



for the Gardener

CENTER FOR AGROECOLOGY
& SUSTAINABLE FOOD SYSTEMS,
UC SANTA CRUZ

Growing Onions & Leeks

There are approximately 400 species of wild onions, leeks, and their relatives found world-wide.

The principal garden species are –

Allium cepa – bulbing onions

Allium cepa aggregatum – shallots, multiplier onions, potato onions

Allium cepa proliferum – topset onions, Egyptian onions, tree onions

Allium sativum sativum – softneck, artichoke garlic

Allium sativum ophioscorodon – stiffneck, ophio, topsetting garlic

Allium amplexicaule (porrum) – leeks, elephant garlic

Allium fistulosum – bunching onions, scallions

Allium schoenoprasum – chives

Allium tuberosum – Chinese chives

ONIONS — ALLIUM CEPA

The cultivated species of onions are thought to be native to Central and Southwest Asia—Iran, Afghanistan, and Pakistan. Evidence of cultivated onions dates back to 2,800–3,200 BC in Egypt, with onions in evidence both in the decoration and hieroglyphics of the pyramids. The bulbs were also used as part of the embalming and mummification process.

Onions are biennial herbaceous plants commonly grown as annuals. They are seeded in the fall or early spring, harvested in the summer, and used fresh or stored for winter. They feature a restricted, shallow root system, with unbranched, pure white succulent roots measuring 6 x 6 inches. Much like the perennial grasses of the steppes and plains, Alliums are constantly sloughing off old roots (almost on a daily basis) and developing new feeding roots. As a result they add significant amounts of organic matter to the soil and contribute to much-improved surface soil structure.

The indispensable onion, which is basic to all soups, stews, stocks, sauces, etc., develops a distinct basal bulb. These aptly named tunicate or laminate bulbs consist of layers of swollen leaf bases that have adapted to be succulent in the center (as a food storage organ) and dry and membranous on the outside (as a protective cloak or tunic).

THE INFLUENCE OF DAY LENGTH

Bulb initiation in onions is affected by two environmental stimuli: day length and temperature. Onions are stimulated to bulb up under the lengthening days of spring into summer. Generally, day lengths of 12–16 hours induce bulbing.

Additionally, onion varieties are classified according to the photoperiod (approximately) necessary to induce bulbing. Short day varieties bulb up at day lengths greater than 12–13 hours; intermediate day varieties, greater than 13 1/2–14 1/2 hours; long day varieties greater than 14 1/2–15 hours; very long day varieties greater than 16 hours.

Basically, to cut to the chase, northern gardeners above the 40th parallel (i.e., north of San Francisco in the west or Washington, DC in the east) experience long summer days and thus grow long day and very long day varieties of onions. Conversely, southern gardeners below the 28th parallel grow short day varieties. Gardeners between 28° and 40° grow intermediate day varieties.

Onions' dry, papery outer layers protect the bulbs' succulent inner layers from drying and damage



Megan O'Dea

Most books and catalogues will reference day length requirements of varieties. It is important information. If, for instance, you reside in Florida or Cuba (where the longest day is approximately 13 hours) and decide to grow the very long day cultivar Maple Star (sometimes varietal names give you a clue as to geographic suitability) that requires 16 hour days to bulb up, you will be growing a perpetual scallion. Similarly, if you live in a long day area like Vermont and grow the short day variety Red Creole (hint, hint), the onion will attempt to bulb up in March or April (if it survives) and result in a thumbnail-size bulb. Pick appropriate varieties for your latitude!

Day neutral varieties are a relatively new development and a great boon to gardeners. They can be grown in almost any latitude and bulb up when the plant has sized up (12–15 leaves). See next page for varietal descriptions.

An onion plant will bulb up only after being exposed to its critical day length for several weeks. The bigger the plant when it goes to bulbing, the bigger the resultant bulb. So establishing a big, vegetative plant with 12–15 leaves is the gardener's goal.

