

Tomatoes



Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Location	Jefferson, WI	Altura, MN	Delavan, WI
Acres in vegetables	2	8	18
Acres in FIELD Tomatoes	0.25 acre	0.25	1/3 acre
Area in HOOPHOUSE Tomatoes	0.05 acre	7000 square feet	1440 square feet
How these tasks are done for Tomatoes			
field prep/tillage	with a walking tractor (BCS, Troy-bilt, etc.)	with a tractor	with a tractor
transplanting	by hand	with a tractor	by hand
cultivating	with a walking tractor (BCS, Troy-bilt, etc.)	with a tractor	by hand
spreading amendments	by hand	by hand	with a tractor
mulch laying	by hand	with a tractor	with a tractor
laying irrigation lines	by hand	with a tractor	with a tractor
laying row cover	by hand	by hand	
pruning	by hand	by hand	by hand
trellising	by hand	by hand	by hand
spraying for pests, diseases, or weeds	by hand	with a tractor	with a walking tractor (BCS, Troy-bilt, etc.)
harvesting	by hand	by hand	by hand
hauling harvested crop from the field	by hand	by hand	by hand
mowing residues	with a walking tractor (BCS, Troy-bilt, etc.)	with a tractor	with a tractor
incorporating residues	with a walking tractor (BCS, Troy-bilt, etc.)	with a tractor	with a tractor
farming style	certified organic	certified organic	certified organic

Propagation

Seed Treatments	N/A	none	
Grafting	No. We have tried it with limited success and didn't see noticeable improvements on successful grafts.	No. I tried to graft tomatoes one time and didn't have much luck and never took the time to try again. I may in the future.	No, didn't have much luck with yield differences or good enough graft taking results to put the time and expense into it
Hoophouse Varieties	Margold, Great White	<u>Hoophouse:</u> Same as field <u>Greenhouse:</u> Rebelski, Favorita, and Sun Peach.	Big Beef, San Marzano or Tiren, Sweet 100's, Brandywine, Green Zebra, Striped Roman and Striped German

