

Cucumbers



Chris McGuire
Two Onion Farm

Elizabeth Minich
Kings Hill Farm

Ariel Pressman
Seed to Seed

Location	Belmont, WI	Mineral Point, WI	Balsam Lake, WI
Acres in vegetables	4	10	12
Acres in FIELD Cucumbers	0	0.2	2
Area in HOOPHOUSE Cucumbers	2112 square feet	0	0

How these tasks are done for Cucumbers

field prep/tillage	do not do this task for cucumbers	with a tractor	with a tractor
hoophouse prep/tillage	with a tractor	do not do this task for cucumbers	do not do this task for cucumbers
transplanting	by hand	with a tractor	with a tractor
cultivating	by hand	by hand	with a tractor
spreading amendments	with a tractor	with a tractor	with a tractor
mulch laying	do not do this task for cucumbers	with a tractor	with a tractor
laying irrigation lines	by hand	with a tractor	with a tractor
laying row cover	by hand	by hand	do not do this task for cucumbers
pruning	by hand	do not do this task for cucumbers	do not do this task for cucumbers
trellising	by hand	do not do this task for cucumbers	do not do this task for cucumbers
spraying for pests, diseases, or weeds	by hand	with a tractor	with a tractor
harvesting	by hand	by hand	by hand
hauling harvested crop from the field	by hand	with a tractor	with a tractor
mowing residues	with a tractor	with a tractor	with a tractor
incorporating residues	with a tractor	with a tractor	with a tractor
farming style	certified organic	certified organic	certified organic

Propagation

Varieties	<p><u>Hoophouse:</u> Corinto - parthenocarpic, high yielding basic slicing cucumber. Seed is very expensive!</p>	<p><u>Field:</u> Marketmore 76 - Has produced well for us, even during bad years</p>	<p><u>Field:</u> Dasher II has been our most common variety. Pro: it has a very nice size and grows fast. Con: under almost any stress (especially transplant stress) it will produce small and misformed fruit that are not saleable Turbo: Just started using this variety - it has very vigorous plants that make very nice and long fruit. In both of our successions this year though the plants died off significantly quicker than our other varieties.</p>
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Soil Mix	Our own mix: compost, peat moss, vermiculite, soybean meal, kelp meal	Fort Vee from Vermont Compost Company	We use a standard green soil mix from Cowsmo with no additional additions.
Seedling Trays	3" soil blocks	72 cell plastic trays	We start all cucumbers in 72 cell flats with 2 seeds per cell
Propagation Schedule	<u>Hoophouse:</u> Seed 4/21, Transplant 5/3	<u>Field:</u> GH Seeding - 2017 was 4/18/17 main seeding, 5/19 second seeding. Transplant date 5/22/17 for main seeding	<u>Field:</u> We start our cucumbers somewhere around 3 weeks before transplant. For the first succession this usually means we start them mid may in 72 cell flats - then harden them off for 3-4 days before transplant. We aim to transplant in the field at the end of the first week of June to avoid the potential swingy whether that can happen at the end of May/start of June. We then start our 2nd planting about 4-5 weeks after the first seeding date and follow the same schedule.
Seeding	Sow 1 seed/block in 3" soil blocks.	We seed 2 seeds per cell in 72 cell flats in the greenhouse. Germ chamber is in the greenhouse. We don't thin, as we are looking for increased production in a moderate amount of bed ft. In April we keep the night time temps about 55-60F.	We don't do anything special with cucumbers - we seed the flats by hand and keep them under the same conditions as other plants. We find it is VERY important to give space between the flats as the plants grow - otherwise they will look fine but once they go out to the cold frame the plants will be spindly and ill suited for transplant
Germination	Hold 1 day in moist germ chamber at 85 degrees and then set trays out in greenhouse.	Depends on Spring temps. 2017 it was warm enough to germ in greenhouse without germ chamber. Germinate in the germ chamber. crock-pots for humidity & heat goal of about 75F, usually for about 48hrs or until I see one to 2 radicals per flat.	Nothing special - they pretty much always come up well
Greenhouse Irrigation	As needed, usually 1x per day for 15-60 minutes, usually in late morning, with automatic sprinkler system	Watering wand, 3x per day with spot watering as needed.	Overhead watering in the greenhouse same as all other plants

