Economics of Hoop Houses

NM ORGANIC CONFERENCE
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CONSTANCE L. FALK
M. EUGENE HONORS PROFESSOR
NEW MEXICO STATE UNIVERSITY

NMSU Hoop house team

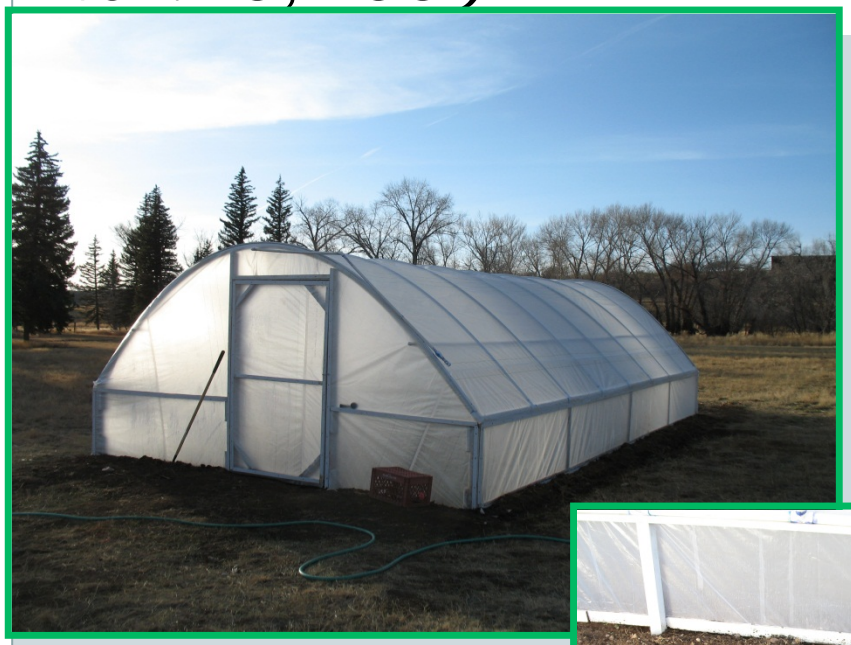
- Economics
  - Emmanuel Hecher, MS student in Agricultural Economics
  - Connie Falk, NMSU faculty, main campus
- Production
  - Juliette Enfield, MS student in Horticulture
  - Mark Uchanski, NMSU faculty, main campus
  - Del Jimenez, NMSU cooperative extension
  - Steve Guldan, NMSU superintendent, Alcalde
  - Staff at NMSU's research stations in Alcalde and Leyendecker (Las Cruces)

Cooperators

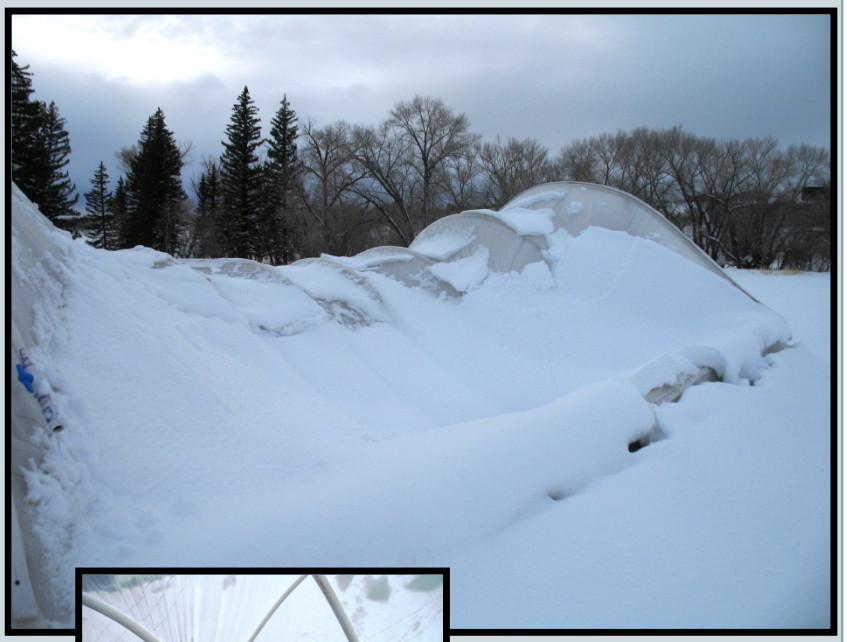
Owner/operator of tunnel	Location
Dine College	Tsaile, AZ
Farm-I	Durango, CO
San Juan Basin Research Center	Hesperus, CO
East Mountain Organics	Tijeras, NM
Jim Maiorano	Window Rock, AZ
Jeff Graham	Las Cruces, NM

