

Growing Sweet Potatoes from Start to Finish

How to grow your own sweet potato slips, plant them, grow healthy crops and harvest good yields. How to select suitable roots for growing next year's slips. How to cure and store roots for top quality and minimal losses.

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Planning ahead – how many to plant

- Decide how much space you want to plant, or how many pounds (tons?) you want to grow.
- One slip will produce a cluster of 4–10 roots, each weighing 3–17 oz (80–500 g).
- Yield range is 2.5– 6.8 lbs (1–3kg) per plant, 276–805 lbs/1,000 ft² (14–40 kg/10 m²), or 6–17.5 tons/ac
- Climate, spacing, growing season affect yield.
- Planting space is 6–18" in the row (wide spacing gives more jumbo roots).
- We do 15" (38 cm) as we *like* to get some jumbos. If unsure, try 12" (30 cm).
- Space between rows could be 32–48" (0.8–1.2m). The vines become rampant.
- Calculate how many slips you'll need and add 5–10%. For an acre you'll need 15,000.

Timing

- Figure out your ideal planting date and work back to find your starting date.
- Planting is usually done about 2 weeks after the last frost. You need *settled* warm weather. The soil temperature should reach at least 65F at 4" deep on 4 consecutive days – don't rush into planting early.
- Plants set out too early will struggle with skin fungi, and produce uneven yields.
- We plant May 10, between pepper and okra & watermelon transplanting.
- It takes 7–8 weeks to grow the slips using our method, and the roots produce more slips if conditioned for 2 weeks (or even 4), before you start to grow slips. So start 10–12 weeks before your planting date.

Three methods of slip production

1. Twin Oaks "slips in flats" method
2. Boutard single node cutting method
3. Traditional outdoor bedding method (Sand Hill)

Testing – see Twin Oaks Sweet Potato Plan for 4 March below

- All the sprouts will grow from the stem end, so don't cut there!
- If you can't tell the difference between the ends, ignore this step and plan to propagate your own slips for just 2 or 3 years (to keep the virus load low).
- If you are a home gardener with a small crop, you could keep the slips from each root separate, and before planting, cut up the mother root and discard the slips from streaked roots.
- An option for commercial growers is to check some, which become your seed stock, and are planted in a different plot from the untested market stock.

Conditioning – see Twin Oaks Sweet Potato Plan for 4 March below

- Conditioning after testing allows the cut surfaces to heal before they are covered by compost.
- The environment for sprouting the roots is similar, so you can probably use the same location.

Sprouting – see Twin Oaks Sweet Potato Plan for 18 March below

- Set up a place with light, humidity and ventilation at 75°F–85°F (24°C–29°C) and 12" (30 cm) of headroom. We use our ex-fridge germinator. Using boxes is much more manageable than having the roots loose in a big cold frame. Insulated boxes could set on a bench at a decent working height, with lights or heat lamps over them.
- The tubers do not need to be fully covered with soil. Water the boxes and put them to sprout.
- Keep the compost damp. If your planting medium is without nutrients, feed occasionally with liquid feed.

Cutting slips see Twin Oaks Sweet Potato Plan for 25 March below

- After 5–7 days, the roots begin to produce slips.
 - The spotted flats need good light in a frost-free greenhouse and sufficient water.
 - This system allows for flexibility about planting dates, and a longer slip-cutting season.
 - 10 days before planting, start to harden off the flats.
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Twin Oaks Sweet Potato Plan 2016

We save about 100 Georgia Jets, 100 Beauregard, 20 Bill Shane's White and 20 Jubilee, of typical appearance and medium size, all from high yielding plants. We will be planting 5 rows at an average of 155' in the West garden. 20' each Bill Shane & Jubilee, 367' each Beauregard & Georgia Jet. Spacing is 16" between plants. 367' @ 16" = 275 plants. +10% = 303 each Beauregard and Georgia Jet. Say 320, 8 flats each. Friday job.

4 March: Pre-sprouting Testing and Conditioning: Test if they float – floaters yield higher and grow better flavor roots. (Optional test for viral streaks: Cut a slice from the distal end (the string root end), not the stem end. Throw out roots with streaks bigger than a pencil lead. Add potatoes from storage if needed to make up to 80 each Beauregard and Georgia Jet. Let cut surfaces heal while conditioning, before planting.) Put the seed potatoes in flats, labeled, in the glass fronted germinator fridge, for 2 weeks. Aim for 75-85°F, 95% humidity, light and ventilation. This will speed the sprouting and double or triple the number of sprouts. Check for excess humidity.

