

STARTING ROBUST TOMATO PLANTS FOR PLANT SALES

By, Jennifer Porwit, Ramsey County Master Gardener

February, 2019

Growing robust tomato plants from seeding to planting out in the garden is a process with many steps. Each step is vital for growing plants that will please you and your customers. I came up with the details through experimentation, accident, and sometimes, desperation, growing plants for our annual Master Gardener Plant Sale.

START DATE: After a fair amount of angst each year as to when to start planting seeds indoors, I finally settled on the third or fourth week of March as a time that seems to work well. If I have a lot of varieties to plant, I do it over the space of several days.

CONTAINERS & CLEANLINESS: Since germinating tomato seeds are prone to damping off disease, I make sure that I use only new containers or trays, or ones that have been thoroughly washed and soaked in a bleach solution and rinsed.

 mix 1 part bleach to 9 parts water

 soak 10-15 minutes

 rinse well with water

I used to use cell trays with one or two seeds per cell, but found that it was hard to get the seedlings out when they got transplanted. Using cell trays changed one day when I was sitting on a gym floor with little kids climbing all over me as I was trying to teach them how to plant seeds. It soon became obvious that having them plant one seed at a time wasn't going to work. In desperation I scooped up starting mix in a 4.5 inch pot. I had one of the kids take a pinch of seeds and then sprinkle them on the surface of the mix. Then the child took a pencil, stirred the surface, and gently patted it down. Several kids followed suit. I promised them that I would bring the pots back in a couple weeks to show them what the new sprouts looked like. Since there was no garden for the youngsters to plant the tomato plants into, I ended up with pots full of mini jungles of tomato plants. As they grew, I decided that I would try to rescue them. I carefully dumped out each pot and teased apart the small plants and potted them up individually. I discovered that this was much easier than dealing with cell trays and have started my tomato plants this way ever since.

HOW TO PLANT: Usually, I plant about 20 seeds per 4.5 inch pot. **All** seeding and transplanting is done into new or sterilized pots. Rather than stirring the seeds in, I



sprinkle seeds on top of the soil mix and then lightly cover with more mix. Lightly patting helps ensure good contact between the soil and the seeds so that the seeds don't stay dry.



LABELING 1: Each pot must be **immediately** labeled! Unlabeled pots all look exactly alike—even two minutes after seeding.

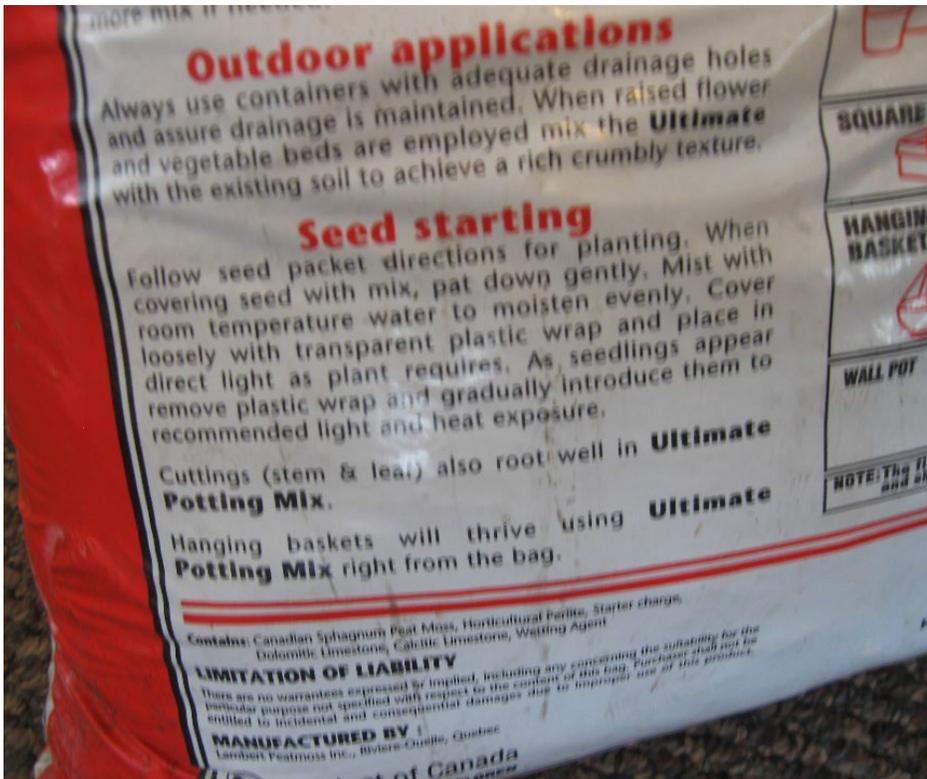
Oh Gee!

