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PEA SHOOTS

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Pea Shoots

About Pea Shoots

Pea shoots are the young, tender vine tips of green or garden peas (*Pisum sativum* L.) (Muehlbauer, and Tullu 1997; Kay 1979). This specialty vegetable crop is eaten fresh in salads, lightly steamed or sautéed in stir-fries, or served as an attractive edible garnish often placed on top of a hot main course just before serving. Pea shoots are generally 2–6 inches long and include 2 to 4 pairs of leaves and immature tendrils; they may also include small flower buds or blossoms. They have a mild “pea pod” flavor and crisp, light texture. Pea shoots are also relatively high in protein compared to other common edible greens (Japan Science and Technology Corporation 2015). Hmong, an Asian ethnic group, introduced the use of pea shoots throughout China, Japan, and Southeast Asia (Larkcom 2008). Hmong farmers also introduced pea shoots to farmers markets in western Washington (Figure 1). Pea shoots are now routinely found in high-end restaurants. Also, because peas are legumes capable of fixing their own nitrogen, pea shoot production gives growers an opportunity to cut fertilizer costs and improve soil nitrogen fertility to benefit subsequent crops. This guide provides growers with basic production information for pea shoots in the Pacific Northwest.



Figure 1. Hmong farmer selling pea shoots at Pike Place Market in Seattle, Washington. (Photo: C. Miles).

Climate

Peas grow best in cool weather and should be planted in early spring or late summer. The ideal mean temperature for growth is 55°F–65°F (13°C–18°C), although this may be somewhat cultivar dependent. Young pea plants can withstand a little frost, though frost may damage the flowers and pods.

As a winter crop, peas tolerate temperatures down to 28°F (-2°C) in the seedling stage, but top growth may be damaged when the temperature falls below 21°F (-6°C) (Slinkard et al. 1994). Austrian winter peas are capable of overwintering in most growing regions of the Pacific Northwest, as they are tolerant to sub-freezing temperatures. However, without protective snow cover, Austrian winter peas can still suffer significant damage or winterkill from extreme temperature drops and/or drying winter winds. Peas are notably water-use-efficient and drought tolerant, and are adaptable to a wide range of seasonal precipitation levels. These characteristics allow them to perform relatively well, even as dryland crops in semi-arid regions.

Soils

The best soils for peas are silt loams, sandy loams, or clay loams. Peas generally tolerate both sandy and heavy clay soils; however, providing proper drainage is critical as peas will not thrive in waterlogged conditions. Peas grown in wet soils develop a shallow root system, and when the soil dries the root system will be insufficient to sustain plant growth. Root rot is also a predominant disease in cool, wet soils, and a major problem in early season peas (Hemphill 2010). Peas are very sensitive to soil compaction, so it is best to avoid or reduce cultivation when soils are wet. Some pea shoots are grown in potting media and/or quasi hydroponic systems, usually in greenhouses.

Soil Testing and Nutrient Applications

Optimum soil fertility is essential for high yields and to produce top-quality pea shoots. In the early fall of the year preceding pea planting, or in the spring just prior to planting, conduct a soil test to determine lime and fertilizer requirements. See Additional Resources section for a detailed description of soil testing and soil nutrition.

Soil pH

Peas are fairly sensitive to soil acidity and the optimum soil pH range for pea production is 6.0 to 7.0.

Table 1. Lime application rates for peas in tons per acre (T/acre) based on soil SMP buffer test (Anderson et al. 2013).

Soil SMP pH	Apply lime (T/acre)
Below 5.5	6
5.5-5.7	5-6
5.7-5.9	4-5
5.9-6.1	3-4
6.1-6.3	2-3
6.3-6.5	1-2
Over 6.5	0

In the maritime Pacific Northwest, due to the high rainfall and relatively warm year-round temperatures in the region, soils typically have a pH range of 5.3 to 5.5 (slightly acidic). Apply lime when soil pH is 6.5 or below, or when calcium (Ca) levels are below 5 milliequivalents (meq) Ca per 100 grams of soil. Conduct a soil test in early fall of the year preceding pea planting to determine if you need to apply lime to your soil. If test results indicate the soil pH is too low, apply ground agricultural limestone, at the recommended rates, based on your soil analysis test. Both soil pH and recommended rates for lime application will be given in the analysis report of your soil test. If specific recommendations for your soil are unavailable, Table 1 gives general guidelines for lime application based on soil pH; however, lime application rates depend on soil type. To be most effective, apply lime in the fall preceding spring planting and mix it with the surface 5–6 inches of soil.

