

CUCUMBERS

Chia Fong Yang
Pheng Yang's Produce

Steve Pincus
Tipi Produce

Ray Cruz
Hartung Brothers Inc.

Location	Montgomery, MN	Evansville, WI	Madison, WI
Acres in Vegetables	10	38	10,000
Acres in Cucumbers	0.5	0.45	300 organic (700 conventional)

How these tasks are done for Cucumbers:

soil prep/tillage	with a walking tractor	with a tractor	with a tractor
transplanting	by hand	with a tractor	with a tractor
direct seeding	by hand	do not do this task for cucumbers	with a tractor
cultivating	by hand	with a tractor	with a tractor
spreading amendments	do not do this task for cucumbers	with a tractor	with a tractor
mulch laying	do not do this task for cucumbers	with a tractor	do not do this task for cucumbers
laying row cover	do not do this task for cucumbers	by hand	do not do this task for cucumbers
spraying for pests/diseases	by hand	with a tractor	with a tractor
harvesting	by hand	by hand	by hand & tractor
planting cucumbers	transplant and direct seed	transplant only	direct seed only
farming style	organic practices, not certified	certified organic	certified organic

Propagation

Varieties: Transplant	Eureka- Transplant from our green house. This is our first harvest to the market. We start these early in the green house because we want them early at the market.	1st planting- Diamondback and Bristol. Diamondback is a little earlier, we get about 2 pickings before Bristol starts. 2nd planting- all Bristol- good disease resistance, longer productive season	N/A
Varieties: Direct Seeding	Eureka and Fancy Pak. We like both of them.		Parthenocarpic / Seedless - pickling cucumber Bowie, Gershwin, Speed, Lennon



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Soil Mix	Grower Select M2 Soil mix	Our own mix; peat, vermiculite, perlite, Purple Cow activated compost, pasteurized soil, alfalfa meal, soy meal, Sustane 5-3-4, kelp, lime, bone meal, azomite, Rootshield Plus	N/A
Seedling Trays	128 seedling trays	50 cell 10x20 trays	N/A
Propagation Schedule	<p>Greenhouse Seeding with Eureka- May 10. The Greenhouse Seedlings Eureka will then be transported to the field around May 20. This is the first batch. We do not plant this a lot. We only need a small batch to begin and available to the market first.</p> <p>There is a time of small frost in May. This time is roughly around May 15th or a little before May 20th. We wait for the frost to pass, and we will plant the seeds in the field. Again, after the frost pass, we will also begin to transport the greenhouse seedlings in the field.</p> <p>After May 20th, we also begin to plant in our field.</p>	<p>2022- seed 5/5, transplant 5/19 w/cover; seed 6/1, transplant 6/24</p> <p>2021- seed 5/6, transplant 5/21 no cover (mistake!); seed 6/11, transplant 6/23</p> <p>2020- seed 5/6, transplant 5/22 w/cover; seed 6/11, transplant 6/29</p>	<p>May 15 - May 27 / June 1 - June 15 / June 17 - June 27 * for Wisconsin Production. Wisconsin Organic production direct seed window June 1- July 15th</p>
Greenhouse Seeding		We use our manual Seederman/woman. Use fingers to dibble holes; might make a dibble plate someday. No need for germ chamber; lay 1st planting on a bottom-heat g-h bench.	N/A
Germination	70-80 degree	Cukes are strong germinators, not fussy about temperature. 55+ nights, 80F days will work fine. We just lay flats on greenhouse benches. Expect 90-95% germ in 3-4 days.	N/A
Greenhouse Irrigation		By hand, as needed	N/A
Greenhouse Conditions		as soon as plants have their 1st leaf, we move them to a cooler better ventilated green house, or outdoors, if nights aren't too cold (>50F).	N/A
Hardening Off		Outdoors is best, but if too cool we toughen the plant by adding air movement with a directed fan.	N/A
Greenhouse Pests or Diseases		not really	N/A
Additional Notes		Don't let plants get too tall; transplant while young. Use small cells.	N/A

