Growing Sweetpotatoes in Western Washington

Production Practices

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Contents

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Production Practices

Sweetpotato (*Ipomoea batatas*) is a heat- and sun-loving crop that requires 90-120 frost-free days to grow. Sweetpotato is in the Convolvulaceae (Morning Glory) family, unlike potatoes (*Solanum tuberosum*), which are in the Solanaceae (Nightshade) family, and true yams (*Dioscorea spp.*), which are in the Dioscoreaceae (Yam) family. This makes sweetpotato a great choice for crop rotations, as there are no other crops in the family that are cultivated in the United States. Sweetpotatoes are tuberous roots (modified roots), while potatoes and yams are both tubers (modified stems). Researchers and industry groups write "sweetpotato" as one word to avoid confusion with potatoes that are sweet and to emphasize that potatoes and sweetpotatoes are completely unrelated species.

Though sweetpotatoes are typically grown as a root crop, the entire plant is edible, including the vines. The vine tips (greens) or leaves alone can be harvested for human consumption, and the entire vine can be used as animal feed (unlike potato leaves). Sweetpotato leaves and vines are very similar to spinach in eating quality, and they hold up in cooking slightly more like kale.

Sweetpotato is one of the most nutritious root crops and ranks fifteenth in world food production (FAO 2022). Sweetpotato's high nutritional value and the projected increase in areas suitable for its production with climate change make it an important crop for climate resilience and addressing nutritional deficiencies (Manners and van Etten 2018).

Globally, 57% of the world's sweetpotatoes are produced in China (FAO 2013-2023 average). The United States ranks 9th in global sweetpotato production, producing only about 1.4% of the world's sweetpotatoes (FAO 2013-2023 average). The top sweetpotato producing states are North Carolina, California, and Mississippi (USDA NASS 2022). California is the top state for organic sweetpotato production (USDA NASS 2022).

Sweetpotato production in the northern United States is limited due to the perceived barriers of a short growing season and relatively cool summer temperatures. Yet, recent studies have shown yield in northern regions can be greater than or equal to the national average of 11 tons/acre when sweetpotatoes are grown with plastic mulch (Duque 2020; Sideman 2015; Shrestha and Miles 2022; Wees et al. 2016). Western Washington farmers are interested in growing sweetpotatoes to diversify locally grown market offerings, add another plant family to crop rotations, and to better serve customers and family members who have food sensitivities. Some growers are also interested in sweetpotato as an alternative leafy green crop to spinach in late summer and early fall.

There are several environmental factors that promote high sweetpotato yields in northern latitude regions. Sweetpotato foliage growth is promoted by long day lengths, while storage root development is promoted by short days (Lebot 2020). Thus, in high latitude regions, long day lengths during early summer promote rapid growth of foliage that can result in higher storage root yields as day lengths rapidly decrease in the early fall. Additionally, cool (68 °F) nighttime air temperatures promote higher yields and earlier maturity in sweetpotato (Lebot 2020).

In a trial of 9 varieties of sweetpotatoes in Mount Vernon, WA in 2023 and 2024, the 2-year average marketable yield ranged from 4 to 13 tons/acre (unpublished data). The keys to successful production in this region are growing suitable varieties, planting into warm soil, maintaining warm soil throughout the growing season, and providing adequate weed control and irrigation during plant establishment.

Slips

Sweetpotatoes are planted using slips, which are vine cuttings about 6-12 inches long with 5-8 nodes, taken from sprouted sweetpotato roots. Sweetpotato slips can be purchased from seed catalogs or produced on-farm. Planting non-rooted sweetpotato slips directly into the field is the generally preferred planting method.

Pre-rooting Slips

Pre-rooted slips are sometimes used in areas with short growing seasons to try to increase sweetpotato yield (Wees et al. 2016). With the complex microclimates present throughout western Washington, planting pre-rooted slips may improve yields in cool areas, or where there tend to be early summer frosts (mid to late June) or early autumn frosts (end of September). In these areas, plant pre-rooted slips as soon as risk of frost has passed.

When ordering slips with the intention to produce pre-rooted slips, be sure to order early enough to allow time to pre-root them. Typically slips are pre-rooted for 7 to 28 days. ***Do not allow the slips to become rootbound*** (Figure 2). The first roots that form on sweetpotato slips become the storage roots that are harvested, so rootbound slips will produce misshapen sweetpotatoes. Do not pre-root slips in water as this produces a weak root system. Place slips together in loose potting mix (for example, 50 slips could be placed together in a 1-gallon pot) (Figure 1), or slips can be placed individually into smaller pots. Slips are pre-rooted for 7 to 28 days.