Allium Propagation and Cultivation Tips

Sexual Propagation

- > Allium seed viability = 1–2 years
- > Seeding depth = 1/4–1/2 inch
- > Small seed, soft seed coat subject to rot and injury
- > Soil crusting delays, retards emergence
- > Germination: In 5–10 days at 68°–86°F (75°F optimal)
- > Can be sown intensively in flats, nursery beds, speedling trays, or six packs and transplanted at 10–12 weeks

Sowing: Timing, Temperature, and Spacing

- > Sow from fall (mild winter areas) into spring
- > In spring, transplant seedlings 3 weeks before last frost
- > Can tolerate light frosts, although prolonged frosts induce flowering; earliest possible start is important to develop a large plant
- > Cool weather to establish plants: 50°–70°F
- > Large plant = large bulb
- > Spacing is correlated to bulb size: 3–4 inches between plants = 2–3-inch bulbs; 6–8 inches between plants = 4–6-inch bulbs. Bulb size is also a function of variety (see varietal descriptions).

Diseases: Downy mildew (*Peronospora destructor*) can be controlled by keeping foliage dry. Use subirrigation (e.g., surface or buried drip or T-tape), especially in crop's late stage. Purple blotch (*Alternaria porri*)—similar symptoms and prevention as downy mildew.

Irrigation, Cultivation, and Harvest

- > Prefer well-drained sands and silty soils
- > Soil pH 6–7 (versatile)
- > Raised beds prevent root rot and increase ability to precisely control water
- > Water 1–2 inches/week
- > Nutrients: High nitrogen (150–200 pounds/acre or 5–10 tons compost per acre) early in cycle to establish plants; moderate phosphorus; high potassium (promotes bulb formation)
- > Shallow root system necessitates surface application of nutrients (top 4 inches)
- > Poor at weed competition, requiring 6–8 weedings during growth cycle
- > Respond quickly to foliar feeding (fish emulsion, kelp)
- > Warm weather >75°F for bulb initiation
- > Warm to hot dry weather (75°–85°F) for finishing off crop
- > Onions cure best if they enter dormancy gradually: Reduce water at end of growing cycle and stretch interval between waterings (easier to do in raised beds where moisture is easier to control)
- > Harvest when 25–50% of tops have fallen over and started to yellow or die back

THE EFFECTS OF TEMPERATURE

Temperature plays a secondary role in bulb initiation. Cooler temperatures (less than 70°F average day temperature) retard bulbing even when the requisite day length is achieved. Temperatures greater than 75°F hasten the bulbing response. Temperature also affects flowering in onions—an undesirable scenario that will lead to small, tough bulbs. Temperatures under 50°F for 10 days or longer (if seedlings are greater than 1/4-inch stem diameter) followed by warm temperatures, in conjunction with lengthening days, will induce flowering. Thus while a bigger plant equals a bigger bulb, starting seedlings too early (especially if you experience back-and-forth spring weather) can doom your onion crop.

BULBING ONIONS

Sweet Onions

These early, large, mild, even sweet types used to be referred to as sweet Spanish or Bermuda onions. These onions can be mid size to huge, reaching 6–8 inches across. They have a high moisture content, moderate sugar, and low pungency, and feature thick, succulent rings or layers. While high water content and low sulfur contribute to flavor and sweetness, they limit storage to 3–4 months. In onions, one of the components of sulfur, pyruvic acid, contributes to pungency. Sweet onions actually have a lower sugar content

than pungent storage types. They also have a lower pyruvic acid content (2–5% vs. 9–11%).

Soil sulfur content also influences sweetness in onions. Low sulfur soils yield sweeter onions. Also, as sulfur is a key component of organic matter, low organic matter soils produce sweeter results.

Regionally famous sweet onion varieties such as the Walla Walla of Washington State, the Vidalia of Georgia, the Maui of Hawaii, and the Grano/Granex types of Texas are in reality the same onion bred for different latitudes and growing environments, regional chauvinism aside. Truly they are the sweetest of onions, creating a mild pandemonium when harvest time arrives in early summer, a time when cooks can say adieu to the last of the pungent winter storage onions.