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Field Varieties	<p>Cherries: Black Cherry, Esterina, Indigo Cherry Drop, Indigo Kumquat, Isis Candy Cherry, Pink Bumble Bee, Purple Bumble Bee, Sakura, Sun Gold, Sunrise Bumble Bee, White Cherry, Yellow Mini</p> <p>Heirloom Mix: Aunt Ruby's German Green, Aussie, Black Krim, Carbon, Chef's Choice Orange, Cherokee Purple, Cosmonaut Volkov, Costoluto Genovese, Crnkovic Yugoslavian, German Johnson, Great White, Green Zebra, Margold, Martha Washington, Moonglow, Mortgage Lifter, Nebraska Wedding, Pantano Romanesco, Paul Robeson, Pierce's Pride, Pink Boar, Prudens Purple, Red Pear var. Franchi, Striped German, Tasty Evergreen, Valencia, Yellow Brandywine, Zapotec Pleated</p> <p>Slicers: Big Beef, Pink Beauty, Wisconsin 55 Roma/Paste: San Marzano Redorta</p>	<p>Mostly heirloom varieties including but not limited to Rose, Cherokee Purple, Copia, Italian Heirloom, Gold Medal and Anna Russian.</p>	<p>Pony Express: processing Slicers: Big Beef, BHN 589, BHN 871 Cherries: Sweet 100's, Bumble Bee, Indigo Cherry Heirlooms: Brandywine, Green Zebra, Striped German, Striped Roman, Indigo Roma Type; San Marzano, Tiren, Devils Horn Salad: Early Girl</p>
Soil Mix	<p>Vermont Compost Fort Vee, which we top with a solid layer of coarse vermiculite to prevent algae growth and promote moisture retention.</p>	<p>We have a special mix made for us by Mississippi Topsoil containing compost and aged rice hulls.</p>	<p>Vermont Compost Fort V</p>
Seedling Trays	<p>50-cell 1020s throughout</p>	<p>We start seeds in 50 and 72 cell trays. Field tomatoes may be potted up to #4 pots if we can't get them into the field right away.</p>	<p>Seeded in open black plastic 1020 flat, up potted to 50 black plastic cell trays 1st or 2nd true leaves, Hoop House transplants up-potted to 2"x 3" black plastic pots</p>
Propagation Schedule	<p><u>Field:</u> Seed 4/13 and 5/1 for 5/15 and 6/1 plantings</p> <p><u>Hoophouse:</u> Seed 3/12 for 4/15 planting</p>	<p><u>Field:</u> End of March. We try to transplant directly from the trays if possible in mid May.</p> <p><u>Hoophouse:</u> End of January to be transplanted directly into the hoophouse in mid March.</p> <p><u>Greenhouse:</u> End of June to be transplanted the end or July to mid August. These are also transplanted directly from the flats that they are started in.</p>	<p><u>Field:</u> Sow: 4/18 UP: 5/2 TP 5/31</p> <p><u>Processing Toms:</u> Sow: 5/1 Up: 5/16 TP: 6/13</p> <p><u>Hoophouse:</u> Sow: 3/14 UP: 4/4 TP: 5/2</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Germination	We place a space heater in one of our walk-in coolers and keep it in the low 80s. We place humidity domes over the flats until we bring them out to the greenhouse. We take them out as soon as we see the first sprouts coming up	<p><u>Field & Hoophouse:</u> tomatoes are seeded and germinated in the all season greenhouse where the daytime temperatures range from 70 to 85 degrees during the day to no lower than 60 degrees at night. After they emerge they are transferred to a slightly cooler greenhouse where the temperatures range from 60 to 75 degrees during the day and no lower than 55 degrees at night.</p> <p><u>Greenhouse:</u> Tomatoes are seeded and kept in the all season greenhouse until transplant.</p>	Germ Chamber 85 degrees or heat mats all done in greenhouse
Greenhouse Irrigation	Overhead watering once a day in the morning, possible additional spot watering as needed. Sometimes less in cloudy weather.	Newly seeded flats are bottom watered in a flood tray initially. After that they are top watered with a spray wand when the surface of the medium begins to dry.	We use a wonder wand in the early stages of development and then use a higher volume wand once they are up potted. When in germ chamber, doesn't require any additional watering other than watering in the sowing. Once out of the chamber they are put on heat mats until 1st or 2nd leaves and requires daily watering with wonder wand, once up potted it depends on sun and warmth but could be once a day until canopy begins to touch then up to twice/day if sunny
Greenhouse Conditions	We keep our greenhouse above 55F with a 45K BTU Hot Dawg heater, and below 85F by opening doors and roll-up sides as needed. We also have standalone fans for air circulation (not endwall vent fans)	Greenhouse temperatures are around 70 to 85 degrees during the day and no later than 50 degrees at night. Humidity is kept at around 85%, lower after emergence when they are transferred to a cooler house.	We use germ chamber and heat mats to get extra warmth so that we stay on schedule for growth rates, otherwise our GH thermostat is set at 58 degrees for all crops and ventilation (exhaust fan and side curtain vents to keep GH as close to 70-75 during the day.
Hardening-off	We place our flats on a hardening off table adjacent to the greenhouse at least a week before planting, weather permitting.	<p><u>Field:</u> Flats go into an open ended walk in cold frame for a few days and then outside to sit in their flats for a couple more days.</p> <p><u>Hoophouse:</u> Flats are set in the hoophouse for a few days before transplanting.</p> <p><u>Greenhouse:</u> No hardening off needed because they are planted right into the greenhouse they are started in.</p>	At least one week prior to transplanting or as soon as they are 4-5 inches tall or if it's really warm to slow them down

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Pests or Diseases in the Greenhouse	N/A	Our biggest problem is mildew. Keeping good air movement with the use of fans and periodic spraying of Milstop generally help to keep that at bay.	Never
Other Notes on Propagation			We spread trays out so that there is room all around each flat to give them more space and minimize stretching. If too much stretching, we get them outside.