by Signe



SEED STARTING MIX: Everyone seems to have their favorite seed starting mix. I have tried several brands but have settled on using Schultz Potting Soil Mix. It is inexpensive, holds moisture well, and still has sufficient drainage. I use it for the initial germination all the way through to the final potting. It has a very small amount of fertilizer included in it. Ferti-lome is another brand that is readily available.





BOTTOM HEATING: For the initial germination, I set a seedling heat mat onto a dining hall tray, jellyroll pan, or under a solid-bottom pot tray. Place the pots onto the heating mat or into the pot tray. I usually remove the bottom heater mats after the seedlings are transplanted up or when they get to be four inches tall in the initial seeding pot.





One pot planted and waiting.

WATERING: At this stage I water almost exclusively from the bottom. To make sure that the surface of the potting mix does not dry out, I loosely cover the pots with a sheet of bubble wrap. Bubble wrap works well as it does not seal as tightly as a plastic kitchen wrap, allowing for limited air circulation and room for the new sprouts to grow. The bubble wrap is removed as soon as most of the seeds have germinated. It is important to remove the bubble wrap so that the surface of the potting soil doesn't remain too damp. Even though the potting mix is nutrient poor and mostly sterile, stray damping-off fungus spores may find their way to the surface of the pots and kill off all of the young seedlings. Not all tomato seeds germinate in the same length of time. Don't panic if seeds planted at the same time sprout over the course of several days.

FERTILIZING: When the seeds do sprout, the plants are quite vigorous and require regular but **diluted** fertilizer. Miracle Grow is one of several brands of readily dissolvable fertilizer that can be used. Be careful **not** to over fertilize. I use about one teaspoon of fertilizer to one gallon of water. I use this diluted fertilizer approximately every other watering. If there is still water in the tray I know that I don't need to water. Otherwise I use the finger test to determine how dry the top of the soil is.

NURSERY & LIGHTING: A four-foot-wide shelving unit works well for holding the trays because then I can suspend a four-foot fluorescent shop light above each of the shelves, leaving 1-2 inches of space between the lights and the potting mix surface (or the leaves after germination). I probably will not switch to LED lights because the fluorescent bulbs are cheap enough and they emit a small amount of heat that the baby plants appreciate. Light from fluorescent bulbs is not identical to sunlight, but it is close enough to do a good job when raising seedlings. I suspend the lights on chains so that I can raise or lower them depending on the height of the plants. This set-up is in our basement in a small room that I can keep warm with a small thermostatically controlled heater. Be sure to only use a heater that automatically turns off if it falls over so that you don't start a fire.

The seeds can be started in other locations, but there are a couple things to remember. Pots should not be placed on a windowsill. It is usually too cold next to a window for adequate germination and growth. Also, sunlight coming in the window is not strong enough for the same reason.

I leave the lights on at least 12 hours each day. I used to use a timer to turn the lights on and off each day, but now I turn the lights on manually when I get up in the morning and off when I go to bed at night. Do not leave the lights on for over 16 hours a day; plants need some darkness and a rest period to grow well. I find that I keep a closer eye on watering and distance from the lights when I do the job manually.

TRANSPLANTING 1: When the seedlings get to be around 4 inches tall (third or fourth pair of true leaves) it is time for the first transplanting. Gently pop out of a pot all the plants and potting soil. Gently separate the plants from each other. Separate out the largest plants to pot up now and put the smaller plants back into the original pot so that they can grow some more and get potted up later. Have a generous supply of two-inch pots at hand (I clean and reuse these each year). Put a small amount of potting soil in the bottom of the pot, place the seedling deep into the pot so that all the roots are near the bottom. Fill in soil around the stem leaving the leaves just above the soil line. This is very important. The top growth of the plant will slow down briefly, but additional roots will grow all along the buried stem. (Only tomatoes will form roots along the stem this way; do not do this with other seedlings!) Remove the bottom heater mats after the seedlings get to be four inches tall in the initial seeding pot and when transplanting.

