



# TOWER GARDEN

BY JUICE PLUS+®

## GROWING GUIDE: GREEN BEANS

Green beans are a wonderfully versatile vegetable to use in stir-fries, soups and stews. No summer picnic is complete without a three-bean salad of kidney beans, garbanzos and crisp, tasty green beans. And when the holidays roll around, many people wouldn't consider their Thanksgiving spread complete without a green bean casserole.

Beans are such an easy crop to grow that elementary school children are often sent home with a tiny bean plant in cup. What better crop for the beginning gardener, then? With just a little effort, you can harvest your own delicious green beans.

And growing green beans in a Tower Garden® is even easier than growing them 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 bean plants in a Tower Garden®.

Read on to learn how to: select a variety, sow seeds, transplant seedlings, pinch, fight pests, and know when to harvest. Get ready ... get set ... grow!



### THE ANATOMY OF A GREEN BEAN PLANT

- **Main Stem:** the trunk of the green bean plant
- **Petioles:** the mini-stems that attach the leaves to the main stem
- **Flowers:** small white petals, which form near the intersection of leaves and stem that pollinate the beans with the help of pollinators, such as bees
- **Beans:** the edible part of the plant, consisting of a pod containing seeds
- **Leaves**



### 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 (or plant support cage) surrounds the Tower Garden®!



## BEFORE YOU PLANT: Choosing Your Varieties

There are two types of green beans plants: bush and pole (also called vine). The beans they produce are identical, but they grow in different patterns. You should choose whichever variety fits better into your plans for other crops you want to grow in your Tower, or whichever you find more visually pleasing.

### Bush Type

Bush bean varieties branch out and grow in a bushy shape, hence the name. They may grow upright and tall or semi-upright and compact, generally reaching a height of 24-30 inches.

#### Advantages:

- Bushy plant growth is easier to manage. There's no need to stake or train vines.
- Bush beans may be ready to harvest slightly earlier than pole beans.
- Bush beans usually produce all their beans in a shorter period of time. If you are intending to freeze or can your crop, or if you have a crowd to feed, having the harvest ready all at once is convenient.

#### Drawbacks:

- Bush beans have a shorter productive period. However, planting successive crops two to three weeks apart will give you a continuous harvest.

### Pole or Vine Type

Most varieties of pole or vine beans grow to be 6-8 feet long, but they have been known to reach heights of 10-15 feet! As a result, pole beans need a cage, trellis or other supportive device next to the Tower so the plant has its own place to grow.

#### Advantages:

- Pole beans have a longer, more continuous harvesting season, which means you get to enjoy your beans for a longer period of time.
- Because the harvest is spread out, if you are gardening for a small family, you won't be overwhelmed with ripe produce.
- Pole beans are ideal for humid climates because they dry quickly after rainfall and are less vulnerable to disease.

#### Drawbacks:

- Because they tend to be leggy, pole beans require more attention to manage their growth (for example, training the tendrils).

## BEFORE YOU PLANT: Deciding When to Plant

For most areas, the best time to plant green beans is after the fear of frost has passed (which can be as late as mid-May or early June, depending on where you're located). The best temperature range for green beans is 60-80 degrees. You might want to replace early lettuce plantings with your beans once nighttime temperatures stop falling below 55 degrees.

**Beware:** A light frost can kill most varieties of beans! On the other hand, temperatures above 80 degrees will cause the plant's maturation to slow.

How long until you're ready to harvest? The beans are ready to pick when they are about as thick around as a pencil — after that they can get tough. That should be a month to six weeks after transplanting.

**Tower Garden® Tip:** A late season planting is possible; just give yourself at least 75 days before average first fall frost date for your area.

## PLANTING: Seed Sowing and Germination

**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 Tower Tonic nutrient solution. 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 one seed per cube.

**Step 5:** Be sure the seed has contact with the cube and lightly cover with coarse vermiculite, which will help retain the right amount of moisture. Gently sprinkle a little water over each hole to wet the vermiculite. Some people like to soak the bean seed for several hours or overnight in room temperature water before sowing. However, this is not absolutely necessary.

**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 semi-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 7-14 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®!

### **PLANTING: Transplanting into the Tower Garden®**

You can expect to transplant your bean seedlings 10 to 14 days after germination.

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 [link to URL] 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 plugs in 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 plug 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.

**Note:** If you are transplanting young plants purchased from a garden center, flowers already on the plant may fall off. Don't worry; new flowers will develop after transplant shock has abated, usually in about a week.

**Tower Garden® Tip:** Put your tomato cage on early so the beans will have something to grown on and around for a properly supported plant.

### **PLANTING: Setting Up a Tomato (Plant Support) Cage**

Plant beans in the bottom of the Tower. If you're planting bush beans, you probably want to use a tomato cage for extra structural support. If you're planting pole beans, you definitely want to!