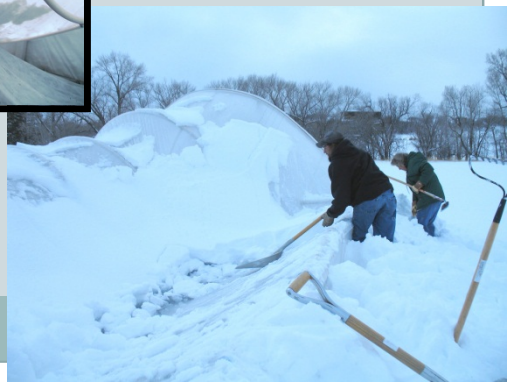
Learning curves, Hesperus

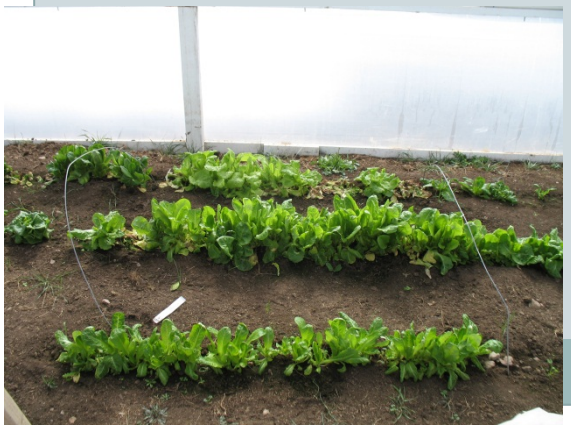
Nov. 10, 2009



Dec. 11, 2009







March 11, 2010

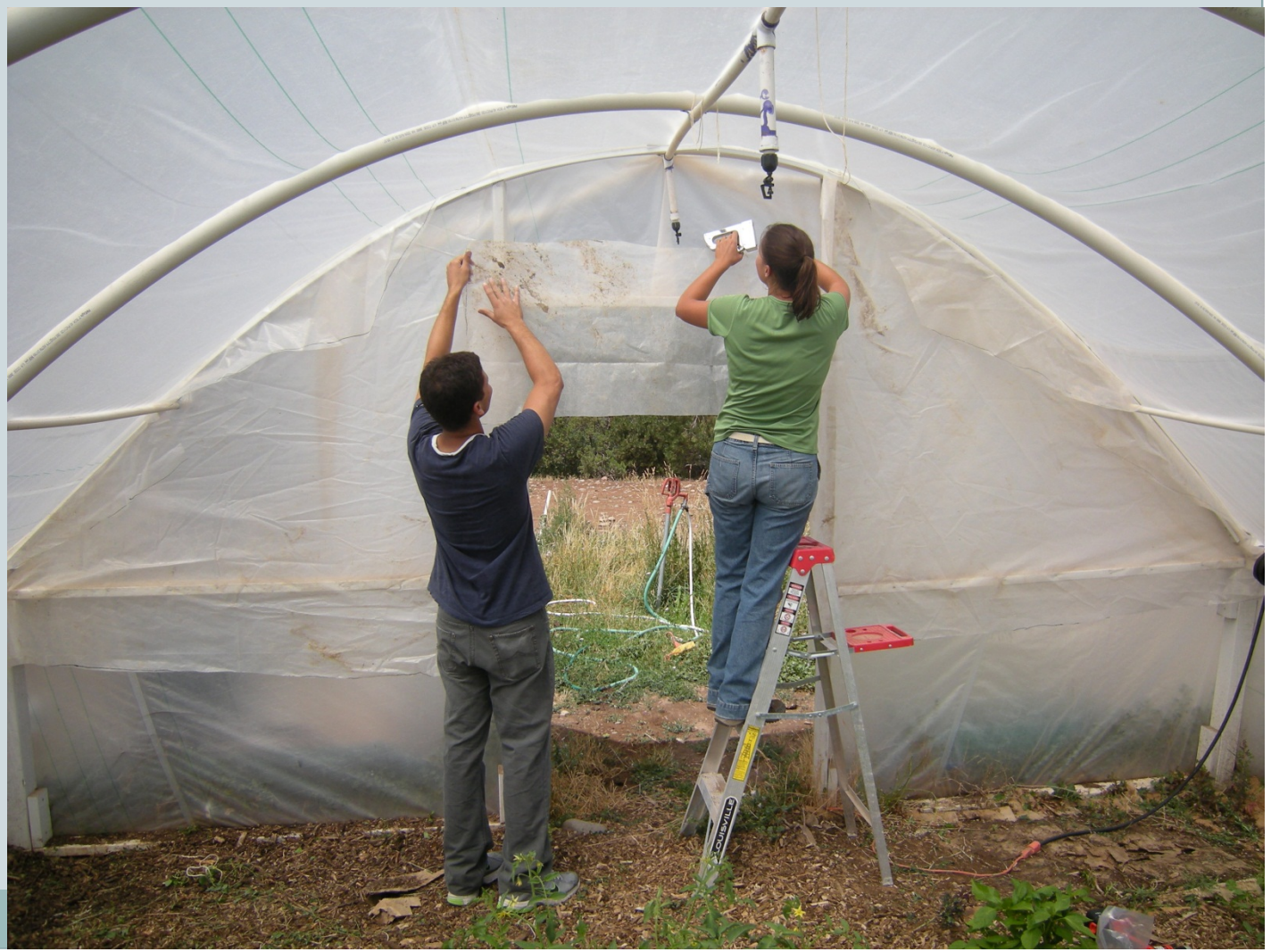
Pictures from Arizona (by Juliette Enfield)