LABELING 2: Every pot must be labeled immediately after being transplanted. I use a popsicle stick, tongue depressor, or vinyl stake with the variety name written on it with a UV resistant pen or a weatherproof printed label.

FUNGUS GNATS: One year, I ended up with an infestation of fungus gnats indoors. Luckily, it was at a stage when the plants were already good sized, so they did not suffer much damage before they went outside. I think that in the future I will put out yellow sticky traps as soon as the seeds are sown to head off a problem. Yellow sticky traps are placed horizontally at the soil surface when the plants are potted individually to capture large numbers of egg laying adults. The gnats are attracted to yellow and are easily removed on the trap before they can lay more eggs. Another option is to cover an amber colored medicine bottle with Tanglefoot. Tanglefoot is usually used outside to capture gypsy moths, apple maggots, etc., but it certainly is effective at capturing inside pests as well.



The little black spots on the bottle are captured insects.

TRANSPLANTING 2: When the plants have outgrown their two-inch pots they get transplanted into 4.5 inch pots. Pop the plant and soil out of the two-inch pot and drop it to the bottom of a 4.5-inch pot. Fill in the pot with soil up to the lower leaves (pinch off some bottom leaves if the plant is very tall). Again, the top growth will be briefly slowed, but roots will grow all along the stem that is below the soil surface. Often, I have missed a pot of seedlings and didn't get them transplanted into the two-inch pot in a timely manner. By this time the seedlings are a big, tall mess of tangled plants. In this case, I tease them apart and plant them directly into 4.5-inch pots. This is not ideal, but it is better than discarding them. I think that it would be fine to always skip the step of potting in the 2-inch pot if you are cramped for time or if the seedlings have gotten very tall.

LABELING 3: Move the labeled stick to the 4.5" pot with the transplanted plant.

SPACE: At this point, the potted plants are taking up a lot more space than the pots of seeds, but they still have the same watering and light requirements. The temperature can be roughly room temperature, but it is best to keep them away from windows. If twenty plants result from each seeded pot, you must provide accommodations for twenty times as many pots. Calculate how many pots will fit per tray and use that figure to calculate how much shelf space you need to fit all the trays. The potted-up plants still need the grow lights until they are moved outdoors.

HARDENING OFF: It is now time to prepare a place outdoors for the plants to harden off. Usually this is around the time that enough frost is out of the ground that a shovel will penetrate full depth and the ends of the hoops can be pushed into the soil. By this time the plants are getting quite big.

The exact form of this structure is unimportant as long as it has certain characteristics. It should be of **translucent** material, such as heavy vinyl sheeting. There should be enough room around the plants and well above them so that their leaves do not touch the plastic. The north side of the enclosure should be liftable so that it can be propped open all day to let breezes in and then closed down at night so that curious critters and/or cold air can't get in. Don't leave the south side open because if plants are exposed to direct sun for long periods before they are accustomed to being outside, they will dry out quickly and get sunburn. If the weather is really foul, the sides can all stay down during the day.

HOOP HOUSE PLANS: A tent frame or boards temporarily nailed together can form the skeleton of the structure to be covered with the plastic. After suffering with jerry-rigged arrangements for a couple years I decided to make a hoop house that could be put up and taken down quickly and re-used every year. The hoops themselves are made from UV resistant vinyl: 10' electrical conduit that I bent using a heater that is used for removing paint. They are shaped like an upside-down U where the legs are 4' across from each other. A 5' post is set deep in the ground at each end of where the hoop house will sit. Each end of each hoop is pushed into the ground about six inches and the hoops are placed 4-5' apart. They are not stable until they are tied to each other at the tops and to the end posts. Then the ten-foot-wide poly sheeting is drawn over the top and fastened down at each end with concrete blocks or rocks. It must be secure enough that a strong wind will not blow the whole thing away. If you have extra hoops you can put a couple of them over the top of the sheeting to help secure it. On occasion, I have simply leaned 2 x 2's or larger boards against the sides.

