



Northern New York Agricultural Development Program
2023 Project Final Report

Alternative High Tunnel Crops for Northern New York

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Justification:

Many fruit and vegetable producers in Northern New York (NNY) have constructed high tunnels in the past two decades to increase yield of fruit and vegetable crops. High tunnels, simple low-technology plastic-covered greenhouses, allow for growers in cold climates to extend the season and create a warmer and more favorable growing environment for crops. After many years of federal subsidies for high tunnels, many farms have multiple high tunnels and are interested in diversifying crops grown in these structures beyond typical summer tomatoes and cucumbers and winter spinach. For our 2023 NNY Agricultural Development Program grant, we evaluated yield and profitability of melons and *Brassica* winter greens as alternative high tunnel crops. In our high tunnel melon trial, we tested vertical trellising treatments for improved production efficiency and fruit quality. Our winter greens variety trial aimed to identify *Brassica* salad mix varieties that are high yielding with regrowth potential allowing for several harvests into the off-season.

High Tunnel Melon Trellising and Variety Trial

Methods:

For our high tunnel melon trial, we tested the effect of three trellising treatments on yield of two small-fruited muskmelon varieties. We conducted our experiment in a 30'x96' unheated high tunnel at the Cornell Willsboro Research Farm using methods approved for certified organic production. Insect exclusion netting panels installed on the side walls and across the door of the tunnel were used to exclude striped cucumber beetles, which are a major pest of cucurbit crops. Prior to planting, we applied fertilizer to the high tunnel according to soil test results at rates of 75 lbs N/ac using Pro Booster (10-0-0) and 80 lbs K₂O/ac using potassium sulfate (0-0-52).

Our first planting was stunted due to the late spring frost on May 18th, thus we reseeded melons on June 15th and transplanted them into the high tunnel on July 6th. We used a randomized complete block design in the tunnel with four replicates per trellising*variety treatment combination (six total). Each plot was 7 ft long with four plants spaced 2 ft apart. Landscape fabric (Weed Barrier) laid between the plots was used to control weeds. A bumblebee hive for pollination was placed in the tunnel once the transplants had begun to flower.

At first fruit set, we fertigated the plants using Chilean nitrate (15-0-2) and potassium sulfate through drip tape in the plots at a rate of 5 lbs N and K₂O each per acre per week until late September.

The melons were treated with Organic Materials Review Institute (OMRI)-listed fungicide sprays for downy mildew prevention, including Double Nickel (*Bacillus amyloliquifaciens*) and Cueva (copper octanoate). Parasitoid wasps (*Aphidius colemani*) were released twice and ladybeetles were released once to manage a severe melon aphid infestation in the tunnel, although they were ineffective in reducing the aphid population. The aphids subsided later in the fall but weakened many plants from feeding damage and honeydew buildup reducing photosynthesis.

The trellising treatments consisted of two vertical systems, double leader and mesh paneling, and an untrellised control treatment that grew along the ground (Fig. 1). Each trellis treatment was tested using two miniature (1-2 lb fruit) orange flesh muskmelon varieties, 'Sugar Cube' (cantaloupe type, Johnny's Selected Seeds) and 'Tasty Bites' (Charentais/Ananas cross, Territorial Seeds), for a total of six treatments (trellis*variety combinations).

The double leader system for the melons was based on the double leader trellis used for high tunnel tomatoes. Two central leader stems were selected for each melon plant and all other lateral branches pruned off. The two leaders were attached using plastic tomato clips to two synthetic tomato twine strings tied to cables fastened to the rafters of the high tunnel. Because melons produce some female flowers along lateral branches, we pruned branches along the stems after the first female flower to allow for fruit set.

For the mesh panel treatment, we hung Hortonova polypropylene mesh with 6"x7"-hole size to cables hung from the rafters of the high tunnel. The mesh reached the ground and the melon stems were woven through the mesh and attached using clips, growing up the panel. Lateral branches running along the ground were removed from the mesh treatment to maintain a vertical growth habit. The untrellised control treatment consisted of plants allowed to grow along the ground with no support, which is typical of field melon production.

The double leader and mesh trellis treatments were trained, pruned, and clipped for six consecutive weeks until the melons grew to reach the high tunnel rafters at the end of August and harvest was imminent.

We harvested the melons two to three times per week as they ripened beginning on September 5, 2023. Both varieties are considered ripe when the fruit slips from the vine with little resistance. We

recorded the number and weight of marketable and unmarketable melons per plot and per plant at each harvest. Melons were deemed unmarketable if they were cracked or split, had soft spots, the rind was not netted according to variety characteristics, or if they were too small (<0.5 lbs). The trial terminated on October 30th with the arrival of the first frost of the season. We analyzed the numbers and weights of marketable and unmarketable melons using a factorial Analysis of Variance (ANOVA) with Tukey pairwise comparisons to determine significant differences between trellis and variety treatments and varieties using JMP statistical software.

Throughout the experiment, we recorded information needed to develop an enterprise budget for high tunnel melons using the trellising treatments. An enterprise budget is an account of all expenses and income generated from production and sales of an agricultural product, used in decision-making to determine profitability. We recorded the cost of materials needed to produce the melons, labor for each production step, etc. At the end of the experiment, we developed an enterprise budget that estimated the cost to produce melons using each variety and trellising treatment combination and compared the cost to gross profitability using our melon yield data.

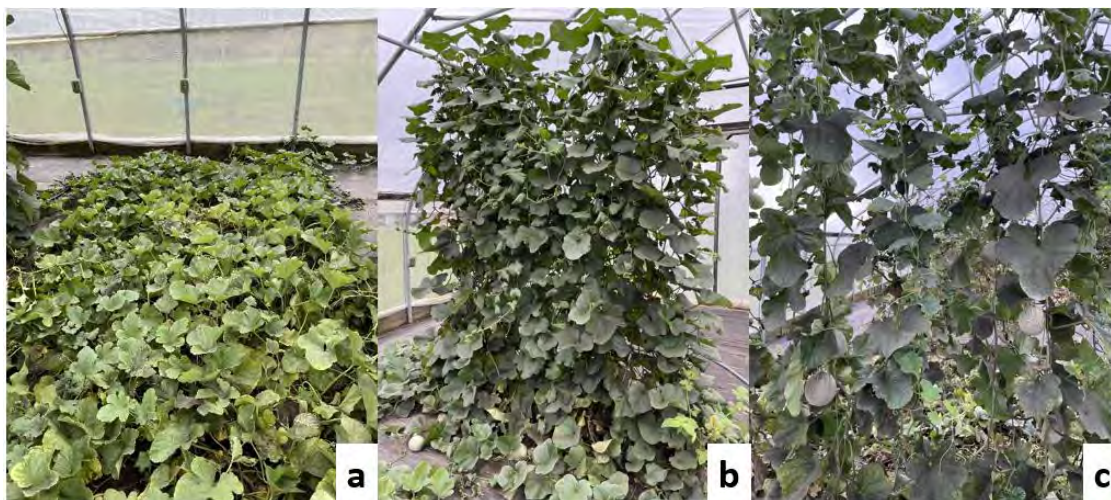


Figure 1. Untrelled (a), mesh vertical trellised (b), and double leader trellised (c) melons; Alternative High Tunnel Crops for NNY trial, Cornell Willsboro Research Farm, September 23, 2023.



Figure 2. Melons harvested at Cornell Willsboro Research Farm, September 2023; Alternative High Tunnel Crops for NNY trial.

