Growing Cannabis under the Texas Sun

Wise Green Herb

Preface

The Lone Star State has a rich history of trailblazers, homesteaders, and pioneers of industry. From Kosmos Spoetzl, a Bavarian who created Shiner brewing company in 1909 and introduced his hoppy malted-barley brew to Charles Alderton's 1880 creation of Dr. Pepper, a world famous fizzy soda that has 23 distinct flavors that Texans crave. This book isn't about the history of ranchers and old oil money that has created the beautiful state of Texas but rather a fairly new crop that has the ability to heal and create new economic opportunities in the rural areas of Texas through flower, oil, seed, and textile production.

Cannabis has an allure that is often misunderstood. It is an ancient plant that has the ability to attract humans to cultivate, propagate, and utilize for medicine on a widespread scale. It is rewarding to cultivate throughout it's short lifecycle. From germination to harvest you will experience the full reward this plant offers after you complete the challenging grow process? This plant is a labor of love, and requires diligent, intensive, work and a great deal of care to create the best plants and most rewarding process. What you put in to your plants you get out of your plants.

Although cannabis cultivation is difficult at times, that doesn't mean it should not be attempted. Growing plants that you nourish and they nourish you back changes your perspective on your place in the world and what you focus on. Many people with no horticultural history have taken to challenging themselves and the cultivation of this plant. This plant can be addictive to grow. This novice grow guide can be used to establish your foundation in growing organic, healthy, rewarding cannabis plants while making the overall process much more simple to grasp.

Species of Cannabis

Cannabis is one of the only annual plants to have two different sexes. This means that plants can come in both male and female varieties, and even occasionally hermaphroditic varieties in which the plant features both male and female reproductive organs.

What Causes Hermaphroditism?

There are a number of different causes of hermaphroditism in cannabis plants. These include:

• *Genetics*

Sometimes, cannabis plants can inherit hermaphroditic genes. This can occur naturally or as a result of breeding, the stress of which can introduce hermaphroditism into a strain.

• *Seed manipulation*

The poor handling and manipulation of seeds can also increase the chances of a plant being hermaphroditic. This can include feminization, an unnatural process used by seedbanks and breeders to guarantee a high percentage of female plants in their seeds. Done correctly, feminization will only produce female plants. Done poorly, some hermaphrodites can occur.

• *Stress*

Plants naturally seek out environmental conditions that allow them to grow healthy and strong. When those conditions aren't met, they suffer from stress. For cannabis, this stress can push a plant to become her WHAT KIND OF STRESS CAN CAUSE CANNABIS PLANTS TO BECOME HERMAPHRODITIC?

There are many ways to stress cannabis plants. These include:

• *Temperature and humidity*

Cannabis plants naturally like temperatures of around 20–30°C and relative humidity of 40–70%. If the temperature or humidity of your grow room is too far out of these ranges, this can be enough to turn your plants into hermaphrodites.

• *Lighting*

As you probably know, lighting is super important for cannabis plants. If your plants are too close to their light source, or your lighting schedules are all over the place, this can also stress your plants. Light leakage during dark periods is also a big stressor and should be addressed immediately.

• *Nutrients*

Cannabis plants need the right nutrients to produce great bud. Over/underfeeding can stress your plants, affecting their ability to develop properly and potentially increasing the risk of becoming hermaphroditic.

• *pH*

Using a growing medium that is too acidic or alkaline is another big stressor for cannabis to express hermaphroditic qualities

Growing Cannabis

After going through the process of vetting out your trusted seed provider, reviewed their certificates of analysis, and identified the cannabinoids you want to grow and express it is time to get growing. You will have to begin your cannabis growing journey by deciding if you want to grow for (INSERT MOLECULES AND CANNABINOIDS).