Compost

If you use compost, broadcast it prior to final field preparation and thoroughly incorporate into the top 5–6 inches of soil. Base compost application rates on the nutrient content of the compost. That is, apply enough compost to meet the nitrogen, phosphorus, or potassium needs of the crop, but do not exceed any of the nutrient application rates. See the Additional Resources section to learn more about how to calculate appropriate application rates for compost and manure. Fresh manure should not be applied within 90–120 days of harvest for a crop that will be eaten fresh or uncooked (Rangarajan et al. 2000).

Fertilizer

Apply fertilizer, at planting, in a band next to the seed row. Band the fertilizer approximately 2 inches to the side of the seeds and 2 inches below the seeds. If you do not have equipment to band fertilizer at planting, broadcast and plow down the fertilizer prior to planting.

Nitrogen

Peas are a legume and have the ability to fix nitrogen from the atmosphere (i.e. “N-fixation”). Little to no N fertilizer is required to grow a healthy crop of pea shoots. If soils can supply at least 50 pounds of available N, no supplemental N may be needed (Seaman 2016). If surface soils are very low in N though (such as in early spring in moist climates, or following mature, high-residue crops), applying up to 30 pounds per acre of N may aid yield and assure fast, early stand growth. This can help the crop get going until it can begin to fix its own N. Fixation may begin as early as 2–3 weeks after planting (Flynn, and Idowu 2015). Applying high rates of nitrogen to the soil (more than 100 pounds per acre N) will actually inhibit the nitrogen fixation process (Hoare 1935) and considerably reduce the economic benefits of growing a legume crop. Apply any supplemental N along with phosphorus and potassium.

To ensure that peas can fix nitrogen, inoculate pea seeds with *Rhizobium leguminosarum* before planting. Rhizobia are naturally occurring soil bacteria that fix nitrogen. Rhizobia live in symbiosis with legumes, within the nodules found on the legume plants’ roots (Figure 2). Many species of Rhizobia exist and each is specific to a particular species of legume plant. If you use a Rhizobium species specific to beans, soybeans, or any other legume (except vetch), it will not work for peas. Rhizobia that works on vetch is an exception: it also works on peas. Inoculant products that contain more than one species of rhizobium can be used, as long as the mix contains the rhizobium specific to peas or vetch (Penn State Extension 2017). Although Rhizobia are naturally occurring, they may not be abundant enough, or may not be found in every soil during every year. Inoculating the seed each year ensures that the nitrogen-fixing bacteria will be available that year. Consider inoculant as low-cost insurance that will ensure good N-fixation for your crop. An added benefit is that the crop that follows peas will benefit from the fixed N. Inoculant also substantially reduces the need for costly N fertilizer. Inoculant can be purchased from most companies that sell pea seed.



Figure 2. The arrow in the figure points to one of many reddish-hued nodules found on pea roots. When nodules are broken open, reddish-pink hues inside indicate active N-fixation; gray or browning colors inside nodules indicate N-fixation is inactive. Photo was taken 60 days after seeding. (Photo: J. O'Dea)

Phosphorus and Potassium

Refer to your soil test results to determine how much phosphorus (P) and potassium (K) should be applied for good pea production (Table 2).

Table 2. Phosphorus (P) and potassium (K) application rates for peas in pounds per acre (lb /acre) based on soil test results in parts per million (ppm) (Hemphill 2010).

Soil Test P (ppm)	Apply Phosphate (P ₂ O ₅) lb/acre	Soil Test K (ppm)	Apply Potassium (K ₂ O) lb/acre
0-15	120-150	0-100	90-120
15-60	80-120	75-150	60-90
Over 60	40-80	150-200	40-60

Do not apply more than 80 pounds of phosphate (P₂O₅) and 60 pounds of potash (K₂O) per acre, in the band, at planting. If additional phosphorus or potassium is required, apply the balance in a side-dress application 6–8 weeks following planting (Hemphill 2010). If pea shoot plantings are intended for multiple harvests, they will benefit from application of side dressing; for single harvest no side dressing is needed.