Results:

The numbers of marketable melons and total marketable melon weights harvested did not differ significantly between our trellising and variety treatments, although the untrellised melons were numerically higher yielding ($p>0.05$; Table 1). On average, untrellised melon plants yielded one additional melon per plant compared to the double leader treatment and two additional melons compared to the mesh treatment. All treatments produced approximately 4-6 marketable melons per plant during the harvest period. ‘Sugar Cube’ marketable melons weighed 1.5 lbs each and ‘Tasty Bites’ 1.8 lbs each on average. Total marketable yield ranged from 7.28 lbs per plant (mesh), to 9.51 lbs per plant (untrellised), with double leader trellised plants yielding 7.71 lbs per plant. ‘Tasty Bites’ yielded approximately 2 lbs more fruit per plant than ‘Sugar Cube,’ although this was not statistically significant.

We observed significant differences in the numbers of unmarketable melons and overall unmarketable melon yield between trellising treatments ($F(2,15)=10.233$, $p=0.0016$ and $F(2,15)=9.553$, $p=0.0021$, respectively). The double leader treatment produced less unmarketable melon yield versus the mesh and untrellised treatments. Melons that grew along the ground in the untrellised treatment were more prone to feeding from chipmunks in the tunnel and rot from resting on the soil and landscape fabric. Untrellised melons began to ripen three days earlier than those grown with the vertical trellis treatments (Fig. 3). We experienced more abortion of young melon fruit on trellised plants compared to the untrellised plants. Fruit on older, lower lateral vines that would have matured first were pruned off of the vertically trellised plants to achieve an upright plant, delaying harvest.

Table 1. 2023 High tunnel melon mean marketable and unmarketable yield per plant, Cornell Willsboro Research Farm, Alternative High Tunnel Crops for NNY trial.

Treatment		No. marketable	Marketable weight (lbs)	No. unmarketable	Unmarketable weight (lbs)
Trellis*Variety (n=4)					
Double leader	Sugar Cube	5	6.97	0 a ²	0.26 a
Double leader	Tasty Bites	5	8.46	1 ab	1.10 ab
Mesh	Sugar Cube	4	5.61	1 ab	0.88 ab
Mesh	Tasty Bites	5	8.94	1 ab	2.08 bc
Untrellised	Sugar Cube	6	9.39	1 b	1.24 ab
Untrellised	Tasty Bites	5	9.63	2 b	3.42 c
Trellis (n=8)					
Double leader		5	7.71	0 a	0.68 a
Mesh		4	7.28	1 b	1.48 ab
Untrellised		6	9.51	2 b	2.33 b
Variety (n=12)					
Sugar Cube		5	7.32	1 a	0.79 a
Tasty Bites		5	9.01	1 b	2.20 b

²Mean yields with the same letter are not significantly different based on Tukey-Kramer HSD pairwise comparison tests.

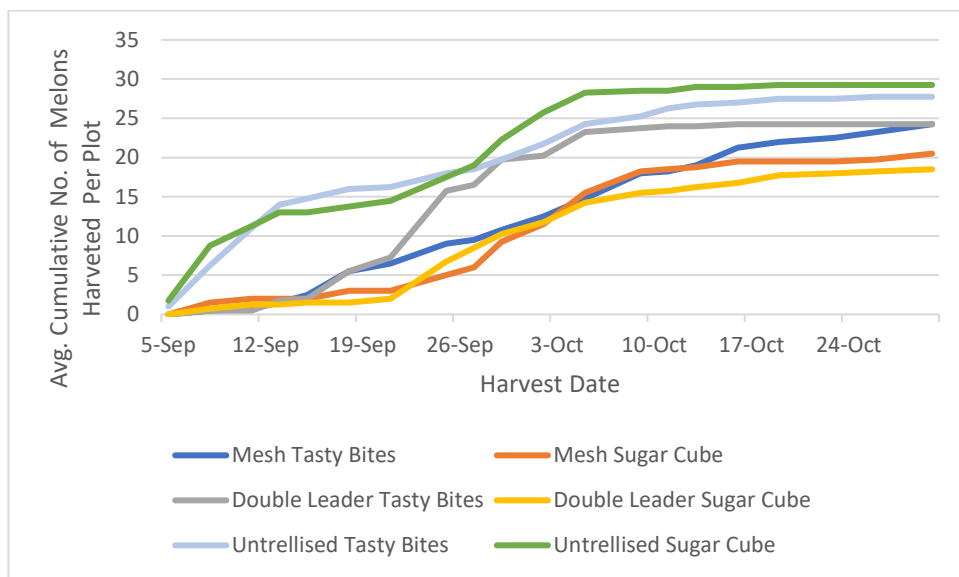


Figure 3. Average cumulative number of total melons (marketable and unmarketable) harvested from trellising and variety treatment plots (four plants each) at the Cornell Willsboro Research Farm, Alternative High Tunnel Crops for NNY trial, 2023.

The enterprise budget (Appendix A) shows a comparison between the costs and net income estimates for melons produced using the three different trellis systems and two varieties. The budgets include estimates for the research plantings (partial high tunnel) and calculations for a full 30'x96' high tunnel of melons at a commercial spacing. The 30'x96' high tunnel comparison shows growers the potential profit they may receive when growing an entire high tunnel of melons. Based on the results there is a profit when growing melons in a high tunnel. The cost of labor will potentially be lower for a grower, as the labor in our trial was completed under research settings. Below is a comparison of net income for the different melon production methods used in an entire 30'x96' high tunnel (Table 2). It is important to show enterprise budgets based on a system that would be readily used by growers (30'x96' high tunnel versus our smaller research planting).

Table 2. Net income estimates for trellised and untrellised high tunnel melon crops, Alternative High Tunnel Crops for NNY trial, 2023.

96'x30' High Tunnel	Sugar Cube Net Income	Tasty Bites Net Income
Double Leader (200 plants per tunnel)	\$2,519.87	\$2,517.87
Mesh (200 plants per tunnel)	\$1,184.43	\$2,182.43
Untrellised (160 plants per tunnel ²)	\$2,835.66	\$2,064.06

²Fewer plants may be grown in an untrellised system due to wider row spacing requirements.

Conclusions:

Because marketable melon yields did not differ between trellised and untrellised treatments, it may not be worth the additional labor and materials cost to use a vertical trellising system for high tunnel melon production. Plants grown in the untrellised system were harvested slightly earlier than the vertical treatments, which is beneficial to farms interested in being the first to market with a particular crop.

Although we harvested more unmarketable melons from the untrellised treatments and overall harvest labor was higher than the trellised treatments, these additional costs were not higher than the cost of trellising. Trellising time was higher than anticipated due to the growth habit of the plants. Early in the season, the melon plants grew vigorously and needed intensive weekly pruning until harvest.

By looking at enterprise budgets from [Pennsylvania State University](#) from 2020 for tomato and cucumber, we can see that a 30'x96' high tunnel tomatoes net income is roughly \$1,374 and cucumber net income is approximately \$2,550. All three of the melon treatments (double leader, mesh, untrellised) had a net income between \$1,184.43 and \$2,835.66, which is more than the \$1,374 estimated net income for tomatoes. The untrellised 'Sugar Cube' treatment was the most profitable, with an estimated \$2,835.66 net income which is more than the net income of cucumbers at \$2,550.

