

ESO-Cuc Economic Decision Support Tool for Cucurbit Farmers

In general:

- Blue cells indicate variables that will change from farm to farm, and can be adjusted based on your production. The sheet comes pre-loaded with numbers that we believe are typical for an organic vegetable farm in upstate NY, but we expect that a farmer will consider each of these cells, and adjust them as appropriate.
- Orange cells provide the output of calculations that include the variables that you've provided. In the case of the materials section, these calculations include assumptions we've made about the longevity and usage of the materials involved.
- Yellow cells provide a description of materials, equipment, and variables.

SCB control-squash tab

The SCB control-squash tab provides calculations to compare two interventions to control striped cucumber beetles (SCB) on summer squash: row cover and Surround spray. Each intervention is independently compared with using no control method in the financial analysis section of the sheet.

The screenshot shows the following data tables:

COST ANALYSIS: ROW COVER VS NO TREATMENT & SURROUND VS NO TREATMENT (SUMMER SQUASH)					
Row length (ft)	250	KEY			
# of Beds summer squash	3	Variables (Use Your Numbers)			
Pay rate (\$/Hr)	\$15	Description of Materials, Equipment, and Variables			
Weeks SCB pressure	3	Calculations			
Weeks SCB during harvest	2				

ROW COVER COST ANALYSIS					
Labor / Bed	person minutes	Materials	Assumptions	Variables	Financial Analysis
Get materials ready	20	Cost of hoops (\$ each)	Ex: Nolts 7 gauge \$0.46ea. In row every 10ft	\$0.46	Yield without Row cover
Set hoops / bed	2	Longevity of hoops (uses)	42 uses	42	100 Lbs/Bed
Unroll cover / bed	10	Cost of sandbags (\$ each)	Ex: woven polypropylene 14" x 26" bags	\$0.33	Yield with Row Cover
Shovel dirt / bed	4	Longevity of sandbags (uses)	5 seasons	5	625 Lbs/Bed
Uncover / bed	10	Cost of row cover (\$)	Ex: Agribon 19 83" 1000ft	\$99	Market Price
Reroll and store / bed	4	Length of roll (ft)	1000	1000	\$1.25 \$/lb
Collecting hoops / bed	5	Longevity of cover (uses)		2	Total Cost Materials and Labor
Labor Cost / Bed	\$10.42		Materials Cost / Bed	\$16.11	\$79.59
Labor for all beds	\$31.25		Materials for all beds	\$48.34	Yield increase / bed to pay for row cover (lbs)
					21.2
					Time spent (hrs)
					2.1
					Net no row cover
					\$375.00
					Net with Row Cover
					\$2,264.16

SPRAY COST ANALYSIS					
Labor / Bed	person minutes	Materials & Equipment	Assumptions	Variables	Financial Analysis
Prep and Mixing	20	Surround Insecticide	weekly sprays for 6 weeks per label	\$40.00	Yield without Spray
Application/bed	5	Surround unit size (lbs)		25.0	100 Lbs/Bed
Cleanup	20	PPE (\$)		\$6.00	Yield with Spray
Washing residue off produce at harvest/bed	15	Sprayer (\$)	ex. Stihl SR 450 backpack sprayer	\$700.00	400 Lbs/Bed
Labor Cost / Bed / spray	\$5.83	Life of Sprayer (Years)		5.0	Market Price
Labor all beds for crop cycle	\$63.75	Farm Size (acres)	20 acres in total production	20.00	\$1.25 \$/lb
		Fuel Etc (\$)		\$0.10	Total Cost Materials and Labor
					\$131.15
					Yield increase / bed to pay for spray (lbs)
					35.0
					Time spent (hrs)
					4.3
					Net no spray
					\$375.00
					Net with spray
					\$1,368.85

1. The top left section of the tab asks for baseline information about your farm – how much you’re growing, how much you pay in labor, how many weeks of production are affected by beetles, and for how many weeks of harvest the beetles will be around. This information will be used in both the row cover and Surround cost/benefit analyses below.

2. Row cover cost analysis

Rows 9 – 19 in the Excel sheet provide a cost & benefit analysis of using row cover to control striped cucumber beetles. This analysis considers the labor and material costs, and provides calculations for the economic returns expected with and without row cover during times of high beetle pressure.