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Greenhouse Conditions	After germ chamber we hold cukes in greenhouse with max daytime temperature at 80-85 and nighttime temp around 60. Trays are laid on greenhouse floor, on landscape fabric, with bottom heat from hot water lines buried in sand beneath fabric. The water is heated in an electric hot water heater; the pump that circulates hot water is governed by thermostat. Ventilate greenhouse with rollup sidewalls and ridge vent as needed to keep temp below 85. Cover trays at night with row cover draped over wickets to maintain nighttime temps.	All seedlings are together so average daytime temps 70-80f and lows 55-60f. I try to keep them sorted to the middle of the gh where its warmest. It was a warm spring this year and temperature management in April / May was easy.	We don't do anything special. We try to keep the daytime temp around 80 or below during the day in the greenhouse and around 60 during the night.
Hardening-off	None	On tables outside of the greenhouse. Goal of one week before transplant date. Or depending on root & leaf development. Not protected, so occasionally have to bring all back in because of cold weather.	We move cucumbers into our cold frame 3-4 days before transplant - anything more than that seems unnecessary
Pests or Diseases in the Greenhouse	None	2016 we had issues with disease transfer from Styrofoam 72 cell flats to seedlings. No longer use Styrofoam flats because of difficulty of sterilizing.	None
Other Notes on Propagation		We have mice issues so we row cover all cucurbit seed trays until all seedlings are fully germinated	

Bed Prep

Preceding Cash Crop	<u>Hoophouse:</u> Tomatoes or fall spinach typically. No formal rotation in hoophouse. Try to have two year rotation with cukes one year and tomatoes the next.	<u>Field:</u> generally brassicas	<u>Field:</u> We do not have a specific crop in the field - but do try to go on a 3 year rotation to avoid pest and disease issues
Preceding Cover Crop	<u>Hoophouse:</u> None	<u>Field:</u> Pea oatlage mix, spring sown, about a month of growth.	<u>Field:</u> This really depends on weather conditions ect. We are pretty simple in our cover crop scheme and use almost only oats and peas

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Soil Amendments	<u>Hoophouse:</u> Compost 2-4" deep depending on what we have available.	<u>Field:</u> broadcast Chicken (poo) pellets 4/3/2, at the recommended rate from our soil tests which was 125# per acre N and 100# per acre Potassium	<u>Field:</u> We use a mix of composted pelletized turkey manure and micro nutrient blend from Cashton farm supply. I aim to add in around 120 - 150lb of N per acre for cucumbers,
Bed Prep	<u>Hoophouse:</u> Deep tillage with spring tine tiller in fall before planting, rototill before planting	<u>Field:</u> mow cover crop, disk in cover crop. till as final prep for plastic mulch laying	<u>Field:</u> We chisel plow, followed by discing, rototilling and then using a raised bed layer. The bed ends up being about 30" across and 4" high
Pre-Planting Mulch		<u>Field:</u> Black plastic mulch w/ drip tape, with rainflow plastic mulch layer. Straw mulch is applied between beds after transplanting.	<u>Field:</u> We use IRT (green mulch) for the first planting and black mulch for the 2nd. We apply using a rainflo raised bed plastic layer. Plastic mulch is incredibly important for good production. it reduces plant contact with soil and completely eliminates the need to damage roots when weeding plants. It also leads to a cleaner crop that has less mechanical and insect damage along with more leaf cover.