Bed Prep

Preceding Cash Crop	<p><u>Field:</u> We rotate our fields in 4 sections roughly divided by family. It depends on the year, but everything eventually.</p> <p><u>Hoophouse:</u> Cucumbers, Greens</p>	<p><u>Field:</u> Brassicas or carrots may precede field tomatoes but we try to plant them directly after a cover crop.</p> <p><u>Hoophouse:</u> A variety of lettuces and greens or beans and cucumbers may precede the tomatoes. Greenhouse tomatoes are now planted in bags so it is always tomatoes in that house. We used to alternate sides of the house between tomatoes and beans and cucumbers but had to eliminate the beans and cucumbers because they attracted more pest and disease.</p> <p><u>Greenhouse:</u> Tomatoes in the greenhouse are planted into 7 gallon bags and the soil is changed each year.</p>	<p><u>Field:</u> 2010-15: Our tomatoes followed our allium/umbel crops. In 2016-17, we expanded our field from a winter lot for cattle to vegetables and the processing tomatoes were in new ground (2017) and the field tomatoes were in a newer field following cucurbits (not a crop I would favor but just worked out this way but as we adjust rotations, I'll go back to following alliums and umbels.)</p> <p><u>Hoophouse:</u> Spinach, radishes and or arugula</p>
Preceding Cover Crop	<p><u>Field:</u> Clover plus a nurse crop, buckwheat.</p> <p><u>Hoophouse:</u> Clover, buckwheat</p>	<p><u>Field:</u> I like to follow winter killed oats and peas. This year we planted a multi mix cover of corn, soybeans, milit, and buckwheat which we knocked down in August and followed with a seeding of oats and peas.</p> <p><u>Hoophouse:</u> We generally do not plant many cover crops in the hoophouse but try to plant and incorporate plenty of beans and peas. We will also periodically blow in chopped hay or straw to till into the soil for added organic matter.</p>	<p><u>Field:</u> Typically Winter Rye</p> <p><u>Hoophouse:</u> oats or rye</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Soil Amendments	<p><u>Field:</u> Chikity 4-3-2 @40#/100', KSul (5#/100'), Soft rock P (10#/100'), Purple Cow compost (6"x1" band). We have fairly low P and K in our soils and benefit from additional minerals. <u>Hoophouse:</u> Same as field, but more compost (12"x1" band)</p>	<p><u>Hoophouse:</u> We will incorporate either Midwest BioAgs Veggie Sol with Veggie Plus or Sustains 4-6-4. These are applied at label rates. Some Quick Lime (calcium carbonate) or gypsum may also be added. These are used to boost and replace nutrition in the plants, especially needed when the plants start fruiting. <u>Greenhouse:</u> We use the same amendments in the compost/aged rice hull mixture for the greenhouse tomatoes in bags. These will be side dressed regularly during the life of the plant with regular additions of soluble calcium and potassium as these plants generally will in place for 10 months.</p>	<p><u>Field:</u> Midwest BioAg - Veg+ 300#/Ac, Veg Sol 600#/Ac, Manure/Pen Pack 10 ton/Ac +/- Soil testing and "rule of thumb" on the Midwest BioAg Products, Manure is full of organic matter. <u>Hoophouse:</u> Veggie Sol 600#/Ac, Calcium (SuperCal SO4) 500#/Ac</p>
Bed Prep	<p><u>Field:</u> Tillage 1-2 weeks prior, ideally twice, with a Grillo-mounted 31" rotavator. Possible additional duck-foot cultivation (Aldo Biagioli ET-5 for Grillo) as needed. Looking for a relatively clean bed with minimal weed presence, and good tilth for hand planting. <u>Hoophouse:</u> Tillage 1-2 weeks prior with a Grillo-mounted 31" rotavator.</p>	<p><u>Field:</u> Cover crops are disced in when it's dry enough to get into the field and then tilled a week or two later with a 60 in tractor tiller. <u>Hoophouse:</u> The soil is worked with a rear tine walk behind tiller leaving paths untilled. These are periodically wheel-hoed to eliminate weeds. <u>Greenhouse:</u> The floor of the greenhouse is covered with a white 20 year weed barrier with bags placed directly on the barrier.</p>	<p><u>Field:</u> Spread fertility, Roto-Till fertility along with cover crop. Roto-Till individual beds for plastic mulch. Lay plastic along with dbl drip tape. <u>Hoophouse:</u> We use hand rototiller to incorporate residues from previous plantings and shape the beds by hand using shovels and rakes. We want a uniform bed preparation so that water can seep evenly when irrigated and that plastic lays smoothly without clods poking through and that the beds are in line with the string lines above.</p>
Pre-Planting Mulch	<p><u>Field:</u> We rarely, but occasionally use landscape fabric in areas with perennial weed issues (quackgrass in particular). <u>Hoophouse:</u> N/A</p>	<p><u>Field:</u> We lay a red plastic mulch with a bed shaper mulcher for weed control, moisture retention and soil warming. The beds are also raised about 8 inches for drainage. <u>Hoophouse:</u> We will sometimes add a layer of straw mulch by hand to the hoophouse tomatoes to help control weeds and keep even soil moisture. <u>Greenhouse:</u> Tomato bags are left open for airflow and evaporation.</p>	<p><u>Field:</u> We grow our tomatoes on black plastic to minimize weeds and rain splash for disease prevention. We use a buckeye plastic mulch and drip tape layer. <u>Hoophouse:</u> We use black plastic mulch for weed control and water retention and is hand layed with drip lines under.</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Other Bed Prep Notes			<p><u>Field:</u> We want to be sure the calcium and potassium are adequate for tomatoes.</p> <p><u>Hoophouse:</u> If there is really cold weather below freezing, we will cover with row cover to protect from frost damage.</p>
----------------------	--	--	--

