



TOWER
GARDEN
BY JUICE PLUS+®

GROWING GUIDE: LETTUCE

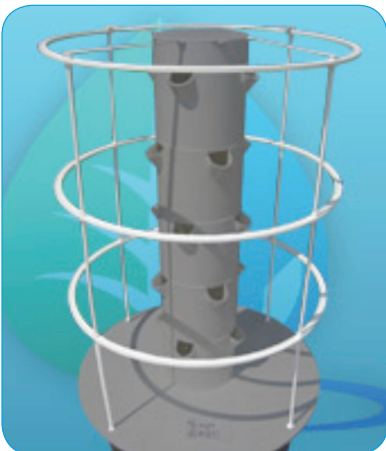
Lettuce is one of the most popular vegetables in the U.S. and it's no wonder why. Whether you add it to sandwiches, salads, tacos or spring rolls, lettuce adds tasty crunch and nutrition to any lunch or dinner. Growing your own lettuce is a super-convenient choice for the home gardener because you can pick exactly how much you need at any given time. No more brown, wilted leaves in your crisper, and you'll never be out of lettuce either! Growing lettuce in a Tower Garden® is even easier than growing it in the ground. No kneeling, no bending, no tilling, no dirt!

Of course, there are some tips and tricks you should know about for growing healthy, productive lettuce plants in a Tower Garden®. Read on to learn how to: choose your lettuce varieties, sow seeds, transplant seedlings, pinch, fight pests, and know when to harvest. Get ready ... get set ... grow!



THE ANATOMY OF A LETTUCE PLANT

- **Stem:** the main stalk that connects the leaves to the roots
- **Leaves:** the green, edible part of the plant



THE ANATOMY OF A TOWER GARDEN®

- **Rockwool Cubes:** The growing medium used to sow seeds
- **Net Pot:** The container used to plant seedlings
- **Growing Pot:** One of several interconnecting sections of the Tower Garden®
- **Plant Port:** The openings in the Tower Garden® where the plants go
- **Tomato Cage:** The ringed structure for providing extra support to certain tomato varieties

In a Nutshell:

- The seed goes into the rock fiber starter plug...
- The rock fiber starter plug with the seedling goes into the net pot...
- The net pot goes into the plant site...
- There are four plant sites in a growing pot...
- Five growing pots make a Tower Garden®...
- And the tomato cage surrounds the Tower Garden®!



BEFORE YOU PLANT: Choosing Your Varieties

Your Tower Garden® can grow most types of lettuce. Leaf lettuce and small to medium head lettuces work best, as some varieties of head lettuce with a stem larger than 1 ½" can be restricted in their development in the Tower.

The following varieties perform well in the aeroponic and hydroponic environment of a Tower Garden®. Red varieties are sun-loving and can be planted on the sunnier side of your Tower Garden®.

Leaf Lettuces

These lettuces grow without forming a dense head. Just pick the leaves as you need them. Good examples include:

Romaine/Cos: If you're a fan of Caesar salad, you already know that Romaine is a thicker-leaf lettuce with crisp, sweet, juicy leaves. Plant it in the spring.

Vulcan: While it shares the same name as the human-like extraterrestrials on Star Trek, this beautiful lettuce is native to Earth. It has a variegated red and green coloring with slightly frilly leaves. A vigorous grower, Vulcan lettuce can be planted early in the season.

Lolla Rosa: Lolla Rosa is an attractive variety that comes in red and green and that grows well in the spring and fall. The red version is a dark, almost-purple color with ruffled leaves. It has a spicy, slightly bitter taste, so it works great in mixed leaf salads.

Tango: Tango lettuce has dark green, extremely frilly leaves and a mild taste. Harvest early, as Tango lettuce bolts quickly.

You can also grow leaf lettuce mixes (or different varieties of seeds packaged together) in the Tower. Gourmet Mix and Encore Mix, for instance, are good choices.

Head Lettuces

Iceberg: The classic iceberg lettuce has a crisp texture and a neutral flavor. It grows to form a very dense thick head and prefers cooler temperatures.

Buttercrunch (red or green): Buttercrunch lettuce forms compact heads of mildly flavored leaves. It's heat-tolerant and slow to bolt.

