

Peas



Extension
UNIVERSITY OF WISCONSIN-MADISON
DANE COUNTY



FAIRSHARE
CSA COALITION

Bethanee Wright

Winterfell Acres

Mike Noltnerwyss

Crossroads Community Farm

Ellen Russo

Featherstone Fruits and Vegetables

Location	Brooklyn, WI	Cross Plains, WI	Rushford, MN
Acres in Vegetables	0.8	26	135
Total Acres in Peas	0.01	0.35	0.5

How these tasks are done for Peas:

field prep/tillage	with a tractor	with a tractor	with a tractor
direct seeding	do not do this task for peas	do not do this task for peas	with a tractor
transplanting	by hand	with a tractor	do not do this task for peas
cultivating	by hand	with a tractor	with a tractor
spreading amendments	by hand	with a tractor	with a tractor
laying irrigation lines	by hand	with a tractor	by hand
laying row cover	do not do this task for peas	by hand	do not do this task for peas
spraying for pests, diseases, weeds	by hand	do not do this task for peas	with a tractor
harvesting	by hand	by hand	by hand
bagging	by hand	by hand	by hand
farming style	certified organic	certified organic	certified organic

Propagation

Varieties SNOW peas	none	Oregon Giant, these are large peas that are quick to pick weight. We like to let the pea develop in the pod for nice sweetness.	Oregon giant- good germination in field, high yielding, large tender pods.
Varieties SHELL peas	none	none	none
Varieties SNAP peas	Cascadia	sugar ann, and ss 141 (listed as pls 141 in johnnys)	Sugar Ann- good germination in the field, high yielding, upright plant habitat makes for easy cultivation.
Soil Mix	Purple Cow Organics potting mix	vermont compost fort v	
Seeding Trays	Paperpot transplanter 4" spaced pots fit 264 cells/tray	fertil pots, 4x5 cm strips of 36. we set two strips in a 1020 undertray for a 72 cell flat.	



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Propagation Schedule	Transplanted: 1 succession only. Seeded in greenhouse mid-March and transplanted out mid-April	Transplanted: In 2019 we did 3 plantings, 4/1, 4/15 and 4/24. We transplant the peat pots into the field anywhere from 10-18 days after planting depending on the weather, our labor availability and needing to free up space in the greenhouse. Growing them in peat pots allows us to transplant them out at a very young age if we are able to get into the field. We plant the peat pots very thick (5-6 seeds per cell) so they use up their space in a hurry.	Direct Seeded: Seeding date for all field peas is 5/1
Greenhouse Germination	Germination chamber with a thermostat and bucket heater set at 70 degrees	we put them in a germ chamber usually set around 80 degrees.	
Greenhouse Irrigation	By hand as needed but avoid over watering due to damping off issues.	We hand water as needed. We like to let them dry down a bit between waterings. we have seen some damping off in the greenhouse if we over water them. The longer we farm the more we realize how much we can let things dry down in the greenhouse between waterings and the happier they are.	
Greenhouse Conditions	Once germinated, they grow fast and vigorously. I turn the trays once 2 weeks after seeding. Nighttime set to 50 degrees and daytime fans come on at 80-85 degrees.	Our greenhouse is pretty much maintained to keep a wide diversity of crops happy, in march we heat it to 50-55 at night and as warmer crops start being planted we heat it to 55-58 at night for april and may. During the day we have automatic louvers that open up around 72, then a primary exhaust fan that draws air through starting at 80 and a secondary exhaust fan on a different thermostat that draws air through if the temps get up to 85.	
Greenhouse Pests or Diseases	Damping off can be an issue if kept too wet.	We have had some plants get molds and die back the first year that we started transplanting them. we have since learned to really back off on watering them and try to get them into the ground sooner then later to give the plants more space.	

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Hardening Off	If I harden them off, I will put them outside on a greenhouse bench for a few days (returning them inside at night) before transplanting.	We put plants on 4 by 8 wire mesh greenhouse tables and put the whole table onto a pallet. we then can move the pallet around with forks on the skid steer. we often will move the tables in and out of the pack shed during cold nights in the month of april. We typically like the have the peas hardened off for at least 3 days prior to going into the field. there is always a couple day period in april where we have too many plants to fit in the greenhouse and the weather outside is too harsh and we will have lots of plants that are just hanging out in the packshed with no light for a couple of days and they are usually fine. Inside the packshed we are able to move the pallets with a pallet jack. this system is pretty quick for moving hundreds of flats in and out side as weather permits to harden them off.	
Other Notes on Propagation	Up until 2020, I have gawn seedings in 128 cell trays and transplanted by hand. It works well but the paper pot is much, much faster.	We have successfully grown peas for transplants in 128 cell trays. but we have switched to the fertil pots to reduce transplant shock and to allow us more flexibility in getting the plants into the ground sooner if conditions allow.	