Windowrock

Tsaile (Dine College)

Durango, CO

Graduate students Juliette Enfield and Emmanuel Hecher providing maintenance



Durango, CO

Some results from our cooperators

- Beth LaShell, Hesperus, CO
  - 2010 total production (year 1):
    - 3 lbs. cilantro
    - 36.41 lbs. lettuce x $$7/lb = $254.87
    - 37.76 lbs. spinach x $8/lb = $242.08
  - 2011 (year 2) production:

Crop	Lbs.	Harvest time (min)	Min/lb.	Gross income
Chard	28.5	110	3.86	
Cilantro	12.5	75	6	
Lettuce	69	255	3.7	$483
Spinach	36.75	285	7.75	$294

East Mountain Organics, Tijeras, NM

- In early November, 2011
  - 30 lbs. of lettuce mix sold for $5/lb ($150 income).
- In early March 2011
  - 96 bunches of radishes weighing about 1.5 lbs each, or 144 lbs
  - 38 days, about 10 days longer than required in larger hoop houses.

Las Tijeras, 2011

Date:	Activity/details:	Yield:	Price/unit:	Total:
24-Feb-11	Planted radishes (15 lines)	-	-	-
31-Mar-11	Harvested radishes: 24 bunches/case, approx 1.5lbs/ bunch	4 cases	$36/case	$144
1-Apr-11	Planted another batch of radishes	-	-	-
End of April	Harvested radishes	5 cases	$36/case	$180
1-Jun-11	Planted bell peppers	-	-	-
5-Aug-11	Harvested bell peppers	20lbs.	$4/lb	$80
12-Aug-11	Harvested bell peppers	90lbs.	$4/lb	$360
19-Aug-11	Harvested bell peppers	30lbs.	$4/lb	$120
Aug 22-Sept 20	Harvested average of 50lbs peppers/week	200lbs.	$3/lb	$600
End of Sept.	Planted lettuce	-	-	-
Last week of Oct	Harvested lettuce, first cut	30lbs.	$5/lb	$150
Nov.-present	Additional cuts of lettuce?			
	Approximate totals to date	694lbs.		$1,634

Methodology for Economic Analysis of Experimental Data

- Experimental plots from which yields were taken are 2 sq. ft.
- Each plot was 5 ft. long, with 3 rows/plot per replication and treatment. Only the interior row (8" wide x 3 ft. long) was harvested for yield data.
- Low and intermediate technologies (no barrels)
  - 437.76 sq. ft. (allows 2-ft. wide center alley)
- High technology design (with barrels)
  - 352.64 sq. ft. (allows 2-ft.wide center alley)
- Experimental yields were extrapolated to whole house production for each distinct scenario.