3/4/16	Start #	Sinkers	Floaters	Rot	Chimeras	Kept	Notes
Beauregard							
Georgia Jets							
Bill Shane's White							
Jubilee							

18 March: Plant the roots, almost touching each other, horizontally in compost in 12" cedar flats. Water. Put in glass fronted germinator with 4 shelves set at 12" spacing, (so the shoots have enough head room).

3/18/16	Beauregard	Georgia Jets	Bill Shane's	Jubilee	Notes
# good roots					
# flats of roots					

25 March - mid May, Daily: Cut shoots when they reach 6-12" tall and have 4-6 leaves. Cut, rather than pull, in order to reduce chance of spreading disease. Stand the slips in water in plastic gallon buckets or jugs. Can bundle in rubber bands to help them stand upright and use small pots in the water to keep them upright. Get rid of ants!

Weekly from 4/1: Plant the well-rooted slips in 4" 12x24" flats of compost, 40 per flat in the usual spacing. Water the flats as needed. Label, and keep the varieties separate. Tally the slips. The goal is 17 flats, 320 (8 flats) each of Georgia Jet and Beauregard, 20 each (1/2 flat each) of Bill Shane's White and Jubilee.(=10% spare).

Late April: Remove rotten roots from flats.

Date	Cut Today	Beauregard		Georgia Jet		Spotted B+GJ YTD	Cut/Un-spotted B+GJ YTD	Total B+GJ YTD	Goal B+GJ	Bill Shane		Jubilee	
		Spot-ted	Not	Spot-ted	Not					Spot-ted	Not	Spot-ted	Not
4/1									80				
4/8									200				
4/15									300				
4/22									400				
4/29									500				
5/6									600				
5/13									640				
5/20									640				
5/27									640				
<i>Goal</i>		320 = 8 flats		320 = 8 flats					640	16		16	

From approx 29 April It is possible to cut secondary slips from the older planted slips.

10 May approx: When soil is 65°F at 4" for 4 consecutive days, start planting, at the emitters. Do two plantings a week apart, rather than plant out very small slips. In the 3rd week, fill any gaps.

Many growers have success with slips with few or no roots, but we like a good root system. More important than root size is keeping newly transplanted slips well-watered.

Second method of slip production: Boutard single node cutting method

Both this system and ours start at the same time, by planting tubers in damp compost in a warm greenhouse

Drawbacks with my version of the traditional method

- The number of slips from one tuber is limited, and some varieties are meager in providing slips
- A lot of warm space is needed to grow the slips, at a time when warm space is at a premium.
- The process takes from early March to mid-May

Advantages of the Boutard single node cutting method, learned from John Hart of Cornell

- Fewer “mother roots” are needed. 10-20% compared to my method.
- Smaller plants save on greenhouse space. Only 18 days between cutting nodes and planting in the field.
- Smaller plants as plugs experience less transplanting shock.
- Root production is concentrated – from a single node rather than several.

To prepare single node cuttings

1. Take a shoot from the mother tuber and cut off about ¼”(6mm) above a leaf node (the swollen point where the leaf emerges).
2. In the leaf axil is a bud which will grow a shoot; just below the bud is a ring of cells that can grow roots.
3. Trim back the leaf stem, or leave the leaf on – your choice.
4. Make the second, lower, cut just above the next node down. Make several cuttings from one slip.
5. 50-cell plug flats work well. If the cutting is too tall to fit your cell plugs, cut more off the lower end.
6. Push the lower end of the shoot cutting at an angle into the soil, creating an even V with the leaf stem. The new shoot will then grow upwards easily.
7. Keep the trays warm and moist. Delaying planting for 10 days or so should not be a problem.
8. Plant out after 18 days into well-prepared damp soil, with drip tape in place.