Bed Prep

Preceding Cash Crop	Tomatoes/peppers	We have typically done fall roots in front of peas. This season we are planting peas into a field that had late brussel sprouts.	We do not have a set rotation that would dictate a particular preceding cash crop. We aim for a five year rotation of our entire early spring direct seed block which includes peas, beans, chard, and spinach.
Preceding Cover Crop	None- I usually let peppers produce until frost so I am unable to get a cover crop in between tomatoes/peppers and peas.	If peas are going into a field that had a late vegetable crop on it, we often will plant the peas into that field without a cover crop in between the two cash crops. We will then usually cover crop the field for the remainder of the season after the peas come out.	We aim for a winter rye preceding cover crop.

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<p>Soil Amendments</p>	<p>Seeds are inoculated with mycorrhiza at seeding. Midwestern BioAg Chicken Crumbles (1000#/ac), FeatherMeal (500#/ac), Potassium Sulfate (250#/ac), Veggies Plus (250#/ac) and Veggies NKO (500#/ac)</p>	<p>We have a standard broadcast blend that we bulk spread over most of our acreage as a starter fertilizer. It supplies micronutrients (microhume a bioag product) in an annual amount to feed the crop without changing soil test levels. This starter blend also contains kmag and manganese sulfate to supply a readily available level of K, Mg and Mn. We spread this over most of our vegetable acres at 170 lbs/a annually. We also spread 4-3-2 chicken manure over fields that didn't have a full grown legume cover crop prior to peas. We would usually apply 1000 lbs per acre of 4-3-2 would supply 40 lbs of nitrogen. So far this has been enough nitrogen to grow a crop without seeing any deficiencies. We inoculate the pea seed with rhizobium but given that the crop is such a short season it is our understanding that it is unable to fix all of the nitrogen and does need some supplemental. we are typically growing in soils that are 3-4% om. If we planted peas on some of our newer land that was 2% om we would likely be applying twice the rate of 4-3-2.</p>	<p>The field will generally get turkey litter in the fall or Chick Magic in the spring before planting, and Midwest BioAg General Blend: Analysis= 1-2-6-6S. 300# per acre applied as beds are being shaped. We work with an independent soil consultant to analyze soil tests before and after each season to make amendment decisions. We put down different amounts of turkey litter, macro and micro nutrients based on his recommendations to balance soil for optimum growing conditions.</p>
<p>Stale bed, Occultation, or Tarping</p>	<p>I use landscape fabric in between my rows of peas to reduce my cultivation to just once in between the plants.</p>	<p>We usually don't do a lot of stale seedbedding. Most of our preplant tillage goals for peas are to break down residue and allow for the efficient transplanting of the crop with a waterwheel transplanter. If the peas are going into a field that has a lot of cover crop residue our usual prep would involve an initial incorporation with a rotovator around 4" deep. then the day of transplanting we would do a second pass to loosen up the soil and allow for quick transplanting</p>	<p>We stale bed with Buddingh baskets, ideally when weeds are at white thread stage.</p>

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Bed Prep	1 round of primary tillage in mid-April and then immediately transplant	<p>If it is mellow soil from fall root harvest without much residue we will just run a perfecta field cultivator through very fast to get a fine seed bed. If we have a cover crop or lots of residue we need to incorporate we will run rotovator through set pretty shallow 3-4 inches. If it is early season and the ground is very wet but we need to plant anyway it is usually easier to prep that soil with a rotovator rather than a perfecta. The reason is that the perfecta needs to have some depth to really get the soil flowing and crumbling, where the rotovator can be set to really just skim the surface and make a plantable situation even if the soil below is too wet to work. This is not recommended to till soil when it is wet, but given the time frame of when peas need to be planted this is something that we definitely have to do some years and we have usually gotten away with it. But our soils are pretty forgiving compared to other parts of the state.</p>	<p>4 weeks before planting: mow down the cover crop with flail mower. 4 weeks: Chisel plow field perpendicular to bed orientation. 3 weeks: Disc/Finish disc field depending on level of vegetation and clumps that exist. 3 weeks: Create raised beds using Rainflo 2600 bed shaper. Rotovate tops of beds to create better soil texture and widen bed tops to 40" 3-0 weeks: Stale bed with belly mounted Buddingh Basket weeder, ideally done 2-3 times with the final pass being done on the day of seeding.</p>
Other Notes on Field Prep		<p>For the earliest peas it is nice to have some chisel plowed beds in the fall to allow them to dry out quickly in the spring and be nice and mellow for planting early without too much field prep.</p>	

