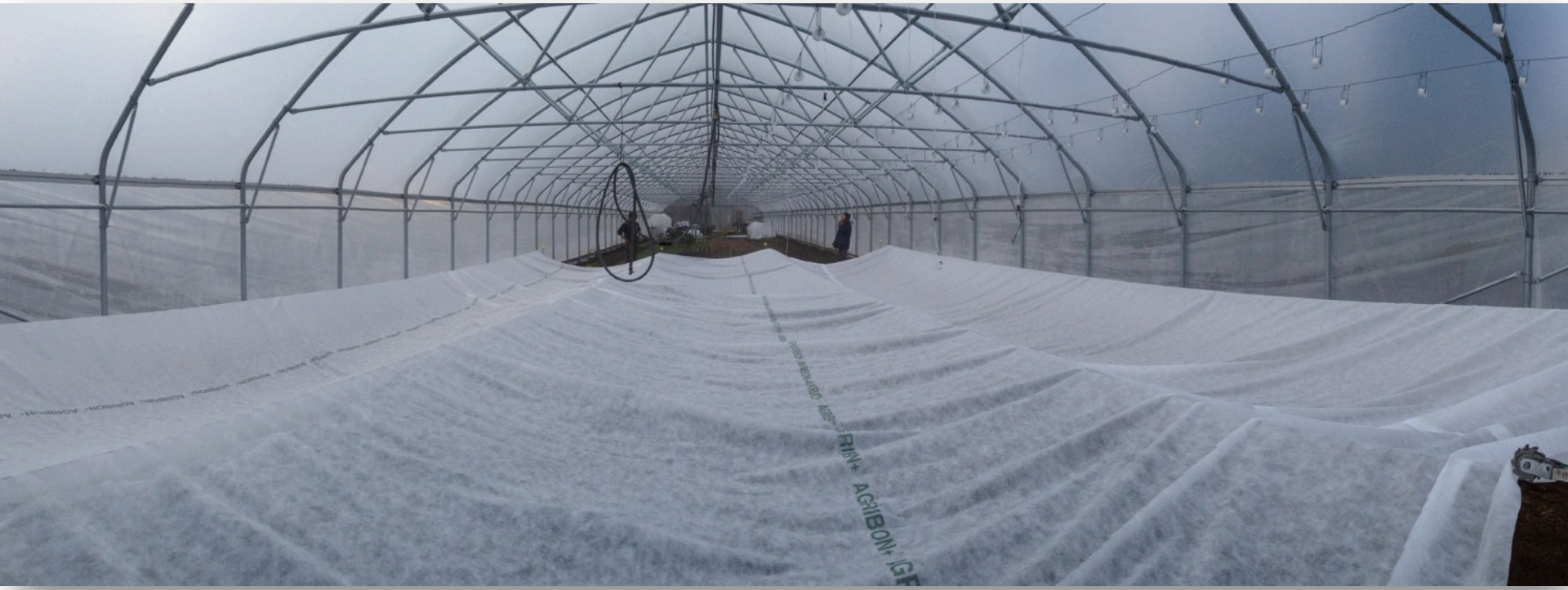
- Interior Germination Room

Season Extension Structures

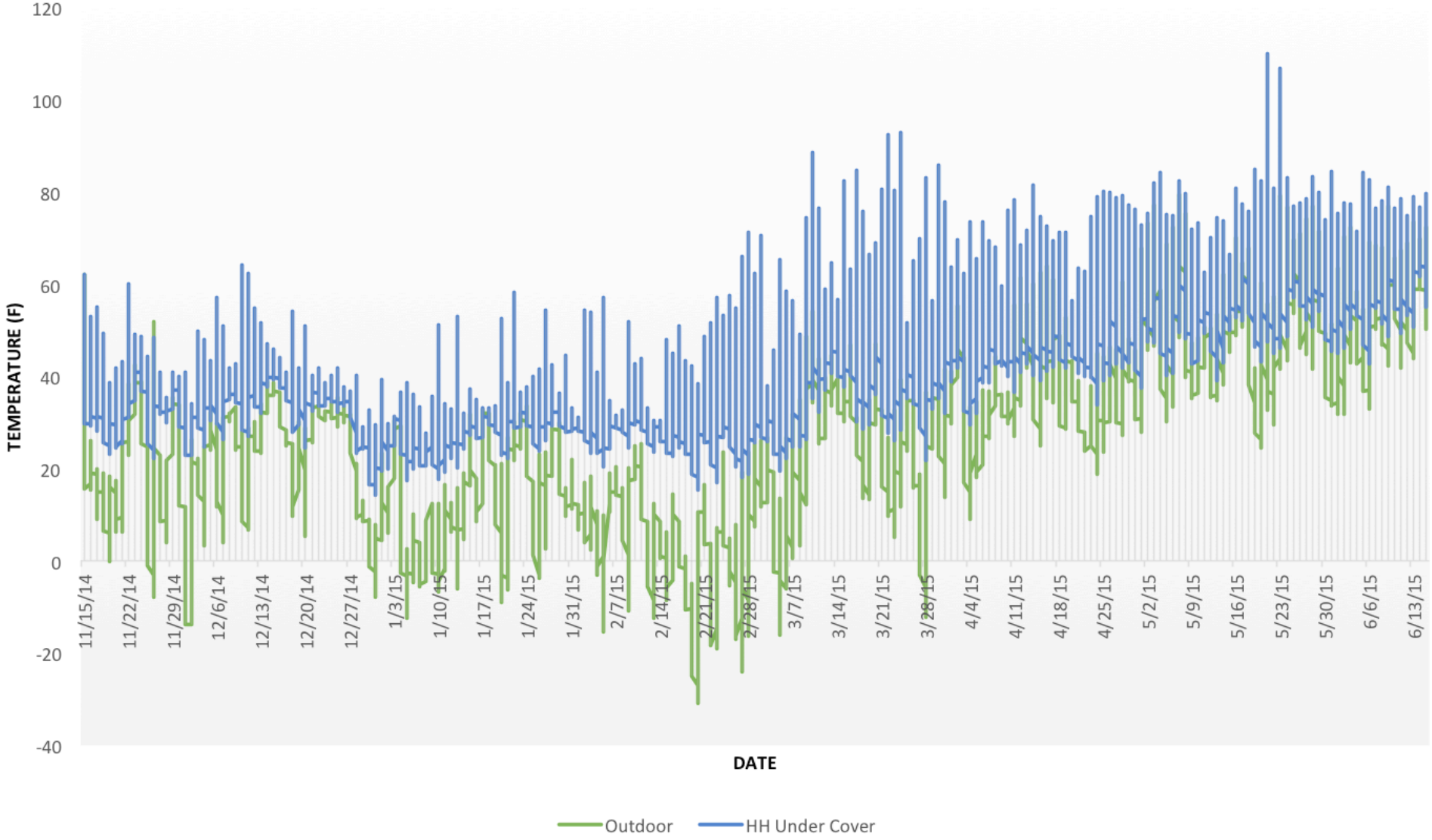
- Interior Germination Room
  - Why?
  - 30'W x 42'L - Inside FST High Tunnel
  - Fencing Materials & Film
  - Propane Heat
  - Manual Ventilation
  - Design Flaws…