A consideration regarding the use of pre-rooted slips is the labor needed for transplanting, which is greater than for non-rooted slips (Bornt 2012). Additionally, pre-rooting slips requires greenhouse space and potting supplies.

Figure 1. Slips just received in the mail placed together in a 5-gallon pot in the greenhouse (left) and slips ready to plant in the field after holding for 1 week in a 5-gallon pot (right).

Figure 2. Rooted slip that has become rootbound and will likely produce misshapen sweetpotatoes (left), and rooted slip that is not badly rootbound but has begun to initiate thickened, pinkish storage roots which may produce sweetpotatoes that are held closer than usual to the stem, making harvest more difficult, and are more likely to produce round instead of oval/elongate roots (right).

Handling Slips Received in the Mail

Slips that are received in the mail can be planted immediately into the field. If slips cannot be planted right away, they can be wrapped in a wet paper towel or placed in water and held at room temperature for 1-2 days, or can placed in a large pot with loose potting mix for 1-2 weeks before planting (Figure 1). If placing in a large pot with potting mix, only bury about the bottom inch of the slips. To avoid misshapen sweetpotatoes, re-cut the ends of the slips before planting to encourage new roots to form. Sweetpotatoes are extremely susceptible to chilling injury, so never refrigerate slips (Hammett 1985).

Planting Slips

Plant slips at least 3 nodes deep, leaving only about 2-3 nodes above the soil surface. Irrigate deeply within one hour of planting to minimize transplant shock. Continue to irrigate regularly for the first few weeks as the slips develop roots. Slips often experience significant transplant shock and may wilt and lose leaves shortly after transplanting. If soil is sufficiently warm and moisture is maintained, slips will recover within a few weeks.

Watch!

Video | How to Plant Sweetpotato Slips

https://youtu.be/eX9JmoKgXEA

Sweetpotatoes produce storage roots from nodes that are within a few inches of the soil surface. Thus, some farmers plant slips horizontally to allow more nodes from the slip to produce storage roots, potentially increasing yield. Slips can be planted horizontally by digging a trench, laying all slips down, then burying a portion of each slip. However, when planting into raised beds covered with plastic mulch, planting slips vertically is typically faster and easier. A small study at WSU NWREC found a marginal increase in root yield (17%) when slips were planted horizontally instead of vertically (unpublished data 2024).

Soil Type

Sweetpotatoes grow best in fertile and well drained loam, sandy-loam or clayey-loam soil. Clay soil is common in parts of western Washington, and heavy clay soil can restrict sweetpotato root development and cause shape irregularity, leading to lower yield and difficult harvest (Mukhopadhyay et al. 2011). In areas with heavy clay soil, plant sweetpotatoes in raised beds or amend fields with compost. Heavy clay soils can also lead to cooler soil temperature and are at risk of holding more water later in the season once the rains begin. Sweetpotato roots left in the field when soil becomes saturated may rot and develop deformities such as corky root. Time harvest to be complete before heavy rains start.

Sweetpotatoes do best within a pH range between 5.6 and 6.6. They can tolerate slightly acidic soil but growth is inhibited when pH is lower than 5.5.

When to Plant

Slip transplanting survival is greatest when soil temperature is at least 65 °F at a 4-inch depth for 4 days in a row, typically about 3 to 4 weeks after the frost-free date. In western Washington, this ranges from mid-May to early July depending on the microclimate. In research trials in Mount Vernon, WA, slips are typically planted the first week of June. Sweetpotato slips are extremely sensitive to cold soil temperatures, so planting before soil is sufficiently warm is not recommended.

In-Row Plant Spacing

Spacing of 8 to 10 inches between plants in a row is recommended for western Washington. A plant spacing trial in Mount Vernon, WA in 2023 and 2024 compared 8, 10, and 12 inch in-row spacing and found that maximum sweetpotato yields were achieved with 10 inch spacing (unpublished data).

In-row plant spacing affects both root size and yield of sweetpotatoes. In general, planting sweetpotato slips closer together will slightly decrease the root yield per plant but will increase overall yield per acre because there are more plants per acre (Duque et al. 2022; Schultheis et al. 1999; Shrestha and Miles 2022; Wees et al. 2016). Root size tends to increase as plant spacing increases due to less competition between plants. Jumbo sweetpotato roots are usually undesirable as they are used for processing, while large and medium-sized roots are preferred for fresh eating (Schultheis et al. 1999). Fingerling size is a new market category for sweetpotatoes and may be well suited for direct marketing.

Narrower in-row spacing also results in more canopy cover early in the growing season (Shrestha and Miles 2022), which may reduce weed competition.

