

Lettuce Offers a Palette of Tastes, Textures, and Colors

Lettuce (*Lactuca sativa*) is a member of the *Asteraceae* (formerly *Compositae*) family. *Asteraceae*, known in the common parlance as the daisy or sunflower family, is the largest dicotyledonous family, with greater than 25,000 species and worldwide distribution. Basically, one in every ten blooming plants on the planet is a daisy!

Lettuce is thought to have originated along the eastern rim of the Mediterranean Sea, possibly as far south as Egypt, into Iraq. There are records of cultivated lettuce dating back 4,000-6,500 years. A Romaine-like lettuce is depicted on Egyptian pyramid murals 6,500 years ago. So perhaps Caesar salad is a misnomer—Pharaoh salad or Tutankhamen salad might be a more appropriate epithet.

Lettuce is an annual, cool season crop. Along with spinach and peas, it is one of the first crops planted in spring. It requires 60-80 days with temperatures below 80°F to develop. Optimal growing conditions include moderate-cool weather, high sunlight levels (especially to enhance color on red types), frequent shallow waterings, and adequate nitrogen (for leaf growth) and potassium (for leaf structure and quick maturation). Successive sowings every 10 days to 2 weeks will yield a steady supply for the salad bowl. At maturation, no lettuce will hold longer than 10 days to 3 weeks. At that juncture bitterness and/or bolting will ensue.

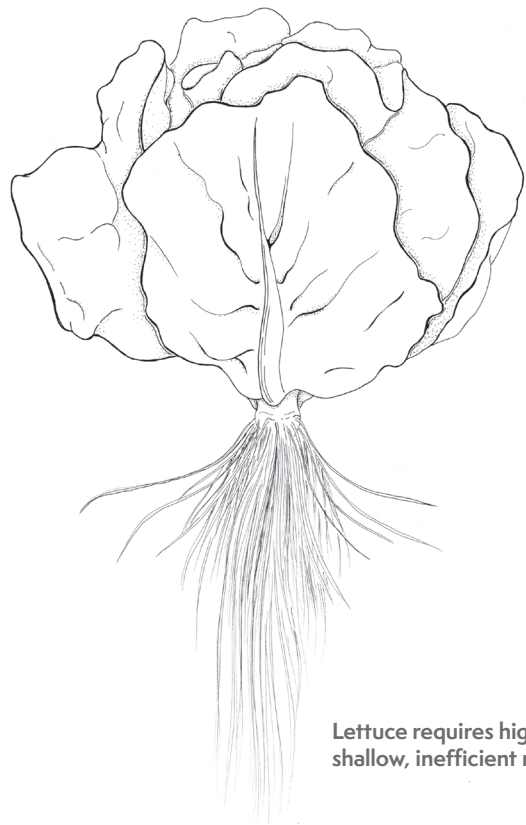
An especially space-efficient crop, lettuce lends itself to creative interplants and side plantings. A particularly efficient use of space is a side planting of lettuce on the edge of a climbing pea fence in spring or fall. A summer sideplant on a bean fence or interplanted in a low-density (12-15" between plants) sunflower bed affords cooler temperatures and a little shade to offset long days and warm temperatures.

Despite its beauty and succulence, lettuce ranks low nutritionally. Leaf lettuce and romaine rank higher than butter and iceberg types. As is so often the case with vegetables, the darker, more mature outer leaves are more nutritious than the inner, blanched leaves. "Aye, there's the rub," nutrition vs. taste. Similar issues surround Chinese (Napa) cabbage, European cabbages, leeks and asparagus. While the darker red leaf types contain more vitamins and antioxidants, they can be less sweet and more astringent.

Lettuce can be a satisfying crop to grow in the home garden because of its early season and quick maturation. Its sweet, crisp succulence can create a symphony for the taste buds. However lettuce is a challenging crop to grow for market (especially the mass market). It is extremely sensitive to water and temperature fluctuations, and needs to be constantly sown and transplanted. Harvest involves bending over and back stress. It is extremely perishable once harvested and needs washing to remove grit.

CULTURAL CONSIDERATIONS

Soil ▶ All forms of lettuce grow well in a wide range of soils: sands, silts, and clays. While each soil textural class has its pros and cons, the paramount consideration is drainage and aeration.