Spring onion, like green garlic, is a general term applied to sweet onions harvested immature. Spring onions are small- to full-sized bulbs with the succulent green tops still attached. They are even lighter and sweeter yet. An added dividend to spring onions is that they are approximately twice as nutritious as storage onions, offering a high source of calcium, iron, and potassium.

Storage Onions

Hard storage onion varieties are higher in both sugar and sulfur. The sulfur adds not only pungency, but increases storage time to 6–10 months, and even up to 12 months. These

onions are smaller, harder, and have a low moisture content. After weathering cutting and cooking (the sulfur being both water and heat soluble) the sugar is accentuated and overall they have a superior flavor. Also, as time in storage increases, sulfur decreases. The primary purpose of sulfur compounds is to act as natural anti-bacterial agents, preventing rot in storage. Generally the darker the skin pigmentation, the higher the sulfur, the longer the storage.

Mini/Summer (also called Pickling or Pearl)

These and other synonyms all refer to a versatile class of onions. They are not as day-length sensitive as standard bulbing onions and can be grown over a wider area. They are much quicker to maturation (60–90 days from transplants), so they can be successively sown from late winter to mid spring. The first wave can fill the gap between the end of the storage onions and the midsummer harvest of sweet onions. These mini onions are small (1–2 inches in diameter) and make excellent bunches with the greens still intact. They tend to be sweet, not pungent

Italian Cipollini onions are usually lumped with the “minis.” Cipollinis are medium-sized (1–3-inch) flat onions that come in white, yellow, and red varieties. They start out sweet and at maturity combine a sublime creamy texture with the perfect balance of sweetness and pungency. They are great keepers and display well when braided.

Onion Varieties of Note

SD=short day ID=intermediate day
LD=long day DN=day neutral

Sweet Types (days to harvest are from transplants)

Candy (DN, 85 days) – Sweet, 6 inches across. Brown golden bulb wrapper, white flesh.

New York (ID, 98 days) – Early product, strain of yellow globe, reliable open-pollinated, firm flesh, mild taste. Good in sandwiches and salads.

Texas Grano (ID, 175 days) – Yellow skinned, 3–4 inch bulb. Very sweet white interior. High yields, short storage (2–3 months).

Stockton Red and Yellow (ID, 150–180 days) – California’s Central Valley answer to Walla Walla, Vidalia, Maui, Texas Grano types. Large, flattened globe shape. Good color, savory flavor, short storage (3–4 months).

Super Star (DN, 100 days; new introduction) – Widely adapted, spring sowing. Can be fall planted in short-day areas. Uniform, white, mild onion with thick rings, short storage period (2 months).

Sweet Sandwich (LD, 110 days) – A unique sweet, long-day storage onion with 2–3 1/2 inch bulbs. Pungent when harvested, sweetens in storage (6–8 months).

Walla Walla (LD, 125 days) – Among the most popular early extra sweet onions 5–6 inches across when fall sown. Can be eaten raw. Short storage (2 months).

Pungent, Storage Types

Copra (LD, 104 days) – Rock-hard bulb, matures very early, 3–4 inches bulb, yellow skin. Pungent, stores 8–10 months.

First Edition (LD, 100 days) – High yielding, early maturing, medium size yellow skinned (2–3 inches). Pungent cream-colored flesh, great for northern climates. Stores 8–10 months.

Redwing (LD, 118 days) – Large (4–5 inches), deep red, late maturing, best northern climate red. Good storage (8 months).

Mini/Summer Varieties

Amethyst (DN, 63 days) – Similar to Purplette, with deeper red color that fades to pink when cooked.

Bianca di Maggio (ID, 80 days) – Flat, white, midsize (2-3 inches) mild-tasting Cipollini type. Good storage (5–6 months).

Blanc Hatif de Paris (SD, 90 days) – White, flattened, mild, sweet Cipollini type

Borretana (LD, 90 days) – Late, yellow-brown heirloom, unique, good storage (6-8 months).