Row Spacing

Spacing between rows is determined by equipment requirements. In trials in Mount Vernon, WA, 6-foot spacing between rows was used to allow for mechanical weed control and harvest with a single-row potato digger. In commercial sweetpotato production in the southeastern United States, 3 to 4-foot row spacing is typically used.

Plastic Mulch

The optimal soil temperature range for sweetpotato storage root development is 77 - 86 °F (Lebot, 2020). In many areas of western Washington, plastic mulch is needed to reach these optimal temperatures, which increases sweetpotato yield (Novak et al. 2007; Shrestha and Miles 2022; Sideman 2015). In warmer microclimates, where average air temperatures during the growing season reach this optimum temperature, plastic may not be needed (Gajanayake et al. 2015). However, plastic mulch also reduces labor inputs for weed management and improves irrigation efficiency by reducing water loss from the soil.

Black polyethylene (PE) is an effective mulch for sweetpotato production in western Washington (Shrestha and Miles 2022). Ghimire et al. (2018) found that soil temperature with pumpkins grown in Mount Vernon, WA was 5.4 °F warmer with PE mulch compared to bare soil. In Mount Vernon, WA, sweetpotato root yield was over three times higher when grown with PE mulch (5.2 tons/acre) than in bare soil (1.3 tons/acre) (unpublished data, 2024). When available, soil-biodegradable plastic mulch is a good option as it can be tilled into the soil at the end of the growing season, though some types of soil-biodegradable mulch do not warm soil as much as PE mulch (DeVetter et al. 2017; Ghimire et al. 2018, Tofanelli and Wortman 2020). Another study in Mount Vernon, WA found that sweetpotato yield was higher when grown with PE mulch (8.9 tons/acre) than with soil-biodegradable mulch (6 tons/acre) likely due to soil warming (Shrestha and Miles 2022).

The two most important mulch factors to consider are color and the contact between the mulch and the soil surface. Black plastic mulch provides both soil warming and weed control (Lamont 1999). Clear plastic mulch can provide greater soil-warming than black plastic, but it does not control weeds (Devi et al. 2020). White or reflective silver mulches lower the soil temperature (Lamont 1999), so they are not recommended in western Washington. Close contact between the plastic mulch and soil provides the best warming effect as heat is transferred directly from the plastic to the soil. Beds should be smooth, and the plastic anchored firmly in place to create this close contact (Lamont 1999).

Farmers in western Washington have used reusable or recycled black plastic including silage tarps, metal/lumber packing plastic, 6 mil polyethylene plastic, and woven weed barrier fabric with success (Figure 3). Not all black plastic provides the same warming qualities so farmers will need to test products at their site. Some farmers have increased the temperature by using floating row covers, low tunnels, or high tunnels.

Figure 3. Sweetpotatoes grown with polyethylene mulch (left), silage tarp (center), and landscape fabric (right).

Raised Beds

Sweetpotatoes are typically planted in raised beds to improve soil aeration, increase soil warming, and make harvest easier. Raised beds that are 6 to 8 inches in height and about 30 inches wide are effective for sweetpotato production in western Washington.

Fertilizer

Sweetpotatoes have relatively low nutrient requirements. Over-fertilization, especially with nitrogen, can promote vigorous vine growth at the expense of root production, leading to lower yields (Lebot 2020). Sufficient levels of potassium are important for storage root yield (Lebot 2020). Add fertilizer based on soil test results to avoid over-fertilizing. Nutrient requirements for sweetpotatoes are shown in Table 1.

Table 1. Nutrient requirements for sweetpotatoes in western Washington.

Nutrient	lbs/ plant	lbs/ 100 ft row	lbs/ acre
Nitrogen (N)	0.0113	1.47	98
Phosphorus (P)	0.0022	0.26	19
Potassium (K)	0.0215	2.59	187

Calculations based on sweetpotato yield of 2.83 lbs/plant (average yield across 6 cultivars in Mount Vernon, WA in 2023 and 2024). Assumes 10 inch in-row spacing and 6 feet between rows, for a plant population of 8,716 plants per acre. Nutrient requirements calculated based on expected nutrient removal if both roots and foliage are removed from the field. Adapted from Lebot (2020). Requirements listed in pounds of elemental nutrient (N, P, K).

Learn more!