Lettuce requires high nutrient levels due to its relatively shallow, inefficient root system. Illustration by Janet Cho

FOR THE GARDENER

Sandy soils offer the benefit of draining, drying, and thus warming more quickly after a rain, or at the outset of the growing season. On the downside, sandy soils tend to be lower in organic matter, not as inherently fertile as silts and clays, and inefficient at holding water and nutrients.

Clay soils are excellent repositories and reservoirs of organic matter, nutrients, and water. Conversely, unless drainage is improved, clays tend to warm slowly and stay waterlogged. Silts are intermediate between the other two textural classes. Thus early season growing favors sands, while mid-late season favors clays.

pH Levels ► Lettuce tolerates a wide pH band (5.8-7.2). As is so often the case, nutrients are optimally available at pH 6.2-6.8.

Nutrients/Fertility Needs ► In general, lettuce is considered a light- to moderate-feeding crop that is fertilized heavily. The reason for this is related to the nature, type and extent of lettuce roots. Lettuce features a somewhat pronounced taproot (15-18" deep on direct-seeded crops and 6-10" on transplanted crops). Most of the effective feeding roots are shallow (4-8") and fibrous. Unfortunately the feeding roots are inefficient at withdrawing nutrients from the soil.

Nutrient needs of lettuce include –

- High Nitrogen: Pre-plant, and in the last three weeks of the crop (lettuce makes 70-80% of its total growth in the last 3 weeks of its growth cycle). N = leaf growth.
- Moderate-low Phosphorus: Mostly for early root development
- High Potassium: Potassium regulates photosynthesis, hastens maturation, and creates structural strength in the leaf. You could say potassium mellows the aggressiveness of nitrogen. High calcium is required by heading types to prevent leaf-tip burn.

With lettuce, the old adage that nutrients should be applied at and slightly above the effective feeding root zone translates to a surface application and shallow incorporation. A good crop to follow lettuce would be something a little deeper rooted with moderate nitrogen and high potassium needs (e.g., carrots, peppers) to catch the nutrients as they leach downward. The finer and more particulate the compost used, the quicker and greater the nutrient availability. On fertile soils nutrient application is optional with lettuce.

Germination Temperatures ► While texts state that lettuce will germinate at temperatures as low as 32-35°F, it will take 35-40 days. In 35-40 days from transplant a leaf lettuce will be mature. So, cool soil germination is a bit of a Pyrrhic victory.

LETTUCE NUTRIENT NEEDS

Nitrogen	100–120 lbs/acre	moderate
Phosphorus	10–12 lbs/acre	low - moderate
Potassium	15–20 lbs/acre	moderate - high
Calcium	20–30 lbs/acre	moderate

Lettuce responds to minimum temperatures of 50-55°F and maximum temperatures of 75°F for best percentage (85-95%) and quickest emergence of seedlings (5-7 days). Because of its Mediterranean origin, lettuce has an inhibition to germinate at sustained temperatures >75°F (thermodormancy). In its native habitat, lettuce seed would mature at the end of the cool, rainy season, be scattered on the ground in a dormant state throughout the hot, dry summer, and then sprout coincident with the onset of cool, wet weather in the fall. It is not evolutionarily advantageous for the seed to germinate at a time of year when it cannot grow optimally (hot and dry). Smart seed! So the gardener's dilemma of summer germination can be averted by outsmarting the seed and pre-chilling moistened seed in the refrigerator for 2-3 days.

Growing Temperatures ► Lettuce grows optimally and produces the sweetest, most succulent crops with daytime air temperatures of 60-65°F and night time temperatures of 45-55°F. Temperatures below 75°F are necessary to maintain the vegetative state; above that temperature, most lettuces will begin to bolt and form seed heads. While hardened seedlings can withstand temperatures in the low 20's F, growth virtually stops below 40-45°F.

With vegetable crops (and plant growth in general) optimal growth (and thus yields) results from diurnal temperature swings; alternating warmer day and cooler night temperatures. This differential (usually 10-20°F) allows the plant to utilize the sun's energy (via photosynthesis) to make growth substances during the day, and convert them into new growth (via cell division and elongation) and storage ("bulking up") at night.

Environmental Factors ► Lettuce is sensitive to both long days and warm temperatures. Either factor can trigger the plant to move from the vegetative state to the reproductive state, that is to bolt and run to seed.

The primary stimulus for flowering is days with over 14-hour day lengths (May 5 in Santa Cruz, 38° latitude). A secondary factor in flowering is temperatures over 75-80°F. Lettuce grown under warm temperatures will respond more quickly to long days. Conversely, lettuce grown under cool temperatures (<75°F) will be slower to

respond to long days. In a nutshell, lettuce is generally a spring and fall crop in northern temperate interiors. Cool coastal climates (such as Central Coastal California) allow year-round production.

