Seed Germination Guide

Preparing The Soil

When germinating cactus seeds such as Peyote and San Pedro it is best to use a high-quality potting soil that contains no nutrients or a seed starting mix. I prefer to use Pro-Mix HP. The seedlings will not require nutrients. They are very sensitive in the early stages and too many nutrients may burn them.

The first step is to pasteurize the soil. The reason we pasteurize and not sterilize is that sterilizing will kill all of the beneficial organisms in the soil. Pasteurization happens at a lower temperature than sterilization which will keep the organisms intact while killing any bugs, eggs, or spores that are present in the soil.

Start by slowly adding spring water to the soil until it reaches field capacity. It is important to use spring water as tap water may have harsh chemicals that will hurt germination rates. Also, stay away from reverse osmosis and distilled water as these contain little beneficial minerals.

You'll know when the soil is at field capacity when you squeeze a handful firmly and only a few drops of water drip from your hand. Mix in the water bit by bit (squeeze testing the soil often) so you don't over saturate the soil. If a stream of water pours from your hand when the soil is firmly squeezed, the soil is too wet and more dry soil must be added.

Once the soil reaches field capacity it can be placed into an oven safe bowl. Fill the bowl completely but do not pack the soil in. Leave it light and airy. Then cover the bowl with tin foil. Seal it well to keep as much moisture in as possible during the pasteurization process.

Now pierce the probe from a digital meat thermometer through the tin foil and push it down

into the soil. Try to get the tip of the probe as close to the center of the soil mass as possible. The alarm on the thermometer should be set to 180F.

Lastly, place the bowl into a conventional oven and then set the oven to 200F. When the thermometer alarm sounds, turn off the oven and leave the bowl inside until it is completely cooled. The temperature of the soil may continue to rise after the oven is turned off and this is okay. The temperature should stay between 180F and 200F for around 10 to 20 minutes. This is when the pasteurization process takes place. If the temperature reaches above 200F remove the bowl from the oven immediately. Temperatures above 200F will kill off the beneficial organisms. Once the soil is completely cooled it can be used and should be used as soon as possible.

Preparing The Container

To prepare the germination container, drill several 1/4-inch drainage holes in the bottom. I use clear Tupperware containers that can be purchased at your local dollar store. The containers should be a few inches deep. Choosing clear plastic will make it much easier to monitor the moisture level of the soil once we begin watering the cacti. The drainage holes will prevent water from pooling in the bottom if the container is overwatered. It is also a good idea to label the container with the type of seeds that you plan to germinate and the date.

Sowing the Seeds

Firstly, turn off any fans or AC units in the area 30 minutes prior to performing the work to limit mold spores floating around in the air. Prepare everything that you need so that you can work quickly to limit the amount of time that the soil will be exposed to the open air.

Then sterilize your work area. The cleaner you work, the less chance you will encounter contamination in the germination container. Prepare your work area by disinfecting the work surface, the germination container, a spoon, your hands, and your forearms with isopropyl alcohol.

Once the area is clean, remove the tin foil from the bowl containing the pasteurized soil and spoon the soil into the germination container. Then cover any leftover soil back up with the tin foil. Flatten the surface of the soil in the germination container with the back of the spoon. Try to get the surface as smooth as possible without compacting the soil too much. You want the soil to stay light and airy. You also want to leave an inch or so of room between the surface of the soil and the top of the container. You will be covering the container with plastic wrap so it is important to leave room for the seedlings to grow.

Once the soil is level you may sprinkle your seeds onto the surface. Do not bury the seeds. They require light in order to germinate. The seeds should not be planted too densely either. Once they germinate they will need room to grow so it is important to leave a few centimeters or so between each seed.

Now give the entire surface of the soil a good spray with pure 3% hydrogen peroxide using a spray bottle. This will help to sterilize the seeds and the soil surface and increase germination rates. The hydrogen peroxide does not need to be diluted. Finally, cover the container tightly with plastic wrap and secure it with tape.

The seeds will require a high level of humidity in order to germinate. This is achieved by keeping the plastic wrap over the container. The seedlings should stay covered until they are about a centimeter in diameter, then they may be hardened off. Hardening off is the process of slowly acclimating the seedlings from the humid environment to the dry outside air. Leave the seedlings alone during this time and don't be tempted to remove the plastic wrap. Doing so will only shock the delicate seedlings and potentially introduce mold spores from the air into the container.

They should not need to be watered during this time as the plastic wrap will retain the water in the container. If the soil does start to dry out you may carefully lift up the plastic wrap and use a spray bottle to moisten the soil. But do it gently so as to not dislodge the delicate roots of the seedlings from the soil.

It is common for peyote seedlings to germinate lying on their side with the root visible. There is no need to worry or try to move them upright. The root will eventually anchor itself and pull the seedling into the proper position.

Light

Now the container can be placed in indirect sunlight or under a grow light. Direct sunlight will burn the delicate seedlings. It is recommended to use a grow light as they are more consistent than natural light and can be controlled more easily.

The seedlings should sprout within a few days to a couple weeks. When they do, they should be bright green. If they are orange or red in color, they are burning (receiving too much light) and should be moved away from the light source. As they grow, they should remain short and round. If they begin to grow tall and skinny, they are not receiving enough light and should be moved closer to the light source.

It will take a little trial and error to find the optimal light position depending on the power of your grow light. I recommend using 5000k to 6500k Daylight lights. LED strip lights work well and

only need to be placed a foot or so away from the container. I zip tie them to the shelves of a plastic shelving unit. More powerful lights will need to be placed further away. As the seedlings grow, they can be moved closer and closer to the light. But keep an eye on them to make sure they do not burn. The lights should be set to a cycle of 16 hours on and 8 hours off using a digital timer.

Temperature

The best germination rates will be achieved if the temperature fluctuates from warm during the day to cooler at night. This replicates the natural conditions of the desert where these cacti grow. While the lights are on the temperature should reach above 80F to a max of 90F. While the lights are off the temperature should dip down below 80F. A good cold shock is needed so try to get the temperature down between 70F and 60F. A heat mat can be used to increase temperature while the lights are on. If this temperature fluctuation can not be achieved, try to keep the temperature at a constant 80F.

After the seeds have germinated, the temperature of the grow space should remain around 80F. Lower temperatures will cause the seedlings to grow more slowly while warmer temperatures may encourage things like fungus and mold to grow. A good piece of equipment to have is a thermometer/hygrometer. The hygrometer will come in handy for monitoring humidity once the seedlings are hardened off.

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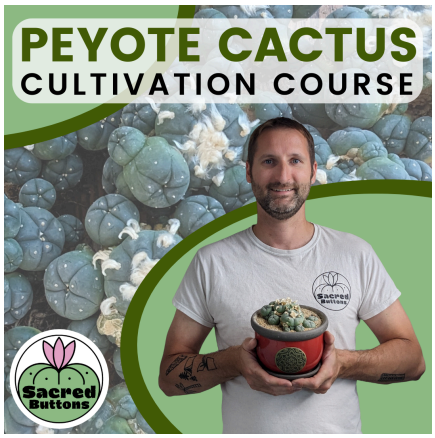

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