

2014 Southern Wisconsin
Vegetable Production Workshop

Onions



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Blue Moon Community Farm

Steve Pincus
Tipi Produce

Natalie Ortega
Natalie's Garden and Greenhouse

Location	Stoughton	Evansville	Oregon
Acres in Vegetables	6	50	22
Acres in Onions	0.25	1	2
How These Tasks are Done for Onions:			
field prep/tillage	tractor	tractor	tractor
transplanting	by hand	tractor	tractor
cultivating	by hand	tractor	tractor
spreading amendments	tractor	tractor	tractor
mulch laying	tractor	tractor	tractor
laying irrigation lines	tractor	tractor	
laying row cover	do not do this task for onions	do not do this task for onions	do not do this task for onions
spraying for pests, diseases, or weeds	do not do this task for onions	tractor	tractor
harvesting	by hand	by hand	by hand
hauling harvested crop from the field	tractor	tractor	tractor
mowing cover crops or crop residues	tractor	tractor	tractor
incorporating cover crops or crop residues	tractor	tractor	tractor
Farming Style	certified organic	certified organic	We use tractors for field work and cultivation. We do a lot of hand hoeing but also use herbicides for weed control in our onion crop.

Propagation

Varieties	Sweet: Ailsa Craig Red Storage: Redwing, Ruby Ring Yellow Storage: Patterson Bottle Onions: Long Red Florence Cipollini: Red Marble, Borrettana	Sweet: Walla-Walla Red: Cabernet Yellow- Calibra, Sedona, Gunnison, Sedona, Cortland White- Sierra Blanca	Sweet: Candy Red: Red Defender
Soil Mix	Vermont Compost "Fort V"	We make our own with peat, perlite, vermiculite, Purple Cow compost, alfalfa meal, feather meal, Sustane 8-4-4, lime, soy meal, bone meal, kelp, pasteurized soil, Them-X 70.	Sun redi earth plug mix. Bfg company in Janesville, WI.
Seedling Trays	We seed 8 seeds/cell into 6-packs	Blackmore Deep Star 200 and 288. Seed 1,2 or 3 seeds per cell. Transplanted directly to field.	We use a 388 tray with 1/2 " deep cells. We use a vacuum seeder and pelleted seeds.

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Propagation Schedule	We seed March 1, no up-potting, transplant April 15 (weather permitting)	Seeding from mid- February through 1st week of March. Transplant April 20 - early May.	We start seeding the onions around mid February, and transplant out by mid April.
Germination	We use one of our walk-in coolers as a dark germination chamber, a bucket heater for moist heat, and a pre-wired greenhouse thermostat set to 75 for the onions.	In dark germ room, 76 F, for 5-6 days, then out to greenhouse at 72-80 day / 50 nights	We seed the tray, water it in very well then place in our germination room. We leave them at 80 degrees for 4 - 5 days until the start to germinate, then move them out into the greenhouse. We trim the tops a couple of times before transplant.
Greenhouse Irrigation	We hand water with various nozzles on a watering wand as needed, typically a deep soak in the morning and a second watering at 12 noon.	Water as needed by hand.	We use a hose with a finer stream head on the wand. We water daily, sometimes more often if sunny and hot.
Optimal Greenhouse Conditions	We keep a cool greenhouse and have adjusted our planting schedule accordingly. Our night temperature is 45 in the greenhouse and the onions begin in the warmest part of the house and get marched to the coldest as other crops enter. We have automated ventilation that maintains a daytime temperature no higher than 85 degrees.	Onions will grow well at a wide range of temperatures; they share the g-houses with other more finicky crops like peppers and lettuce. Just enough watering is best, which I think is generally true for all plugs.	We grow our onions on the floor of the greenhouse. We feel the grow thicker and stronger if not grown on too hot. We keep the greenhouse at 75* day temp and 60* over night.
Hardening-off-off	We move our onions outdoors on "stretchers" holding 8 trays each for at least 1 week prior to planting, without subjecting them to sub-freezing night temperatures. We move them into an unheated cold frame in that case.	We usually just move them outside around April 10, not during a cold spell. Row cover is ready for protection during cold nights. Moderate frost is not a problem. We do have a lightly heated house with roll-up sides that we use for protection and hardening if weather demands.	We move the onions outside at least a week before transplanting. We trim them to about 4-5" tall before transplanting.
Pests or Diseases in the Greenhouse	None	Onion plugs are typically trouble-free.	
Other Notes on Propagation	Some years if conditions are very favorable in the greenhouse, we trim back the tops to about 2" a week or 2 before moving them outdoors.		

