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Joyce Moore's Guide to Successful Seed Germination

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Greetings fellow Gardeners!

The following tutorial refers to tomato growing specifically, but can easily be used for most vegetable gardening starts and annual flowers. Enjoy the following gardening tips.

The following information is for general germination techniques that work well for the majority of plant seeds that don't require special care. For example, most vegetables, herbs, and summer type flowers. Of course, there are lots of specialty seeds and plants that require specific techniques but as I am not a professional horticulturist, but a home gardener like yourselves, I will stick with what I know!



For basic seed germination you need a few things. First of all your seeds! It is always a good idea that if you are just starting out, to start with seeds that are forgiving and germinate easily and quickly! We all want to be successful as gardeners!

I am basically a vegetable gardener so every year I start out with my tomato plant seeds in late February to early March. I like to get a ten week minimum head start before it is planting time outside. Once you have your seeds, then you need to gather up your pots, bag of soil, a soil thermometer, a household fan, , an inexpensive outlet timer, a watering can, plant tags and what else you think you need. Don't worry, I will go over each item and

my rationale for having them in my arsenal!

LIGHTING: If you don't have a south facing window area like me, then you need to consider investing in a shop light at your local hardware store and a couple of "grow light bulbs". The shop light is around \$10-\$15 which is cheap lighting but the grow lights are kind of spendy, but well worth it. They are specifically made to project the correct colored light rays for the seedlings. Keep your lights just barely above the growing seedlings.



POTS: OK, so I am cheap! I reuse pots and flats from the previous year!

No biggie as long as they are cleaned out and dipped in a solution of 10:1 water to household bleach solution before using. This kills any lingering diseases or fungus spores from last year. Course, if you are using brand new pots, then skip this step!



SOIL: Always use new potting soil ! I know, garden soil can be used as long as it is sterilized first but why bother ! Potting soil is cheap and already sterilized. I personally like Whitney Farm's Germinating Mix (Ingredients: A soil less mix consisting of fine-screened Sphagnum Peat Moss, Fine Perlite, Fine Vermiculite, Sand, and Fine Pumice.) for small seeds like petunias and tomatoes. but any good brand will do. For larger seeds like squashes and cucumbers, I use the cheapest generic soil mix available. It has coarser texture and stuff like stick chunks but the larger seeds can push up through it and the roots like the coarser texture to grow into. Makes transplanting easy as the soil doesn't fall off the root ball like the finer stuff does.

Most commercial mixes contain : high-quality sphagnum peat, fine vermiculite and often perlite, a very small quantity of limestone, a wetting agent and enough fertilizer to last through two or three waterings For a home made mix (per gallon) My personal home-made soil mix: 1 part store bought bagged

soil, 1 part peat moss, and 1 part perlite. You can also add as an option, 1 part organic compost for an added nutritional boost.

As for fertilizer, that would come later in the watering can when I water. Seeds do not need fertilizers or additional nutrients until they are established and are growing leaves. The most important thing to remember when using peat moss is that it doesn't retain or wick moisture well. Once you have it dampened, you can't let it dry out completely or you will lose your seeds from dehydration! A good rule of thumb is to mix your seed starting mix the day before sowing and dampen it. Recheck the moisture level the next day before you plant your seeds, then keep the mix "slightly damp" until ready to transplant. Your seedlings will pop up quickly through this mix and once established well, then you will be ready to "pot up" into larger containers with standard soil mix (here is where the generic cheap soil mix comes in).

SOIL THERMOMETER: Why? So you know the temperature of your soil! Most seeds don't like cold wet soil and will refuse to germinate, even rot! Now, this is more important for starting seeds in your unheated greenhouse I admit, but I use mine indoors to monitor the ambient general temperatures surrounding my seed environment. Also since I use a heating mat to give my seeds a head start, I can make sure that the soil isn't getting too hot. This first year I used a plant heating mat, I couldn't understand why none of the seeds were germinating. I check the soil temp and found out that the soil was nearly one hundred degrees! So, I use some wood slats and raised the seed flats off the mats by an inch or two and within a few days, seedlings started to emerge! I learned that since I start my seed indoors and the average room temperature is around seventy, that the mats got too hot when in direct contact with the flats! So by raising them, I got the temp closer to 75-80 and the seeds germinated!



Remember, this is tomatoes we are talking about. For general seed germination, the soil temp should be in the 60-75 degree range. If your soil temp is staying too warm, then the heat needs to be turned down or preferable off in the room where the seed flats are at. Seedlings like a night time temp of 50-60 degrees so the plant can harden off gradually. I had my heat mats plugged into my timer so at night when the lights and fan turned off, so did the heat mats. Once the seeds have germinated, turn off the heat mats permanently. They don't need them and you want your seedlings to grow up stout and ready to go outside in the real world!

HOUSEHOLD FAN: The **number two** reason for seed failure is a fungus called "damping off". The fungus attacks the tender stems at the soil level and before you know it, your precious seedlings have fallen over and are dying. Nothing you can do at that point. So, the trick here is prevention! This is where the household fan comes in. By maintaining a steady low flow of air circulating in your seedling room, you help keep the top layer of soil dry enough that the fungus doesn't grow. I have had no seedling damping off since I tried this years ago and continue faithfully to use the fan every spring. Of course in the greenhouse setting, you have to provide a cross ventilation through your windows, doors and fan system if you have one. I have my fan hooked up to my timer so than when the lights come on, the fan comes on too! Works great!

