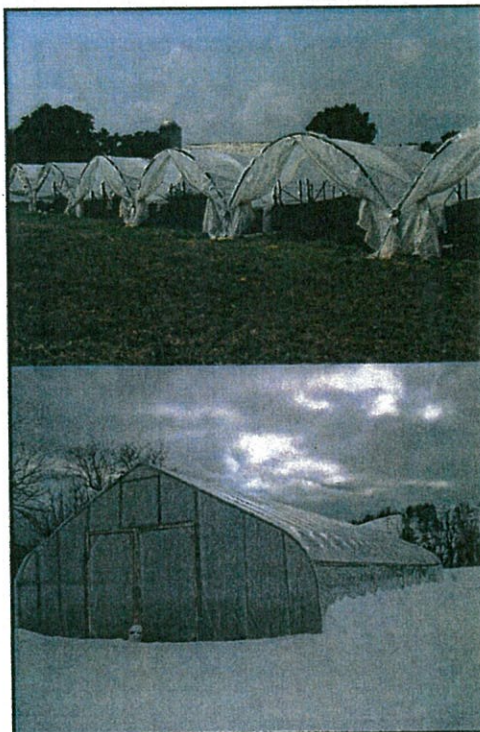


High Tunnels

- **Definition:** Unheated, plastic-covered structures that provide an intermediate level of environmental protection and control, compared to open field conditions and greenhouse.
- Low-tech, low cost (\$0.5-\$3.0/ft²)
- The word High:
 - Walk upright and work comfortably
 - Operate small machines: small tractors and rototillers

High Tunnel and Season Extension

- A single layer poly provides one hardiness zone of protection, and a second (the row cover) will provide another zone of protection (zone 6 with two layers approximately equivalent to zone 8)—Spring, Fall and Winter.
- Air temperature (*leaf temp*) can be reduced by 4 degrees Fahrenheit with 30% shade—Summer.
- Provide 4-6 weeks' season extension for spring and fall



Multi-bay Tunnels:

Best for tomatoes, peppers, small fruits (blackberries, raspberries, strawberries).
(3 season)

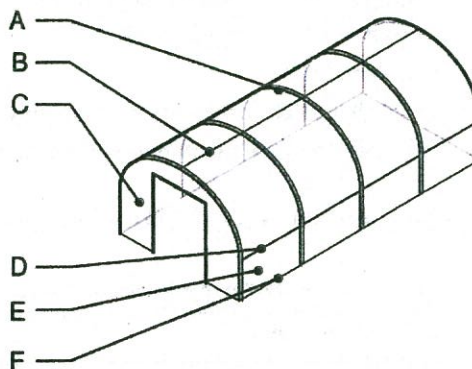
Single Bay Tunnels:

Best for annual vegetables, flowers, strawberries.
(4 season)

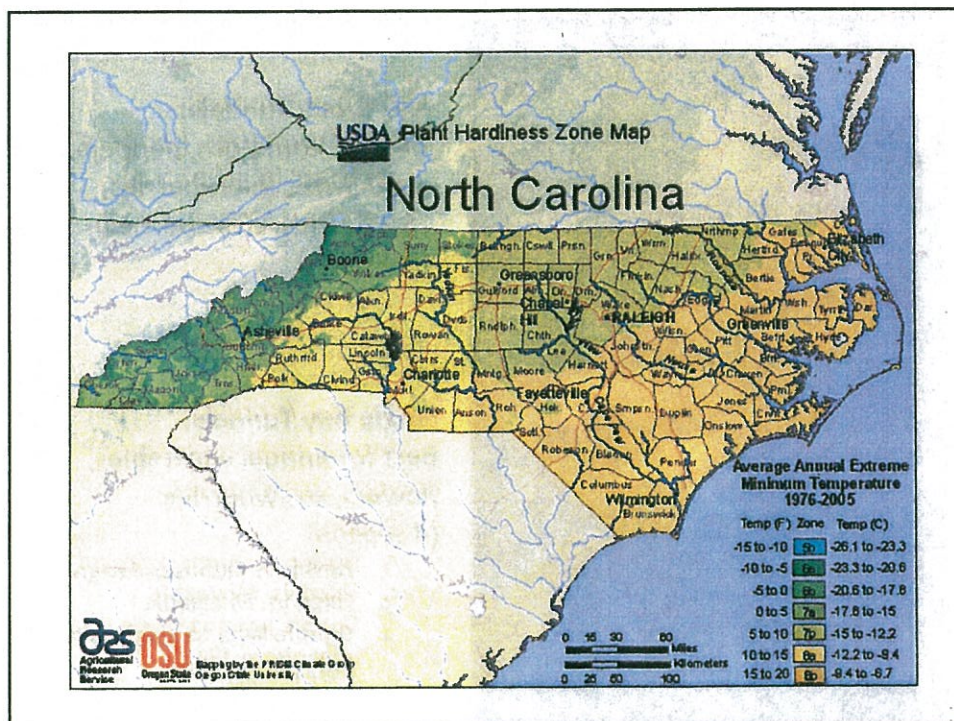
- Gothic vs Quonset design
- Fixed vs. Moveable
- Double layer vs single layer poly plastic films

Basic HT Structure: Single Bay

- A: Bow or Hoop
- B: Purlin or Ridge Pole
- C: End Wall
- D: Hip Board
- E: Side Wall
- F: Base Board



Brace/truss to strengthen structure



Choosing a right high tunnel

- Type of high tunnels in your mind
 - Single bay vs. multi bays
 - Hay-Grove: three seasons
 - Moveable?
 - *Is this a NRCS supported?*
 - Double layer or single layer poly HTs
- Budget
- Market
- Your Experience