Field Prep

Preceding Cash Crop	Our rotation is dynamic in order to account for the effects of topography and soil type on crop placement. Our 2013 onion crop was preceded by: 2012: late Cucurbits 2011: early Brassicas	Often follow fall-harvested carrots. Because: field is bare over winter after Nov. harvest and ready for April use, always excellent weed control the previous year, little surface residue to interfere with transplanting and early cultivation.	
Preceding Cover Crop	Our 2013 onion crop was preceded by: 2012: spring Oats/Peas 2011: spring Oats/Chickling Vetch	Previous year's carrots usually follow a big rye/hairy vetch cover.	
Soil Amendments	We use amendments from Midwest Bio Ag. For onions: 1 ton/acre dehydrated chicken manure, 300#/acre "Veggies Plus" (trace minerals, calcium), and 300#/acre "Veggies NKO" (6-1-6)	We spread 15-20 T/A of year-old leaves, and 1-1.5 T/A dried chicken pellets.	We use a standard crop fertilizer with trace elements added.
Bed Prep	We use a raised bed plastic mulch layer for our onion crop from Nolts Produce Supply in Iowa. We chisel plow our onion ground in the fall, and as soon as the soil can be worked in the spring we use a field cultivator to level the field. We use a tractor-mounted broadcast fertilizer spreader to broadcast our amendments. We then prep our beds with a rotovator.	If fields were chisel plowed previous fall, then one pass with a Perfecta field cultivator is usually adequate.	We wait until the soil is dry enough to work. First we use a disk to work up any large debris in the field, then we use a Perfecta which is a combination of a digger and a rotary hoe. We work it up relatively fine for better transplanting results.
Bed Shaping	The raised bed layer allows for water to drain away from the crop, and the onions are never sitting in excess moisture.	No shaped beds on bare ground.	
Mulch	We use silver reflective plastic mulch for several reasons: it suppresses weeds, it repels insect pests including thrips, it conserves moisture in the soil, and reflects light to the tops of the onions, increasing their photosynthetic potential.	We're now using shiny reflective silver plastic mulch on part of our onions, for weed and thrips control. We plant 1 or 2 seeds / cell on mulch and get larger onions, but overall yields are only slightly increased over bare ground. Mulch applied with Rainflo 2550 layer, using 2 drip lines.	

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Other Notes on Field Prep	Our layer digs into the soil about 8"; our soil has a higher clay content and can be difficult to work at that depth in the spring, and so we have to choose our onion location carefully. While the raised bed layer is a good choice for us for other summer crops, we would do better with a flat-ground layer for onions because of the timing...		

Transplanting

Bed Width	5 foot centers	6 feet	36" between rows
Onion Spacing	3 rows per bed, groups of 3-4 plants spaced 9" apart in-row	3 rows 18" apart w/ plugs of 1-4 plants each 8" apart on bare ground. 3 rows 12" apart w/ plugs of 1-2 plants each 5.5" apart on mulch.	We plant three rows per bed and about 4" between plants.
Transplanting Process	See photos. We use a hand-held dibbler to poke holes in the plastic at the correct spacing. If we have several people 2 will lay out onions ahead of the plantings. 2 planters will work across from one another, sharing the middle row, hand-planting the onion groups into the holes.	Bare ground- 3-row Mechanical 5000 carousel transplanter Mulched beds- 3 rows with Rainflo Waterwheel transplanter	We have a custom built onion planter made from shoe of an old corn planter. We drop the transplants down the shoot and the wheels pack it in place.
Water at Transplanting	If the soil is coarse for planting, we will run the drip irrigation for 1-2 hours prior and plant into the wet soil. Otherwise we water in all transplants at once.	We use a little water with both transplanters.	We water with overhead center pivot irrigation following transplanting.
Row Cover	None	None	
Other Notes on Transplanting	In wet years we've transplanted as late as May 15, and the TP date has not correlated with onion size but certainly with harvest date.		