Planting

Bed Width	<u>Hoophouse:</u> Rows about 8' apart in 16' wide hoophouse, also grow them 1 row per caterpillar tunnel in 10' wide tunnels	<u>Field:</u> 4 feet	<u>Field:</u> 30 feet
Plant Spacing	<u>Hoophouse:</u> 1 row/bed; plants 16" apart in hoophouse but 24" in caterpillar tunnel (because trellis is shorter in caterpillar tunnel because height of tunnel is less than height of hoophouse)	<u>Field:</u> 1 row/per bed 12" spacing	<u>Field:</u> we plant two rows - 14" between cells - each cell has 2 plants
Transplanting Process	<u>Hoophouse:</u> lay tape measure down bed, set soil blocks on ground at appropriate spacing, dig holes with right angle trowel, set plants in, cover block, water with drip tape when done.	<u>Field:</u> Rainflow water wheel transplanter. Either 1-2 people riding, placing and covering root ball into spiked hole. We'll walk the line to check that root zone is completely covered and seedling aren't covered by plastic.	<u>Field:</u> The plastic mulch layer already lays plastic and drip tape. We then transplant 2 rows at a time using our rainflo water wheel. We make sure to use a ton of water that also contains a good amount of fish emulsion. We find it is very important to only plant good quality plants and to make sure they are well situated with the root ball completely buried.

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Water at Planting	<u>Hoophouse:</u> Crop is watered in with drip tape immediately after seeding	<u>Field:</u> enough water per spike to fill the hole.	<u>Field:</u> As much as possible applied through the water wheel
Mulch at Planting		<u>Field:</u> Straw mulch in between the plastic much for weed suppression after transplanting - depends on schedule when applied. With in 1-3 weeks Our fields are fairly sloped, we'd have straw binding up the transplanter if applied before transplant. We have manually spread small square and round bales. Both have pros and cons related to ease of application and how thick they can be applied.	
Row Cover	<u>Hoophouse:</u> We have used row cover over beds with hoops for 1-2 weeks if nighttime temperatures will be cold especially in past years when we transplanted cukes in mid late April; this is less of an issue with early May transplanting	<u>Field:</u> Agribon Row cover with hoops to keep off the plants immediately if timing allows. Main uses, heat to accelerate growth and reduce damage from cucumber beetles. Put in place manually, held down with red pins and dirt.	
Other Notes on Planting	<u>Hoophouse:</u> Damping off after transplanting is a problem; heavy compost applications seem to reduce the problem		

Crop Maintenance

Irrigation	<u>Hoophouse:</u> Irrigated through drip tape 2-3x per week for 3-5 hours to simulate 1 to 1.5 inches of rain/week.	<u>Field:</u> Drip tape irrigation under the plastic mulch, ideally weekly depending on rain accumulation. 2-4hrs	<u>Field:</u> We pretty much irrigate based on soil conditions and we irrigate through our drip tape - normally we try to irrigate for a longer period of time so we don't need to keep coming back.
Irrigation Modifications	<u>Hoophouse:</u> Less irrigation before flowering and also late in summer	<u>Field:</u> I do try to water more frequently in the weeks succeeding transplant. Once crop is established and producing fruit, no more than once a week unless extremely dry. Our clay soil holds moisture well.	<u>Field:</u> Not especially - we usually need to start irrigating more once it gets really hot and the plants have started fruiting.