Planting

Bed Width	<p><u>Field:</u> 30"</p> <p><u>Hoophouse:</u> 30"</p>	<p><u>Field:</u> 2'</p> <p><u>Hoophouse:</u> 3'</p>	<p><u>Field:</u> 5'</p> <p><u>Hoophouse:</u> 2'</p>
Plant Spacing	<p><u>Field:</u> 1 row/bed, 16" between plants, 4' between rows</p> <p><u>Hoophouse:</u> Same</p>	<p><u>Field:</u> 1 row/bed, 24" between plants, beds are 6 foot on center.</p> <p><u>Hoophouse:</u> 1 row/bed, 24" between plants, one foot paths between 3' beds.</p> <p><u>Greenhouse:</u> Plants are placed 18" apart, two rows per bed with the plants staggered and the rows 18" apart. Paths are 2'.</p>	<p><u>Field:</u> 1 row/bed, 18" between plants 3' between rows and 5' aisle every two beds</p> <p><u>Hoophouse:</u> 2 rows/bed 24" apart staggered 2' paths between beds</p>
Transplanting Process	<p>We place drip tape down the center of the bed slightly off to one side (consistent through the field) and turn it on. We use 16" pieces of wire to measure and make dibbles by hand (with a wooden dibbler). Usually one person is dibbling and 2-3 people are following behind with plants. One person dropping, and the other(s) pushing them into the soil.</p>	<p><u>Field:</u> Planted with a water wheel transplanter. Plants are placed in the ground by hand as deep as possible with the water from the transplanter pulling soil around the root balls. We try to help pull some soil around the plant as much as possible from the transplanter. Plants are then soaked thoroughly with drip irrigation.</p> <p><u>Hoophouse:</u> Tomatoes are planted by hand with a hole being dug with a hoe, plants placed as deep as possible (up to the first true leaves on small transplants, deeper with larger transplants) and tucked into the soil by hand. Plant distances are measured with an appropriated length of lath down the center of the bed. Plants are then soaked thoroughly with drip irrigation.</p> <p><u>Greenhouse:</u> Tomatoes are transplanted by hand directly into the 7 gallon bags as deep as possible. Plants are soaked thoroughly with orchard tubing and spike emitters.</p>	<p><u>Field:</u> We plant our tomatoes with the water wheel transplanter single 18" spacing wheel</p> <p><u>Hoophouse:</u> We hand transplant</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Fertility at Planting	N/A		<u>Field:</u> Compost 20 yds/acres is applied using wheel barrels and shovels
Water at Planting	Drip irrigation immediately at least 1" equivalent.	<u>Field & Hoophouse:</u> Plants are soaked thoroughly with drip irrigation. <u>Greenhouse:</u> We use orchard tubing with spike emitters to thoroughly soak the transplants.	<u>Field:</u> The water wheel waters automatically fills the hole We get 160 gallons for every 400 row ft.
Mulch at Planting	N/A	If used in the <u>hoophouse</u> straw mulch is added within a week to help keep down weeds and keep soil moisture even. Drip tape is placed on the soil prior to mulching.	<u>Field:</u> We use a living mulch in the aisle typically winter rye and put down as soon as the black mulch is laid.
Row Cover	We don't row cover our tomatoes except for frost protection. Because we have had late frosts, we do avoid putting in t-posts for trellising until June 1st in case we do need to cover them.	<u>Field:</u> Row cover may be used if temperatures threaten to drop too low and will be placed by hand directly on the plants and secured with soil. <u>Hoophouse:</u> if we do not run additional heat up to three layers of row cover may be placed over plants with hoops so the cover does not touch the plants. There is no need to secure the edges in the hoophouse. <u>Greenhouse:</u> Temperatures are controlled so it is not necessary to use cover.	<u>Hoophouse:</u> Only use floating row cover if needed in an emergency.