Third method of slip production: Sand Hill Preservation Center field bedding method

Glenn and Linda Drowns at the Sand Hill Preservation Center in Iowa have a version of field bedding of slips

- They start field beds in late April or early May, their usual last frost date.
- The soil is still too cold for tender sweet potato slips, but they prepare beds by digging a wide trench several inches deep.
- They set the mother roots in it, cover with peat moss and wet it down.
- They cover the beds with clear plastic and wait several weeks.
- If they have warm weather the roots start sending up slips in about 20 days.
- Cool, cloudy weather means added time, fewer slips – parent roots can rot.
- Glenn says: “Slips set out when the weather is very warm will outgrow and out-produce ones set out even as much as a month earlier. A slip set out in cold soil will many times become stunted and not produce as large a yield. I typically do not get my slips planted until June 20 to June 25.”
- The sweet potatoes are almost all ready to harvest by mid- to late September.

Crop requirements

- Heat is vital.
- Sweet potatoes prefer loose, well-drained soil with pH of 5.8-6.2. They will tolerate pH from 4.5-7.5.
- Enough potassium (K) is important for drought-resistance, but too much K makes them taste bitter.
- Sweet potatoes do not benefit from high nitrogen (N). They can get plenty from high-biomass cover crops, organic mulch, and soil life.
- As with other crops, a 3 or more year rotation helps control disease.
- Once they are established, sweet potatoes are fairly drought-tolerant. Critical times to maintain sufficient moisture are after transplanting and for at least the first 20-40 days while roots are developing.

Planting out

- We like to do 2 plantings a week apart, using the older slips first, and then make a 3rd visit to fill gaps.
- It's better to wait for the slips to grow 4 leaves or more before planting, rather than rush them outside.
- For big roots, plant the slip vertically. For average size roots but larger crops, plant horizontally 2-3” deep.
- Have 3-5 leaf nodes underground and only the tips above the ground – this gives the plants a second chance if frost strikes.
- If you are planting in hot dry weather, water the soil first, and keep the roots enclosed in damp or wet compost as you plant.

Development

- The first month or so after transplanting is the root development stage. Roots can go 8' deep in 40 days. Don't be alarmed at the lack of above-ground action. Give 1" water/week, and cultivate to remove weeds.
- The second month or so is the vine growth stage. The roots begin to store starch and sugar close to the stem base. Cultivate until vines cover the ground, after which very little weeding will be needed.
- During the last month of growth for that variety (3rd or 4th month), the potatoes develop.
- Make sure you dig them up before the soil temperature gets down to 55F –the week of the average first fall frost is about right.
- Most varieties take 90–110 days from planting out to reach a good size, if the weather is warm enough.

Afflictions

- Round chunky roots, low yield, purple color: Planted too early, too cold.
- Low yield: Flooded or crusted soil 6–7 weeks after planting? Planted too early?
- Rough irregular shaped roots: Heavy clay soils or OM above 2%.
- Rattails: thin, tough, tubers caused by hot dry weather, insufficient water.
- Souring: tissue breakdown caused by poor soil aeration; for instance, flooding.
- Water blisters: Small whitish bumps around the lenticels/breathing holes – wet soil.
- Cracking: Uneven water supply or too much late-season water.
- Blister: small raised bumps appearing several months into storage – boron deficiency.
- Fine hairline cracks: also boron deficiency.
- Long, slender malformed roots, reduced yield: Potassium deficiency.

Diseases

- Brownish skin patches, worse in wet years. Stored roots shrivel. Scurf fungus, *Monilochaetes infuscans*, more likely if too much compost was used.
 - Metallic black surface lesions, maybe covering most of the root: black rot fungus, *Certocystis fimbriata*. Internal decay is not deep, but the fungus may impart a bitter flavor;
 - Sunken brown lesions that may encircle the root: ring rot, *Pythium* fungus;
 - Sunken lesions that dry and may fall out: Circular Spot, *Sclerotium rolfsii*. May taste bitter;
 - Hard, dry, black, sunken spots developing in harvest wounds: *Fusarium*. Spots may become larger than 2" (5 cm) diameter, but damage is not deep.
 - Pitting: Soil rot or soil pox fungus in the presence of water stress. Roots will be small and malformed.
 - *Streptomyces* root rot bacterium causes a similar rot;
 - Fine or coarse irregular cracks, browning of the surface; dry, corky, dark-colored clumps of tissue scattered throughout the flesh, becoming worse if roots are stored warmer than 60°F (16°C): russet-crack/internal cork, feathery mottle virus (yellow feathery patterns of leaves). Do not use as seed stock.
- More info and photos: North Carolina Sweet Potato Commission commercial growing page

Harvest planning

- Unlike white potatoes, which have the annual plant sequence of vegetative growth, flowering and dying back, sweet potato plants would go on growing forever if the weather remained warm enough.
- Choose when to dig them up, ahead of cold weather.
- The longer you wait, the bigger the potatoes, but you are gambling with the weather.