Sulfur

Small quantities of sulfur may be required for good pea production. Sulfur deficiencies in pea crops can reduce yield, N-fixation, and pea's ability to build proteins (Scherer et al. 2006). Refer to your soil analysis results to see whether sulfur is recommended. Gypsum is a good source of sulfur, and because it also contains calcium, it does not alter the soil pH.

Fertilizers such as ammonium sulfate can be applied at planting and will provide the sulfur needed for good crop growth. Apply 20–30 pounds per acre of sulfur in the form of sulfate at, or prior to, seeding. Elemental sulfur is another source of sulfur, but it must be converted to the sulfate form in the soil before it is available for plant uptake. Apply finely ground (less than 40-mesh) elemental sulfur in the year preceding pea production. Sulfate and elemental sulfur both have an acidifying effect on soil and will cause the soil pH to drop. If you apply these sources of sulfur, you may also need to apply lime to maintain a soil pH in the range of 6.0–7.0.

Magnesium

When the soil test value for magnesium is below 0.5 meq per 100 g of soil, or when the calcium level is 10 times greater than the magnesium level, apply 10–15 pounds of magnesium per acre, in the fertilizer band, at planting (Hemphill 2010).

Dolomite, a form of limestone, is a good source of magnesium. Broadcast dolomite and mix it into the seedbed a minimum of several weeks in advance of seeding and preferably the preceding year. One application of dolomite can be effective for several years.

Manganese

Under low soil pH conditions, manganese may be unavailable for plant uptake. Symptoms of manganese deficiency include bright yellow interveinal areas on leaves while leaf veins remain green.

To ensure that soil manganese is available for plant growth, maintain a soil pH of around 6.5. If the soil is low in manganese, apply no more than 75 pounds of manganese sulfate per acre prior to planting. If manganese deficiency symptoms are observed in your pea crop, apply a foliar spray of manganese chelate at a rate of 0.12 pounds per acre at first bloom (Hagedorn 1991).

Selecting a Cultivar

Although many pea cultivars, including Austrian winter pea, can be used for producing pea shoots, snow pea and snap pea cultivars may be the most flavorful and attractive (Table 3). Sweetness, succulence, and tenderness are the major qualities valued in pea shoots. Cultivars that are leafy with short, tender stems and few tendrils are the most suitable for culinary uses (Figure 3). Stem stringiness is a culinary defect and may render your crop unsaleable. Both cultivar choice, and to some extent growing environment, contribute to stringiness. Plant small test plots of various cultivars each year to understand pea performance under a variety of conditions. Record results and compare across years. The flavor of pea cultivars can vary from site to site and from year to year.



Figure 3. A snow pea (left) and a snap pea cultivar (right), both at approximately 6 weeks after planting. This snow pea cultivar is more compact with shorter vines and is more suitable for pea shoots than this snap pea cultivar. (Photo: C. Miles)

To ensure good-tasting pea shoots, it is especially important to adjust soil pH and soil nutrition to meet specific plant needs. Pea shoots that have immature blossoms are attractive for use in fresh salads or as an edible garnish; thus, flower color may be a factor for consideration when choosing a cultivar. Pea shoots with pink or purple blossoms can be particularly attractive in a fresh salad.

Afila pea cultivars produce many tendrils and might, at first glance, appear attractive as a garnish (Figure 4). However, the tendrils are not considered palatable. The afila (*af*) gene is a naturally occurring mutation in peas that replaces pea leaflets with tendrils (Goldman et al. 1992). Tendrils can cause an unpleasant eating experience. A saying in Southeast Asia that best describes this phenomenon is “tendrils tie your tongue” (Chao pers. comm. 1998).



Figure 4. Snow pea cultivar (left) and afila pea cultivar (right). Afila cultivar produces many tendrils that may appear attractive but are not palatable. (Photo: C. Miles)

It is important to note that flowering sweet pea cultivars (*Lathyrus odoratus*) and other *Lathyrus* spp. are NOT safe to eat because they contain a neurotoxic amino acid that some people react negatively to. Thus, do not use sweet peas for pea shoot production. Also, do not to use any part of flowering sweet peas as animal feed.

Table 3. Pea cultivars well-suited for pea shoot production (adapted from Miles et al. 1999).