ROW COVER COST ANALYSIS					
Labor / Bed	person minutes	Materials	Assumptions	Variables	Financial Analysis
Get materials ready	20	Cost of hoops (\$ each)	Ex: Nolts 7 gauge \$0.46ea. In row every 10ft	\$0.46	Yield without Row cover
Set hoops / bed	2	Longevity of hoops (uses)	42 uses	42	100 Lbs/Bed
Unroll cover / bed	10	Cost of sandbags (\$ each)	Ex: woven polypropylene 14" x 26" bags	\$0.33	Yield with Row Cover
Shovel dirt / bed	4	Longevity of sandbags (uses)	5 seasons	5	625 Lbs/Bed
Uncover / bed	10	Cost of row cover (\$)	Ex: Agribon 19 83" 1000ft	\$99	Market Price
Reroll and store / bed	4	Length of roll (ft)	1000	1000	\$1.25 \$/lb
Collecting hoops / bed	5	Longevity of cover (uses)		2	Total Cost Materials and Labor
Labor Cost / Bed	\$10.42		Materials Cost / Bed	\$16.11	\$79.59
Labor for all beds	\$31.25		Materials for all beds	\$48.34	Yield increase / bed to pay for row cover (lbs)
					21.2
					Time spent (hrs)
					2.1
					Net no row cover
					\$375.00
					Net with Row Cover
					\$2,264.16

a. Labor/bed

Column C asks for information regarding the labor cost of using row cover over your cucurbit beds. Cell C11 asks for the amount of time needed to “get materials ready” – how long does it take to get the row cover, sandbags and hoops from the barn out to the field where it will be set up? (If sandbags need to be filled, please include that time in this number.)

Then, the cells below break down the question: how long does it take you / your crew to set up and break down the row cover for a single bed?

The formulas (the orange cells) then look at how many beds you're growing, and how much you're paying in labor per hour, and calculate cost per bed (C18) and for the entire field (C19).

b. Materials

Column G relates to the supplies you would need to purchase (hoops, sandbags and the row cover itself) and the longevity of these materials (for how many seasons do you expect to be able to use them before having to purchase new supplies?).

The formulas then calculate the total cost of row cover per bed, and for the entire field.

Note that these calculations do not include the infrastructure needed to hold the supplies during the off-season or to transport them. The sheet assumes that the farm already has a barn and the vehicle necessary to move the supplies around.

G11, G13, and G15 ask for the cost of the hoops, sandbags and row cover; please be sure to include the cost of shipping these materials in your estimate of their cost! The cost of shipping can be a significant portion of the total cost of these materials, such that the calculations for the cost of materials for all beds (G19) will be inaccurate if the shipping costs are not included in your estimates.

c. Financial Analysis

Column J asks for information about the yield of summer squash in lbs/bed with and without row cover (*during peak periods of striped cucumber beetle pressure*), and the anticipated market unit price of the produce. The screen shots in this document show example numbers. In the tool itself, **these cells need to be filled in, based on the specifics of your farm, and will likely differ from the examples based on the cultivar you're growing and the time of year you're harvesting/selling.**

With the example numbers, you'll see that if you decide to use row cover, it will cost \$79.59 total (K15), and an additional two hours of labor (K17). The net profit from beds under row cover is \$2,264.16 (K19), while the net profit from uncovered beds (K18) is \$375.

The calculation in K16 refers to the amount of additional squash per bed you would need to harvest in order to financially break even with the investment of labor and materials needed to use the row cover on your field. In the calculation with example numbers, the field would need to produce an additional 21.2 lbs per bed just to make up for the cost of the row cover.

3. Spray cost analysis

Rows 21-31 in the Excel sheet provide a cost & benefit analysis of spraying Surround on your summer squash to control striped cucumber beetles instead of using row cover.

A	B	C	D	E	F	G	H	I	J	K
21	SPRAY COST ANALYSIS									
22	Labor / Bed	person minutes	Materials & Equipment	Assumptions	Variables	Financial Analysis				
23	Prep and Mixing	20	Surround Insecticide	weekly sprays for 6 weeks per label	\$40.00	Yield without Spray	100	Lbs/Bed		
24	Application/bed	5	Surround unit size (lbs)		25.0	Yield with Spray	400	Lbs/Bed		
25	Cleanup	20	PPE (\$)		\$6.00	Market Price	1.25	\$/lb		
26	Washing residue off produce at harvest/bed	15	Sprayer (\$)	ex. Stihl SR 450 backpack sprayer	\$700.00	Total Cost Materials and Labor	\$131.15			
27	Labor Cost / Bed / spray	\$5.83	Life of Sprayer (Years)		5.0	Yield increase / bed to pay for spray (lbs)	35.0			
28	Labor all beds for crop cycle	\$63.75	Farm Size (acres)	20 acres in total production	20.00	Time spent (hrs)	4.3			
29			Fuel Etc (\$)		\$0.10	Net no spray	\$375.00			
30			Materials & Equip. Cost / Bed / spray		\$7.49	Net with spray	\$1,368.85			
31			Materials & Equip. Cost all Beds for crop cycle		\$67.40					

d. Labor/bed

Column C refers to the amount of labor needed to prepare the application, spray Surround, and clean up the backpack sprayer.