Crop Maintenance

Irrigation	<u>Field:</u> Roughly 1"/week as needed, ideally heavier and less frequent earlier in the season. We have very well drained soil and need to irrigate even during wet periods sometimes. We have very low flow in our field (4-5 GPM), so we use low-flow drip tape (.22GPM/100') to maximize the number of beds we can water at once (~18x200' beds for 18-24 hours) <u>Hoophouse:</u> We irrigate more heavily in the hoophouse since we have lighter soils, but generally once a week to simulate 1.5-2" of rain	<u>Field:</u> Drip tape is placed under plastic mulch at the time of bed forming and will be run once or twice a week for up to 6 hours to keep soil moist. If there is a severe lack of rain the drip may be left on over night. <u>Hoophouse:</u> Drip irrigation is used in the hoophouse watering twice a week, time depending on amount of sunshine and temperatures. Usually 4 to 5 hours. <u>Greenhouse:</u> Tomatoes are watered from 1/2 hour to one hour twice a week depending on conditions.	<u>Field:</u> Tomatoes receive 1" of irrigation or water per week. 6hrs = 1" <u>Hoophouse:</u> We use drip irrigation 1" per watering. 8hrs = 1" of water. Usually per week
------------	--	--	--

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Irrigation Modifications	<p><u>Field:</u> We start irrigation on the morning of a harvest day to avoid split fruits. We generally decrease irrigation as the season progresses.</p> <p><u>Hoophouse:</u> Generally decrease as the season progresses.</p>	<p><u>All:</u> We try to keep on an as even a schedule as possible to avoid fruit cracking. This is for field, hoop, and greenhouse. Field tomatoes may be stopped when plants slow production in fall.</p>	<p><u>Field:</u> We back off at harvest or ripening but still try to maintain an inch every 10-14 days</p> <p><u>Hoophouse:</u> No change</p>
Trellising	<p><u>Field:</u> We basket weave all tomatoes with 6 or 6.5' t-posts every 4-5 plants. We wire attach 3' wooden stakes on top of the t-posts for our cherry tomatoes, and trellis as high as we can reach.</p> <p><u>Hoophouse:</u> Same as field.</p>	<p><u>Field:</u> Tomatoes are trellised using a modified basket weave with t-posts every 4 to 5 plants for all tomato types. The weave is done with tomato twine or plastic baling twine to prevent rotting and breakage.</p> <p><u>Hoophouse:</u> Tomatoes are trellised using a modified basket weave with t-posts every 3 to 4 plants.</p> <p><u>Greenhouse:</u> All plants are secured to tomato twine with tomato clips. Thirty foot lengths of twine are wound around tomato hooks and hooked on to cable secured 9 feet above from the rafters.</p>	<p><u>Field:</u> We use the Florida weave technique. 4 - 5' t posts or oak posts every 3rd plant and always have t-posts at the ends of the beds.</p> <p><u>Hoophouse:</u> We use the two leader system in the greenhouse. We begin by attaching the two strings to the base of the plant when the plants are about 8-10" high or when the first leader begins to form. The second string gets attached to the second leader (first sucker after the first flowering bract) as soon as it's big enough to attach the string. Supports are added every ft and all other suckers are removed.</p>
Pruning	<p><u>Field:</u> No pruning</p> <p><u>Hoophouse:</u> No pruning</p>	<p><u>Field:</u> Only if the foliage is so heavy that it keeps the fruit from ripening. Then only as much foliage is removed as needed to allow light penetration without causing sunscald. This is usually done quite late in the season.</p> <p><u>Hoophouse:</u> Only if there is excess foliage and fruit need some light.</p> <p><u>Greenhouse:</u> All suckers are removed. Fuits in excess of 4 on a truss are removed. All bottom leaves are periodically removed leaving approx. 15 leaf sets (4' to 5') on the plant. When the plants reach the cable, the twine is unrolled a couple of feet and the hook is moved down the cable 18" to 24", thus dropping the plant down a couple of feet and leaving it growing at an angle. Pruning is done on a weekly basis with dropping done approx. every 2 weeks.</p>	<p><u>Field:</u> No pruning</p> <p><u>Hoophouse:</u> Using the two leader system, we prune the suckers as often as we are able.</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Weeding	<p><u>Field:</u> 12" wheel hoe blade on either side of the plants as needed (2-3x), with stand-up diamond/triangle or hand hoes for in-row. We have experimented with pre-transplant smothering with landscape fabric with some excellent success, but it depends on conditions. Early season smothering needs at least 6 weeks, and established quackgrass will not be killed in that timeframe. <u>Hoophouse:</u> Same as field</p>	<p><u>Field:</u> Since they are on plastic mulch only the holes need to be hand weeded when the plants are young. As they grow and cover the holes only post holes need weeding. Paths are tractor cultivated or mowed. <u>Hoophouse:</u> Weeding is done by hand directly around the plants and any weeds in the mulch. A scuffle hoe is used to clean up around the mulch and a scuffle hoe or a wheel hoe is used to clean up the paths.</p>	<p><u>Field:</u> Spot weed in holes approximately 4 weeks after planting and rogue as needed. Weed whip plastic mulch edges about 3-4x per season depends on how much rain we get. <u>Hoophouse:</u> We hand weed in the holes as often as needed and weed the periphery about once or twice per season this is usually by digging out quack grass or thistle creeping in from the outside.</p>
Insects & Pests	<p><u>Field:</u> Tomato hornworms are the only major pest – we go out in the night or early morning with UV lights and handpick. 1-2 rounds result in excellent control. We also leave any parasitized caterpillars in the field. <u>Hoophouse:</u> Same as field</p>	<p><u>Field:</u> We usually do not have many pest issues on the field tomatoes with the exception of the occasional mouse or vole that find the most perfectly ripe fruit. <u>Hoophouse:</u> We do not usually have too many insect problems in the hoophouse.</p>	<p><u>Field:</u> Our pests are horn worms and tomato fruit worms we use BT <u>Hoophouse:</u> Horn Worm and Tomato Fruit Worm; BT sprayings about 3x per season.</p>
Diseases	<p><u>Field:</u> We spray EF400 on a 7-10 day schedule starting in late June, or when late blight is reported. If late blight is in the area, we increase the ratio of EF400 and spray every 4-5 days. If late blight is present on the farm, we add peroxide to the spray. We scout while spraying, and also harvesting (every 2 days). All employees are trained on recognizing diseases. If we have late blight, employees must not wear the same clothing from day to day, and we sanitize boots. Recently, early blight and septoria have been our other major diseases. We have had bacterial canker in parts of the tomato patch, and we pick those areas last. We use drip to avoid wetting the foliage and may experiment with straw mulch to reduce soil splash. <u>Hoophouse:</u> We have far fewer disease issues in the hoophouse, just grey mold. We have 6' roll up sides and tall doors that we open as much as possible during the season.</p>	<p><u>Field:</u> Mildew can be a problem as well as septoria, bacterial spot and alternaria. We try to make regular applications rotating between Milstop, Actinovate, and Regalia which help some if there is not excess rain or storms which make all of the above disease worse. <u>Hoophouse:</u> Powdery mildew is usually our biggest problem and regular sprays of Milstop ten to keep it to a minimum. Actinovate and Regalia will also be used to help control development of problems. <u>Greenhouse:</u> Along with powdery mildew in the greenhouse we may see some anthracnose or blossom end rot. Adjusting fertilizer usually controls the blossom end rot, with regular rotated applications of Milstop, Actinovate and Regalia helping to control the other disease. <u>Both Houses:</u> Plenty of air flow from ventilation and fans help control the mildew.</p>	<p><u>Field:</u> septoria: copper and will mitigate other bacterial and fungal disease; early blight</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