Cultivar	Type	Growth Habit	Disease Resistance
Snowgreen	Snow	Short Vine	None
Oregon Sugar Pod II	Snow	Bush	Fusarium wilt race 1 Powdery mildew Pea enation mosaic virus
Oregon Giant	Snow	Bush	Fusarium wilt race 1 Pea enation mosaic virus Powdery mildew
Cascadia	Snap	Bush	Pea enation mosaic virus Powdery mildew
Austrian winter peas	Forage/Dry	Vining	Fusarium wilt race 1

Disease Resistance

If you plant peas after April 1, or if you intend to harvest peas shoots throughout the summer, plant pea cultivars that are resistant to pea enation viruses. Pea enation virus is a common disease affecting peas in the maritime Pacific Northwest and is spread by the pea aphid (*Acyrtosiphon pisum*) and green peach aphid (*Myzus persicae*). Resistant varieties include Oregon Giant, Oregon Sugar Pod II, and Cascadia. By planting after April 1, young plants are exposed to migrating aphids that carry this disease. Symptoms include vein flecking (translucent windows), blister-like outgrowths in the leaves, pod distortion, stunted plants, and reduced yield (Zitter 1984). Peas are particularly susceptible to pea enation virus when temperatures are greater than 72°F (22°C) (Hagedorn 1991). Other crops that are affected by the virus include broad bean, sweet pea, alfalfa, and other perennial legumes (Pscheidt, and Ocamb 2017).

Planting

Rotational Considerations

Pea shoot production presents an opportunity for a multiple use crop. A single planting can be used for pea shoots, pea pods, and/or a green manure crop for soil amendment. Austrian winter peas are not an option for green pea pod harvests though. Peas grown for any of these uses will contribute N to soils and the following crops, but to differing degrees. A pea shoot crop that is later harvested for pea pods commonly returns about 30 pounds per acre of N in the crop residues.

A robust stand of peas used as a green manure crop commonly contributes 70–150 pounds per acre of N to soils. Exceptional stands of Austrian winter peas can return upwards of 300 pounds per acre of N to soils in the crop residues. Pea green manure crops typically reach their maximum N contribution around early pod set. Once peas begin to fill, N concentrations in the plant are directed to the seeds forming within the pods. This phenomenon explains why peas harvested for their pods return less N to soils than pea green manure crops. Organic growers may particularly benefit from the N contribution of a pea crop as it can replace costly N fertility products such as composted poultry manure. Legume N sources can also help organic growers avoid excessive phosphorus additions that are otherwise unavoidable when dairy manure in particular is used to meet N needs. Legumes that return more than 100 pounds per acre N to soils may completely eliminate the need for N fertilizer amendments for a wide range of subsequent crops (Tonitto et al. 2006). In this respect, using a pea crop can have an additional economic benefit to conventional and organic growers alike.

If soil water depletion is a concern, terminate the pea crop at the first sight of flowering. Soil water use increases steadily through flowering and pod set. Peas are shallow rooted and typically do not deplete stored soil water below 2 feet, especially if terminated at or before flowering.

Pea shoots are well suited to spring and fall production, and can also be grown in the summer in areas where average maximum temperature is below 80°F (27°C). Adequate soil moisture is needed for the relatively large pea seeds to absorb enough moisture to germinate well.

Peas can tolerate hot weather once growing though, even during the seedling stage. In the spring, plant peas once soil temperature reaches 40°F (4°C) and the ground is dry enough to work. This may be as early as February in the maritime Pacific Northwest. For a fall crop, plant peas in the late summer or early fall. Temperatures should stay above freezing for two or more months after planting. During the winter, in areas where temperatures are above freezing most days, pea shoots can be grown in a high tunnel. In the high tunnel, plant peas when the maximum day temperature in the tunnel falls below 80°F; this may be September in Spokane and many other areas in the inland Pacific Northwest. Pea shoots may be grown all winter long in the high tunnel with no heat, if temperatures do not fall below 28°F (-2°C). However, plant growth will be slow as the crop does not actively grow unless the temperature is 40°F (4°C) or greater.

Pea seeding rate (pounds per acre) will depend on in-row and between-row spacing (Table 4). To calculate how many pounds of pea seed you will need, it is helpful to know that a pound of pea seed contains 1,760 seeds, on average.

Direct-seed peas 2–4 inches apart, in the row, and 1–1.5 inches deep (Elkner et al. 2004). Space rows at least 6 inches apart. If you are planting on beds, plant 2–6 rows per bed.