For more information about calculating fertilizer rates or using manure, compost, and cover crops for soil fertility management, see Soil Fertility in Organic Systems: A Guide for Gardeners and Small Acreage Farmers (pdf).

https://s3.wp.wsu.edu/uploads/sites/2074/2019/01/Soil-Fertility-in-Organic-Systems-1.pdf

Irrigation

Sweetpotatoes need irrigation for slip establishment and to successfully produce a marketable crop. In general, 18 to 26 inches of water distributed throughout the growing season are needed to produce a good sweetpotato crop (Stathers et al. 2013). While irrigation management is dependent on soil type, recommended irrigation frequency is shown in Table 2. Apply 0.5 inches of water for each irrigation event and adjust irrigation amount as needed to wet the root zone (Felix et al. 2012; Smith and Villordon 2016). For example, in Mount Vernon, WA, sweetpotatoes were grown with plastic mulch and drip irrigation was applied for approximately 3 hours once a week (0.5 inches), skipping irrigation in weeks with significant rain. If using soil water tension (SWT) to determine when to apply irrigation, irrigate when SWT reaches 25 kPa (Felix et al. 2012).

Table 2. Recommended irrigation frequency and depth for sweetpotatoes from planting until harvest around 120 days after transplanting (DAT). Adapted from Felix et al. (2012), Smith and Villordon (2016), and Stathers et al. (2013).

Days after transplanting (DAT)	At planting	0-20 DAT	20-40 DAT	40-100 DAT	100-120 DAT
Typical dates in western Washington	June 1	June 1 - June 20	June 20 - July 10	July 10 - Sept. 10	Sept. 10 - Oct. 1
Irrigation frequency	Irrigate within 1 hour of planting	Twice a week	Once a week	Once every two weeks	Stop irrigating 1-2 weeks before harvest
Root zone depth	6 inches	8 inches	15 inches	15 inches	N/A

Sweetpotato is considered a drought tolerant crop, and though the vines can survive long periods of drought, storage roots do not develop in drought conditions (Woolfe 1992). Uneven watering can cause root cracking, and overwatering or extended periods of heavy rain can reduce storage root development and cause corky root and root rot (Stathers et al. 2013). Corky root, also called water blisters or edema, are small lumps that are enlarged lenticels on the surface of the roots. When plants experience drought stress during storage root initiation, plant symptoms resemble herbicide damage, and storage roots will become pencil roots or misshapen (Smith and Villordon 2016). Excessive irrigation leads to lower yields and poor root quality (flavor, color, and texture are negatively affected) and undesirable root elongation, though vines will appear vigorous and healthy (Smith and Villordon 2016; Thompson et al. 1992).

Weed Management

Weeds are one of the major pests of sweetpotato in western Washington. The critical weed-free period—the period during which weeds must be controlled to prevent yield loss—is the first 3 to 6 weeks after transplanting (Nedunzhiyan et al. 1998; Seem et al. 2003; Wadl et al. 2023).

Plastic mulch helps control weeds within the rows. Additional weed control will be necessary, such as hand weeding the planting holes during the critical weed-free period and cultivating between rows if spacing and equipment are suitable. Growing erect cultivars instead of spreading cultivars (see Table 1) can extend the use of between-row mechanical weed management later into the growing season.

Harvest

When to Harvest

Sweetpotatoes are a perennial plant and there are no maturity indicators for when roots are ready to harvest. Plants continue to grow as long as conditions are favorable. Dig up the roots of a few plants to assess root size and time the harvest based on desired size. While delaying harvest will allow root bulking to continue, it also comes with the risk of frost or poor soil conditions due to rain. Harvest sweetpotatoes before temperatures drop below 50 °F to avoid chilling injury, and before the fall and winter rains start, especially if soil has a high clay content. In Mount Vernon, WA, sweetpotatoes are typically harvested the first and second week of October.

Harvest Methods

Vines do not need to be cut before harvest like potato vines do, though they are often removed a few days in advance of harvest to make harvesting easier.

Sweetpotatoes can be harvested by hand with a shovel or fork (Figure 4). On a larger scale, a potato digger can be used (Figure 5). When using a potato digger, set the depth as deep as possible, ideally eight inches or more. Some sweetpotatoes will be deep in the soil so a deep setting is important for reducing damage to roots. Harvest with a potato digger may need to be done slightly earlier than hand harvesting—before major rain events in the late fall—to reduce soil compaction.

Figure 4. Harvesting sweetpotatoes with a shovel.

Figure 5. Harvesting sweetpotatoes with a potato digger.

Harvest Considerations

During harvest, minimize skinning and bruising of the sweetpotatoes. Minor wounds during harvest are not a concern if roots are cured properly.

Do not leave sweetpotatoes exposed to the hot sun for a prolonged period of time after harvest as this can increase moisture loss and susceptibility to decay during curing and storage (Woolfe 1992). Sweetpotatoes harvested from cold, wet soils or exposed to temperatures below 50 °F after harvest may be more susceptible to pathogens during storage, develop off-flavors, and/or develop permanently hard areas of the flesh that are not softened by cooking (Woolfe 1992).