Seed Viability ▶ I've always found it puzzling that most texts list lettuce seed viability at up to 6 years. In truth it is good for 1-2 years (80-95% germination rate), then germination drops precipitously to 50% in year 3 and lower thereafter. Buying a small amount of seed annually is the best strategy.

Germination Conditions ▶ Again, most books (gardening and text) talk about certain species of seed needing either sunlight or darkness to germinate (light for lettuce, columbines, and snapdragons; darkness for phlox, onions, and leeks). This prescription is then offered: leave seed exposed on the soil surface, or cover with grass clippings, burlap, or a board. This is a prescription for failure. Common sense translates to a very light soil covering of 1/8-1/4" for lettuce and the like, and 1/2" covering for alliums and such.

Seed Pelleting ▶ Seed pelleting is a relatively new and always improving technique of coating small and difficult-to-sow seed (lettuce, carrots, snapdragons, etc.) to enlarge the seed, reduce its angularity, and facilitate ease of sowing. The coating, always a tightly-guarded company secret, consists largely of clay, talc, and agar or other binding agents. The formulation is such that moisture can permeate to the seed and break open the coating, allowing oxygen (which stimulates germination) access to the seed.

Before now, pelleted seed was only available on a large commercial scale (pounds of seed or a 500,000 seed minimum per variety). Johnny's Selected Seeds now offers pelleted lettuce (as well as carrot) seed that is certified organic. Options range from 250 seeds a packet to a pail (500,000 seeds).

Seed specs ▶ 1 gram = approx. 800 seeds
28 grams = 1 ounce
1 ounce = 20,000-30,000 seeds

Most retail packets contain 200-400 seeds (different varieties have different seed sizes.) Renee's Garden Seeds' (www.reneesgarden.com) offerings are tailor made for home gardeners, with multiple varieties of lettuce, squash, tomatoes, peppers, etc. per retail packet. The seeds are color coded (with vegetable dye) and packets contain elegant, succinct, and accurate varietal descriptions.

CLASSES OF LETTUCE

The history of lettuces and salad mix greens dates to antiquity in the Mediterranean regions of Europe. Although these fast-growing, succulent greens are now often associated with upscale, fast-paced lifestyles, they derive from rural peasant culture, and in fact featured a blend of cultivated plant varieties and wild wayside weeds. Regionally, small towns bred indigenous varieties passed down from generation to generation, with the seed and growing techniques as closely guarded as modern-day state secrets. In those times and climes recipes for salads changed seasonally if not weekly, and were subject to almost daily improvisations.

We of the confined, controlled, contemporary climes can create the solid underpinnings of daily salads by giving some forethought to the timings and types of lettuces planted in our kitchen gardens.

There are six basic classes or types of lettuce:

- ▶ **Loose leaf**
- ▶ **Butterhead/Bibb**
- ▶ **Romaine**
- ▶ **Iceberg**
- ▶ **Batavian or Summer Crisphead**
- ▶ **Cutting types**

What follows is a thumbnail sketch of each class and a descriptive list of notable varieties—the best of both the newest and time-honored varieties.

Aside from the obvious factors of looks, taste, and texture, the primary considerations when selecting any given class of lettuce are –

Plant size ▶ Often referred to as frame size, the choices range from small, one plant = one serving for one person (e.g., Tom thumb Butterhead), to softball-sized plants, to enormous Paris Island Romaines with their 18"-tall heads. The size of the plant influences spacing between plants.

Seasonality ▶ While some varieties are touted as year-round types, this rarely proves to be the case. For example, the old French heirloom *Merveille des Quatre Saisons* (Marvel of Four Seasons) is exclusively a spring and fall affair, choosing to bolt at the mention of warm weather and long days. *Winter Density*, despite its name, is an excellent three-season lettuce (spring, summer, fall). Among the most heat-resistant varieties are the green leaf type *Salad Bowl*, the summer butterhead types *Ermosa* and *Nancy*, and all varieties of *Batavian* types.

FOR THE GARDENER

Loose Leaf Lettuce (9-12" apart for full-size varieties)

Leaf lettuce is easy and fast to mature, but not as tasty as other classes. Along with Romaine it has the highest nutritional profile, and is among the most heat and cold tolerant of all lettuces. Leaf lettuces are also the most versatile, as they can be harvested at any stage, from baby to full size. Days to maturity—baby size 20-30, full size 45-55. (Note: All days to maturity are from transplants. Plug trays produce transplants in 30-40 days.)