Bibb/Boston/Butterhead: These lettuces have large outer ruffled leaves surrounding a soft, folded blanched heart. Rex Bibb is the most heat-tolerant of the three and can be used in the mid-summer. It might still need to be harvested early before bolting occurs.

Summer Crisp: As the name implies, Summer Crisp lettuces are very crisp, like Romaine, but sweeter. These lettuces are easy to grow and certain varieties can tolerate hotter weather. You can harvest the leaves when they are small (baby lettuce) or let them grow to full size, when they develop into a heavy compact head.

BEFORE YOU PLANT: Deciding When to Plant

Lettuce is great for all seasons! Some varieties are best for spring and fall and others are better summer performers; for choice of varieties look for trigger descriptions like... 'heat tolerant,' 'slow to bolt,' and 'resistant to mildew.' In the Southern U.S. and many mild climates, lettuce can be grown through winter! Just make sure to select cooler-temperature varieties.

Lettuce grows best in temperatures of 45 to 80 degrees. It can grow in hotter weather for short intervals, but as temperatures remain above 80 degrees, the lettuce will start to bolt into seeding. Your lettuce will take longer to grow in cooler temperatures but will taste better. Lettuce will grow faster in higher temperatures but it can be bitter if you don't harvest when the plant is young.

Tower Garden® Tip: In the heat of the summer, place the lettuce in the Tower where it gets the most shade; this will keep the plant cooler.

PLANTING: Seed Sowing and Germination

Your Tower Garden® Kit comes with everything you need to get started growing lettuce.

Remember: the germination range for lettuce is 60-70 degrees.

Step 1: Locate the slab of Rockwool cubes and place in the seed starter tray.

Step 2: Thoroughly wet the Rockwool cubes by completely submerging the slab for 30 minutes in half-strength Tower Tonic nutrient solution (Please reference the Tower Garden® Instruction Manual for more information). This will stabilize the pH of your cubes. After 30 minutes, thoroughly flush cubes with fresh water.

Important: Because the Rockwool repels water, you can't get away with just spraying it. You really need to soak it!

Step 3: Drain all excess water from the seed starter tray.

Step 4: Sow two to five seeds per cube for leaf lettuce (two to three for summer plantings) or one seed per cube for head lettuce.

Step 5: Leave seeds uncovered or cover lightly with coarse vermiculite, which will help retain the right amount of moisture. Gently sprinkle a little water over each hole to wet the vermiculite.

Step 6: After seeding, put a little water into the bottom of the container. If possible, use filtered water without chlorine. Do not close the lid.

Step 7: Place seed starter tray outside in the shade (a bench or table will do nicely) until the seeds have germinated. Always keep about 1/8" to 1/4" of fresh water in the bottom of the tray.

Step 8: Once the seeds have germinated (about two to five days or longer in cooler temperatures), IMMEDIATELY place outside in full sun for 7 to 14 days to increase their hardiness.

Step 9: Make sure your sprouted seeds have 1/4" of fresh water in the bottom of the tray each morning so your seedlings won't dry out during the day. Add Tower Garden® fertilizer solution every other morning in place of fresh water.

Step 10: Ten to 14 days after germination, and once the fear of frost has passed, your seedlings should be ready to transplant into the Tower Garden®! Look for at least two to three true leaves before transplanting.

Tower Garden® Tip: There is no pruning needed but removing the smaller lower leaves keeps the plant healthier.

PLANTING: Transplanting into the Tower Garden®

Generally, you can transplant your seedlings into your Tower Garden® about 10-14 days after they germinate. The exact timeframe depends on the date of the last frost in your area. You'll know your plants are ready when they have a good root system growing from the rock fiber starter plugs.

If you're using a Submersible Heater and a frost blanket, you can start transplanting three weeks before the suggested planting date. Just make sure you heat the water in the Tower Tonic reservoir to a minimum of 70 degrees until daytime temperatures rise to that level.

Step 1: Gently separate the cubes from the Rockwool slab. Do your best to break as few roots as possible.

Step 2: Your assembled Tower Garden® should already have a net pot in each planting port. Place each cube with its newly planted seedling into one of these net pots. Guide any hanging roots from the net pot into the growing pot.