Contrary to their time indoors, when the pots are outdoors they must have free drainage. Do not keep them in solid bottomed trays.



A happy hoop house.



The exact timing of putting the plants outdoors is quite flexible—it depends on how cold it is outdoors and how crowded it is getting indoors, as well as whether you are able to tend to them every day when they are outside. (It is possible to leave them covered for a day or more if it is cool and cloudy/rainy.) Before the trays of plants are put out in the hoop house it is a good idea to spread a layer of straw or newspaper on the ground to act as temporary insulation barrier.

Once the plants are out in the hoop house they stay there until they are planted or

donated. Every night the sides are lowered and secured so that the plants don't suffer from chill breezes or hungry animals. If a frost is predicted, I put five-gallon buckets of hot water out in the house and cover the hoop house with tarps. A couple times over the years leaves that touched the plastic got frosted a bit, but no serious damage happened.

While the plants are in the hoop house I water them with a wand on the end of a hose. Every other watering or so I use a sprinkling can of very dilute fertilizer. This way the plants get used to water falling on them.



The last week before the plant sale I **completely** slide the plastic sheeting off each day for increasing lengths of time (depending on the weather). If it is really cloudy the plants can stand more time unprotected. It still is important to keep them covered each night.

LABELING 4: Label pots with sticky-back labels before putting them out to sell. If you labeled the seeds and the transplants when they were potted, this will be an easy task.

See examples of sticky-back labels in Appendix 1.



Some varieties, like Tumbler, refuse to stand up straight without help.



Even when young, determinate or dwarf indeterminate tomato plants are shorter than indeterminate ones. All types of tomato plants should be planted deeply in the garden. If the indeterminates are **really** tall they can be laid on their side for a day. The growing tip will bend upwards toward the sun and then the plant can be planted in a trench rather than in an extremely deep hole. All leaves that would end up underground should be pinched off.



The big sticky-back labels are put on the pots just before the plant sale. The colored inks tend to run when wet, so the less time between final labeling and selling, the better.

While all of these various steps contribute to the growing of robust plants, probably the most important is that of transplanting deeply into pots.

****Slowing down the top growth and adding to the root system is key****

The second most important step is keeping them outdoors in the hoop house or similar structure for quite a while. The plants then grow very stocky as opposed to lanky.

Appendix 1—CREATING LABELS by Joe Baltrukonis, Ramsey Co. MG

The labels that we use are printed 10 to a sheet. We have tested these for durability, and they will generally last on the final pot for at least 2 weeks. If the labels do get wet, the ink will bleed and the label will become illegible. We label just before the plant sale.

To create a label (using Microsoft Word):

1. Open a **New Blank Document**. Go to the **Ribbon** at the top of the document. Click on the **Mailings** tab.
2. Click on **Labels**.
3. A box comes up which is labeled **Envelopes and Labels**.
4. Make sure that the **Labels** tab is in use.
5. Under **Print**, make sure that the radio button **Full Page of the same label** is chosen.
6. At the bottom of the box, click on **Options**. Under **Printer Information**, choose **Page Printer**.
7. Under **Label Vendors**, choose **Avery US Letter**.
8. Under **Product Number**, choose **5163 Shipping Labels**.
9. Click **OK**.
10. Click on **New Document** at the bottom of the Envelopes and Labels box. A label template should appear.
11. I like to darken all the lines on my template for easier visibility.
 - a. Click on one of the labels. Click on the Design tab. **Table Tools** appears at the very top of the ribbon. Click on **Table Tools**.
 - b. At the far right, click on the **Border Painter**.
 - c. To the left of the **Border Painter Box**, click on the **1 ½ pt** line weight.
 - d. Now, take the **Border Painter Brush** and click on all the lines of your template, including all the lines in the middle of the template. Now, all the lines on your template should be darkened.
 - e. When you are done, click on the **File** tab. Choose **Save**.
 - f. Pick out the spot on the Hard Drive or cloud (or create a new File Folder) where you want to save the document. I usually name the template **Avery Label Template 10 per sheet 5163**. Save the file.