If planting in single rows, space rows far enough apart to accommodate machinery and harvesting needs. Row planting will accommodate most standard cultivation equipment, whereas 6 rows per bed will result in a solid bed of peas that will require hand weeding.

Table 4. Number of plants per acre and seeding rate (pounds per acre) of peas based on in-row and between-row spacing.

Between-row spacing (inches)	In-row spacing (inches)	Number of plants per acre	Pounds seed per acre
6	2	522,720	297
6	4	261,360	149
24	2	130,680	74
24	4	65,340	37

The width of the bed should be such that a person can easily reach from the edge into the center to harvest pea shoots. Some growers plant peas at about 1 inch by 1 inch spacing, in narrow beds, for repeated hand harvest. This requires more seed per acre, but can provide better weed control and higher yield per acre. For this planting design, place pea seeds on the soil surface and push into soft soil with a rake. Dense seed plantings may also not work as well if peas are later intended to be harvested for pods, and disease risk may be increased due to reduced airflow through the canopy.

Weed Control

Weeds can be a major problem for pea shoot production early in the season. First, peas do not usually become competitive against weeds until after they have begun to fix nitrogen and form a canopy, which occurs a month or two after planting. Additionally, harvesting pea shoots removes the crop canopy, thereby reducing its competitiveness with weeds. To maximize success, plan ahead, and manage weeds prior to planting peas whenever possible. Another consideration is that weeds will likely be harvested when you harvest the pea shoots, which contaminates the crop. Strive to keep pea stands clean from weeds from the start.

Select a field that had low weed population in previous years, so that weed pressure is low for pea shoots. Annual weeds that germinate in hot summer conditions may be very competitive with peas planted at the same time. Weeds that produce large seedlings may also out-compete peas. Source quality seed that has excellent germination, and plant at a consistent depth with adequate moisture to ensure robust stand establishment. Peas can have a competitive advantage in soils with relatively low nitrogen levels.

Before the pea crop reaches the early vining stage (less than 6 inches tall), cultivate to control weeds. For current herbicide recommendations, refer to the *Pacific Northwest Weed Management Handbook* (Peachey et al. 2017) at <http://pnwhandbooks.org/weed/>, and check herbicide product labels to ensure preharvest intervals for pea shoots are met, as they are first harvested when the plants are only 6–8 weeks old.

Disease and Insect Control

Many diseases and insects can be managed by using appropriate crop rotations, especially by not planting peas after other legumes. However, some diseases have a wide host range that can't be managed with rotation alone. Root rot, the primary disease affecting peas in the Pacific Northwest, is one example. Root rot is a general term used to describe a disease caused by several different and commonly occurring fungal species, including *Fusarium*, *Aphanomyces*, and *Pythium*. The effect of all these pathogens on aboveground growth is somewhat similar. Aboveground plant growth is generally stunted and chlorotic (lacking in chlorophyll), and leaves begin to die from the bottom of the plant upwards. This is caused by reduced root growth and low ability to take up water and nutrients. However, the symptoms on roots are quite different (Table 5). Refer to *Pacific Northwest Plant Disease Management Handbook* (Pscheidt, and Ocamb 2017) at <http://pnwhandbooks.org/plantdisease>, or *Compendium of Pea Diseases* (Kraft, and Pflieger 2001), for detailed descriptions of disease symptoms.

Table 5. Symptoms on pea roots due to infection by pathogenic *Fusarium*, *Aphanomyces*, and *Pythium* species (Kraft, and Pflieger 2001).

Pathogen	Predominant Point of Infection	Root Symptoms
<i>Fusarium</i>	Main and secondary roots	Reddish-brown streaks turning to dark reddish brown, especially at the soil line.
<i>Aphanomyces</i>	Main roots	Straw-colored tissue that softens and turns honey-brown as infection progresses. When an infected plant is pulled from the ground, a strand of vascular tissue may be all that remains of the roots as the outer layers are destroyed due to rot
<i>Pythium</i>	Secondary root tips	Tan to light brown color. "Root pruning" or reduced root length

There are essentially no cost-effective chemical controls for root rot. Soil fumigation will control root rot-causing organisms, but is not typically cost-effective. Seed treatments are generally not effective either. There are currently no resistant pea cultivars. The best control strategies are to manage the soil and planting environments to minimize the likelihood of infection. Factors that stress the plant and reduce root growth can promote the disease. Thus, do not plant peas in fields where soil is saturated, compacted, acidic (pH below 6.2), or has low fertility. Avoid disease buildup in the soil by rotating peas—do not plant peas in the same field more than once in 5 years. Plant peas early in the year when soil and air temperatures are cool, and avoid summer production because heat and disease stress (pea enation virus in particular) can cause crop failure. Use high quality seed and do not save seed from infected plants.