Type of Tunnels and Costs

Type of Building	Cost to Make	Approx. Growing Ft	Lifespan of Bldg	Production
PVC small & simple 12 by 20	\$200	240 sq. ft.	2-3 years	600 lb of tomatoes
PVC with sidewalls 18 by 42	\$650	756 sq. ft.	4-5 years?	2,000-3,000 lbs. of tomatoes
Homemade Steel and Movable 16 by 32	\$700	512 sq ft each crop / 1,536 square feet per season	10 plus?	350 lbs of Zucchini 100 lb of Broccoli 100 lb of Beans 200 bunches of turnips 100's lb of carrots
Premade	\$2,500-\$4,000+	800 sq ft	10 plus	
Premade - metal	\$6,500-\$10,000+	30 x 96=2880 ft ²	>10 years	varies

\$0.5-\$3.5/ft²

HT Construction: A 30' x 96' high tunnel

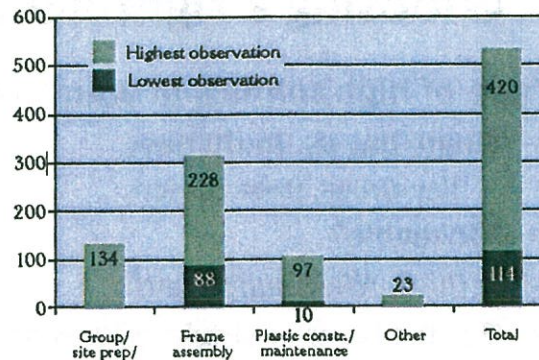


Figure 3. Minimum and maximum person hours required to construct hoophouses.

HT Production

- Labor is the most expensive input in high tunnel production
- Most Labor Input: Harvesting and Bed preparation
- Time to pay off the high tunnel: 1-2 years (survey showed 1.2-12.3 years)

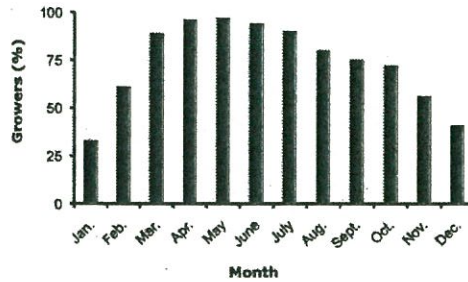
Table 2. Tomato production in a 30 ft x 96 ft high tunnel.¹

Item	Quantity, hr	\$/Tunnel
Labor (\$10/hour)		
Cover tunnel	6	\$60
Retighten cover	4	\$40
Soil preparation and planting	12	\$120
Scouting and pesticide application	8	\$80
Maintenance (stake, weed, prune, etc.)	35	\$350
Monitor and ventilation	8	\$80
Harvest, grading and packaging	50	\$500
Post-season cleanup	6	\$60
Supplies/Materials		
Fertilizer		\$35
Plastic mulch		\$18
Transplants (including seed)	360	\$75
Fuel and electrical		\$25
Pesticides		\$25
Lab testing		\$30
Harvest supplies		\$500
Scouting supplies		\$50
Water (\$4.90/1,000 gallons)	15,000 gallons	\$74
1/10 of initial high tunnel costs		\$860
Total estimated expenses²		\$2,982
Gross income with an estimated yield of 5,200 pounds marketable (\$2/pound)		\$10,336
Less production expenses		\$2,982
Net Income		\$7,354

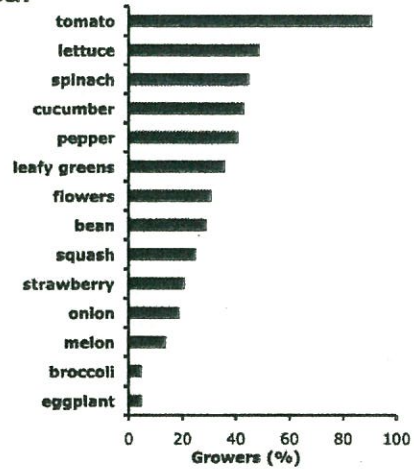
¹Taber, Henry G., Bernard Havovic and Nick Howell. 2007. High Tunnel Tomato Production. 2007 ISU Outlying Research Farms Report.

²Does not include costs associated with marketing.

Crop choices and Economical Potentials



High Tunnel Use in the Great Plains during a Year



High Tunnel Crops in the Great Plains Area

Annual High Tunnel Crops for West Virginia (1800 ft² bed space)

Crop	Ft ² /plant	Yield/R ² (lbs.)	Price/lb.	Total Revenue (\$)	Time (days)	S/R ² /day	Rank
Cucumbers	4	2.5	3.00	13500	65	208.00	1
Kale	0.6	1.0	6.00	10800	60	180.00	2
Lettuce	0.2	1.0	6.00	10800	65	166.00	3
Tomatoes	8	2.5	2.50	11250	100	113.00	4
Spinach	0.2	1.0	4.00	7200	65	111.00	5
Carrots	0.2	1.3	3.00	7020	75	94.00	6
Beets	0.2	1.25	2.50	5625	75	75.00	7
Peppers	4	2.0	1.00	3600	100	42.00	8
Ch. Cabbage	1.5	2	1.65	2700	70	39.00	9
Beans (bush)	0.1	0.5	2.00	1800	65	28.00	10
Eggplants	6	0.7	2.00	2520	100	25.00	11
Peas	0.1	0.5	2.00	1800	75	24.00	12
Strawberries	2	0.8	3.00	4320	200	22.00	13
Broccoli	1.5	0.4	2.50	1800	80	21.00	14
Summer Squash	8	0.6	1.00	1080	70	15.00	15
Melons	8	1.5	0.50	1350	120	14.00	16

Modified from Lewis Jett