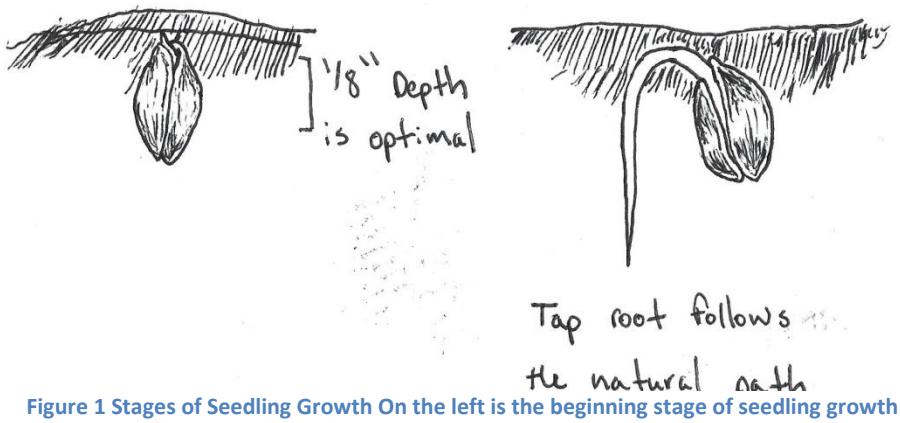

Figure 1 Stages of Seedling Growth On the left is the beginning stage of seedling growth when the seed has received the appropriate amount of water, pressure, air, and darkness. On the left you can see the tap root following the natural path of bending to stabilize the emerging cotyledons. (Hemp Cultivation and Science 2020).

Germination

Germination is a crucial step that determines the trajectory of the whole plants lifecycle, health, yield, and cannabinoid production. This step needs to be closely monitored due to its importance. During germination moisture, heat, air, and pressure active hormones within the durable outer coating of the seeds. When ideal conditions are created, seeds outer protective coating will crack and the root tip (observed as a small white sprout) will push its way downward through gravitropic force into the medium in which it is planted. Next, the first leaves called cotyledons or seed leaves, will emerge out from within the cracked shell as they search upward in search of light bursting through the 1/8” planting depth.

Pictured above, germinated hemp seed at Texas Hemp Cultivators. Pictured right, the seedling bay in Texas Hemp Cultivators greenhouse.

The seedling has all the nutrients needed for the first 2-4 weeks of life. Cannabis seeds only need water,

heat, darkness, pressure, and air to germinate. They do not need any extra fertilizer, hormones, or light. Everything the plant needs during the seedling stage is contained inside the seed. Fertilizer will be required after the seedling stage is complete.

Figure 2 Incorrect seed orientation during germination. This wastes plants valuable starting resources and energy causing problems from the start of the plants life.

Depending on your source of seeds and if you committed to purchasing feminized seeds will determine if you need to cull your plants as they develop. We will touch more on this in a later chapter in the book. Note that seeds stored too long under unfavorable conditions will germinate slowly and have a higher chance of failure. Properly germinated seeds (vigorous, mature, and under a year old) will sprout in 2-7 days. After all of your plants have germinated you will want to determine what plants are the healthiest and most developed, you will want to remove any underdeveloped or poor performing plants, they will not need to be in your growing system any longer and must be treated as compost. Bad technique and a slew of misinformation is often used in cannabis seed sprouting. The information presented to you above has been used for a commercial organic cannabis farm and has been found to be the most successful way to germinate seed for a solid crop start.

3 A emerging seedling at Texas Hemp Cultivators

Seedling Stage 4-3-4

Once your seed sprouts, orients itself properly in the grow medium, and develops its first two leaves called the cotyledon or “seedling leaves” you will want to closely monitor the moisture, air, and temperature of the plants to ensure proper growth. Monitor the N, Ca, K levels at this point for healthy development.

4 A rooted seedling in its vegetative stage

Vegetative Stage 5-2-3

This stage demands the highest nitrogen exposure to the plants. Think of this stage as the shaping and vertical growth of the plants top node and root system. The higher N content allows for stem, node structure, and fan leaf growth to prepare for flower development. Monitor the N, S, Ca levels closely at this point for healthy branch and root growth.

Flowering Stage 2-5-3

The reason you are growing the plant. The phosphorus levels are at the highest levels and the nitrogen is at its lowest. The uptake of both phosphorus and potassium are higher as the flowers bloom, harden, and resin begins to form. Monitor the P, K, and S levels closely in your solution at this point for resin production and finishing.