Most loose leaf lettuces feature frilly, wrinkled, or puckered leaves. Arrowhead, oakleaf, or deer tongue types have lobed leaves and often enormous frames (one head feeds a small family). At full maturation they are usually too big, floppy, and fragile to hold up to packing and shipping, thus they are rarely seen on the retail scene.

There are two trends in the world of leaf lettuces –

Red, redder, and reddest ▶ Until recently there were no true red leaf lettuces, but rather red-tipped leaves with a green base, or red speckled over a green background. There are now true red and almost black-red at that (base to tip) varieties aplenty. Examples include Outredgeous Romaine, Galactic, and Blackjack leaf types. While there is no appreciable difference in the taste of red or green leaves, red contains more nutrition and draws the eye, thus increasing appeal and sales. So it is a good friend.

Compact, extra-frilly types ▶ The Lollo Rossa types feature small, really slow-growing, extra frilly, bland-tasting leaves. They are virtually the miniature French poodles of the lettuce world. However, salad mix growers prefer them because they add loft to a mix and improve shelf life. C'est la difference.

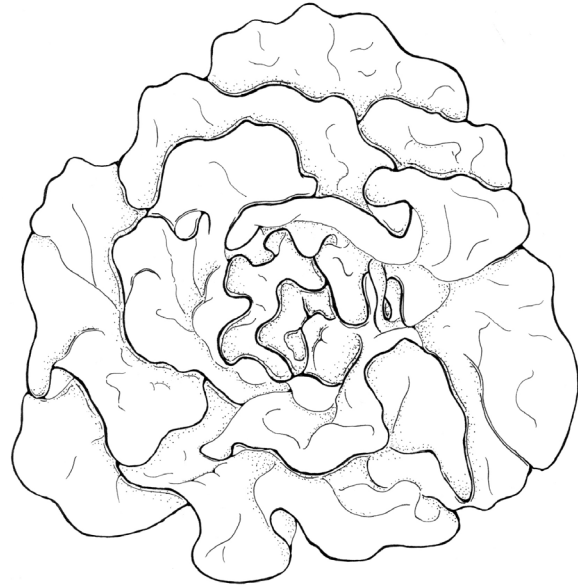
Butterhead Lettuce (a.k.a Boston or Bibb) (space 12-15")

This class features soft, loose heads of silky, buttery taste and texture. It is top of the charts taste-wise. Because the beauty of these Butterhead (Bibb) types is in the mature, blanched hearts, do not harvest before maturity.

The Bibb or Boston types of Butterheads are small framed (4-8" across), prone to bolting, and all but vanishing from seed catalogues.

Distinctive varieties include –

- **Buttercrunch** (48 days) – Small (6-8" head), oblong-shaped, firm-headed butter type. Dark green outer leaves with yellow blanched hearts and a smooth, creamy taste. Buttercrunch is more heat resistant than other Bibb types.
- **Chadwick's Rodan** (58 days) – An heirloom that UCSC Garden founder Alan Chadwick brought from France. Crunchy, tender, sweet and silky, similar to Red Deer



The soft outer leaves of Butterhead lettuce surround a creamy, sweet, blanched heart. Illustration by Janet Cho

Tongue in appearance. Available from Abundant Life Seed Company (www.abundantlifeseeds.com).

- **Deer Tongue** and **Red Deer Tongue** (46 days) – This heirloom dates back to 1840. Deltoid, triangular-shaped outer leaves, blanched heart. The habit is upright and the frame small 4"x6".
- **Limestone** or **Kentucky Bibb** (48 days) – This was one of Alan Chadwick's favorites, with seed being secreted from England to Santa Cruz. Because of climatic similarities it performed admirably here (within the constraints of its narrow seasonality, late winter–spring). It is a small (4-6"), open head with dark green leaves and a distinctive crunchy taste. Among the more bolt prone of all lettuces. Seed is rare, but Cook's Garden (www.cooksgarden.com, Londonderry, Vermont) now offers it. Because of the small plant size, this variety can be planted intensively, 6-8" apart.

Butterheads can be further divided amongst the heirloom and modern varieties; light or dark green color; red or red-speckled color; and small-, medium- or large-framed varieties.