An important thing to note is that Surround is a kaolin clay based spray that needs to be washed off of fruit after harvest. Cell C26 asks for the amount of time needed per bed to wash spray residue off of the fruit. We've given an estimate, but this cell should be adjusted for your farm, as clay can be difficult or time consuming to remove.

e. Materials and Equipment

This section is similar to the Materials section for the row cover analysis.

G28 asks for the entire production space of your farm. We assume that you are going to use the sprayer for your entire farm, which affects the lifespan of the sprayer. The fraction of your farm that is sprayed with Surround for striped cucumber beetles is used to calculate the wear and tear on the equipment specifically due to spraying your cucurbits for SCB, which is part of the calculations in cells G30 and G31. Cell E29 (labelled, 'Fuel Etc (\$)') is the cost of fuel per application.

f. Financial analysis

This section asks for the same variables as the row cover analysis above.

In the case of spraying Surround, given the example numbers, the additional amount of harvest needed to break even on the costs of the intervention is 35 lbs. / bed (cell K28).

Again, the example numbers for yields and prices shown in the screen shots are meant to illustrate of how the tool works, and will not necessarily be accurate to your production. **These cells should be filled in based on the specifics of your farm, and will likely differ based on the cultivar you're growing and the time of year you're harvesting/selling.**

CDM control ZONIX

This tab of the Excel sheet provides a cost & benefit analysis of spraying Zonix fungicide on a cucumber crop to control downy mildew.

The screenshot shows an Excel spreadsheet with the following data:

COST ANALYSIS ZONIX VS NO TREATMENT (CUCUMBER)			
Row length (ft)	250	Variables (Use Your Numbers)	
# of Beds cucumber	3	Description of Materials, Equipment, and Variables	
Pay rate (\$/Hr)	\$15	Calculations	
Weeks CDM pressure	3		

SPRAY COST ANALYSIS			
Labor / Bed	person minutes	Materials & Equipment	Assumptions
Prep and Mixing	20	Zonix fungicide	label indicates spraying at 5 day intervals, we've rounded to weekly at high rate of 500ppm.
Application/bed	5	Zonix unit size (oz)	
Cleanup	20	PPE (\$)	
Labor Cost / Bed / spray	\$4.58	Sprayer (\$)	Ex. Stihl SR 450 Backpack Sprayer
Labor all beds for crop cycle	\$41.25	Life of Sprayer (Years)	
		Farm Size (acres)	20 acres in total production
		Fuel Etc (\$)	
		Materials & Equip. Cost / Bed / spray	
		Materials & Equip. Cost all Beds for crop cycle	

Financial Analysis		
Yield without Spray	100	Lbs/Bed
Yield with Spray	400	Lbs/Bed
Market Price	2	\$/lb
Total Cost Materials and Labor		\$176.34
Yield increase / bed to pay for spray (lbs)		29.4
Time spent (hrs)		2.8
Net no spray		\$600.00
Net with spray		\$2,223.66

1. The top left section of the sheet asks for background information about the space of your farm dedicated to cucumbers, cost of labor, and number of weeks of cucumber downy mildew pressure.

2/3/4. The calculations for labor (2), materials & equipment (3), and financial analysis (4) are the same as the analysis for Surround application in the SCB control-squash tab. One difference is that the spray residue doesn't have to be washed off the fruit, so that's not included in the cost of labor per application.

Again, the example numbers for yields and prices shown in the screen shots are meant to illustrate of how the tool works, and will not necessarily be accurate to your production. **These cells should be filled in based on the specifics of your farm, and will likely differ based on the cultivar you're growing and the time of year you're harvesting/selling.**

Cucumber HT vs. Field

This tab of the Excel sheet provides a cost & benefit analysis of growing cucumbers on trellises in a new high tunnel.