Bed Prep

Preceding Vegetable Crop		Not cucurbits. 1st planting generally goes into field that was used for late harvested crop like roots or brassicas.	Organic Sweet Corn, Seed Corn, or Soybeans - cucumbers are not planted more than twice in a single year on the same ground. We are on a four year crop rotation.
Preceding Cover Crop		2nd planting often goes into field that had a winter cover of rye/hairy vetch	Rye, Oats
Soil Amendments		about 600 lb/acre of Re-Vita Pro (Ohio Earth Food) applied when plastic mulch is laid	Cooked Chicken Pellets' - 700 pounds to the acre. Two applications for Machine Harvested fields & four applications for Hand Harvested fields.
Soil Prep	<p>Transplant: We tilt the field soil. When we transplant the cucumbers, we dug rows and gently put the greenhouse seedlings in the row. The rows are about 3-4 inches deep. This is also depend on how tall the greenhouse plants get. The deeper the plant is on the ground, the better it is. However, small plants will not need deep holes.</p> <p>Direct Seed: We till the ground. We use a feed planter to plant our seed. We use lines to help us measure and ensure the rows are straight.</p>	<p>Transplant: Final pass is usually with Perfecta field cultivator</p>	<p>Direct Seed: Moldboard plow with pull behind crosskill packer burial of cover crop and winter annual weeds Field Cultivator with sweep shovels and mounted rolling basket levels and preps soil for direct seeding 50 foot tine-weeder-removes weed seedlings prior to direct seeding Plant</p>
Mulch		Transplant: 4' wide plastic mulch. Green for 1st planting, black for later plantings. Low bed, about 3".	N/A

Planting

Bed Width		6 feet	Direct Seed: 25' pass, 10 Rows are 30" apart
Plant Spacing	<p>Transplant: 5 inches apart.</p> <p>Direct Seed: 3 feet between each row.</p>	Transplant: 1 row, 12" spacing	Direct Seed: Rows are 30" apart / plants are 6"-8" apart.
Planting		Transplant: Water wheel transplanter, plain water. Handle plants carefully, cukes are delicate.	Direct Seed: 10 row stackable Monosem vacum plate planter - .75'-1.25" deep
Amendments at Planting			Second application if chicken pellets' goes on about the 15th day after emergence.
Water at Planting	Any plant we transplant to the field, we would water it.	A single drip line is laid under the plastic mulch. Watering is started as soon as practical after transplanting is finished.	Center Pivot Irrigation, .5" of water is applied immediately after planting

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Row Cover		We currently use a single line of Covertan Pro-19 (0.56oz) over each mulched bed. Hand applied, held down by shovelfuls of dirt. We've tried other systems, but this is the most successful.	N/A
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Crop Maintenance

Irrigation	We only water when we transplant the green house seedlings to the field. We do not irrigate if we plant seeds in the field. We depend on the weather forecast for this. We keep an eye and read the weather forecast.	Irrigate through drip line. Once a week until blossoming, then increase to 2 or 3 times/week during harvest period. Cut back after heavy rains. Cukes thrive with lots of water while fruiting.	Every field has overhead center pivot irrigation - there is not a set watering schedule; we try to stay ahead of extreme hi temps and, natural rain events and monitor electrical coop peek power restrictions government regulated water restrictions. There are days where we are unable to water for up to 8 hours.
Changes to Irrigation			There is less water applied when crop has closed the rows. Beneath the canopy is very humid and is the perfect breeding grounds for disease.
Weed Control	We will tilt the rows and weed out by hands the weeds that are with the plants.	Tractor cultivation. Case-IH 265 with belly mount shanks and a disc to push soil back against the mulch edge. 1st pass just as the row covers come off, a 2nd pass about 8-10 days later as plants start to run off plastic. Sometimes a 3rd cultivation (different tool) to clean up the middles. Some hand work on the mulch edges and holes. Usually no hand weeding on 2nd planting.	Organic - Various tillage practices throughout crops' life - Hand weeding in-between plants with garden hoes before plants have enough canopy to drown out weed pressure. 50 foot full width tine-weeder after planting 25 foot tine-weeder with tines removed over row 25 foot row crop cultivator with or without finger weeder, depending on target weed species may have one or combination of shovel, sweep, or Danish tine Non-Organic - round up, post
Insect Pests	Mana Alias 4s (not approved for organic production)	Cucumber beetles, of course. Covering the 1st planting keeps them in check for weeks. More of an issue on 2nd and later plantings. Can cause scarring on the fruits. Pyganic or Entrust will knock them back.	Generally not an issue due to production time frame, seclusion of fields, lack of neighboring overwintering host crops, use of destructive machine harvesting
Diseases	Liquid copper for any plants with diseases.	Late plantings to extend season past late August item usually succumb to downy mildew and have never been worthwhile for us. Bristol cv is somewhat tolerant of DM.	Conventional only: Orandis for Downey