A research project from [Iowa State University](#), however, found average net returns on a 30'x72' high tunnel of tomatoes to be \$6,776 based on data provided by farmers. This estimate is considerably higher than our melon net profits. We can see that melons have the potential to be more profitable in a high tunnel than lower estimates of tomato and cucumber incomes. A grower may opt to grow 'Sugar Cube' untrellised for highest yields and lowest costs based on our first year of data. While melons likely will not replace tomatoes and cucumbers in a high tunnel, they may be a valuable addition to a farm's tunnel crops as they expand and install new tunnels.

Winter High Tunnel Salad Mix Variety Evaluation

Methods:

See our [2022 NNYADP Final Report](#) for winter greens variety trial methods. In fall 2023, we conducted a second year of our winter high tunnel salad mix variety trial at the Cornell Willsboro Research Farm, using similar methods to our 2022 trial. The greens were direct seeded by hand on September 21, 2023, in a 20'x48' unheated high tunnel using a randomized complete block design following fertilizer application according to soil test results. 'Central Red' was omitted from the variety trial in 2023 due to lack of seed availability. 'Runaway' arugula was used as a replacement, as arugula is an important green for many producers. Harvest occurred between October 11th and November 30th in the fall using the same harvest criteria as in 2022. The plots were covered with heavy row cover on December 6th and held over the winter. Harvest resumed in February 2024 as the plants regrew with longer daylength and warmer temperatures. The last harvest took place on March 4th, after which the plots bolted or otherwise became unmarketable. Snap traps were set up to control rodents during the winter; otherwise, no additional pest management was needed.

We conducted a taste test on March 7th using 13 available varieties that were of marketable size (3-4" long leaves) and quality (free from yellowing or rodent damage). Six participants were presented with the greens and asked to rate the pungency of the varieties on a scale of 1 (mild) to 5 (very strong). Mean taste ratings were used to describe the flavor of the greens.

Throughout the winter greens experiment, we gathered information on cost of production, including materials cost and labor. An enterprise budget was developed using this information similar to our melon budget. We used average yield of all *Brassica* leafy greens at 0.17 lbs per sq ft at \$10 per lb to

generate an overall profitability estimate per 20'x48' tunnel. The price per pound was obtained using grower-reported pricing from our 2022 NNYADP winter greens producer interviews.

Results:

Most winter greens plots were harvested between one and three times in the fall (Table 3). Several mustards, kale, and all arugula varieties were harvested once during the winter before bolting. The spinach, however, did not reach harvestable size or quality in the fall and was consumed by rodents over the winter despite traps set up in the tunnel. Thus, we were unable to compare our *Brassica* leafy green varieties to spinach, the most widely grown winter high tunnel crop. Lettuce was only harvested in the fall.

Table 3. Mean number of harvests and total yield of winter greens harvested at the Cornell Willsboro Research Farm in fall 2023.

Crop Type	Variety	Mean No. Harvests per Plot	Fall ^z Yield (lbs/5 sq ft)	Late winter ^y Yield (lbs/5 sq ft)	Total Yield (lbs/5 sq ft)	Pungency
Mustard	'Tokyo Bekana'	3	1.40 a ^y	0 b	1.40 a	NA ^x
Mustard	'Tatsoi'	2	0.95 ab	0.13 ab	0.95 abc	NA
Mustard	'Green Giant'	2	0.87 bc	0.20 ab	1.07 ab	Medium
Mizuna	'Mizuna'	3	0.73 bcd	0.22 ab	0.95 abc	Mild
Tatsoi	'Koji'	1	0.71 bcd	0 b	0.71 abc	NA
Mustard	'Red Giant'	2	0.71 bcd	0.12 ab	0.82 abc	Strong
Mustard	'Green Wave'	3	0.63 bcd	0.28 ab	0.91 abc	NA
Kale	'Red Russian'	3	0.61 bcd	0.08 ab	0.70 bcd	Mild
Mustard	'Ruby Streaks'	4	0.61 bcd	0.28 ab	0.89 abc	Medium
Arugula	'Esme'	3	0.60 bcd	0.59 a	1.18 ab	Strong
Mustard	'Golden Frills'	2	0.56 bcd	0 b	0.56 bcd	Medium/Strong
Mustard	'Scarlet Frills'	2	0.56 bcd	0 b	0.69 bcd	Very Strong
Tatsoi	'Red Cloud'	1	0.54 bcd	0 b	0.54 bcd	Medium
Mustard	'Red Kingdom'	2	0.52 bcd	0 b	0.52 bcd	Medium
Kale	KX-1	2	0.51 bcde	0 b	0.51 bcd	Medium
Arugula	'Astro'	2	0.48 bcde	0.59 a	1.06 ab	Medium/Strong
Arugula	'Runaway'	2	0.48 bcde	0.57 a	1.05 abc	NA
Arugula	'Arugula'	2	0.43 cde	0.50 ab	0.93abc	NA
Lettuce	'Five Star'	1	0.35 de	0 b	0.35 cd	Medium
Spinach	'Space'	0	0 e	0 b	0 d	NA

^zFall harvests occurred in late October through November 2023.

^yMean yields with the same letter are not significantly different based on Tukey-Kramer HSD pairwise comparison tests.

^xVarieties with "NA" in the table were not sampled for the taste test due to unmarketability at the time of the test.

Winter greens varieties differed significantly in total yield harvested during the trial ($F_{19}=5.847$, $p<0.001$), as well as fall ($F_{19}=7.619$, $p<0.001$) and winter harvests ($F_{19}=4.560$, $p<0.001$; Table 3). The mustard 'Tokyo Bekana' was the highest yielding of the 20 varieties evaluated, with 1.40 lbs/5 sq ft plot harvested over three picks in the fall. All arugulas yielded greater than 1 lb per plot, and were the highest yielding amongst varieties harvested in the winter. Although we observed bacterial disease symptoms (dark spots on leaves) in 'Esme' arugula plots in 2022, no disease impacted yield in our 2023 plots and 'Esme' was the highest yielding arugula and second highest yielding amongst all varieties in total. After 'Tokyo Bekana,' 'Green Giant' and 'Tatsoi' were top yielding mustards. Most varieties were described as having a mild to medium pungency during the taste test. Mustards 'Scarlet Frills' and 'Red Giant,' as well as arugula 'Esme' were the most pungent. Most Mizuna, lettuce, and kale varieties were mild in comparison to other taste-tested varieties.

Our enterprise budget for winter greens production using methods used and 2023-2024 yields at the Willsboro Farm revealed that this crop was not profitable, with a net income of -\$1,424.91 for the tunnel (Appendix B). The most expensive inputs in the trial included compost (\$550), seed (\$252), and harvest labor (\$199.95).

Conclusions:

Overall, our fall yields were much lower in 2023 compared to 2022 (109 lbs total in 2022 vs. 49 lbs in 2023), likely due to cooler and cloudier weather in 2023. Winter yields were higher in 2024 versus 2023 (14 lbs vs. 11 lbs), but quite low. Given the low yields in the winter, these *Brassica* greens may be most worthwhile as a late fall crop to extend the season into November and December for holiday markets, late-season community supported agriculture (CSA) shares, or wholesale markets. Our enterprise budgets showed that *Brassica* winter greens may not be a profitable endeavor on a farm, although in our previous NNYADP interviews and visits with growers, producers shared economic benefits to growing these crops. Winter greens may be a "loss leader" to add value to winter CSA shares; adding leafy greens to shares with storage vegetables can be more appealing to customers. Additionally, winter greens allow for farms to retain labor and maintain wholesale markets year-round.