<p>Hoophouse Environment</p>	<p>Control heat and ventilation through doors and roll-up sides. No added heat. No shade cloth.</p>	<p><u>Hoophouse:</u> Ventilation and humidity are controlled with peak louvers, end doors and side curtains. We have recently begun to heat the hoophouse with a 300,000 btu hydronic heater hooked up to our log boiler. We try to keep the temperature no lower than 50 degrees at night.</p> <p><u>Greenhouse:</u> Ventilation consists of roof vents, endwall peak louvers and fans, and various fans place around the greenhouse.</p> <p>There are several different heat systems. The soil in the floor is heated with a geo-thermal heat pump. Then for the main heating we have two 300,000 btu hydronic heat units hooked up to the log boiler. The hydronic units in both the greenhouse and the hoophouse have 24" vent socks attached to spread out the heat evenly throughout the houses. The greenhouse also has two 300,000 btu propane backup heaters that are only used if the temps drop extremely low. The temperatures in the greenhouse are kept a 70 degrees and above during the day and no lower than 60 degrees at night. Greenhouse also gets extended light from HID lights that are turned on at 4pm and turned off at 9pm. These are also kept on all day on cloudy days. This schedule runs from late November until the end of Feb.</p>	<p>Close the HH at night to retain warmth and open side curtain vents during the day and open upper louver vents to allow heat rising to escape the peak. No added heat. No shade cloth.</p>
------------------------------	---	--	--

Harvest and Yields

<p>Harvest Window</p>	<p><u>Field:</u> All tomatoes mid-late July to frost <u>Hoophouse:</u> Late June/early July to frost</p>	<p><u>Field:</u> Harvesting begins early August and runs through frost (mostly heirlooms). <u>Hoophouse:</u> Begin harvest approx early June and go through late Sept. to early Oct (mostly heirlooms) <u>Greenhouse:</u></p>	<p><u>Field:</u> Depends on the weather, but usually expect harvest around Aug 1 starting with cherry's and going to frost <u>Hoophouse:</u> July 4 for cherries, July 18 for big beef and roma types, and July 25 for heirlooms also weather pending</p>
-----------------------	--	---	---