When to harvest

- Usually sweet potatoes are harvested in the week that the first frost typically occurs in your region.
- Aim to harvest on a mild day, above 50°F (10°C), to avoid permanent chilling injury
- Don't wait till soil temperatures have been below 55°F for several hours.
- If frost strikes, waste no time – get them harvested within a few days.
- If the days are warm, a couple of light frosts will not harm your crop. Despite myths, there is no toxin in frozen leaves going down into the roots.
- Cold wet soil can quickly rot sweet potatoes. Cold injury can ruin the crop – roots without leaf cover are exposed to cold air temperatures, and have lost their method of pulling water up out of the soil.
- In drought, irrigate the field before harvest, to avoid scratching the skin with chunks of dry soil.

How to harvest

- Remove the vines from the plants to be harvested that day. If there is more than one day's digging, leave intact vines to protect the rest of the crop. Clip the vines, leaving stumps to show where to dig.
- Roll the vines into the gaps between the rows –Digging forks can be useful tools for this job.

- Mowing isn't recommended, as the roots sometimes stick up out of the ground.
- Mechanical harvesting is done with a modified disk or moldboard plow with a spiral attachment. Potato diggers usually do too much damage on sweet potatoes. We dig ours by hand.
- Using digging forks, carefully dig up the roots, which grow in the ground in a bunch-of-bananas shape. Begin digging 12-18" from the center of the plant to avoid damaging them. Go straight down about 6", then angle toward the center and gently lift the potatoes out of the ground.
- It's important not to drop, throw or in any other way bruise the roots.
- Avoid any abrasion of the skin, which is very fragile at this stage. This is the reason for the recommendation to irrigate before harvest if the soil is very dry.
- Set the potatoes out beside the spot they've grown, one clump per plant, so it's easy to identify the most productive plants, for seed stock.
- Let the tubers dry in the sun for up to an hour, unless the weather is unsuitable.
- Don't leave roots exposed to temperatures higher than 90°F for more than ½ hour, or they get sun-scald.

Sorting and crating

1. If you want to grow your own slips next year, select seed potatoes. We grow several different kinds, and make sure not to mix roots from different rows
2. Sort storable from damaged roots. Large open broken surfaces will cure and can be stored, but any roots with soft wet damaged areas or deep holes (whether from bugs or fork tines) will not store and should be graded out, for composting or immediate use at home. We sort into wood flats or plastic crates for curing and buckets for the "Use First" or cull category.

Selecting seed potatoes

- Select the best: choose plants with a high yield and no string (rat-tail) roots.
- From these plants, choose medium sized (1½" diameter) potatoes with good shape and color.
- Don't save jumbo potatoes for seed, they're harder to deal with, and will not produce more or better crops. Each potato produces about the same number of slips (shoots) regardless of size.
- Do not save for seed any roots with disease symptoms. Damage due to poor growing conditions can look like a disease, but as it isn't, it will not carry over to the next crop.
- Save about one tuber per 10 slips wanted.
- If you want to be sure to avoid saving roots with color breaks, you can cut a small slice from the distal end (the end distant from the plant) for examination. The cut surface will heal over during curing. Discard any roots with streaks or dots bigger than a pencil lead.

Curing

- Immediately after harvest, field drying, sorting and crating, take the boxes of sweet potatoes into a warm, damp basement or other indoor space to cure.
- Curing allows the skin to thicken, cuts to heal over, and some of the starches to convert to sugars.
- Ideal conditions are **85-90°F**, and **80-95% humidity** for 4-7 days. Air flow and ventilation needed.
- Curing takes longer if conditions are less than perfect. The length of the curing period also varies with the dryness of the soil just prior to harvest. We reckon on 10-14 days.
- To test if curing is complete, rub two sweet tubers together. If the skins scratch, they need to cure longer.