Our yield data and taste tests enabled us to generate a recommendation for a high yielding and quality winter greens salad mix harvested in late fall. 'Tokyo Bekana' and 'Tatsoi' are reliably high yielding with a mild taste appealing to consumers. 'Green Giant,' 'Red Giant,' 'Mizuna,' and 'Ruby Streaks' also provided reliable harvests. 'Ruby Streaks' adds value to a salad mix with its purple color and frilly texture, and we were able to harvest it four times in the fall. These varieties could be mixed with spinach or lettuce, although these two crops would need to be transplanted or seeded earlier in order to yield comparably in the fall. Although the arugula varieties performed well in our 2024 winter harvests, 'Esme' is not recommended due to disease observed in 2022. 'Astro' arugula was the highest yielding in our 2022 and 2023 trials. Mixes containing varieties with a strong or very strong flavor, such as 'Red Giant' or 'Scarlet Frills,' could be labeled as "spicy" or "zesty" for consumers.

Outreach and Education:

Workshops

- May 2, 2023: In lieu of crop-specific food safety workshops, we held an all-day Good Agricultural Practices (GAPs) workshop virtually in response to NNY and other regional grower needs for

certification assistance before the growing season. The workshop included specific information on leafy greens food safety best management practices and melon foodborne illness outbreaks. 19 participants.

- June 9, July 20, September 14, 2023: In addition to the GAPs workshop, we presented information on food safety best management practices at three St Lawrence Valley Produce Auction twilight meetings (two in Franklin County and one in St Lawrence County on food safety topics including Food Safety Modernization Act (FSMA) coverage for farms, principles of microbiology, manure handling, water quality, and worker hygiene when handling fresh produce. 111 attendees at the three twilight meetings in total.
- October 14, 2023: Small fruit workshop at CCE Lewis County office; discussion on strawberry, bramble, and blueberry production systems, season extension, pest management, and food safety, with farm tour and pruning demonstration, Tug Hill Estates, Lowville (Fig. 4). 14 participants.
- November 1, 2023: Soil health workshop for vegetable growers at Whallonsburg Grange, Essex County; speakers from Cornell University, Ithaca; Cornell Cooperative Extension; Compost for Good; and Wild Work Farm (Essex County), presenting on general soil health concepts, tarping, high tunnel soil management, cover cropping, composting, and climate change impacts on soil in NNY. 36 farmers, students, and agricultural service providers attended (Fig. 5).
- December 11, 2023: Pricing workshop via Zoom; topics included tracking production costs, value-added costs, and determining prices to charge customers. 22 participants.

Farm visits: In 2023, project leaders conducted farm visits in all six NNY counties:

- Elisabeth Hodgdon: Clinton: 35, Essex: 43, Franklin: 8, Jefferson: 4, Lewis: 5, St Lawrence: 1
- Lindsey Pashow: Clinton: 9, Essex: 19, Franklin: 12, Jefferson: 3, Lewis: 3, St Lawrence: 3
- Jud Reid: Clinton: 4, Essex: 6, Franklin: 3, Jefferson: 6, Lewis: 2, St Lawrence: 4.

Educational resources: Enterprise budgets (Appendix A) for the high tunnel melons and winter greens will be available for download on the [NNYADP website](#).



Left: Figure 4. Small fruit workshop: specialist Anya Osatuke (CCE Harvest NY) discusses pruning practices, Tug Hill Estates, 10/4/23. Right: Figure 5. Soil health workshop: ENYCHP specialist Crystal Stewart-Courtens shares results from tarping work at Philia Farm, Whallonsburg Grange, 11/1/23.

Acknowledgements: ENYCHP program aide Jennifer Stanton and specialist retiree Amy Ivy, and Cornell Willsboro Farm staff Tully Miller and Adam Sayward for assistance with high tunnel experiments; Natasha Field, Mike Nuckols, Mellissa Spence, and Jennifer Stanton for coordination assistance for outreach activities and farm visits.

WINTER GREENS ENTERPRISE BUDGET

			Price	Qty	Units	1 Total cost Willsboro Trial	Notes
Variable costs	Bed Preparation and Transplanting	High Tunnel Preparation/Rototilling	15.00	6.00	hrs	90.00	2
		Fertilizer Application	15.00	11.00	hrs	165.00	3
		Bed Preparation	15.00	3.00	hrs	45.00	4
		Planting	15.00	6.00	hrs	90.00	5
	Fertilizer and Sprays	K	4.04	1.00	Quantity	4.04	6
		Lime	9.46	1.00	Quantity	9.46	7
		Probooster	24.48	1.00	Quantity	24.48	8
		Compost	550.00	1.00	Quantity	550.00	9
	Labor	Row Cover	15.00	1.50	hrs	22.50	10
		Hoops	15.00	0.67	hrs	10.05	11
		Irrigation	15.00	10.00	hrs	150.00	
		Irrigation Set Up	15.00	0.25	hrs	3.75	
	Materials	Row Cover	32.00	4.00	#	128.00	12
		Hoops	1.55	48.00	#	74.40	13
		Seed	251.99	1.00	order	251.99	14
Harvest	Labor	15.00	13.33	hrs	199.95	15	
Total Variable Cost					1818.62		
Fixed Cost	Land Rent		139.00	0.07	ac	9.73	16
	High Tunnel		605.33	0.33	unit	199.76	17
	Total Fixed Costs					209.49	
TOTAL COSTS						2028.11	
			Price/lb	Yield/Trial	Unit		
Gross income			10.00	60.32	lb	603.20	
Net Income						-1424.91	

Crop terminated March 4

Labor/purchase for trial & full tunnel were the same due to need to pre entire tunnel. Adjust number down to use tunnel for multiple crops.

- Notes 1** Willsboro Trial: 80 plots with 20 varieties planted in 4 beds size 2.5'x40'
- 2** Rototilling took 4 hours between 9/19 - 9/20/2023. Also broadforked the tunnel to break up the grass for an additional 2 hours.
 - 3** Compost application took 6 hours on 9/18/2023. Other fertilizer application took 5 hours on 9/17/2023.
 - 4** High Tunnel Scenario: High Tunnel 20'x48', 4 beds in 30'x40' space, Each bed had 12 rows
 - 5** Hand Planted Seeds: We seeded about 2-3 seeds per inch before thinning for 11,520-17,280 seeds per bed.
 - 6** K (sulfate of potash - 100lbs/acre) \$45.95/50 lbs: Used 4.4 lbs
 - 7** Lime (1 ton/acre) \$10.59/50 lbs: Used 43.2 lbs
 - 8** Pro Booster (130 lbs/acre) \$42.86/50 lbs: Used 28.56 lbs applied
 - 9** Compost (480 gallons or 2.38 yards or 1.11 tons) \$550/1.11 ton VT Compost Company. Used 1.11 ton
 - 10** Due to mild winter the row cover was taken off and put on 3 times. Each time 15 minutes put on and 15 removal
 - 11** 20 minutes set up and 20 minutes take down
 - 12** Johnny's Agribon+ AG-50 – 83" x 50'
 - 13** Hoops 26"x16"-18"
 - 14** 20 different varieties 1 oz bags
 - 15** 10 minutes per plot and 80 plots harvest total
 - 16** \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 6 mo. Rate differs for land owners.
 - 17** \$605.33 for year rental only used for 6 months
- Cleaning, packing, storage, and marketing costs not included in Willsboro Farm enterprise budget.
Washing, packing, and marketing costs will vary by operation.