Using Systems

- Row Cover + High Tunnel



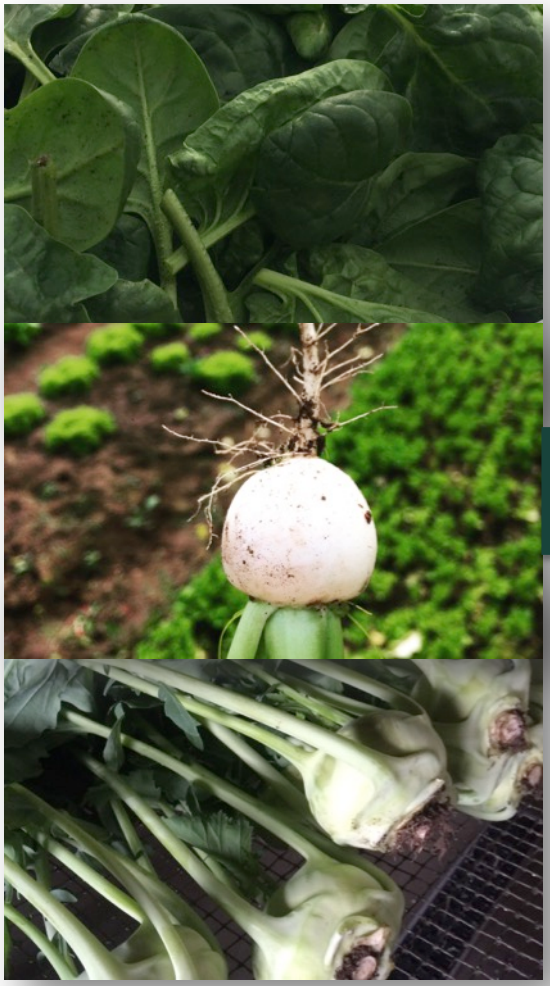
Temperature (F)
Hoophouse (covered) vs. Outdoor



MICHIGAN STATE UNIVERSITY | Extension

MICHIGAN STATE UNIVERSITY | AgBioResearch

Crops and Crop Schedules



MICHIGAN STATE UNIVERSITY | Extension

MICHIGAN STATE UNIVERSITY | AgBioResearch

Crops and Crop Schedules

- Spring
  - First Direct Seeding Date: March 1
  - Carrots, Spinach, Baby Greens
  - 1-3 layers AG-19

Crops and Crop Schedules

- Summer
  - Transplant May 15-21
  - Tomatoes, Eggplant, Peppers, Cucumber, Melons
  - 1-3 layers AG-19

Crops and Crop Schedules

- Fall Baby Greens
  - Overwintered
    - Final Transplant Date: 11/15
    - Final Direct Seeding Date: 10/21
  - Winter Harvest
    - Final Transplant Date: 9/30
    - Final Direct Seeding Date: 9/7

Field Overwintered Crops

- Onions
  - Bridger
  - Keepsake
  - Top Keeper
- Quick hoops
  - AG-19
  - 4mil poly
  - $0.38/sq.ft.

Field Overwintered Crops

Field Overwintered Crops

Market Extension

- Cold storage
  - Walk-In Cooler
  - Root Cellar
    - Cool Bot
- Variety Selection
  - Root Crops
  - Brassicas
  - Winter Squash
  - Alliums

Questions?

Collin Thompson

thom1264@msu.edu

www.msunorthfarm.org