Step 3: Be SURE the bottom of the cube is securely against the bottom of the net pot. This aligns the plant for optimal irrigation inside the Tower Garden® and keeps it from getting too dry.

MAINTAINING PLANT HEALTH: How to Keep Your Plants Happy

Tower Gardens are wonderfully free of some of the bothers of traditional gardening: there's no weeding, tilling, kneeling, or getting dirty! Just a few basic maintenance steps will keep your plants healthy and happy.

Maintain Tower Tonic Levels

Because your Tower Garden® doesn't use any dirt, your plants are totally dependent on Tower Tonic to get their nutritional needs met. (Kind of like a baby and a bottle.)

- Maintain the recommended Tower Tonic levels at all times to allow your plants maximum uptake of the nutrients they need to grow.
- With a "young" Tower Garden®, check the Tower Tonic levels twice a week to learn how quickly your plants are utilizing the tonic solution. Later, as your plants grow larger and the roots have reached the reservoir, you'll probably need to refill the tonic solution every two to three days.

Avoid Plant Stress

It's well-documented that healthy plants are less desirable to insects! A plant that is stressed in some way — whether from lack of water or nutrients, or from heat, wind or cold stress — becomes an easy target for pests and disease.

Dehydration, starvation, heat, wind, and cold can all cause a plant to wilt. Therefore, the number-one rule for keeping plants healthy is to prevent wilting!

- Always maintain a cool temperature within the reservoir. Tower Tonic should never feel warmer than the temperature of your skin.
- On a very windy or extremely hot day, turn the irrigation timer to run constantly for the most stressful hours of the day. Just remember to turn the timer back to its normal cycling times!

Tower Garden® Tip: If your Tower Garden® has to be partly shaded due to your surroundings, it is better to have afternoon shade when the day is the hottest!

Keep It Clean

When it comes to your Tower Garden®, clean is good. You don't have to pass the-white-glove-test, but keeping your Tower Garden® debris-free discourages plant pathogens.

- Keep your Tower Garden® in as clean an area as possible.
- Remove most mature, yellowing or brittle leaves from the base of the plant.
- Keep loose plant debris and insect debris clear from the top of the reservoir tank, and place the compost of discarded tomato plant clippings well away from your actively growing Tower Garden®.

MAINTAINING PLANT HEALTH: Managing Pests

Like most crops, lettuce is vulnerable to pests. These vary by region and time of year. Fortunately, growing plants off the ground in a Tower Garden is one of the best ways to avoid pests! Following are the most common pests affecting lettuce.



Aphids

Aphids are small, soft-bodied insects that are most commonly green and black in color, but may also be gray, brown, pink, red, yellow, or lavender. They tend to feed on tender, young growth causing it to appear puckered or deformed. Though they are visible to the naked eye, they also leave behind an excretion known as honey dew, which is another method of identification.

What to do if you have them: There are numerous methods of aphid control, including botanical sprays such as insecticidal soap, pyrethrum, rotenone and horticultural oils. Beneficial insects such as ladybugs will also help to eradicate the pest.



Cabbage Loopers

A common lettuce pest, the cabbage looper larva is light green with a thin white line that stretches down each side of the caterpillar's body. Typically found on the underside of the lower leaves, and in the center of the head of lettuce, they tend to skeletonize the leaves leaving fecal matter behind. The larvae characteristically arch their backs as they crawl and transform into adult moths with brown mottled forewings.

What to do if you have them: You can control cabbage loopers using botanical sprays such as insecticidal soap, neem oil, *Bacillus thuringiensis*, pyrethrum, rotenone and horticultural oil sprays.



Cucumber Beetles

Despite their name, cucumber beetles are also a pest to lettuce, especially when the plants are young. Spotted, striped and banded cucumber beetles can be present during all stages of the plant's development and during the entire growing season.

What to do if you have them: You can control cucumber beetles by using botanical sprays such as pyrethrum, rotenone and insecticidal soap.

MAINTAINING PLANT HEALTH: Managing Disease

Not all plant problems are caused by pests; some are caused by disease. Here are the ones most likely to affect lettuce.



Botrytis

A gray mold that thrives in humid yet relatively cool environments, botrytis is a devastating disease that can be exacerbated by poor air circulation. This gray-brown fuzzy growth can appear on plant debris that has fallen from the plant or on the remaining stem after harvest.