Fertilizer: applied K (sulfate of potash 100lbs/acre), lime (1 ton/ac), probooster (130lbs/ac), compost (480 gallons or 2.38 yards or 1.11 tons)

This breaks down to exactly 4.4lb of K, 43.2lbs lime, and 28.56lbs probooster.

Compost application: 6 hours on 9/18/2023. Other fertilizer application: 5 hours on 9/17/2023.

Rototilling: 4 hours 9/19-9/20/2023; additional 2 hours: broadforked tunnel to break up grass

Hand-irrigated plants: 10 hours (1 hour increments 9/22-10/18/2023); additional 20 minutes to set up irrigation.

MELON ENTERPRISE BUDGET: Tasty Bites Double Leader

				1 Total				Notes	
				cost	Cost/Plant	2 # of Plants	Total Cost:		
				Willsboro	Willsboro	96'30' High	96'x30' High		
				Trial	Trial	Tunnel	Tunnel		
Variable Costs		Price	Qty	Units	Total			Notes	
					Willsboro	Willsboro	96'30' High		
Variable Costs	Bed Preparation and Transplanting	High Tunnel Preparation	15.00	6.00 hrs	90.00	0.94		90.00	
		Installing Netting Channels	15.00	4.00 hrs	60.00	0.63		60.00	
		Fertilizer Application & Rototilling	15.00	2.00 hrs	30.00	0.31		30.00	
		Seeding Melons	15.00	0.50 hrs	7.50	0.08	200	15.63	
		Seeds: 150 seeds at \$4190	0.28	96.00 seeds	26.88	0.28	200	56.00	3
		Potting mix	4.99	4.00 qt	19.96	0.21	200	41.58	4
		Irrigating trays	15.00	1.00 hrs	15.00	0.16	200	31.25	
		Transplanting	15.00	1.25 hrs	18.75	0.20	200	39.06	
		50 cell plug flat 5 trays	16.55	1.00 cell trays	16.55	0.07	200	13.24	5
		Dosatron Setup	15.00	0.50 hrs	7.50	0.08	200	15.63	
	Fertilizer and Sprays	Cable Installation	15.00	2.00 hrs	30.00	0.31		30.00	
		Fertigation and irrigation	4.00	15.00 hrs	60.00	0.63		60.00	
		Fungicide 1: Double Nickel	0.52	3.80 oz	1.98	0.02	200	4.12	6
		Fungicide 2: Cueva	0.45	1.30 oz	0.59	0.01	200	1.22	7
	Beneficial insects	Fungicide Spray Labor	15.00	2.75 hrs	41.25	0.43	200	85.94	
		Bumblebees	484.57	1.00 hive	484.57	5.05		484.57	
		Aphidius colemani 1000	61.00	2.00	122.00	1.27		122.00	
	Materials	Lady Beetle	85.00	1.00 pint	85.00	0.89		85.00	
		Irrigation Line	0.14	336.00 ft	47.04	0.49	200	98.00	8
		Insect Netting	0.32	210.00	67.20	0.70	200	140.00	9
Weed Barrier		0.89	192.00 ft	170.88	1.78	200	356.00	10	
Trellis	Tomato Trellis Clips 100 clips	10.85	1.00 bag	10.85	0.11		10.85		
	Labor	15.00	10.92 hrs	163.80	1.71	200	341.25		
Harvest	Labor	15.00	1.41 hrs	21.15	0.22	200	44.06		
	Total Variable Costs				1598.44	16.54	2255.39		
Fixed Costs	Tractor/Machinery	17.25	1.00 hrs	17.25	0.18		17.25	11	
	Land Rent	139.00	0.07 ac	9.73	0.10		9.73	12	
	High Tunnel	605.33	0.33 unit	199.76	2.08		199.76	13	
Total Fixed Costs				226.74	2.36		226.74		
TOTAL COSTS					1825.18	18.91	2482.13		
				Price/melon	Yield/plant	Unit			
Gross income				5.00	5.00 amount	2400.00	25.00	200	5000.00
Net Income						574.82	6.09		2517.87

Crop terminated November 1

Labor/purchase for trial & full tunnel were the same due to need to prep entire tunnel. Adjust number down to use tunnel for multiple crops

- Notes 1** Willsboro Trial: 24 plots with 4 plants per plot: Total 96 plants 2'x7' spacing
 - 2** High Tunnel Scenario: 30'x96', 5 beds, 2'x6' plant density
 - 3** 150 Tasty Bites seeds in packet cost \$41.90
 - 4** Vermont Compost Fort Vee 20 qt @\$24.95, 4 qts per tray * 4 trays = 16 qts = \$19.96
 - 5** 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
 - 6** Double Nickel \$167.95 (Forestry Distributing) for 2.5 gal (320 oz) = \$.52 per oz
 - 7** Cueva \$143.50 (Arbico Organics) for 2.5 gal (320 oz) = \$.45 per oz
 - 8** Trial 2 lines*7 feet*24 plots= 336 High Tunnel 2 lines * 96 length*5 rows = 480 ft. drip line. \$140 for 1,000 ft irrigation system (\$0.14/ft)
 - 9** Side Wall Insect Netting: 4'x984' @\$312 (Dubois Agrinovation) = \$0.32 per foot
 - 10** Weed Barrier: Covered entire high tunnel
 - 11** 4h @ \$69 rototiller rental (Home Depot rate) to prepare soil for transplanting. Rate differs for tiller owners.
 - 12** \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 4 mo. Rate differs for land owners.
 - 13** \$605.33 for year rental only used for 4 months
- Washing, packing, and marketing costs will vary by operation.

MELON ENTERPRISE BUDGET: Tasty Bites Mesh

2

				1 Total	Cost/Plant	2 # Plants	Total Cost:		
				cost	Willsboro	96'30' High	96'x30' High		
				Willsboro	Trial	Trial	Tunnel	Tunnel	
				Price	Qty	Units		Notes	
Variable Costs	Bed Preparation and Transplanting	High Tunnel Preparation	15.00	6.00 hrs	90.00	0.94		90.00	
		Installing Netting Channels	15.00	4.00 hrs	60.00	0.63		60.00	
		Fertilizer Application & Rototilling	15.00	2.00 hrs	30.00	0.31		30.00	
		Seeding Melons	15.00	0.50 hrs	7.50	0.08	200	15.63	
		Seeds: 150 seeds at \$41.90	0.28	96.00 seeds	26.88	0.28	200	56.00	3
		Potting mix	4.99	4.00 qt	19.96	0.21	200	41.58	4
		Irrigating trays	15.00	1.00 hrs	15.00	0.16	200	31.25	
		Transplanting	15.00	1.25 hrs	18.75	0.20	200	39.06	
		50 cell plug flat 5 trays	16.55	1.00 cell trays	16.55	0.07	200	13.24	5
		Dosatron Setup	15.00	0.50 hrs	7.50	0.08	200	15.63	
		Cable Installation	15.00	2.00 hrs	30.00	0.31		30.00	
		Fertilizer and Sprays	Fertigation and irrigation	4.00	15.00 hrs	60.00	0.63		60.00
	Fungicide 1: Double Nickel	0.52	3.80 oz	1.98	0.02	200	4.12	7	
	Fungicide 2: Cueva	0.45	1.30 oz	0.59	0.01	200	1.22		
	Fungicide Spray Labor	15.00	2.75 hrs	41.25	0.43	200	85.94		
	Beneficial insects	Bumblebees	484.57	1.00 hive	484.57	5.05		484.57	
	Aphidius colemani 1000	61.00	2.00	122.00	1.27		122.00		
	Lady Beetle	85.00	1.00 pint	85.00	0.89		85.00		
	Materials	Irrigation Line	0.14	336.00 ft	47.04	0.49	200	98.00	8
	Insect Netting	0.32	210.00	67.20	0.70	200	140.00	9	
	Weed Barrier	0.89	192.00 ft	170.88	1.78	200	356.00	10	
	Hortonova FG-79"x250'	0.82	168.00 ft	137.76	1.44	200	287.00	11	
	Tomato Trellis Clips 100 clips	10.85	1.00 bag	10.85	0.11		10.85		
	Trellis Labor	15.00	11.83 hrs	177.45	1.85	200	369.69		
Harvest Labor	15.00	2.05 hrs	30.75	0.32	200	64.06			
Total Variable Costs				1759.45	18.22		2590.83		
Fixed Costs	Tractor/Machinery	17.25	1.00 hrs	17.25	0.18		17.25	12	
	Land Rent	139.00	0.07 ac	9.73	0.10		9.73	13	
	High Tunnel	605.33	0.33 unit	199.76	2.08		199.76	14	
	Total Fixed Costs				226.74	2.36		226.74	
TOTAL COSTS				1986.19	20.58		2817.57		
				Price/lb	Yield/plant	Unit			
Gross income				5.00	5.00 lbs	2400.00	25.00	200	5000.00
Net Income						413.81	4.42		2182.43