COST ANALYSIS: HIGH TUNNEL VS FIELD PRODUCTION (CUCUMBER)			
KEY	Description of Materials, and Variables	Variables (Use Your Numbers)	Calculations
High Tunnel Cost			
HT frame kit cost	Ex: Farmtek 108189HFRU	\$6,629.00	1
Construction of HT	Labor: 2 people at 50 hrs ea (hrs)	100.0	1
	Life of HT steel in years	30	
Plastic HT cover	Ex: 108661Farmtek	\$700.00	9
Plastic HT cover	Labor (hrs)	11.0	9
	Replacement interval in years	3	
Door material	Ex: 108657 Farmtek	\$120.00	6.5
Door	Labor (hrs)	10.0	6.5
	Replacement interval ends (years)	4	
	Misc maintenance on HT 2%		
		\$353.38	
Allocation of Crop Costs			
	Days spent growing cucumbers	120	80%
	Days spent growing other crops	30	20%
	Total Cost Over Life of High Tunnel		\$17,669.00
	Annual Cost of High Tunnel		\$588.97
	Cost of HT Allocated to Cucumbers		\$471.17
Trellis Supplies and Seed Cost			
	Trellis end support anchors (\$ ea)	18	\$216.00
	Trellis end supports (assuming 30 year life) (\$ ea)	77.6	\$931.20
	Round trellis support (\$ ea)	2	\$30.00
	Trellis wire - horizontal (\$/ft)	1.7	\$10.20
	Trellis string - vertical (\$/100 ft)	0.5	\$14.08
	Trellis cross brace rope (\$/ft)	\$0.04	\$6.40
	Seed (\$ ea)	\$0.50	\$176.00
	Total		\$1,443.88
Production Variables & Supplies			
	Length of each bed (ft)	68	
	# Beds per tunnel	5	
	In-row spacing (ft)	1.5	
	Trellis posts per bed (#)	8	
	Trellis height (string/plant) (ft)	8	
	End of crop cleanup (hrs)	7	
	Tunnel width at trellis top (ft)	20	
	Distance between hoops (ft)	6	
	Labor rate (\$/hr)		\$15.00
Labor Costs			
	Timing & training (seconds/plant/row)	6.0	\$201.14
	Horizontal trellis wire and supports	1	\$50.00
	Dropping trellis twine (seconds/plant)	10	\$14.67
	Tying cross brace rope (min)	10	\$2.40
	Sharing plants on strings (seconds/plant)	1	\$15.00
	Total Labor		\$323.21
	Total Costs Materials + labor for one season		\$2,238.26
Financial Analysis			
	Yield HT (lb)	Libs per HT	3000
	Yield Field (lb)	Libs per same area as HT	1000
	Market Price (\$/lb)		\$2.00
	Time Spent (hr)		310
	Net HT		\$3,761.74
	Net no HT		\$2,900.00

1. High Tunnel Cost + Allocation of Crop Costs

This section walks through the costs associated with the construction of a steel framed, plastic-covered high tunnel, and calculates the cost per season of using the high tunnel for a cucumber crop.

COST ANALYSIS: HIGH TUNNEL VS FIELD PRODUCTION (CUCUMBER)			
KEY	Description of Materials, and Variables	Variables (Use Your Numbers)	Calculations
High Tunnel Cost			
HT frame kit cost	Ex: Farmtek 108189HFRU	\$6,629.00	1
Construction of HT	Labor: 2 people at 50 hrs ea (hrs)	100.0	1
	Life of HT steel in years	30	
Plastic HT cover	Ex: 108661Farmtek	\$700.00	9
Plastic HT cover	Labor (hrs)	11.0	9
	Replacement interval in years	3	
Door material	Ex: 108657 Farmtek	\$120.00	6.5
Door	Labor (hrs)	10.0	6.5
	Replacement interval ends (years)	4	
	Misc maintenance on HT 2%		
			\$353.38
Allocation of Crop Costs			
	Days spent growing cucumbers	120	80%
	Days spent growing other crops	30	20%
	Total Cost Over Life of High Tunnel		\$17,669.00
	Annual Cost of High Tunnel		\$588.97
	Cost of HT Allocated to Cucumbers		\$471.17

Cell C8 asks for the life expectancy of the steel frame of the high tunnel.

The pink cells indicate the number of times the costs need to be incurred over the expected lifetime of the high tunnel steel frame. The frame itself would be purchased once (D6) and constructed once (D7), while the plastic would be replaced multiple times over the estimated 30 year lifetime of the steel frame (D9 for material cost, D10 for labor cost of replacement), as would the door material (D12 and D13).