Planting - DIRECT SEEDING

Bed Width		<p>we plant on 60" tractor tire centers. usually leaves a bed width between the tires of 45"</p>	5.75'
Plant Spacing		2 rows per bed 30" apart.	3 rows per bed using PlanetJr. using seed hole 1 or 2 depending on variety. In row spacing is 3", between row 15"

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Seeding Process		We didn't do any direct seeding of peas this season, but in the past we used a mater mac to seed two rows of peas. we put down a lot of seed, usually 15-20 seeds per foot. we consistently had very poor germination and started doing transplants to fill in the gaps. the transplanting took so much labor to do in this fashion, and the germination problems became more consistent so we eventually went to just transplanting.	We direct seed into raised bare beds using a 3-point mounted Planet Jr. I use seeding hole 1 for snow peas and 2 for snap peas. I weigh the seed amount i'll need and take it into the field with me. There is a basket mounted to the front of my tractor for easy travel with large amounts of seed. I then begin seeding making sure to check depth and adjust as necessary.
Row Cover		We use row cover over the first planting of sugar ann's. which is typically a small planting that gets transplanted out the second week of april. we have had these plants go through snow storms the last two seasons and freezing cold temperatures. the tips have gotten burned back but we have still gotten a crop out of them. if the weather does cooperate after planting some seasons will yield a really nice early crop.	I will occasionally use remay on bare beds if it is a cold spring to encourage weed germination for stale bedding. This would be our only use of remay in the field for peas.
Field Germination		we no longer direct seed, but in the past we bought in fresh seed each year and tried to plant around 1" deep to keep them moist but not be too far down in cold wet soil.	To ensure germination I aim to get consistent seed depth and to keep the field wet until first emergence making sure no crust forms.
Other Notes on Direct Seeding			We trialed direct seeding into plastic beds last season. It worked very well and we are considering using this as our main seeding technique in the future. Weed control is a major issue for spring direct seed crops and this mitigated a lot of hand weeding we would otherwise have to be doing.

Planting - TRANSPLANTING

Bed Width	2' between rows	60" tire centers about a 45" bed width	
Plant Spacing	1 row per bed with 4" between plants	2 rows per bed 30" apart	

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<p>Transplanting Process</p>	<p>Paper pot: Measure 2' on center for each row of peas and align paper pot transplanter. Pull transplanter down the row, grabbing another tray half way through. Then again for the next row and on. Lay landscape fabric in-between rows as close to plants as possible. Drive t-posts every 10' or so and string up plants using the basket weave method.</p> <p>By hand with plugs: Measure 2' on center for each row of peas and run a tape measure down the row. Quickly pull plants out of tray and insert into ground every 4". Then again for the next row and on. Lay landscape fabric in-between rows as close to plants as possible. Drive t-posts every 10' or so and string up plants using the basket weave method.</p> <p>Also see my two videos for regular transplanting by hand and transplanting with the paper pot.</p>	<p>we use a waterwheel transplanter with a size c spike. we use that size spike for every crop we grow. we have a superwheel that allows us to hammer on or off spikes without removing the wheel. we put all the spikes on the two outside wheels and drive the transplanter with the water all the way. we don't set the wheels all the way into the ground otherwise they get clogged with mud too quickly. for 6" spacing (peas, garlic, scallions) we end up just having the tractor driver drive the beds quickly (1 mph) with the water on, but no one riding on the transplanter. after the bed is marked we have a larger crew come in and drop the plants in the wet spots and then usually a second person puts them into the ground. The tractor driver can get off and help plant by hand, or if there are enough people, that driver may be marking and filling water and bringing plants out just to keep ahead of the crew. we expect to plant about 600 plants per labor hour with the waterwheel transplanter.</p>	
<p>Water at Transplant</p>	<p>Irrigate with drip if needed. Although I usually try to transplant peas right before a rain as in the past few years, I have not needed to irrigate them again.</p>	<p>the trick is to not put too much water down. between having the spikes not all the way down and not having too much water come out it is helpful to prevent the spikes from clogging with mud. with 12" spacing and these techniques we rarely have to ever stop and clean off the spikes. however with 6" spacing the close spaces between spikes eventually get filled with mud and we need to clean them off at the end of every bed with a paint scraper. these transplanter were originally designed to plant through plastic so we need to use some finesse to get them to work well on bare ground.</p>	

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Row Cover	None	we use row cover on the first planting, set right on the plants. we like the weight and durability of the covertan 83" wide from Jordan, however for wider covers we have not had good luck with covertan.	
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Crop Maintenance