Crop terminated November 1

Labor/purchase for trial and full tunnel were the same due to need to prep entire tunnel. Adjust number down to use tunnel for multiple crops

Notes

- 1 Willsboro Trial: 24 plots with 4 plants per plot: Total 96 plants 2'x7' spacing
 - 2 High Tunnel Scenario: 30'x96', 5 beds, 2'x6' plant density
 - 3 150 Tasty Bites seeds in packet cost \$41.90
 - 4 Vermont Compost Fort Vee 20 qt @\$24.95, 4 qts per tray * 4 trays = 16 qts = \$19.96
 - 5 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
 - 6 Double Nickel \$167.95 (Forestry Distributing) for 2.5 gal (320 oz) = \$.52 per oz
 - 7 Cueva \$143.50 (Arbico Organics) for 2.5 gal (320 oz) = \$.45 per oz
 - 8 Trial 2 lines*7 feet*24 plots= 336 High Tunnel 2 lines * 96 length*5 rows = 480 ft. drip line. \$140 for 1,000 ft irrigation system (\$0.14/ft)
 - 9 Side Wall Insect Netting: 4'x984' @\$312 (Dubois Agrinovation) = \$0.32 per foot
 - 10 Weed Barrier: Covered entire high tunnel
 - 11 Hortonova FG-79"x250' \$137.33 cost per foot \$.82 (Willsboro trial needed 168 ft)
 - 12 4h @ \$69 rototiller rental (Home Depot rate) to prepare soil for transplanting. Rate differs for tiller owners.
 - 13 \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 4 mo. Rate differs for land owners.
 - 14 \$605.33 for year rental only used for 4 months
- Washing, packing, and marketing costs will vary by operation.

MELON ENTERPRISE BUDGET: Tasty Bites Untrellised

				1 Total	Cost Per Plant	2 # Plants	Total Cost:				
				cost	from	96'30' High	96'x30' High				
				Willsboro	Willsboro	Tunnel	Tunnel	Notes			
				Trial	Trial						
			Price	Qty	Units						
Variable Costs	Bed Preparation and Transplanting	High Tunnel Preparation	15.00	6.00	hrs	90.00	0.94		90.00		
		Installing Netting Channels	15.00	4.00	hrs	60.00	0.63		60.00		
		Fertilizer Application & Rototilling	15.00	2.00	hrs	30.00	0.31		30.00		
		Seeding Melons	15.00	0.50	hrs	7.50	0.08	160	12.50		
		Seeds: 150 seeds at \$41.90	0.28	96.00	seeds	26.88	0.28	160	44.80	3	
		Potting mix	4.99	4.00	qt	19.96	0.21	160	33.27	4	
		Irrigating trays	15.00	1.00	hrs	15.00	0.16	160	25.00		
		Transplanting	15.00	1.25	hrs	18.75	0.20	160	31.25		
	50 cell plug flat 5 trays	16.55	1.00	cell trays	16.55	0.07	160	10.59	5		
	Fertilizer and Sprays	Dosatron Setup	15.00	0.50	hrs	7.50	0.08	160	12.50		
		Cable Installation	15.00	2.00	hrs	30.00	0.31		30.00		
		Fungicide 1: Double Nickel	0.52	3.80	oz	1.98	0.02	160	3.29	6	
	Beneficial Insects	Fungicide 2: Cueva	0.45	1.30	oz	0.59	0.01	160	0.98	7	
		Fungicide Spray Labor	15.00	2.75	hrs	41.25	0.43	160	68.75		
		Bumblebees	484.57	1.00	hive	484.57	5.05		484.57		
	Materials	Aphidius colemani 1000	61.00	2.00		122.00	1.27		122.00		
		Lady Beetle	85.00	1.00	pint	85.00	0.89		85.00		
		Irrigation Line	0.14	336.00	ft	47.04	0.49	160	78.40	8	
		Insect Netting	0.32	210.00		67.20	0.70	160	112.00	9	
		Weed Barrier	0.89	192.00	ft	170.88	1.78	160	284.80	10	
Harvest	Labor	15.00	3.58	hrs	53.70	0.56	160	89.50			
Total Variable Costs						1396.34	14.44		1709.20		
Fixed Costs	Tractor/Machinery	Tractor/Machinery	17.25	1.00	hrs	17.25	0.18		17.25	11	
		Land Rent	139.00	0.07	ac	9.73	0.10		9.73	12	
		High Tunnel	605.33	0.33	unit	199.76	2.08		199.76	13	
	Total Fixed Costs						226.74	2.36		226.74	
TOTAL COSTS						1623.08	16.80		1935.94		
				Price/lb	Yield/plant	Unit					
Gross income				5.00	5.00	lbs	2400.00	25.00	160	4000.00	
Net Income							776.92	8.20		2064.06	

Crop terminated November 1

Labor/purchase for trial & full tunnel were the same due to need to prep entire tunnel. Adjust number down to use tunnel for multiple crops

Notes

- 1 Willsboro Trial: 24 plots with 4 plants per plot: Total 96 plants 2'x7' spacing
- 2 High Tunnel Scenario: 30'x96', 4 beds, 2'x6' plant density
- 3 150 Tasty Bites seeds in packet cost \$41.90
- 4 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
- 5 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
- 6 Double Nickel \$167.95 (Forestry Distributing) for 2.5 gal (320 oz) = \$.52 per oz
- 7 Cueva \$143.50 (Arbico Organics) for 2.5 gal (320 oz) = \$.45 per oz
- 8 Trial 2 lines*7 feet*24 plots= 336 High Tunnel 2 lines * 96 length*4 rows = 768 ft. drip line. \$140 for 1,000 ft irrigation system (\$0.14/ft)
- 9 Side Wall Insect Netting: 4'x984' @\$312 (Dubois Agrinovation) = \$0.32 per foot
- 10 Weed Barrier: Covered entire high tunnel
- 11 4h @ \$69 rototiller rental (Home Depot rate) to prepare soil for transplanting. Rate differs for tiller owners.
- 12 \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 4 mo. Rate differs for land owners.
- 13 \$605.33 for year rental only used for 4 months
Washing, packing, and marketing costs will vary by operation.