Storage

- Ideal storage conditions for sweet potatoes are **55-60°F**, **85-90% humidity**, with one air change each day. Above 60°F, shrinking and sprouting may occur, and below 55°F, permanent chilling injury (Hard Core) can happen. The potatoes remain hard no matter how long you cook them, and are useless. Do not ever let the temperature drop below 50°F.
- Sweet potatoes do not need to be stored in the dark. Dormancy is generally broken by moisture and warmth, not daylight. Green sprouts are not toxic, as are those of white potatoes.
- We use a rodent-proof "cage" in our basement. We stack the boxes directly on top of each other and this seems to keep enough moisture in. This way, assuming we had a good enough harvest, we can still have sweet potatoes into May and early June.

Resources

- *ATTRA Sweet Potato: Organic production*
www.attra.ncat.org/attra-pub/summaries/summary.php?pub=32

- ❑ North Carolina Sweet Potato Commission, www.ncsweetpotatoes.com/
The commercial growing page has lots of information, including photos of problems:
<http://www.ncsweetpotatoes.com/sweet-potato-industry/growing-sweet-potatoes-in-north-carolina/>
 - ❑ North Carolina State University, <http://www.ces.ncsu.edu/depts/hort/hil/pdf/hil-23-c.pdf>
Guidelines for Sweetpotato Seed Stock and Transplant Production
 - ❑ Mississippi State University *Commercial Sweet Potato Production in Mississippi*
<http://ageconsearch.umn.edu/bitstream/15785/1/rr99-005.pdf>
 - ❑ Clemson University *Estimated costs and Returns for Sweet Potatoes*
https://www.clemson.edu/extension/aes/budgets/melons_vegetables/swtpot6.pdf
 - ❑ Islam, A. F. M. Saiful, C. Kubota, M. Takagaki, and T. Kozai. 2002. *Sweetpotato growth and yield from plug transplants of different volumes, planted intact or without roots*. *Crop Sci.* 42:822-826.
<https://dl.sciencesocieties.org/publications/cs/abstracts/42/3/822?access=0&view=pdf>
 - ❑ Somasundaram, K. and V. S. Santhosh Mithra. 2008. *Madhuram: A simulation model for sweet potato growth*. *World Jour. Agr. Sci.* 4: 241-254. for more understanding of sweet potato growth.
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.415.4824&rep=rep1&type=pdf>
 - ❑ *Sustainable Practices for Vegetable Production in the South*, Dr Mary Peet:
<https://www.amazon.com/Sustainable-Practices-Vegetable-Production-South/dp/0941051552>
 - ❑ Sweet Potato IPM (not organic, but includes good info on insect pests)
<http://www.ipmcenters.org/pmsp/pdf/sesweetpotato.pdf>
 - ❑ Alabama Co-operative Extension *Guide to Sweetpotato Production in Alabama*
<http://aces.edu/pubs/docs/A/ANR-0982/ANR-0982.pdf>
 - ❑ Alabama Co-operative Extension *Harvesting and Curing Sweetpotatoes*
<http://www.aces.edu/pubs/docs/A/ANR-1111/ANR-1111.pdf>
 - ❑ University of Georgia Extension *Commercial Sweet Potato Production*
<http://extension.uga.edu/publications/detail.cfm?number=B677>
 - ❑ *Sweetpotato production in California* <http://anrcatalog.ucanr.edu/pdf/7237.pdf>
 - ❑ Anthony Boutard and Caroline Boutard Hunt wrote about single node sweet potato propagation in *Growing for Market* in March 2015.
 - ❑ Anthony Boutard is the author of *Beautiful Corn: America's Original Grain from Seed to Plate*. New Society Publishers
- Suppliers of slips**
- ❑ Sand Hill Preservation Center, Iowa. Heirlooms, 225 Varieties. Some limits on how many you can buy.
www.sandhillpreservation.com/pages/sweetpotato_catalog.html
 - ❑ Steele Plant Co. Slips in small and large quantities, good prices, great service. 10 varieties
<http://www.sweetpotatoplant.com/>
 - ❑ Southern Exposure Seed Exchange 14 varieties, all organic. <http://www.southernexposure.com>