TIMER: Onto the timer, this is where it gets tricky. Some plants are light sensitive such as marigolds while others could care less. So for simplicity sake, let's stick with tomatoes. I start my seedlings in late February. I will start out my daylight hours with the timer set to eight hours on and sixteen hours off. Then as the plants grow, I gradually extend the daylight hours until I hit twelve and twelve. This seems to work great for tomatoes. By the time they are ready for moving into my outdoor greenhouse in April, they are nice and stout, deep green and look fabulous. Also by using a timer, I don't have to worry if we are out of town a few days. The plants will never

miss me!

WATERING CAN: Well, this is a no brainer. I use a gallon milk jug often times so I can mix my fertilizer correctly, then pour that mixture into a watering can for individual pot watering. OK, here is the **Number One** Cause of seed failure!: Over watering! Don't drown your seedlings. The soil should never be more than slightly damp. If the soil feels damp, don't water! I finally broke down and bought a water meter. The soil may look dry on top but the meter says it's plenty damp underneath! Great tool and one can be picked up for around \$6.00. For fertilizing, I use a liquid hydroponic solution that is balanced and has all the nutrients that the plant needs. After all, hydroponic systems don't use any soil and the plants are totally dependent on the nutrients provided. Of course, general products such as Miracle Grow are just fine too. Dilute the solution to half the recommended concentration. I add nutrients to my watering can every time I water. I feel that the plants get a sustainable and constant feeding this way. After all, you wouldn't want to go for three days on just water, then get a mega meal to make up! Plants are constantly growing and need nutrients just like children!



Here is a great idea for conserving water in your outdoor garden! A Poor Man's drip system, if you will. **Fertigating:** (See picture on right) Works great with any type soil, especially heavy or gravel type soils like ours. Drill a 3/16 hole near the bottom on one of your plastic bucket or gallon milk jug and you are all set. I like the idea of the gallon jug so I can put in the correct amount of nutrients as stated on the packet and not worry about over or underfeeding. Just fill your bucket with quantity of water you want per plant, add your nutrients if desired and walk away!

PLANT TAGS AND PERMANENT MARKER: A must have before you even start planting. Believe me, you won't be able to remember what every tray has in it. Then when you are ready to transplant, you already have the tag and it goes right in with the plant in it's new pot! Nothing more frustrating than "mystery plants"!



Onto Planting! : OK, you have your premixed dampened soil which you prepare the previous day. Your pots are cleaned and sterilized. You have your plant tags, pen, seeds, and pots. Let's go! Lightly fill each pot or section 3/4 full of soil mix but don't pack down. Using your finger, or the back end of the pen, knife or what have you and create a depression at least three times the diameter of the seed or in most cases about 1/4 inch deep. Drop in one or two seeds. I like to overseed slightly so I have something sprouted in every section. I have no problem in pinching off extras later! Gently tap the soil back over the seed and press down lightly but don't compress! Gently water the section with tepid warm tap water, place your printed plant tag and move on. When the whole tray is filled, then cover with a clear tray top or clear

plastic wrap and tuck underneath. There, you are done for now! Place under the light so that the light bulbs are no more than three to four inches above the seed flat. The further the light is away, the less intensity the seedlings will get and you will have weak, spindly plants that will probably die. I place the shop light fixture right over the top of the seed tray cover. Not only do the seeds get the most intense light but the warm heat from the bulbs help in germinating too. No need to take the cover off again until you see sprouts!



In a few days, you will start seeing seedlings appear. Now, it is time to remove the cover so the emerging seedlings can get the circulated air from your fan. No need to fertilized until they have started to show true leaves. See the picture to the right. Notice on this pumpkin seedlings that the first two seed leaves are rounded (fig 1). These are called the "seed leaves". Then the "true leaves" start to come on. This is the serrated looking leaf (fig 2) and notice the newly emerging leaf in the center. The white arrow points to a new true leaf just emerging.



You will notice in the sprouts picture on the left, that three out of four seeds have sprouted so far. That's 75% which is considered average for most garden seeds. I checked and found the final seed is sprouting but just below the soil surface.

Probably in about a week, these sprouts will be ready to be transplanted into the outdoor garden. I am looking forward to growing my first crop of popcorn (Japanese Hull-less popcorn)!

There, you've done it! You have now planted and germinated your own seeds for your garden!



When you judge that your plants are outgrowing their cells or section, gently remove one from it's cell and look at the soil ball. Do you see white roots extending from the side of the ball and maybe starting to curl around the exterior? OK! It's time to transplant up into a larger pot and a more sturdier soil mix as described above.



[Dozens of petunia plants for my garden and for selling at the Master Gardener's Fair this spring!](#)

Congratulations, you are a true gardener! I hope you enjoy this quick tutorial on seed starting. All instructions contained here are from my own personal experiences. Your situation may be different and your seeds may need special conditions, lighting, temperatures and soils. Please consult some good gardening books for more info such as American Horticultural Society Series including their excellent A-Z Plant Encyclopedia, Plant and Propagation book and others found in your local library. For more specific planting help, please call your local county Extension office and ask to speak to a "Master Gardener". He or she would be more than happy to help you find solutions and be successful as a home gardener. Click [HERE](#) to find your local County Extension Office.

Happy Gardening!

Joyce Moore

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[USDA Garden Bulletin](#) (*excellent article on soil preparation and site location*)

[Germination Guide](#) (*covers a wide range of different seeds germination requirements*)

[Growing Garlic Successfully](#)