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Harvest Procedure	<p>We pick our tomatoes underride but with identifiable color (e.g. a red tomato will be identifiably red) every two days to maintain quality (minimize splitting, bruising), and control ripeness through storage options. We always pick when the plants are dry. Calyxes are removed from heirlooms and paste tomatoes, not necessarily for cherries. We harvest into buckets and store them in the shade of the plants until they are taken back to the packshed. Picking underride dramatically improves our quality. We also pick ALL tomatoes that we have ready. Our plants remain well-picked throughout the season – this saves labor in not sorting through overripe fruit and maximizes yield.</p>	<p><u>Field & Hoopouse:</u> Fruit will be harvested when conditions are dry. Fruit is harvested trying to leave the calyx on the plant as much as possible. Marketable fruit is placed in tomato boxes set along the rows with seconds placed in tomato crates. Damaged fruit is left in the field. Boxes are then picked up and place at the ends of the rows to be transported to the pack shed either by hand or with the tractor depending on the location of the field.</p> <p><u>Greenhouse:</u> Tomatoes are harvested into tomato crates placed on a cart. Full crates are placed at the end of the rows and then transported by hand to the pack shed which is located 25 feet from the greenhouse.</p>	<p><u>Field:</u> Harvested at the end of the day when dry or when all other heat sensitive produce is done harvested or when dry. Tomatoes are put into smooth plastic bins and collected into the back of the field van and brought to the post harvest dry goods area for sorting. We do like to remove the stem and calyx to avoid the stems poking holes in the fruits.</p> <p><u>Hoopouse:</u> Harvest in the am before it gets too hot. Harvest all into smooth bottom plastic totes and sort in post harvest area, leave calyx behind if can for everything but cherry types, damaged tomatoes get put into buckets for pigs, load into golf cart and taken to post harvest dry goods area for sorting.</p>
Cleaning	<p>A cloth is used to wipe fruits if they are dirty.</p>	<p><u>Field & Hoopouse:</u> Fruits from the field or hoopouse are not cleaned unless necessary are are wiped with a cloth if needed.</p> <p><u>Greenhouse:</u> Fruit is sent through a vegetable washer without the water turned on. This cleans and polishes the fruit.</p>	<p>Fruits are not cleaned except when necessary such as dust and then polished with rags</p>
Packing - Salad/Slicing Tomatoes		<p>First quality fruit is placed in 13# single layer tomato boxes for wholesale. Tomatoes are place stem side down. Extra first quality are place in double layer tomato boxes or crates for market with seconds boxed into cardboard boxes for canning sales, stem side down, 20# to a box.</p>	<p>Fruits are sorted by size into double layer tomato boxes (20#) for wholesale to restaurants and stores by placing tomatoes stem side down, CSA tomatoes are bagged by weight or approximate units, and farmers market tomatoes are pinted or bagged by weight (we don't use a scale at our market). Second tomatoes are sorted out for our staff, packed into plastic lined 5/9 boxes for freezing (for processing), or sold as seconds (canners) and put into plastic lined 5/9 boxes.</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Packing - Heirloom Tomatoes	<p>We sort heirlooms by color and overall ripeness into black bulb crates lined with cardboard, stem side down. We pack as necessary into 20# 5/9 bushel waxed boxes (with kraft paper liner). We find that we can safely stack heirlooms two layers deep without quality problems. There are a couple of varieties that are exceptionally delicate (e.g. Aunt Ruby's Green), that we never store underneath other tomatoes, either in storage or in boxes packed for orders. Only dry, healed over scars are acceptable. Even a pinprick of exposed wet flesh is graded as a 2nd.</p>	<p>Heirlooms are placed stem side down into cardboard 10# tomato boxes for wholesale or market. Seconds are placed into cardboard boxes stem side down for canning, 20# to a box.</p>	<p>Fruits are sorted into a double layer (20#) tomato box and wiped if needed with a rag. We sell a mixed box only. Large fruits; brandywine and striped Germans are on the bottom and smaller varieties on top, so that when they are opened they are beautifully displayed with pink and red, yellows, black and green, the striped romans add the elongated shape sprinkled on top.</p>
Packing - Romas	<p>We sort by overall ripeness into black bulb crates with cardboard liners, and let them ripen out in the packshed until fairly ripe, at which point they go to the cooler. We typically sell these bulk to CSA members and farmers market customers in 20# increments.</p>		<p>They put into the double layer tomato boxes (20#) (sometimes we harvest right into the boxes from the hoophouse) for wholesale and if they come out of the field, we transfer to boxes, or bag by weight (2#) bags for farmers market. All excess is put into 5/9 for processing and goes into freezer if holding until processing time.</p>
Packing - Cherry Tomatoes	<p>We store cherries in small shipping totes (interlocking lid). About 18# fit in each. They go straight to the cooler typically. We leave them open in the cooler for an afternoon or overnight to take out field heat, and then close them and stack them. We pack cherry tomatoes into pint clamshells (48 fit into a 2950 cu. in. leafy greens box perfectly), careful to discard any splits.</p>	<p>Cherry tomatoes are sorted and placed into pint plastic clamshell containers for wholesale or pressed paper pint containers for farmers market. Split fruits are taken to the compost pile.</p>	<p>Cherry tomatoes are taken from the smooth bottom crates and put into pints. And any split are either left in the field or inspected at packing.</p>