Using the Label Template:

1. Open your **template** document (Avery Label Template 10 per sheet 5163).
2. Go to the File Tab. Choose Save As and rename your template document. For example, you could name the new file **Tomato Candyland Red Hybrid** or

whatever tomato you are making a label for. Save the file. Congratulations, you have now preserved your original template document, and are now using a new label document called **Tomato Candyland Red Hybrid**.

3. Now go to the internet and find a fantastic picture of your tomato. Use your right click menu to choose and copy the picture.
4. Paste the picture into one of your blank labels on the template. Click on the picture; the **Picture Tools** menu should come up. Use the **Picture Tools** menu to make color corrections, reduce or increase the **Height** and **Width** of your picture, or **Crop** as needed.
5. When clicking on your picture, you will notice a small box at the upper right of the picture. Click on this **Layout Option menu** and choose **In Line with text** (the first of 6 choices). This will enable you to drag your picture anywhere within the label. I usually drag my pictures to the right (sometimes the print alignment cuts off part of the picture and this prevents losing any of the written information on your label).
6. Enter the name of the tomato and other information: **“CANDYLAND HYBRID TOMATO. Indeterminate. 55-65 days. 2016 All America Selections winner. Currant (pea-sized tomato) on a compact and tidy plant. Trusses of tiny tomatoes are on the outside of the plant and can be harvested at one time. Tons of sweet red fruits are great for snacking. High Vitamin A and C. Support the plant because of heavy fruit load.”**
7. Note that I check at least 5 or 6 vendors, and reviews (if available) before writing up my description. Sometimes vendors differ in their descriptions. For example, one vendor listed Candyland Tomato as an Open pollinated (that is, non-hybrid), but it is indeed a hybrid. I capitalize and bolden the name of the tomato. The growth pattern, days to maturity, and special features are in bold. I always try to include a reminder to stake the plant if needed. I try to leave a line of blank space at both the top and bottom of the description, to make it easier to peel off the labels.
8. Once your label is perfect, you reduced the font size, justified the margins, corrected the grammar and spelling, copy the label to the rest of the nine labels on the temple. Be sure to save the finished page of 10 labels.
9. On our printer, we must position the blank label sheets face down to end up printing on the correct side.

Appendix 2: CHEAT SHEET- by Sylvia Peters, Ramsey Co. MG

START DATE: 3rd or 4th week of March

CONTAINERS AND CLEANLINESS: New 4.5" pots or-
Used 4.5" pots soaked in a bleach solution- mix 1 part bleach to 9 parts water
soak and scrub 10-15 minutes, rinse in clear water

SEED STARTING MIX: Schultz Potting Mix or Ferti-Lome have given good results

HOW TO PLANT: 20 seeds per 4.5" pot, sprinkled on top of soil mix
then, lightly cover with soil mix

LABELING 1: Do it **immediately!** Have labels with varieties listed and ready

BOTTOM HEATING: Use a Seedling Heating Mat under newly potted seeds

WATERING: Bottom water in the tray and loosely cover pots with bubble wrap

FERTILIZING: Use a diluted mix of granulated fertilizer such as Miracle Grow
1 teaspoon per gallon of water—every other watering

NURSERY & LIGHTING: 4' wide shelving units with 4' long fluorescent shop lights
suspended on chains to raise and lower lights 1-2" above pots and plants

TRANSPLANTING 1: When 4" tall, transplant largest plants to 2" pots
Fill pots with a small amount of soil, put roots near bottom and fill around stem

LABELING 2: **Immediately** label each pot with a stick listing the variety

FUNGUS GNATS: Yellow sticky traps at the soil surface as needed

TRANSPLANTING 2: When transplants outgrow 2" pot, transfer to 4.5" pot
Place plant and soil in 4.5" pot and fill with more soil up to lower leaves

LABELING 3: **Immediately** move label sticks from the 2" pots to the 4.5" pots

SPACE: For each seed that grows, you will need enough space to accommodate it
Transplants will have the same light and water requirements as previously

HARDENING OFF: Place transplants outside after frost starts going out of the ground
Cover transplants with a translucent material
Open north end during the day for a breeze and close at night
Consider building a:

HOOP HOUSE: Read through directions in main body for instructions

LABELING 4: See Appendix 1 for examples of sticky-back labels to attach to pots for sale