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Trellising & Pruning	<p><u>Two Onion - Hoophouse:</u> The trellis is 7.5' t posts with 6 horizontal wires about 10" apart. (In caterpillar tunnels, we use shorter trellis with 4 wires, but principles are the same). The first plant in the row is trained upward until it reaches the first wire and then bent down and kept clipped to that wire thereafter. 2nd plant upward to the 2nd wire, then bent over and clipped to that one as it grows, third plant to the third wire, etc. 7th plant will go the first wire again, 8th plant to the 2nd wire, etc. We remove all branches and use plastic tomato clips to clip vines to wires. We also will deleaf vines later in the summer, removing old leaves from a vine where the next plant on that wire catches up to it and overtakes it on the wire, so that two leafy vines will never overlap. Vines on the 1st, 3rd, and 5th wires go one direction, say left, and vines on the other wires go the other direction. When a vine on the 1st wire reaches the end of the row, it gets trained up to the 2nd wire and starts going back in the other direction. When a vine on the 2nd wire reaches the end, it gets trained down to the first wire and reverses direction. 3rd and 4th wires make the same loop, and 5th and 6th as well. So you never run out of space on the trellis... Pruning and leaf removal keep things organized for easy harvest and also minimize self-shading which will sooner or later reduce flowering and fruiting.</p> <p>We work the vines once per week but every 4-5 days would be better in early summer. About 3-4 hours/week required for 240' of row (180 plants) for about 9-10 weeks.</p> <p>In late summer, we stop all pruning and leaf removal and just let the vines go for one huge final hurrah of fruiting (7/26 was last pruning in 2017; in other years we have gone on 1-2 weeks longer). Many side branches will grow at this point and yield heavily. Harvest gets more time-consuming because of crazy vine growth, and self-shading of vines would eventually reduce yield but it's okay for a short time before the end of the season.</p> <p>This is quite time consuming, so I am not sure it is worth it, but production can be maintained for a long time with insect control. Foliar disease eventually takes a toll in some years.</p>		
Weeding	<p><u>Hoophouse:</u> Hoe and hand weed</p>	<p><u>Field:</u> I try really hard not to weed cucumbers. We will go through by hand and top tall weeds getting through the straw much or plastic to keep harvest easy. Cucumbers usually grow quickly enough to out compete weeds trying to come through the transplant holes. Main weed issue is in the walk paths which I have utilized a weed-whip for.</p>	<p><u>Field:</u> Because all of our plants are in plastic mulch most of our cultivating happens on the edges of the plastic. We normally need to weed using our Kress cultivator along the edges of the plastic twice for each planting. We also usually need to hand weed out the plant holes 1-2 times per planting.</p>

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Insects & Pests	<p><u>Hoophouse:</u> Cucumber beetles are main problem because of fruit scarring and bacterial wilt. We try to exclude them with insect netting over all openings in hoophouse but if/when they get in we spray with pyganic regularly, at dusk, with citric acid in tank to reduce ph. Occasional problems with squash bugs but pyganic controls them as well.</p> <p><u>Caterpillar Tunnels:</u> We have tried covering whole tunnel with insect netting and another layer of plastic over that. We lift up plastic to vent but leave insect netting down all the time. We have also just used a single layer of row cover over an entire tunnel which did not provide as much early season warmth as netting+plastic but was much more comfortable in hot summer weather and the vines under row cover had less powdery mildew.</p>	<p><u>Field:</u> Cucumber beetles. Row covering seedlings until first flower helps the most. If populations are aggressive and damaging, will spray pyganic</p>	<p><u>Field:</u> Cucumber beetles - we use a clay solution on young transplants to reduce feeding but don't have a very good solution for later season issues.</p>
Diseases	<p><u>Hoophouse:</u> Bacterial wilt whenever cucumber beetles are present. Otherwise powdery mildew late in summer.</p>	<p><u>Field:</u> Late season powdery mildew. Let run course, end of cucumber season anyway.</p>	
Other Notes on Crop Maintenance	<p><u>Hoophouse:</u> Rollup sidewalls for ventilation basically all the time in summer except for during thunderstorms. Still gets pretty hot in there but this does not seem to effect fruitset. No shade cloth.</p>	<p><u>Field:</u> 2017 we had a lot of rain during the fruiting development of the cucumbers, as a result needed a limited amount of irrigation for cucurbits.</p>	