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Additional Notes		<p>Outdoor cukes need insect pollination to produce fruits. Many modern hybrids produce only female flowers (gynoecious) and are packaged with 10-15% male-flowering types to provide pollen. We pay a beekeeper to bring hives to our farm to aid pollination, although we do see plenty of small native bees and flies working the flowers. Don't know if the honey bees are necessary, but we grow 6 acres of cucurbits, and figure the cost is good insurance and probably adds yield. We have some plantings around the landscape to nurture native pollinators.</p> <p>Plants just wear down after 10-12 pickings. Likely a result of our cultivar choices and disease buildup and physical damage from harvest. Quality drops and it's time to move to a fresh planting.</p>	<p>Parthenocarpic / Seedless - pickling cucumbers do not require pollinators to produce fruit, machine harvest is one time destructive harvest so timing for optimum yield very important.</p>
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Harvest and Yields

Harvest Window	July through frost	<p>2022: 1st planting start 6/27, finish 7/25; 2nd planting start 7/27, finish 8/17</p> <p>2021: 1st planting start 7/2, finish 7/30; 2nd planting start 7/30, finish 8/13</p> <p>2020: 1st planting start 7/3, finish 7/29; 2nd planting start 7/27, finish 8/19</p>	<p>Non-Organic 6/26 - 7/10 * Organic 7/11 - 9/5 * Non-Organic 9/10 - 9/26</p>
Harvest Procedure	Hand picked, cukes are carefully snapped from the vine and place in a 5- gallon bucket. Buckets are carried and stored in shaded area.	<p>Harvest Monday, Wednesday, Friday, often in late mornings. Need creeper-gear tractor, large 4-wheel wagon, hydraulic powered harvest belt. 1 tractor driver, 1-2 people on wagon, 1- 2 people per row, to cover both sides (could be one when plants are small). Pull cukes of the right size off plants, put on belt, keep moving down the row. On the wagon, move cukes off belt into 1 bu. harvest baskets.</p>	<p>Custom built 6 row self-propelled mechanical harvester can harvest 1,200 bu. an hour at optimal yield. Hand Harvest is conducted with six -12 seater self propelled personnel carriers.</p> <p>Crop is harvested at fruit diameters:</p> <p>1 1/4" - 1 1/2" * 8% 1 1/2" - 1 3/4" * 50% 1 3/4" - 2" * 35%</p>

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Cleaning		Cukes go through a brush washer w/medium bristles, are graded and packed as they come through.	Cucumbers are flumed out of trailer into a 8,000 gallon concrete pit full of water - cucumbers are then taken up into grading facility via conveyor at 1,200 bu/hr. This is the only "rinsing / cleaning process". To bring pulp temp of cucumber down from 78 degrees to 42 we send boxes of product through a 60' tunnel that rains cold water onto box for 18 minutes. This could also be seen as a rinsing process.
Packing		35 lb black crates for CSA use, 25 lb boxes for wholesale.	Product is sized on an 18 chain Sormac Grader. Grader separates product into nine sizes and sorters discard crooked & broken (bi-product) onto separate conveyors. Cucumbers then fall into 60" cardboard boxes (42 bushels per box) - boxes are weighed, placed into hydro-cooling tunnel; end of tunnel feeds 9,600 cold room.
Storage		Into a 48-50F cooler, could be kept up to 2 weeks if plants are healthy.	Product enters cold room at 42 degrees and is then loaded onto trailer to be shipped to customer no more than 12 hours after grading.
Yields		2022- 1st planting=5.8 lbs/bd ft; 2nd planting=3.3 lbs/bd ft (12" spacing) 2021- 1st planting=3.0 lbs/bd ft; 2nd planting=2.2 lbs/bd ft (18" spacing) 2020- 1st planting=2.4 lbs/bd ft; 2nd planting=1.7 lbs/bd ft (18" spacing) All 6 plantings started with the same number of actual plants, +/- 5%	Organic Hand Harvest - 850 bu/acre Organic Machine Harvest - 260 bu/acre Non-Organic Machine Harvest (Illinois) - 270 bu/acre, 1 bushel = 50 lbs.

Equipment

General		Harvest belt (Nolt's) \$2400+shipping	Sormac Grading Equipment & Conveyor - \$1.2 million Hydro-cooling Tunnel - \$55,000 Building & Cold Room \$800,000
Biggest Impact		Harvest belt- stop dragging' those pails around! We use this belt for summer and winter squash, sweet corn, broccoli, cauliflower, cabbage	Second Grading Line - we were able to increase our bushels per hour and ensure product was sized accurately.

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Marketing

Markets	farmers market, wholesale through a distributor	CSA, direct to grocery	Pickling Processors
CSA		Cukes are usually in boxes for 8-10 weeks, 3 or 4/week, maybe 5 at peak season, fewer at beginning and end of harvest.	N/A
Farmers Market			N/A
Direct to Grocery		\$30.00/25 lbs	N/A
Wholesale to Distributor	\$22 for 20 pounds		N/A