C17 and C18 ask for the break-down of the crops grown in the high tunnel. How many growing days will be allocated to cucumbers, how many to other crops?

E19 calculates the total cost of the high tunnel over its entire life.

E20 calculates the annual cost of the high tunnel, given the total cost of construction and maintenance of the high tunnel and the estimated lifespan of the high tunnel.

E21 calculates the cost of the high tunnel specifically allocated to growing cucumbers for one year.

2. Production Variables & Supplies

This section asks for information about the specifics of your production, including the dimensions of your high tunnel, the amount of time required to clean the high tunnel at the end of the season (I11) and the rate you pay for labor (I14).

	G	H	I	J
5	Production Variables & Supplies		Your cost	
6		Length of each bed (ft)	88	
7		# Beds per tunnel	6	
8		In-row spacing (ft)	1.5	
9		Trellis posts per bed (#)	8	
10		Trellis height (string/plant) (ft)	8	
11		End of crop cleanup (hrs)	7	
12		Tunnel width at trellis top (ft)	20	
13		Distance between hoops (ft)	6	
14		Labor rate (\$/hr)	\$15.00	

3. Trellis Supplies and Seed Cost

Rows 23 – 31 (columns A – E) ask for information about the unit costs of supplies needed to trellis cucumbers within the high tunnel (column C) and calculate the cost of using the supplies throughout the high tunnel, given the specifics of your high tunnel and production choices (above).

	A	B	C	D	E	F
22						
23	Trellis Supplies and Seed Cost		Your cost		Cost all beds	
24		Trellis end support anchors (\$ ea)	18		\$216.00	
25		Trellis end supports (assuming 30 year life) (\$ ea)	77.6		\$931.20	
26		Posts for trellis support (\$ ea)	2		\$90.00	
27		Trellis wire - horizontal (\$/ft)	1.7		\$10.20	
28		Trellis string - vertical (\$/100 ft)	0.5		\$14.08	
29		Trellis cross brace rope (\$/ft)	\$0.04		\$6.40	
30		Seed (\$ ea)	\$0.50		\$176.00	
31		Total			\$1,443.88	
32						

E31 calculates the total cost of the trellising supplies and seeds for one season.

4. Labor

This section (rows 16 – 22, columns G –J) asks for information about the amount of labor in person time you anticipate spending on trellising the cucumbers in the high tunnel, and calculates the total cost in labor during the season associated with the trellising system (J22).

	G	H	I	J
16	Labor Costs		Your time	Cost all beds
17		Trimming & training (seconds/plant/week)	8.0	\$201.14
18		Horizontal trellis wire and supports	1	\$90.00
19		Dropping trellis twine (seconds/plant)	10	\$14.67
20		Tying cross brace rope (min)	10	\$2.40
21		Starting plants on strings (seconds/plant)	1	\$15.00
22	Total Labor			\$323.21
23				
24	Total Costs	Materials + labor for one season		\$2,238.26

Cell J24 shows the total cost of materials and labor associated with the entire high tunnel system for one season.

(Note that these labor calculations do not include transplanting seedlings or harvesting fruit, as the calculations are intended to show only the increased cost & benefit of using a high tunnel over growing cucumbers in the field. Any activity that would also take place in the field is not included in these calculations.)

5. Financial Analysis

	G	H	I	J
25	Financial Analysis			
26	Yield HT (lb)	Lbs per HT	3000	
27	Yield Field (lb)	Lbs per same area as HT	1000	
28	Market Price (\$/lb)		\$2.00	
29	Time Spent (hr)			31.0
30	Net HT			\$3,761.74
31	Net no HT			\$2,000.00
32				

Column I asks for estimates of the yield of cucumbers in lbs, both under the high tunnel and in the field (over the same area as the high tunnel), and the anticipated market unit price of the produce.

Again, the example numbers for yields and prices shown in the screen shots are meant to illustrate of how the tool works, and will not necessarily be accurate to your production. **These cells should be filled in based on the specifics of your farm, and will likely differ based on the cultivar you're growing and the time of year you're harvesting/selling.**

Cell J30 calculates the total amount of person time spent annually to use the high tunnel for growing cucumbers (using the example numbers in the labor section, an additional 31 hours of person time would be required

Given all of the above:

Cell J31 calculates the net profit of one season of the cucumbers under high tunnel.

Cell J32 calculates the net profit of one season of the cucumbers without the high tunnel.