Harvest and Yields

Harvest Window	<p><u>Hoophouse:</u> Six days per week until yield declines enough to make it not worthwhile to pick 2017 (hoophouse): 6/12-10/5 2016 (caterpillars): 6/9-9/29 2015 (hoophouse): 6/7-9/2</p>	<p><u>Field:</u> First to second week of July through beginning of September</p>	<p><u>Field:</u> Normally first planting starts harvest around Middle of July. We finish harvesting the 2nd planting around mid September</p>
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Harvest Procedure	<p><u>Hoophouse:</u> Clip with pruners and place in vented harvest crate, place full crates in shade. Transport to packing shed in hand cart or on tractor bin</p>	<p><u>Field:</u> Harvest 3 days per week M/W/F, Mondays & Fridays harvest is first thing in the AM. (as part of zucchini harvest) Cucumbers popped or snapped off vine. Those that are not good at this can use a knife. Cucumbers are harvested into shopping baskets, full baskets are transferred into crates at the pickup truck before transport back to pack shed. Cucumbers are initially culled for quality in field during harvest. Making sure to harvest and chuck imperfect fruits to encourage more fruiting.</p>	<p><u>Field:</u> We harvest by hand twice per week into 5 gallon buckets which we then dump into 1 3/4 bu green bins that are placed on a hay wagon for transport back to the pack shed.</p>
Cleaning	<p>Soak in tub of water. Wash by hand in tub or in brush washer, depending on number of cukes and whether brush washer is being used for something else that day. Need to knock off old blossoms with fingers when setting fruit into brush washer. Count fruit during washing.</p>	<p>Brush washed and counted for CSA. Not immediately washed after harvest. Washing is more for ease of sorting out seconds and counting vs. need for cleaning.</p>	<p>We clean all cucumbers using our 18" brush washer line.</p>
Packing	<p>For storage for 1 day, place in vented crates; stack crates and cover with plastic bag. For longer storage, place in individual boxes with plastic liner bags</p>	<p>Cucumber are placed back into crates after washing. We don't cover.</p>	<p>After brush washing cukes are placed directly in 5/9th bushel boxes that are weighed to 20lbs. Our 2nds cucumbers are placed in 3/4 bushel boxes so we can keep them separated.</p>
Storage	<p>55 degrees up to 3-4 days before packing in CSA boxes</p>	<p>Cucumbers are stored in our 'warm' cooler at 55F immediately after harvest is brought in. They keep for about 7 days before quality starts to decrease. Ideally cucumbers harvested Monday & Wednesday ship with CSA & Wholesale on Thursdays, and Friday harvest ships with Tuesday wholesale.</p>	<p>We keep them in our walk in cooler that under the area containing the fans as that is the warmest area in the cooler - it is normally around 38-40 degrees. Cukes seem to keep well for at least a week - but we try to move them 3 days after picking.</p>

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Yields	2017 <u>Hoophouse</u> : 65 fruits per plant total for year 2016 <u>Caterpillar</u> tunnels: 45 - cuc beetles in some of the tunnels 2015 <u>Hoophouse</u> : 26 - cuc beetle devastation 2014 <u>Hoophouse</u> : 58	Field: 6.77# per bed ft. for 2017 season	Field: We average about 20,000lbs per acre of #1 quality product. This is over a 3-4 week picking window for each crop. There are probably around another 10,000lbs of #2 quality fruit picked as well per acre
Other Notes on Harvest & Yield	Control the cucumber beetles for good prolonged yield.		

Marketing

Markets	CSA	CSA, direct to grocery, direct to restaurant	direct to grocery, wholesale through a distributor
CSA	In 2017, standard and large boxes received cukes for first 17 weeks of the 20 week season; mini size boxes received them about 2 of every 3 weeks during that season. Portions vary with yield, but we like to have 3-4 per large box, 2 per standard and 1 per mini.	Goal is 2 for small share 4 for large share. This varies as the harvest season goes. Maximum that I'll comfortably hand out is 4-5 small share, 6-7 lg share with a refrigerator pickle recipe.	
Farmers Market Prices		past years we've sold for \$1 per #	
Direct to Grocery Prices		20# case, wax box (5/9's) \$1.25/lb Mindful of shape, size, and cucumber beetle damage.	
Direct to Restaurant Prices		20# case wax box (5/9's) Depending on the restaurant I will do special grading for them depending on circumference preferences. Always mindful of cucumber beetle damage. \$1.25 per/lb	
Other Markets			Cases are all 20lbs and price varies between 1.10/lb and 1.50/lb