Gold Coin (ID, 80 days) – Small to medium yellow-gold bulb (1-2 inches) flattened like Cipollini types. Both pungent and sweet. Good storage (4-6 months).

Purplette (DN, 60 days) – Early, purple skin, white flesh, used at spring onion stage or let mature. Golf ball to tennis ball size, mild, succulent taste.

LEEKS — ALLIUM PORRUM/AMPELOPRASUM

The modern leek is related to the wild leek of the Mediterranean and the Canary Islands, Madeira, and the Azores. Leeks are cool-season, cold-hardy biennials grown as annuals. They are grown for the fleshy blanched sheath of the basal leaves, known as the shank in gardening parlance. While leeks have long been a staple winter vegetable of Northern Europe, they are decidedly unsung and underappreciated in the U.S.

There is great difficulty in describing the unique taste and texture of leeks. Both gardening and cookbooks abound with comparisons between leeks and other vegetables: poor man’s asparagus; sweet onion-like; bulbless onions, etc. As Shakespeare said, “Comparisons are odious,” and to call them mild onions is a disservice. Leeks are prized for their succulent, rich, yet delicate mildly sweet taste. When used in soups and stews they add a creamy texture and thickness.

Leeks can be harvested almost year-round in most climates. Along with kale, they are the most cold-tolerant of vegetables. If established in late summer they can overwinter through the frozen ground and snow pack of northern New England. In fact, the colder the temperature, the sweeter the taste. On the other end of the spectrum, they will endure, but are not particularly fond of temperatures consistently above 85°F.

There are two basic types of leeks: summer types (long shanked—bulbless) and winter types (short shanked—slight bulbing). Summer varieties feature taller plants with light- to mi-green foliage, almost to the point of appearing nitrogen deficient. The shanks are long (8–12 inches) and self-blanching. They are “quicker” to maturation (90–100 days; all dates are from transplants) than winter types and have a lighter, slightly milder taste. Summer types are more heat tolerant and less cold hardy than winter varieties. They are generally grown spring to fall, although in mild winter areas they are overwintered.

Winter varieties possess dark, almost blue-green foliage with shorter, squat plants. They are slower to mature (120

–180 days) and the shanks are fatter, growing 3–4 inches across, often with some basal bulbing. Even with hilling there is less blanched, succulent edible portion of the stem. They offer a richer, meatier taste and texture. Winter types feature minimal heat tolerance and excellent cold tolerance with temperatures consistently in the teens being acceptable.

Stalwart, long, slow and steady are operative words when thinking of leeks—

Stalwart—Cold tolerant, persisting through the snows of winter undeterred. Leeks are virtually bulletproof when it comes to pest and disease problems.

Long—Tall; some winter varieties achieve the same dimensions as a baseball bat. In fact, leeks, unlike most vegetables, achieve full flavor and ideal texture as they size up. A full-size, mature leek eclipses a young baby leek in both categories.

Slow and steady—While most books and catalogues indicate 4–8 weeks from seeding to transplant and 50–100 days from transplanting to maturity, 10–12 weeks from seed to transplant and 90–120, or even 180 days from transplanting to harvest is the norm.

Culture (also see sidebar, page 2)

Leeks lend themselves to transplanting versus direct sowing. A transplantable seedling (10–12 weeks old, 1/4-inch stem diameter) can be raised in intensively broadcast sown flats or nursery beds. Because they are monocots with a vigorous fibrous root system and a narrow, waxy leaf surface, leek transplants can be barerooted with minimal transplant shock. The blanched, succulent shanks can be increased slightly by planting seedlings up to the first leaf, or more significantly by planting in a 6–8 inch V-shaped trench and subsequently hilling up soil around the base of the plant as it grows (2–3 times).