Butterhead Heirlooms –

- **Merveille des Quatre Saisons** (or as we say stateside, Marvel of Four Seasons) (50 days) – An excellent spring and fall variety. A large-framed (12-16" head) plant, with bronze-red outer leaves enclosing a light green heart that is thin-leaved and succulent.

- *Sanguine Ameliore* (45 days) – 1906 French heirloom. Small frame (6-9”), tongue-shaped leaves with pink-tinged centers overlaid with reddish-bronze speckles.
- *Speckles* (50 days) – An old Amish heirloom. Mottled brilliant red color overlays lime green leaf. Develops a dense yellow-green heart with extremely buttery taste.

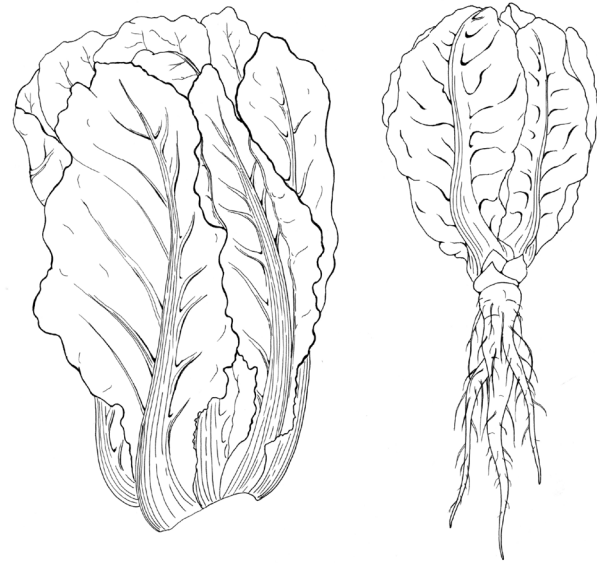
Butterhead Modern Varieties –

- *Arctic King* (65 days) – The most reliable-performing winter butter type. Small heads in winter, large heads in spring and fall. Among the sweetest of all lettuces. Holds for up to two months at maturity in winter.
- *Ermosa* (48 days) – Resistant to mosaic virus and mildew. Dark green, good summer heat tolerance. Uniform, reliable producer.
- *Esmeralda* (48 days) – New and improved! Extremely large frame = 1 pound heads of disease resistant, slow bolting, tender, sweet and crunchy taste treat.
- *Nancy* (52 days) – Large frame, suitable for spring and fall, good along the coast in summer. Mildew resistant, thick crunchy leaves hold up well post harvest.
- *Optima* (52 days) – Large-framed (12-16”), darkest green butter type. Uniform production, heavy dense heads.
- *Pirat* (46 days) – Firm heads of savoyed leaves, brick red over green, medium-size frame. Excellent spring, summer, fall production. Similar in appearance and taste to Marvel of Four Seasons, but more reliable.

Romaine or Cos Types (from the Eastern Mediterranean Isle of Kos)

The Romaines can be grouped into full size varieties (12-18” tall), and compact-dwarf (mini) varieties (4-8” tall) that are a cross between Romaine (conferring leaf shape and crunchy texture to the outside of the head) and Butterhead types (conferring a blanched, creamy texture and taste to the hearts).

Romaines feature upright, cylindrical, loose to dense heads, with spoonbill-shaped leaves. The individual outer leaves are long on crisp texture with a juicy midrib. The inner leaves (especially on mini types) are blanched, silky and sweet. Romaines can be used traditionally in Caesar salads (leaf by leaf) or stripped down to the center to comprise a hearts of Romaine mix. They are slower to maturation (70-90 days) than either leaf (40-55 days) or butterhead types (50-65 days). The hearts are sweet. All Romaines can be harvested young for a loose leaf mix or left to mature.



Both full-size Romaine (left) and mini Romaine varieties offer a rewarding crop for superb salads. Illustration by Janet Cho

Mini Romaines

The mini Romaines are very heavy and dense for their compact size. They can be split in half longitudinally, laid out on a long platter, and slathered with the dressing of your choice, along with pine nuts and crumbles of white Stilton cheese laced with either dried apricots or cranberries and sliced pears for a salad supreme! Because of their compactness they can be spaced 4-6” apart in the garden. Heavy, high yields per square foot. Red leaf, red over green speckled leaf, and green leaf types.