Crop Maintenance

Irrigation	We run drip irrigation once a week to lay down 1" if we don't get rain.	We want onions to receive 2+ inches of water (rain + irrigation) during 2 weeks. Irrigation is overhead on bare ground, drip where plastic mulch is used.	We irrigate each week if rain is less than 1" in the week. We have a center pivot system that meters the water so we know how many inches we put on.
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Irrigation Modifications	As onions begin to bulb we manually check soil moisture and don't water if we don't have to.	Less water is better as bulbs mature. If weather is dry, we back off on irrigation for a couple of weeks before harvest.	
Weeding	Because the onions are on plastic mulch, our primary weeding is to maintain the aisles between the beds. Approximately every 2 weeks we use a set of s-tine cultivators to weed the aisles, and a set of hilling disks to cultivate the edges of the plastic. Holes in the plastic where the onions are growing are weeded as needed, typically 1-2 times in a season.	About 10 days after transplanting, tine weed. Repeat in another 10 days. Then start cultivating with small discs and side knives / sweeps. Then hand weed with both stand-up and hand hoes. Cultivate again. If conditions are right, flame weed with burners aimed next to rows below leaves. Then cultivate with larger sweeps on Super-C tractor; throw some dirt onto base of plants. Keep cultivating and hoeing, but don't waste time on late weeds- they won't affect yields or quality.	When the onion has been transplanted for about three weeks and there is a flush of weed growth about 2" tall we spray with goal. It will take care of most of the weeds. We hand hoe for jostled and any other remaining weeds throughout the growing season.
Insects		Key insect is thrips- must be controlled when they first appear (usually early July). Entrust is effective, but only 9 oz/acre total and 5 applications/year are allowed. Reflective silver plastic mulch does seem to reduce thrip damage on onions planted into it.	
Diseases	We typically lose a bit in storage, possibly due to disease but it's never been enough to be an issue. This year we saw slightly more and are considering a better storage set-up to maintain low temperatures.	Many many diseases! Botrytis leaf blight, Purple blotch, Downy mildew, and especially the bacterial post-harvest rots (Pseudomonas and Erwinia). All these diseases are worse when high thrip populations cause substantial leaf damage. We're starting to use approved fungicides to try to reduce these problems. Also, earlier bulb harvest may reduce post-harvest rots.	