What to do if you have it: The best way to control for botrytis is to keep a clean growing environment.



Downy Mildew

A common fungal disease of lettuce, downy mildew looks like fine white cotton or frosting and tends to infect the lower leaves of the plant first. This disease can spread rapidly and kill plants during cool, moist conditions.

What to do if you have it: Be sure to grow from disease-free seed or purchase healthy seedlings. Proper care and air circulation will help maintain your plants' health because diseases are more likely to strike stressed plants. You can protect plants against downy mildew infections with copper sprays.



Powdery Mildew

This is one of the most widespread and recognizable fungal diseases. Powdery mildew forms a white to grayish powdery growth, usually on the upper surfaces of leaves. Fungal spores are spread by wind and can survive the winter on nearby plants and plant debris. The warm days and cool nights of late summer create an ideal climate for spore growth and dispersal.

What to do if you have it: To control mildew, prune plants to improve air circulation and dispose of infected plants. To control minor infestations, pick off affected plant parts and dispose of them immediately. In the case of a larger outbreak, apply bicarbonate and copper sprays to prevent spread of the infection.

When to replace your plants

If a plant has become too diseased despite control efforts, replace with new plants.

For more information

For additional information on how to handle crop pests, consult your local office of the Cooperative Extension System, a nationwide, governmental educational network that provides useful information on agricultural practices:

<http://www.csrees.usda.gov/Extension/>

HARVESTING

You have lettuce! Now it's time to pick it. There are two techniques for harvesting lettuce. You can harvest individual leaves, which keeps the plant alive and allows it to continue to produce. Or you can allow the plant to grow to a full head. So your vegetable drawer isn't inundated with too much produce at once, often it's practical to use a combination of the two techniques: leaf harvest and full head harvest.

Leaf Harvest Procedure

When there are plenty of mature (lowest) leaves present, you can harvest from the bottom of the plant upward. Collect only a few leaves from each plant, and always allow two to three expanding leaves to remain so the plant has enough energy to keep growing.

You can harvest like this every two to three days until the plant shows signs of bolting. In spring and fall, you can generally leaf harvest for three to five weeks before bolting begins. In summer, this harvesting period will be a bit shorter.

Head Harvest Procedure

You can harvest anywhere from 45–60 days after your seeds have germinated, depending on the variety or whenever the head reaches the size you desire! If you don't eat the lettuce right away, you can store it in the fridge for up to two weeks without losing flavor.

Simply harvest by cutting the roots just below the net pot and then remove the net pot from the Tower Garden. Trim any remaining roots closely to the Rockwool plug. If you rinse your lettuce, allow it to drain well before placing it in a plastic produce bag. However, you'll often find that your lettuce is very clean and may not need rinsing, which is great, because unrinsed lettuce actually stores a bit better and longer. You can then rinse it before eating.

Another way to harvest the whole head is to simply cut all of the leaves off the plant. Make sure to cut above the apical growing point — the center of the plant where the new leaves are formed before emerging. Typically this will be two to three inches above the base of the plant in early and late crops. In the heat of the summer, the growing tip might be higher up the plant.

BOLTING

Bolting is defined as “rapid expansion of a lettuce plant into flowering mode.”

Inevitably, Nature will take her course — all plants want to flower to reproduce and create seed. That's their life's quest! With some varieties of lettuce, heat (temperatures in the 80s-90s F) will trigger the plant into fast flowering mode. The plant will appear to quickly expand upward with a strong central stem. Sometimes you may see a short-leafed stalk with a tight bud. This means your plant is in flowering mode. The lettuce you harvest at this time becomes more bitter and less crisp. Generally, this isn't desirable, and your plant has spent its life cycle. Replace bolting plants by transplanting a two-week-old lettuce plant/plug and the cycle begins again!

When to replace your plants

Obviously, if you harvested the head, or your lettuce sneakily bolted, then it is time to replace your plant. Depending on the season, you may want to sow your next crop of lettuce about two to three weeks after transplanting your first lettuce plants into the Tower Garden®. Following this general timing, you will be in a continuous cropping cycle for lettuce.