To avoid pea enation virus, plant resistant cultivars, plant early, and exclude aphids. If using cultivars that are susceptible to pea enation virus, plant before March 31 to avoid aphid infestation. For a complete list of diseases and insect pests that affect peas, including management recommendations, refer to the *Pacific Northwest Plant Disease Management Handbook* and the *Pacific Northwest Insect Management Handbook*, both at <http://insect.pnwhandbooks.org/> (Pscheidt, and Ocamb 2017; Hollingsworth 2017).

Irrigation

In the maritime Pacific Northwest, field irrigation is not generally necessary for a spring or fall pea shoot crop. Following summer droughts though, fall plantings may need irrigation to ensure good germination and stand establishment. Irrigation is also necessary for peas grown from June through August in this area. In the inland Pacific Northwest, irrigation is generally needed for pea shoot production every season. Irrigation is also needed at all times of the year for pea shoots grown in a high tunnel.

Pea shoot yield can be very responsive to water application. Irrigation rates and frequency depend on soil conditions and air temperatures. Heavy soils will require less irrigation than lighter soils. Knowing the general water holding capacity of your soils will help you target your irrigation schedules. Generally, avoid letting soils go below 60% of their water holding capacity to keep pea yield potential high. If peas are past the flowering state, their water consumption increases.

High yielding peas grown to full maturity may use approximately 10–14 inches of water, less than half of which is used before flowering; young peas may use 0.25 inch of water per week and gradually increase consumption to 1.5 inches of water per week from flowering through pod set. If irrigation is needed, growers can develop a graduated irrigation plan using the estimates of water use mentioned above as a general guide. More frequent irrigations (7–10 days) will be more useful in early growth stages due to the plant's limited root systems at that time. On a well-drained, medium-weight soil in growing conditions under 80°F, a simplified irrigation schedule of approximately 1 inch of water every 2 weeks may be sufficient. Growers with coarser-textured soils with poor water holding capacity may benefit more from a graduated schedule with more frequent irrigations (7–10 day intervals). You also may need to apply irrigation more frequently when temperatures are above 80°F for more than a week at a time. Over-irrigation (amount and/or frequency), and irrigating peas after flower petals begin to fall may increase disease risk (Hemphill 2010). If water pools on the soil surface during irrigation, reduce the amount of water being applied. Persistent water pooling indicates waterlogged conditions and drainage needs to be improved for future plantings.

If the pea crop is later intended to be harvested for pods, maintain irrigation throughout crop growth otherwise flowering and pod set can be reduced. For a pea crop that is first grown for shoots and then for pods, water application from flowering through pod set should be approximately 1.5 times the amount applied from emergence to flowering. Detailed pea irrigation guidelines can be found at: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex13625](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex13625)

Harvesting

For an early harvest, or if the main crop is pea shoots, clip the tips of the pea plants down to 0.5 inch above the ground when plants are 3–7 inches tall. A mechanized baby-leaf salad harvester may be suitable for harvesting peas at this growth stage, if pea shoots are grown on a densely-planted bed. As long as one leaf node remains on the stem, pea plants will continue to grow after this first harvest and may be harvested several more times. The first cutting is usually the best quality, but the second through third or fourth cuttings are very good. Plant new beds every couple of weeks for continuous production.

If the main crop is pea pods, harvest the vine tips for pea shoots when plants are 12–18 inches tall, about 6–8 weeks after planting. Plants should have flowered already. After clipping off the top 2–6 inches of the plant, a new vine will develop at the remaining top leaf node(s) (Figure 4) and flowers will continue to develop below the clipping line. The first harvest will yield only a single shoot per plant, but the second harvest will yield 2–3 shoots per plant. The plants can be harvested again after sufficient regrowth has occurred, in approximately 3–4 weeks. Pods are harvested according to normal production schedules.