The best time to set up the tomato cage is immediately after you've transplanted your green bean seedlings into your Tower Garden®. That way, as the plants mature, the cage gives them the support they need to grow naturally. Follow the directions that came with the tomato cage for assembly.

Beans are aggressive growers, so you want to make sure they don't take over the other crops on the Tower. As the tendrils grow, you can train them around the cage by gently taking the tendrils and wrapping onto the desired surface. They will quickly establish a hold. If you use a trellis, train the beans toward the trellis on the north side, so the growing vines don't block other crops from the sun.

**Tower Garden® Tip:** For branches that are heavily laden with fruit, use a pliable material (used pantyhose works great!) to gently tie them to the rungs of the tomato cage.

## PRUNING: Is it Necessary?

Bush-type green beans will branch and grow without needing to be pruned. You may occasionally have to move some of the branches so they stay on their side of the tower. You might also want to cut a wild branch if needed.

Pole beans don't need to be pruned, other than to remove diseased or broken stems. Some people like to snap off smaller or misshapen blossoms, which are not as productive, so the plant can concentrate its energy on the healthier blossoms.

## MAINTAINING PLANT HEALTH: How to Keep Your Plants Happy

Tower Garden®s 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®.

## Manage Pests

Like most crops, green beans are 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 beans.



### 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 honeydew, which is another method of identification.

**What to do if you have Aphids:** 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.



### Leafhoppers

Identifiable by their wedge-shaped, light green bodies, leafhoppers are a common problem for both greenhouse and field growers. They can be detected by stippling on the top of the leaves, giving the appearance of white or pale yellow spots. The damage caused is not solely cosmetic since these insects also are known to transmit viral diseases.

**What to do if you have them:** Botanical sprays such as neem, pyrethrum, rotenone and horticultural oil sprays are your best bet for controlling leafhoppers.



### Mexican Bean Beetles

Beetles are the major foliage feeders of the insect world. Brownish-yellow with 16 spots on their backs, Mexican bean beetles resemble ladybugs. They spend their entire lifecycle on the plant, feeding on the undersides of the leaves so they can easily go unnoticed until their populations increase.

**What to do if you have them:** There are numerous methods of Mexican bean beetle control. You can use botanical sprays such as pyrethrum, rotenone and insecticidal soap. Pests may also be removed by hand and destroyed, but if you use this method, be sure to also remove any leaves that harbor eggs.

## Manage Disease

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



### Anthracnose

A major disease of beans, anthracnose is caused by a fungus and is responsible for major crop loss throughout the world. This disease has the ability to reach epidemic proportions in wet growing conditions. It results in reduced yields due initially to poor seed germination. Symptoms of anthracnose appear on seedlings grown from infected seeds. Dark spots appear on the stems and the young leaves, which can stunt or kill the plant during its seedling stage. In older plants, red or black lesions may be found on the underside of the leaf, where they tend to go unnoticed. The pods themselves develop black circular lesions with a reddish-brown border. These pods may shrivel up and develop seeds that exhibit the same lesions.

**What to do if you have it:** Anthracnose is less common in arid regions of the country, but if you live in a wetter area, 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. Make sure the area is clear of the previous crops' plant debris and practice good sanitation measures between crops. There are no chemicals on the market labeled for home treatment of this disease.



### Bacterial Blight

Bacterial blight infections occur during warm weather. Infections develop on parts of the plant that have been previously injured through insect feeding or weather-induced damage, such as hail, wind or hard rainfalls. The symptoms appear as water-soaked lesions on the underside of the leaves, which dry and become brown and brittle. A yellow border usually develops around the dead tissue.

**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. Make sure the area is clear of the previous crops' plant debris and practice good sanitation measures between crops. You can be proactive and treat plants against infection with preventative hydrogen dioxide or copper sprays.



### Downy Mildew:

A common fungal disease of beans, 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 infection with copper sprays.

### For more info:

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 free useful information on agricultural practices.

[http://www.csrees.usda.gov/qlinks/partners/state\\_partners.html](http://www.csrees.usda.gov/qlinks/partners/state_partners.html)

### When to replace your plants:

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

## HARVESTING

- Your green beans are ready to pick! Keep these things in mind when harvesting:
- Green beans will develop about a month to six weeks after transplanting into your Tower Garden®.
- Younger beans will be more tender and have fewer strings inside the pod. For best taste, harvest before the beans show excessive swelling. Just snap or cut the beans from the stem, taking care to not damage the stem.
- Early harvest might be just a few pods, but as the crop matures the harvest will be more plentiful until the heat of summer slows the plant's growth. Harvesting promotes the next set of new pods.
- You will eventually notice several of the most mature leaves turn yellow or brown. Don't be concerned. These leaves may be removed, but this will be an indicator that your green beans will be finished within a few weeks.