Harvest and Yields

Harvest Dates	We begin harvesting green-top Ailsa Craig and bottle onions around July 15, and begin harvesting our storage crop around August 1-15.	Walla-Walla harvest - mid-July through mid-August; White- mid-August; Red and Yellow- mid-August into September	We start harvesting the sweet onions in mid July. The red onions take 2 -3 weeks longer to bulb up.
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Harvest Procedure	<p>We wait for the majority of the yellow onion tops to fall down to start harvesting our storage crop. We typically knock down our reds as they do not fall as readily. We have had negative results field-curing onions on the reflective plastic, and so we pull the onions, twist off the tops above the growing point, and place them in crates to haul to the greenhouse to cure.</p>	<p>If tops are healthy, maturity is first shown by some tops falling as necks weaken. Each cultivar has a different maturity date; it's usually easy to see the sequence of maturity in the field. We wait until most tops are down, then pull bulbs by hand and windrow on dry ground or plastic mulch for a day or two to desiccate roots.</p> <p>We usually cut tops off by hand as we take bulbs out of the field. This past year we set up a mechanical onion topper on a wagon, run by tractor hydraulics, and fed windrowed bulbs through topper, then into black bulb crates for curing.</p> <p>Often, we need to mow over the fields to knock weeds down before harvest. If ground is dry and hard and tops are already too dry and shrunken to pull, we take a chisel plow very slowly through the field to pop bulbs to the surface. Often there is too much weed residue to use a blade-type undercutter.</p> <p>Harvest should be started and finished during a dry spell, which we can usually find in late-August / early September. But this is also our peak harvest and sales time for summer crops, so onion harvest gets squeezed in whenever possible.</p>	<p>We wait until the tops are fully doubled and the bulbs are brown. We then pull and spread out on the ground in partially shaded areas. We have cured them under mature trees with good drainage. We pull the onions by hand, transport by flat bed wagon and leave to cure. Sometimes we run them through the conveyor washing machine if we had muddy conditions before laying them out to cure.</p>
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Cleaning and Curing	Onions are cured in our greenhouse with 60% shade cloth and fans until tops are completely dry. We then rub outer layer off and trim tops to 1"	We clean and grade by hand. Atlas-type rubber-palmed gloves help rub off dirt and loose scales. Cotton gloves with gripper dots work well, too. Bulbs are 2-3 layers deep in black bulb crates, usually topped. Crates are laid on benches in well-ventilated greenhouse, with air circulation fans on full. Sometimes we'll put shade cloth over greenhouse to reduce temperature. Cure for 7-12 days, usually. After curing, we gently dump crates into 18 bu wood bins for storage.	If they were muddy we run through a table washing machine then lay outside to cure. We leave the onions outside for several weeks like that and box them up as needed for sale. We use a scissors and run a gloved hand over the onion to remove ugly skins .
Packing	Onions are packed into black bulb crates.	For wholesale, onions are packed into 1 1/9 bu boxes, 45 lbs.	We pack by hand.
Storage	Once onions are cured, cleaned, and packed we stack them in our barn where temperatures are cooler and it's relatively dark. NOT a controlled environment.	After curing, we keep bins of onions in dry hay mow in barn at ambient temps, or move into a low-humidity cooler at about 45F. Since we grow onions mainly for CSA, we do not expect to store any past early January. Any CSA over-production is sold by then.	We keep our onions in slotted bins in a cool shed until the temps fall to freezing. We try to sell them all so we do not worry about long storage.
Yields	2013: Yellow 2.3#, Red 2.7#, Ailsa 2.8#, Bottle 1.47#, Cip 1#	Our spacing gives us 7200 bed feet/acre. Yields vary from 2-6 lbs of good saleable onions/bed foot. Because of disease problems, onion yields are extremely variable year-to-year.	Our goal is to raise one pound sweet candy onions. In reality they average out to be 10 to 12 ounces each. I estimate we yield about 3 pounds per bed foot for candy onions and a little bit more for the red defender this year because we had a good crop.
Other Notes on Harvest and Yields	For Ailsa Craig and Bottle onions, we harvest these greentop for bunching and select the largest bulbs at every harvest.	I think we have been harvesting onions too late. As plants mature, leaf diseases move into the bulbs, causing post-harvest rots. Earlier harvest might decrease these post-harvest problems. We should, but don't always, cut off tops before curing, to avoid these rots. Onion harvest comes at such a busy time already, so we sometimes take shortcuts that bite back later.	

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Marketing

Markets	CSA, farmers market, direct to restaurant	CSA, direct to grocery	farmers market, direct to grocery
CSA Onions - quantity delivered per share	Standard Share: approx. 4 lb. sweet onions, 3 lbs. bottle onions, 1 lb. cipollini onions, 12 lbs. yellow storage, 8 lbs. red storage	Walla-Walla- 6 lbs; White- 1-2 lbs; Red- 2-3 lbs; Yellow storage- 12-16 lbs.; Winter share gets 10 lbs, mostly yellow.	
Farmers Market Prices	Ailsa Craig sweet onions \$2.50/lb Red bottle onions \$2.50/lb Cipollini onions \$4.00/lb Red and yellow storage onions \$2.00/lb. or 5# for \$9		\$1.00 per pound
Direct to Grocery Prices		\$1.00/lb for all types in 2013	\$.65 per pound in 1, 000 pound bins.
Direct to Restaurant Prices	Ailsa Craig sweet onions \$2.25/lb Red bottle onions \$2.25/lb Cipollini onions \$3.75/lb Red and yellow storage onions \$1.75		