Figure 5. First harvest pea shoots when plants are 3–7 inches tall (left). Plants will continue to grow by developing branches at the top leaf node (right). (Photos: C. Miles).

Pea shoots should include the top pair of small leaves, delicate tendrils, a few larger leaves, and blossoms or immature pods. Shoots that have immature blossoms are especially attractive for use as an edible garnish or as a fresh salad green. However, to concentrate the plant energy on vine production, remove flowers to prevent the formation of pods. Select shoots that are fresh, crisp, bright green in color, and undamaged. The smallest shoots are the most tender. Pea shoots are generally hand harvested and bundled. Immediately after harvest, pre-cool pea shoots in ice water and place in cool, moist storage. Before packing, gently shake off excess moisture so pea shoots are not wet when packed. Otherwise, post-harvest rots may ruin the shipment. Do not pack peas shoots tightly into boxes or crates as they will be bruised and crushed.

Though pea blossoms and pea pods are susceptible to frost damage, pea shoots can be harvested throughout the winter if the crop is protected from severe temperatures. A single planting can be harvested throughout the growing season.

It is important to check the flavor of the shoots to ensure high quality. If shoots begin to taste bitter, stop harvesting. Observations in western Washington indicate that it is possible to mow plants down to 2–4 inches in height in July, and the plants will regrow enough to produce a fall crop.

Storage

Pea shoots are fragile, very perishable, and best used within 1–2 days of harvest. Storage conditions for pea shoots are similar to those for lettuce and spinach. Rapidly pre-cool pea shoots to 32°F (0°C), and store at 32°F–34°F (0°–1°C) and 98%–100% relative humidity (Morris, and Jobling 2016). Freezing will damage leaf tissues, so maintain storage temperatures above 28°F (-2°C) (Hardenburg et al. 2016).

Marketing

Pea shoots can be marketed as a salad green, a fresh vegetable, or an edible garnish, and should include the top pair of immature leaves, tendrils, and flower buds or immature pods. Pea shoots tend to be smaller when they are used as a salad green (2–4 inches), and larger when they are used as a green vegetable or an edible garnish (4–6 inches) (Figure 6). Young flowers or immature pods can increase the value of pea shoots in a salad mix.



Figure 6. Pea shoots are harvested at 2–4 inches long for use as a salad green (right) and 4–6 inches long (left) for use as a fresh vegetable or edible garnish. (Photo: C. Miles).

The market value of pea shoots as a salad green is generally greater than the value as a fresh vegetable. Prices for pea shoots as a vegetable vary between \$8 and \$15 per pound, depending on pea shoot quality and the retail location.

To determine an approximate price for pea shoots as a salad green, evaluate the price (by weight or volume) of a high-quality salad mix in your area, and price your pea shoots similarly. A lightly packed cup of pea shoots weighs approximately 1/2 oz (14g), and there are approximately 32 cups of pea shoots in a pound.

Nutritional Value of Pea Shoots

Pea shoots are a green leafy vegetable and generally are a good source of several vitamins and minerals (Table 6). They are high in vitamin K and vitamin C and are an excellent source of vitamin A.

Table 6. The percent of recommended daily amounts (RDA) of vitamins and minerals for adults contained in 1 ounce (approximately 2 cups) of fresh pea shoots (adapted from the Japanese Standard Tables of Food Composition, 7th edition).

Potassium	3.0%	Folate	10.5%
Vitamin C	35.5%	Thiamin	5.75%
Vitamin A	15.0%	Riboflavin	7.0%
Vitamin E	8.75%	Vitamin B-6	4.75%
Vitamin K	132%	Fiber	3.5%

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Additional Resources

[*Fertilizing with Manure*](#) (Bary et al. 2016).

[*Soil Testing: A Guide for Farms with Diverse Vegetable Crops*](#) (Collins 2012).

Pea shoots also commonly contain approximately 2 to 2.5 times the protein concentration of other common edible greens such as lettuce, kale, spinach, mustard greens, and Swiss chard (Japan Science and Technology Corporation 2015). To preserve the healthy nutritional aspects of pea shoots, eat them fresh or lightly steamed or sautéed. Before eating pea shoots, remove any coarse stems, rinse under cold water, and spin dry in a salad spinner.

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