Market Classes

Sweetpotatoes are a perennial plant and the roots will continue to grow larger the longer and warmer the growing season. Growers may want to target specific size classes for various markets and end uses (Figure 6).

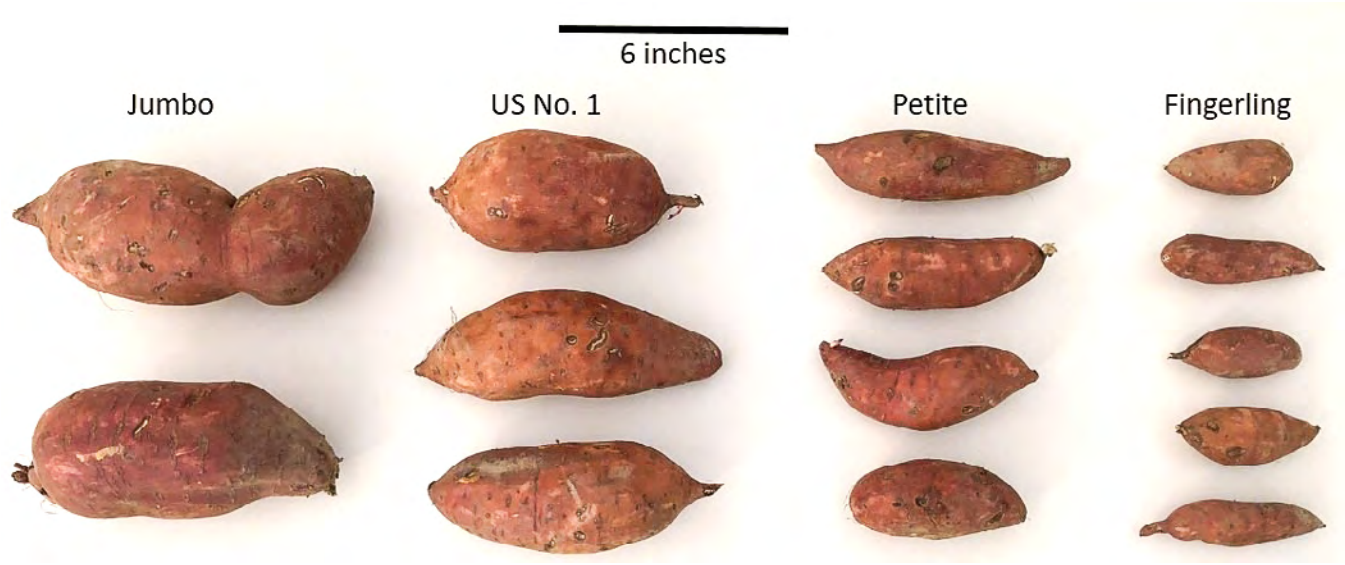

Figure 6. Market classes of sweetpotatoes. (From left) Jumbo, US No. 1, Petite, and Fingerling.

Jumbo Sweetpotatoes

Jumbo roots are the largest size class and are typically sold for processing. Jumbo roots have a diameter larger than 3½ inches and/or a length greater than 9 inches (USDA ARS 2005). Direct market farmers often want to minimize production of jumbo roots since they are less popular with direct market consumers. The production of jumbo roots can be minimized by using a narrower in-row plant spacing and/or harvesting earlier.

U.S. No. 1 Sweetpotatoes

U.S. No. 1 sweetpotato roots are the standard fresh market class of sweetpotato. They have a diameter between 1¾ and 3½ inches and a length between 3 and 9 inches (USDA ARS 2005).

Petite Sweetpotatoes

U.S. No. 1 Petite sweetpotato roots have a diameter between 1 ½ and 2 ¼ inches and a length between 3 and 7 inches (USDA ARS 2005). At grocery stores, petite sweetpotatoes are often sold in microwavable bags of 4 to 6 roots. Petite sweetpotatoes are ideal for baking or steaming whole and are a nice size for individual servings.

Fingerling Sweetpotatoes

Fingerling sweetpotatoes are smaller than petite sweetpotatoes, with a diameter of one to 1 ½ inches and a length of 2 to 4 inches. Fingerling sweetpotatoes cook faster, are less stringy, and have more tender skin than larger sweetpotatoes (Hoffman 2019). Fingerling sweetpotatoes can be steamed, baked, or roasted whole or chopped with the skins on. Fingerling sweetpotatoes do not store as well as larger roots, so they should be consumed soon after curing.

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