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Storage	We store underride tomatoes in our packshed at room temperature. When they are getting close to market ripe, we then move them into the walk-in cooler at 50-55F for storage. 7-10 days is generally our limit for cooler storage.	Tomatoes are stored on shelving in the packing shed and kept at temperatures no lower than 55 degrees. We constantly monitor and sort tomatoes on a daily basis and move them as soon as possible.	We put our tomatoes on wheeled carts and store in 50 degree cooler during the hottest time of the year otherwise, they are left out of the cooler and staged in the post harvest dry goods area and stacked according to variety and date harvested. We can hold tomatoes in the cooler around two weeks or so depending on how hot it is when they are harvested.
Field Yields	Yields were wildly different for 2015 and 2016 (and then again 2017), by a factor of 2. This was directly connected to weather. 2015 and 2017 were very cool summers with 2016 being unseasonably warm. We expect 3-8#/plant for heirlooms of saleable fruit, and 6-12#/plant for cherries.		Slicers: 1.25# per bed ft Romas: 2.8# per bed ft Cherries: 2.5# Heirlooms; 2.76# per bed ft
Hoophouse Yields	10#/plant for heirlooms	<u>Greenhouse:</u> We strive for at least 35# per plant per length of life of plant which is usually approx. 10 months. Ideally we get more than that.	Slicers: Approximately 1.7# per bed ft, Romas: Approximately 3.4# per bed ft, heirlooms: Approximately 2.25# per bed ft

Marketing

Markets	CSA, farmers market, direct to grocery, direct to restaurant	farmers market, direct to grocery, direct to restaurant	CSA, farmers market, direct to grocery, direct to restaurant, on line farm store, processing for tomato puree
CSA	4-7 pints of cherries, 5-10# of heirlooms, and 10-20# of slicers		Slicers; 12# Romas 4# Cherries 6 pints
Farmers Market Prices	\$3/# for heirlooms, \$3/pint for cherries	Summer production will sell at \$3 to \$3.50 per pound for slicers and heirlooms and the same per pint for cherry tomatoes. For off season tomatoes we charge from \$4 to \$4.50 per pound for slicers and \$4.50 per pint for cherries.	2# Roma \$4 2# Slicers \$3 Cherry pints \$3 early \$2 peak Heirlooms 1.75# \$4

Dennis Fiser
Regenerative Roots

Sandy Dietz
Whitewater Gardens Farm

Janet Gamble
Turtle Creek Gardens

Direct to Grocery Prices	We sell cherry tomatoes for \$28.75/dozen pints and \$27/10# for heirlooms. Sale prices vary, but our low end is \$24/dozen pints and \$21/10#, for 2 for \$5 pints and \$2.99/# heirlooms on the shelf, respectively. Sales are usually late August, early September.	Off season slicers sell for \$3 to \$2.70 lb. depending on amount purchased and drops to \$2.50 in the summer, possibly down to \$2. Cherries off season sell at \$3 per pint and down to \$2 in the summer.	Slicers \$38/20# early \$34/20# peak Heirlooms: \$42/20# early \$38/20# peak Cherry \$38/12pnt, Romas \$36/20# early \$34/20# peak
Direct to Restaurant Prices	Typically full farmers' market price unless they order wholesale quantities.	Our prices are the same to restaurants as grocery stores. Price is generally determined by quantity purchased. We do sell some seconds to restaurants that will generally go for \$1.50 lb.	same as grocery store prices
Other Markets			On line store is same as farmers market price or direct to customer price