Irrigation	I usually don't irrigate peas except a few times in the first week or so. Lately our springs have been wet enough that I don't need to irrigate much.	we irrigate peas with a travelling reel. our smaller one is a good fit for the pea fields. kifco b140 with a komet 163 sprinkler. Indiana irrigation can be a good source for used kifco reels.	We irrigate field peas using 3 inch over head pipes. Peas are irrigated once or twice per week depending on amount of rain.
Changes to Irrigation		its rare that we need to irrigate anything in april or may. at end of may/early june, if we get a hot spell we will irrigate to cool the peas down and keep the soil moist as the peas ripen to allow for them to hold better and not get starchy under stress. This can be 1-2 " per week in the picking season, if needed.	
Trellising	Pound t-posts every 10' or so and using twine, I string the plants up in a basket weave similar to field tomatoes. I try to add more twine every foot of growth or so before they start falling over (weekly usually). I used to use hortanova trellis but it's such a pain to work with and I end up using twine anyways that I have stopped using it.	we use 20' 1/2" rebar, cut into 4' sections, tapped in the row every 10' with a 3 lb hammer, then basket weave with baling twine, similar to paul betz described for high mowing seeds. trellising two rows on a bed gets tight. sometimes we add extra lines at the same height of the existing line just to get the row to narrow up and allow for picking between rows. we spend a lot of labor with this method, but it allows for convenient picking and decent yields. some of our employees suggest using the trellinet white pea trellis instead of putting up lines for 3-4 weeks. We have used this material in the past and found it difficult to remove at the end of the season, but we may try it again. the baling twine is fairly easy to remove. we cut it down at every post and pull out the 10' pieces into a bin.	

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<p>Weed Control</p>	<p>My goal is to cultivate peas once only. I lay down landscape fabric between beds getting as close to the plant as possible. Then a week or so after planting, I come in with a hand hoe and cultivate any little weeds that have germinated in-between the plants. If needed, I will come back a 2nd time but usually the plants are large enough to shade out any small weeds that come back. The bigger issue here is with the wet springs we have had lately, I am cultivating at less than ideal times and need to come back a 2nd time when it's drier out.</p>	<p>With transplanting peas we are able to do a pretty decent job keeping the weeds under control with our tractor mounted cultivators. pretty much immediately after planting 3-4 days we are able to run the basket weeder very close to the rows. This allows us to incorporate any trash that is still in the field, dry out any perennial roots that were chopped by the rotovator and kill any cover crop that is trying to come back. We usually will basket weed one to three times in the first 10 days depending on the conditions. we basket weed every bed twice in both directions, getting close to one side of the rows and then the opposite side. After that we will finger weed one to three times 10-20 days after planting until the plants need to be trellised. it is rare that we need to do any hand work prior to putting up the trellis. once the trellis is up we usually go through and hand hoe along the row and possibly all the soil between the row if we have time. once the peas are trellised over 20" tall they are usually going to be consuming enough of the light and moisture to prevent weeds from causing yield loss.</p>	<p>1. First cultivation is done with 30" spaced baskets, 3-5 days after plants first emerge. I will use 3-point wheel track shovels with this set up. I will do this cultivation 1-2 more times until plants are too big. 2. As plants get larger I'll use a 3 row shovel set up until plants are too big. If weeds are really bad we may hand weed once before harvest.</p>
<p>Insects or Pests</p>	<p>I haven't noticed any major insect or pest issues.</p>	<p>it may be a lack of observation but we don't have much loss from insects or disease that we know about. we do have a lot of ground squirrels that will eat the peas from the edge of the field and have tried trapping them to reduce the population.</p>	<p>We do not have major insect or pest problems with peas.</p>
<p>Diseases</p>	<p>Root rots- not much will help with cold and wet springs Fusarium wilt- again not much you can do with a cold wet spring</p>	<p>not much that we know about.</p>	<p>We do not have major disease problems with peas.</p>