Scenarios

- Planting dates (2) Either O & N, or N & D.
- Technologies (3) H, M, L
- Crops (2) S, L.
- 2 x 3 x 2 = 12 scenarios at each location
- 2 NMSU research farm locations (Las Cruces, Alcalde)
- Seasons
  - **Season 1: 2009-2010**
    - **(Las Cruces did not have M & H technologies ready)**
  - **Season 2: 2010- 2011**
  - **Season 3: 2011-2012**

Economic Simulation model

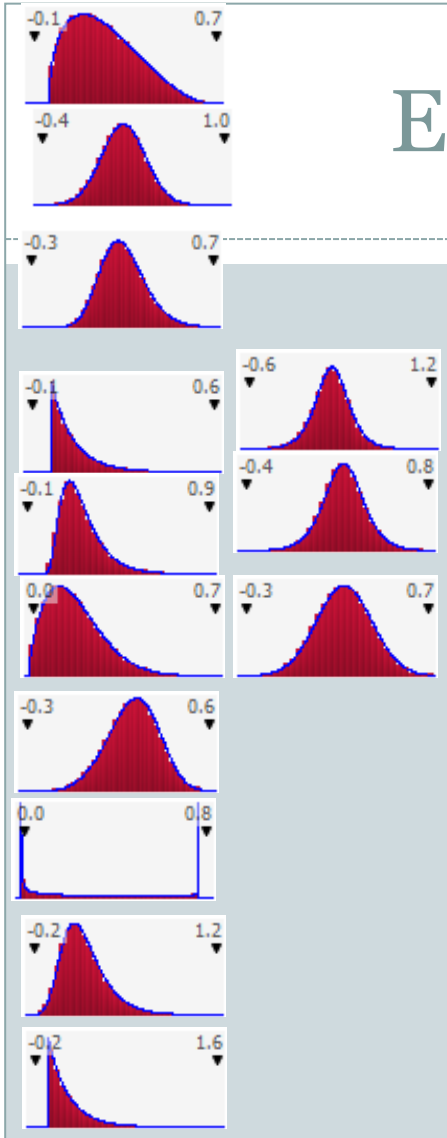
- Bestfit, part of @Risk simulation model (Excel add-in program) used to fit harvest data to probability distributions.
- Yields then are represented by the full probability distribution, not just the mean.
- A Latin Hypercube simulation model was run 1,000 times.
- In each model run, a yield was selected from its probability distribution, and included in the computation of income.
- Probabilities of income exceeding zero were calculated over a range of prices.
- Costs included were maintenance and depreciated structure costs. (Useful life assumed was 10 years, and the houses occupied 3 months)

Experiment Station Results

	Las Cruces, NM (Season 2 only)			Alcalde, NM (Seasons 1-2)		
	Percentage chance of returns exceeding $0.0					
Price ($/lb)	**1.50**	**3.00**	**6.00**	**1.50**	**3.00**	**6.00**
H,N,L	4.9	21.8	46.1	48.6	64.2	76.4
H,N,S	39.6	79.1	92.2	9.9	25.4	39.2
H,O,L	52.3	77.0	86.0	39.4	71.0	85.8
H,O,S	26.8	69.2	91.2	17.7	41.5	63.6
M,N,L	77.1	89.8	93.5	33.2	66.0	79.8
M,N,S	73.5	89.0	93.6	16.4	40.0	62.4
M,O,L	73.5	87.7	92.3	41.2	75.3	95.3
M,O,S	71.1	97.9	100.0	42.4	74.2	92.1
Lo,N,L	54.4	72.7	84.1	66.4	77.1	81.4
Lo,N,S	76.3	89.9	95.5	31.1	44.5	54.6
Lo,O,L	80.0	88.0	91.0	52.6	71.3	83.1
Lo,O,S	84.6	97.4	99.4	43.5	65.0	79.5

H:High technology model
M: Medium technology model
Lo: Low technology model
N: November planting date
O: October planting date
L: Lettuce
S: Spinach

Example distributions fit to scenarios



Name	Distribution	Mean	Max
H,N,L	Exponential	0.07488662	0.572104
H,N,S	Pearson5	0.2084891	0.6528932
H,O,L	Logistic	0.2326461	1.001479
H,O,S	Weibull	0.1775288	0.6270869
M,N,L	Logistic	0.2437921	0.7793471
M,N,S	Weibull	0.2214401	0.5350622
M,O,L	Normal	0.2392993	0.6953721
M,O,S	Invgauss	0.2166331	0.8797076
Lo,N,L	Exponential	0.1754159	1.590481
Lo,N,S	BetaGeneral	0.2173062	0.6282606