MELON ENTERPRISE BUDGET: Sugar Cube Double Leader

				1 Total				Notes		
				cost	Cost/Plant	2 # Plant	Total Cost:			
				Willsboro	Willsboro	96'30' High	96'x30' High			
				Trial	Trial	Tunnel	Tunnel			
				Price	Qty	Units				
Variable Costs	Bed Preparation and Transplanting	High Tunnel Preparation	15.00	6.00	hrs	90.00	0.94		90.00	
		Installing Netting Channels	15.00	4.00	hrs	60.00	0.63		60.00	
		Fertilizer Application & Rototilling	15.00	2.00	hrs	30.00	0.31		30.00	
		Seeding Melons	15.00	0.50	hrs	7.50	0.08	200	15.63	
		Seeds: 250 seeds at \$68.50	0.27	96.00	seeds	25.92	0.27	200	54.00	3
		Potting mix	4.99	4.00	qt	19.96	0.21	200	41.58	4
		Irrigating trays	15.00	1.00	hrs	15.00	0.16	200	31.25	
		Transplanting	15.00	1.25	hrs	18.75	0.20	200	39.06	
		50 cell plug flat 5 trays	16.55	1.00	cell trays	16.55	0.07	200	13.24	5
		Dosatron Setup	15.00	0.50	hrs	7.50	0.08	200	15.63	
	Cable Installation	15.00	2.00	hrs	30.00	0.31		30.00		
	Fertilizer and Sprays	Fertigation and irrigation	4.00	15.00	hrs	60.00	0.63		60.00	
		Fungicide 1: Double Nickel	0.52	3.80	oz	1.98	0.02	200	4.12	6
		Fungicide 2: Cueva	0.45	1.30	oz	0.59	0.01	200	1.22	7
		Fungicide Spray Labor	15.00	2.75	hrs	41.25	0.43	200	85.94	
	Beneficial insects	Bumblebees	484.57	1.00	hive	484.57	5.05		484.57	
		Aphidius colemani 1000	61.00	2.00		122.00	1.27		122.00	
		Lady Beetles	85.00	1.00	pint	85.00	0.89		85.00	
	Materials	Irrigation Line	0.14	336.00	ft	47.04	0.49	200	98.00	8
		Insect Netting	0.32	210.00		67.20	0.70	200	140.00	9
		Weed Barrier	0.89	192.00	ft	170.88	1.78	200	356.00	10
		Tomato Trellis Clips 100 clips	10.85	1.00	bag	10.85	0.11		10.85	
	Trellis	Labor	15.00	10.92	hrs	163.80	1.71	200	341.25	
		Harvest	15.00	1.41	hrs	21.15	0.22	200	44.06	
	Total Variable Costs					1597.48	16.53		2253.39	
Fixed Costs	Tractor/Machinery	17.25	1.00	hrs	17.25	0.18		17.25	11	
	Land Rent	139.00	0.07	ac	9.73	0.10		9.73	12	
	High Tunnel	605.33	0.33	unit	199.76	0.08		199.76	13	
Total Fixed Costs					226.74	0.36		226.74		
TOTAL COSTS										
				1824.22	16.90			2480.13		
				Price/melon	Yield/plant	Unit				
Gross income				5.00	5.00	amount	2400.00	25.00	200	5000.00
Net Income							575.78	8.10		2519.87

Crop terminated November 1

Labor/purchase for trial & full tunnel were the same due to need to prep entire tunnel. Adjust number down to use tunnel for multiple crops

Note

- 1 Willsboro Trial: 24 plots with 4 plants per plot: Total 96 plants 2'x7' spacing
- 2 High Tunnel Scenario: 30'x96', 5 beds, 2'x6' plant density
- 3 250 Sugar Cube seeds in packet cost \$68.50
- 4 Vermont Compost Fort Vee 20 qt @\$24.95, 4 qts per tray * 4 trays = 16 qts = \$19.96
- 5 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
- 6 Double Nickel \$167.95 (Forestry Distributing) for 2.5 gal (320 oz) = \$.52 per oz
- 7 Cueva \$143.50 (Arbico Organics) for 2.5 gal (320 oz) = \$.45 per oz
- 8 Trial 2 lines*7 feet*24 plots= 336 High Tunnel 2 lines * 96 length*5 rows = 480 ft. drip line. \$140 for 1,000 ft irrigation system (\$0.14/ft)
- 9 Side Wall Insect Netting: 4'x984' @\$312 (Dubois Agrinovation) = \$0.32 per foot
- 10 Weed Barrier: Covered entire high tunnel
- 11 4h @ \$69 rototiller rental (Home Depot rate) to prepare soil for transplanting. Rate differs for tiller owners.
- 12 \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 4 mo. Rate differs for land owners.
- 13 \$605.33 for year rental only used for 4 months
Washing, packing, and marketing costs will vary by operation.

MELON ENTERPRISE BUDGET: Sugar Cube Mesh

				1 Total	Cost/Plant	2 # Plants	Total Cost:			
				cost	Willsboro	96'30' High	96'x30' High			
				Willsboro	Willsboro	Tunnel	Tunnel	Notes		
				Trial	Trial					
		Price	Qty	Units						
Variable Costs	Bed Preparation and Transplanting	High Tunnel Preparation	15.00	6.00 hrs	90.00	0.94		90.00		
		Installing Netting Channels	15.00	4.00 hrs	60.00	0.63		60.00		
		Fertilizer Application & Rototilling	15.00	2.00 hrs	30.00	0.31		30.00		
		Seeding Melons	15.00	0.50 hrs	7.50	0.08	200	15.63		
		Seeds: 250 seeds at \$68.50	0.27	96.00 seeds	25.92	0.27	200	54.00	3	
		Potting mix	4.99	4.00 qt	19.96	0.21	200	41.58	4	
		Irrigating trays	15.00	1.00 hrs	15.00	0.16	200	31.25		
		Transplanting	15.00	1.25 hrs	18.75	0.20	200	39.06		
		50 cell plug flat 5 trays	16.55	1.00 cell trays	16.55	0.07	200	13.24	5	
		Dosatron Setup	15.00	0.50 hrs	7.50	0.08	200	15.63		
		Cable Installation	15.00	2.00 hrs	30.00	0.31		30.00		
	Fertilizer and Sprays	Fertigation and irrigation	4.00	15.00 hrs	60.00	0.63		60.00		
		Fungicide 1: Double Nickel	0.52	3.80 oz	1.98	0.02	200	4.12	6	
		Fungicide 2: Cueva	0.45	1.30 oz	0.59	0.01	200	1.22	7	
		Fungicide Spray Labor	15.00	2.75 hrs	41.25	0.43	200	85.94		
	Beneficial insects	Bumblebees	484.57	1.00 hive	484.57	5.05		484.57		
		Aphidius colemani 1000	61.00	2.00	122.00	1.27		122.00		
		Lady Beetle	85.00	1.00 pint	85.00	0.89		85.00		
	Materials	Irrigation Line	0.14	336.00 ft	47.04	0.49	200	98.00	8	
		Insect Netting	0.32	210.00	67.20	0.70	200	140.00	9	
		Weed Barrier	0.89	192.00 ft	170.88	1.78	200	356.00	10	
		Hortonova FG-79"x250'	0.82	168.00 ft	137.76	1.44	200	287.00	11	
		Tomato Trellis Clips 100 clips	10.85	1.00 bag	10.85	0.11		10.85		
	Trellis Labor	15.00	11.83 hrs	177.45	1.85	200	369.69			
Harvest Labor	15.00	2.05 hrs	30.75	0.32	200	64.06				
Total Variable Costs					1758.49	18.21	2588.83			
Fixed Costs	Tractor/Machinery	Tractor/Machinery	17.25	1.00 hrs	17.25	0.18		17.25	12	
		Land Rent	139.00	0.07 ac	9.73	0.10		9.73	13	
		High Tunnel	605.33	0.33 unit	199.76	2.08		199.76	14	
	Total Fixed Costs					226.74	2.36	226.74		
TOTAL COSTS					1985.23	20.57	2815.57			
				Price/melon	Yield/plant	Unit				
Gross income				5.00	4.00 amount		1920.00	20.00	200	4000.00
Net Income							-65.23	-0.57		1184.43