Harvest and Yields

Harvest Window	1 succession of snap Peas transplanted mid-April for June harvest 6/7/19 was 1st harvest 6/12/19 to 6/24/19 was peak harvest	In 2019 we started harvesting sugar ann on 6/16 and oregon giant on 6/24. Our last harvest date for both was around July 12th. We had pretty steady consistent yields from 6/24 through 7/12 harvesting about 550 lbs a week for 3 weeks.	Our harvest window for snow and snap peas is mid-late June and possibly into early July depending on weather.
Harvest Frequency	3x/week	We harvest peas a lot of days out of the week. Mainly because we can't get through the whole patch in one session. In general if a plant gets picked we are hoping to pick it again 1 week later. Sometimes we might be able to pick the plant within 5 days for best quality.	Peas are generally harvested two times per week.
Harvest Procedure	Just a harvest bucket and a good pair of eyes	use buckets, try to grab more then one pod in your hand at a time. when in doubt if its not quite ready we still take it.	Harvest totes are brought into the field. Harvester checks each plant while harvesting mature peas along the way and leaving small peas to mature for future harvest.
Training Harvest Workers	I pick 3 different stages of ripeness and lay them in my hand for people to see and feel. I am looking for nice round, lightly filled out pods. Not too full that they are hard and not too small without sweetness. If people are in doubt, I tell them to harvest it anyways.	for both types we go out to the field with them and pick ones that are ready, not ready and too far past. try to give them a visual example of each. we try to give advice to be efficient with where you place your bin in relation to where you are picking. look at the trellis from more then one direction and move the plants around a bit to try and get the peas to be more visible as you are picking.	When peas have filled out completely.
Cleaning Procedure	If it's really hot hout, hydrocool in tank of fresh well water then drip dry.	Don't do much cleaning if any. if they come in really hot we will wand them off in black crates and put into cooler to help bring them down to temperature sooner.	We do not clean peas.
Packing Procedure	Stored in plastic bin in cooler until packed into plastic bags for CSA boxes.	Most of our peas go into our csa and are bagged by hand into roll bags. for wholesale we might use a liner bag to keep the peas from falling out of the box.	Peas are packed in the warehouse from totes into plastic bags for CSA.

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Storage	Stored in covered plastic bin in cooler set at 40 degrees	usually in black crates in a cold humid cooler (34 degrees)	When peas come in from the field totes are stacked on a pallet and brought into a cooler we use specifically for quickly cooling product coming in from the field. This cooler has a high horse power compressor and fans that allow for high cooling capacity and air movement relative to the size of the space. Once totes are below 40 degrees they are either packed into bags for CSA or put in another 36 degree cooler until pack out.
Maximum Storage Time	5 days- could go up to 7 days but I never can grow enough to sell wholesale and always use them all for the CSA shares.	we sometimes are picking peas on thursday for the following wednesday delivery, but usually not. often we are picking on friday for csa the following week and then picking again monday or tuesday for the wednesday delivery. getting them cold and keeping them cold they can maintain their quality for over a week.	7-10 days
Yields	Snap- average 20# per 100'	We harvested around 2000 lbs on .35 acres in 2019. This translates out to about 5700 lbs per acre, this is a relatively low number according to the literature, but it was by far our best pea season that we have ever had. We probably could have had higher yields if we picked our planting longer and more often, but we are happy with what we got out of it this season.	We generally yield .06 pounds per bed foot.

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Other notes on Harvest & Yields	Peas are technically not profitable for me but they are a great early season addition to the CSA shares so I continue to grow them. They yield very little per bed. Even charging \$5/# I would only be making \$100/bed.	The profitability of peas is entirely dependent on the how quickly they get picked per hour. For us we are able to have a lot of worker shares join in the picking which helps the project get done quickly. Depending on how the farm value's the cost of the worker share labor will also change the looks of the crop budget. On our farm if we average around 12 lbs of peas picked per labor hour we are right around (\$2500 profit per acre). If we can get the average to be around 24 lbs picked per labor hour, then we can expect around a \$10k profit per acre after labor costs and production costs are accounted for. Picking speed is the number one factor on whether we are able to make a profit growing peas.	
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Equipment

Equipment	Paperpot transplanter set up \$3200, lanscape fabric \$30/bed (good for 3-4 years)	waterwheel transplanter \$4000 new, basket weeder \$2000, finger weeder \$11000, water reel, \$4000	Planet Jr.: \$1,000 used
Biggest Impact	Paperpot transplanter by far! It's a game changer when it comes to speed of transplanting crops.	probably the finger weeder because it reduces the hand weeding labor that would eat into profitability	

Marketing

Markets	CSA	CSA, wholesale through a direct distributor (another farmer)	CSA
CSA	1-2# per season (usually .25-.5#/box)	we shoot for about a 50/50 split between snow peas and snap peas to each member. in 2019 regular shares received peas 3 deliveries. Every other shares received them for 2 deliveries. The first delivery was around .7 lbs and the other deliveries were 1 lb bags or just over a lb.	We aim for a 1/2 pound of snow or snap peas for at least 2 weeks of the CSA.
Farmers Market			
Direct to Grocery		\$4.50 for snow peas, \$4 for snap peas.	
Direct to Restaurant			
Wholesale to Distributor		\$4.50 for snow peas, \$4 for snap peas.	