Spacing is extremely variable on leeks (as with most Alliums). Baby or bunching varieties (see varieties list) can be transplanted 1–2 inches apart or clusters of 3–5 seedlings 4 inches apart in rows 6–8 inches apart. Midsized leeks (1–2 inch stem diameter) can be achieved by spacing transplants 4–8 inches apart in the row and 6–8 inches between rows. Fullsize, overwintering varieties (2–3 inch stem diameter) should be given ample room—8–10 inches between plants and 8–12 inches between rows.

While leeks will grow on light-textured soils, sands, and silts, more than any other Allium they thrive on heavier-textured clays.

LEEK VARIETIES OF NOTE

Summer Varieties (all summer types can be grown as baby leeks)

Columbus f-1 hybrid (85–90 days) – Medium-sized shanks (2 inch x 10 inch) mature quickly. Some winter hardiness.

Kilma (90 days) – Fast-growing summer leek with 10–12-inch shanks. Only tolerates slight frosts.

King Richard and *Titan* (90–100 days from transplant) – Virtually indistinguishable from one another. One of the earliest-maturing varieties. Long (10–12 inch) self-blanching

shanks. Light green foliage. Light, sweet texture and taste. More heat tolerant than any other variety. Some cold tolerance (35°–32°F), but not truly winter hardy. Will deteriorate quickly with extensive winter rains.

Lincoln – Often used for baby leeks or bunching, leaves similar to King Richard.

Rival f-1 hybrid – Can grow to 36 inches with 12-inch blanched shank. 2-inch stem diameter.

Upton f-1 hybrid (70–80 days) – A new variety from Johnny’s Seeds. Achieves large size (3–4-inch) stem diameter quickly (for a leek). Extremely vigorous, uniform, tall, broad-leafed plants. Almost every one identical in size and quality. Darker blue-green foliage is unusual for a summer variety. Expensive seed: 250 seeds for \$5.60; 1000 seeds for \$16.00 vs. King Richard, 2500 seeds for \$4.90. Great taste, creamy texture, easy peeling and cleaning.

Winter Varieties

American Flag (130 days) — Pure white blanched stems with mild sweet flavor and good winter hardiness.

Blue De Solaise (105 days) – Old French variety with blue-green to almost blue foliage tinged with red. Extremely cold hardy with fat, succulent shanks.

Broad London (120 days) – Very squat, short (4–6 inch) shanked, sweet, creamy-textured old variety. Some heat tolerance and moderate cold tolerance.

Giant Musselburg – Old German variety, 150 days to maturation, pure white, sweet, tender, short shank, dark green foliage.

Lancelot f-1 hybrid (120 days) — Very short plant and shank (4–6 inch) with gray-green foliage. Excellent flavor.

Laura f-1 hybrid (180 days) — Short, sweet, thick, tender shanks with dark green foliage. Among the most cold-tolerant varieties.

With rare exceptions, U.S. seed catalogues usually offer only one to three varieties of leeks. Two exceptions are Irish Eyes and Garden City Seeds, which offer ten varieties. Northern European seed companies usually feature greater varietal diversity, types and varieties.

SHALLOTS — ALLIUM CEPA AGGREGATUM

Shallots are a variation on the theme of onions. Until recently they have been cloaked in a gourmet, snobbish mystique with minimal supply and maximum price (it’s a Euro-thing). Thankfully, that veil is lifting. Shallots are small, onion-like bulbs (round, oblong, or tear-drop shaped) with a unique flavor—more intense than onions yet less pungent and less sweet. Used in soups and sauces or even as a relish they lend an additional layer of flavor that is more complex than onions, garlic, or even leeks.

– ORIN MARTIN

This material was written, produced, and distributed by staff of the Center for Agroecology and Sustainable Food Systems (CASFS) at the University of California, Santa Cruz. CASFS manages the Alan Chadwick Garden and the UCSC Farm on the UCSC campus. Both sites are open to the public daily from 8 am to 6 pm. For more information and additional publications, call 831.459-3240, email casfs@ucsc.edu write UCSC, CASFS, 1156 High St., Santa Cruz, CA 95064, or see casfs.ucsc.edu.