- *Claremont* (46 days) – A slightly bigger green Winter Density “wannabe” (see below).
- *Diamond Gem* (42 days) – Early-maturing, upright, compact Bibb-Romaine cross. Good all-season production.
- *Little Gem* (a.k.a. Sucrine in England) (40 days) – Old English heirloom variety with a small (4-6”), dense head. Romaine-like in looks and texture but the hearts are as silky smooth tasting as the best of the butterheads. It defines the class. Use whole, halved, or leaf by leaf in a mix. Good fall to spring; needs cool conditions for summer production.
- *Little Leprechaun* – A mahogany-red Little Gem-Winter Density type. Outstanding color, pretty good taste.
- *Red Eruption* (50 days) – Another red Little Gem type.
- *Winter Density* (54 days) – Good three season variety, fall to spring. Summer production in cool-growing areas. A slightly bigger (8”), slightly darker green, slightly denser Little Gem type. Equally good taste as well. Space 8-10” apart in garden beds.

Full-size Romaines

- *Crispmint/Erthel* – Old English variety with wavy mint green leaves, 8"x12." Longstanding (>1 month) under moderate temperatures.
- *Flashy Trout Back, Freckles* and *Forellenschluss* (75 days) – Essentially the same variety of heirloom from Austria. The Austrian name means speckled like a trout. Strikingly beautiful, mild, sweet, dark-green leaves, splashed with red that spreads and turns maroon at maturity. Loose head young, extremely dense and heavy at maturity.
- *Parris Island* (island off the Carolina Coast, famous for its Marine boot camp) (70 days) – Classic large (15-18" tall), green, crisp-textured Romaine. A real throwback.
- *Rosalita* (55 days) – Developed by Johnny's Select Seed Co. An early red Romaine. Leaves are emerald green with a burgundy tip. Good as baby leaf mix. Loose head at maturity.

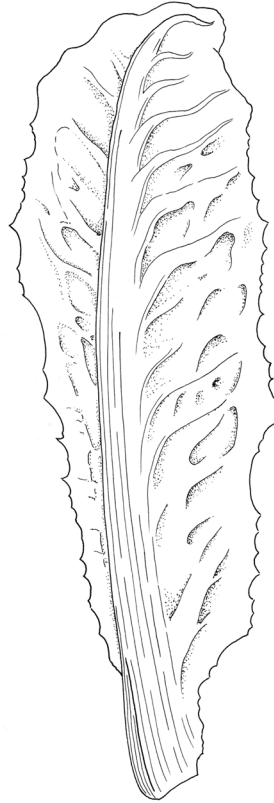
Iceberg or Crisphead Types

While these "cannonballs" respire at a much slower rate, can keep almost endlessly (up to two months) under refrigeration (33-40°F) and provide the requisite crunch in tacos, they are virtually nutritionless, difficult to grow and thus best procured from the shelves of chain supermarkets, if at all.

French Batavians (a.k.a Summer Crisphead)

An unsung and underappreciated (though not so in Europe) class of lettuce. Batavians are the most versatile type of lettuce. They can be used young as cutting types or loose leaf types, at mid-maturity as a soft, loose butterhead, and at full maturity as an ersatz iceberg type, but with color and nutrition. Batavians rival loose leaf types for production in the extremes of cold and hot. They have a thick, waxy but still juicy succulent leaf structure and provide an amazing amount of biomass per plant.

- *Anuenu* (50 days) – Compact, non-bitter. At maturation resembles a small iceberg head. Thick, crisp outer leaves surround a tight, small heart. A popular variety in Hawaii, where it can be grown year round and withstands heat without bolting or developing tip burn.
- *Canasta* (55 days) – A heat-tolerant Batavian that is crunchy and sweet. Red-tinged leaves and a green, soft heart.
- *Cardinale* (48 days) – Thick, crisp, purple-black leaf. Plant color is alluring and intense. Has the habit of a wide Romaine.
- *Magenta* (52 days) – An improved Sierra from Johnny's Seeds. Darker red leaves form a whorled, conical head with a crunchy green heart.



The outer leaves of Romaine lettuce, with their "spoonbill" shape and pronounced, juicy midrib, surround a heart of light green, succulent inner leaves.

Illustration by Janet Cho

Cutting or Cut-and-Come-Again Types

Almost any lettuce type can be used as a cutting lettuce, but Romaine and loose leaf types work best. Cut leaves above the growing center of the plant and they will regrow vigorously—3 to 5 cuttings per plant is not uncommon. Cutting types can be densely broadcast sown or planted in clusters (3-5 plants) at tight spacing (3-5" apart).

– Orin Martin

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