Crop terminated November 1

Labor/purchase for trial & full tunnel were the same due to need to prep entire tunnel. Adjust number down to use tunnel for multiple crops

Notes

- 1 Willsboro Trial: 24 plots with 4 plants per plot: Total 96 plants 2'x7' spacing
 - 2 High Tunnel Scenario: 30'x96', 5 beds, 2'x6' plant density
 - 3 250 seeds in packet cost \$68.50
 - 4 Vermont Compost Fort Vee 20 qt @\$24.95, 4 qts per tray * 4 trays = 16 qts = \$19.96
 - 5 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
 - 6 Double Nickel \$167.95 (Forestry Distributing) for 2.5 gal (320 oz) = \$.52 per oz
 - 7 Cueva \$143.50 (Arbico Organics) for 2.5 gal (320 oz) = \$.45 per oz
 - 8 Trial 2 lines*7 feet*24 plots= 336 High Tunnel 2 lines * 96 length*5 rows = 480 ft. drip line. \$140 for 1,000 ft irrigation system (\$0.14/ft)
 - 9 Side Wall Insect Netting: 4'x984' @\$312 (Dubois Agrinovation) = \$0.32 per foot
 - 10 Weed Barrier: Covered entire high tunnel
 - 11 Hortonova FG-79"x250' \$137.33 cost per foot \$.82 (Willsboro trial needed 168 ft)
 - 12 4h @ \$69 rototiller rental (Home Depot rate) to prepare soil for transplanting. Rate differs for tiller owners.
 - 13 \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 4 mo. Rate differs for land owners.
 - 14 \$605.33 for year rental only used for 4 months
- Washing, packing, and marketing costs will vary by operation.

MELON ENTERPRISE BUDGET: Sugar Cube Untrellised

			Price	Qty	Units	¹ Total cost Willsboro Trial	Cost/Plant Willsboro Trial	² # Plants 96'30' High Tunnel	Total Cost 96'x30' High Tunnel	Notes
Variable Costs	Bed Preparation and Transplanting	High Tunnel Preparation	15.00	6.00	hrs	90.00	0.94		90.00	
		Installing Netting Channels	15.00	4.00	hrs	60.00	0.63		60.00	
		Fertilizer Application & Rototilling	15.00	2.00	hrs	30.00	0.31		30.00	
		Seeding Melons	15.00	0.50	hrs	7.50	0.08	160	12.50	
		Seeds: 250 seeds at \$68.50	0.27	96.00	seeds	25.92	0.27	160	43.20	3
		Potting mix	4.99	4.00	qt	19.96	0.21	160	33.27	4
		Irrigating trays	15.00	1.00	hrs	15.00	0.16	160	25.00	
		Transplanting	15.00	1.25	hrs	18.75	0.20	160	31.25	
		50 cell plug flat 5 trays	16.55	1.00	cell trays	16.55	0.07	160	10.59	5
	Fertilizer and Sprays	Fertigation and irrigation	4.00	15.00	hrs	60.00	0.63		60.00	
		Dosatron Setup	15.00	0.50	hrs	7.50	0.08	160	12.50	
		Fungicide 1: Double Nickel	0.52	3.80	oz	1.98	0.02	160	3.29	6
		Fungicide 2: Cueva	0.45	1.30	oz	0.59	0.01	160	0.98	7
		Fungicide Spray Labor	15.00	2.75	hrs	41.25	0.43	160	68.75	
	Beneficial Insects	Bumblebees	484.57	1.00	hive	484.57	5.05		484.57	
		Aphidius colemani 1000	61.00	2.00		122.00	1.27		122.00	
		Lady Beetle	85.00	1.00	pint	85.00	0.89		85.00	
	Materials	Irrigation Line	0.14	336.00	ft	47.04	0.49	160	78.40	8
		Insect Netting	0.32	210.00		67.20	0.70	160	112.00	9
		Weed Barrier	0.89	192.00	ft	170.88	1.78	160	284.80	10
Harvest	Labor	15.00	3.58	hrs	53.70	0.56	160	89.50		
Total Variable Costs					1425.38	14.74		1737.60		
Fixed Costs	Tractor/Machinery	Tractor/Machinery	17.25	1.00	hrs	17.25	0.18		17.25	11
		Land Rent	139.00	0.07	ac	9.73	0.10		9.73	12
		High Tunnel	605.33	0.33	unit	199.76	2.08		199.76	13
	Total Fixed Costs					226.74	2.36		226.74	
TOTAL COSTS						1652.12	17.10		1964.34	
			Price/melon	Yield/plant	Unit					
Gross income			5.00	6.00	amount	2880.00	30.00	160	4800.00	
Net Income						1227.88	12.90		2835.66	

Crop terminated November 1

Labor/purchase for trial & full tunnel were the same due to need to prep entire tunnel. Adjust number down to use tunnel for multiple crops

Notes

- 1 Willsboro Trial: 24 plots with 4 plants per plot: Total 96 plants 2'x7' spacing
 - 2 High Tunnel Scenario: 30'x96', 4 beds, 2'x6' plant density
 - 3 250 Sugar Cube seeds in packet cost \$68.50
 - 4 Vermont Compost Fort Vee 20 qt @\$24.95, 4 qts per tray * 4 trays = 16 qts = \$19.96
 - 5 50 plugs per tray for 5 trays @\$16.55 or \$3.31 per tray or \$0.07 per plug hole
 - 6 Double Nickel \$167.95 (Forestry Distributing) for 2.5 gal (320 oz) = \$.52 per oz
 - 7 Cueva \$143.50 (Arbico Organics) for 2.5 gal (320 oz) = \$.45 per oz
 - 8 Trial 2 lines*7 feet*24 plots= 336 High Tunnel 2 lines * 96 length*4 rows = 768 ft. drip line. \$140 for 1,000 ft irrigation system (\$0.14/ft)
 - 9 Side Wall Insect Netting: 4'x984' @\$312 (Dubois Agrinovation) = \$0.32 per foot
 - 10 Weed Barrier: Covered entire high tunnel
 - 11 4h @ \$69 rototiller rental (Home Depot rate) to prepare soil for transplanting. Rate differs for tiller owners.
 - 12 \$139/ac/yr land rental. 2880 sq ft (0.07 ac) needed for 4 mo. Rate differs for land owners.
 - 13 \$605.33 for year rental only used for 4 months
- Washing, packing, and marketing costs will vary by operation.