Weekly Schedule

Stage Name	Nitrogen N (ppm)	Phosphorus P (ppm)	Potassium K (ppm)	Calcium Ca (ppm)	Magnesium Mg (ppm)	Sulfur S (ppm)
First 2 weeks - Seedling	80-100	40	140	70	50	20
Vegetative – High N	300-350	60	215	150-300	60	150-250
Flowering – Low N	100-110	70	200	300	60	250

Week 1 Vegetative - Seedling

Light Quantity Percentage (LQ%)	50
Light Distance (Inches 400 Watt lamp)	40
Light Duration (Photoperiod Hours)	18
Temperature Day/Night (TD/TN degrees Fahrenheit)	73.4ºF / 64.4ºF (23ºC/18ºC)
Humidity Level (RH%)	80%
pH Level Soil (pHS)	6.0-6.5
Nutrient solution (TDS/EC)	NONE
Watering Schedule (mL)	250 mL per plant, every other day

Cannabis needs to get used to the light during the first week of growth. They will need enough water and more white/blue light to stimulate growth. You will water heavy initially and wait until they have used all the water. The humidity levels will need to be relatively high. You will not need to utilize fertilizer because it will be present in your seedling soil and the seed has enough nutrients to make it 14 days (note and observe yellowing, that may indicate the need of fertilization). The pH level should also be closely monitored, kept between 6.0 and 6.5.

Week 2 Vegetative

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	20
Light Duration (Photoperiod Hours)	18
Temperature Day/Night (TD/TN degrees Fahrenheit)	77ºF / 64.4ºF (23ºC/18ºC)
Humidity Level (RH%)	70%
pH Level Soil (pHS)	6.2
Nutrient solution (TDS/EC)	500/1.0
Watering Schedule (mL)	500 mL per plant, every other day

The light intensity needs to increase to full capacity and increase the distance to 1.6’ but ensure the heat doesn’t become too harsh for the seedlings. At this point you will want to drench water your plants from below. They will begin to search for water

5 Applying Rove Beetles during early vegetative growth

Week 3 Flowering

Light Quantity Percentage (LQ%)	50
Light Distance (Inches 400 Watt lamp)	20
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	77ºF / 65ºF (23ºC/18ºC)
Humidity Level (RH%)	60%
pH Level Soil (pHS)	6.2
Nutrient solution (TDS/EC)	600/1.2
Watering Schedule (mL)	1000 mL per plant, every other day

A blackout period of 12 hours followed by a 100% light period when the phase shift from vegetative to flowering growth occurs. The plant will quadruple in size after this period is complete. Most of the plants vertical growth is obtained during this first week of flowering. The lighting must be moved as the canopy growth expands upwards. The idea is to keep the lights as close as possible to the plants without causing any stress or burning on the sprawling foliage.

Week 4 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	60%
pH Level Soil (pHS)	6.2
Nutrient solution (TDS/EC)	650/1.3
Watering Schedule (mL)	2000 mL per plant, every other day

This is an ideal time for determining the aggressive traits that are desired in plants, such as wider node spacing and taller plants within that cultivar. These physiological traits may help you stabilize and identify strong genotypical expressions with your cultivar of choice. By closely following this week of growth you can create a stable of resilient plants that will become prized favorites for years to come.

6 An early flowering hemp plant. Notice the pistil formation in the top node.

Males will begin to express themselves depending on your source of genetics. They will develop pollen sacs that resemble green nodules at the base of stem nodes. Males tend to express themselves more readily and a week earlier than males, remove male plants or isolate them to create a stud program isolating and propagating the desired males pollen for pollination to a desired female from the same strain or a different cultivar entirely.

Week 5 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	60%
pH Level Soil (pHS)	6.0
Nutrient solution (TDS/EC)	700/1.3
Watering Schedule (mL)	2000 mL per plant, every other day

Water should maintain a pH of 6.5-6.8 and should increase from 2 liters per plant to 4 liters per plant upon each watering event. Female parts although later to develop than male plants, begin to display their swelling white pistils on the tips of the future colas. Single female flowers are brought together to form buds and the stigmas are completely formed. These two hairs originating from the pistils of the stigmas are quite protrusive and produce a pungent odor.

Week 6 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	50%
pH Level Soil (pHS)	6.0
Nutrient solution (TDS/EC)	700/1.5
Watering Schedule (mL)	2500 mL per plant, every other day

This week involves a crop walk to observe any signs of nutrient deficiencies, leaf abnormalities, and or phenotypical expressions. The phosphorus levels need to be increased with lower nitrogen and potassium levels. Week 3 Flowering a plain water rinse of a 6.5 pH water caused a flushing of nitrogen to prepare the living soil and the plant for a maximum uptake of phosphorus.

Week 7 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	50%
pH Level Soil (pHS)	6.0-6.2
Nutrient solution (TDS/EC)	800/1.6
Watering Schedule (mL)	2500 mL per plant, every other day

The plants will be drinking upwards of 3 liters of water daily in this phase. The production of leaves has slowed down significantly because of the low N levels and the high P stores are creating an enhanced flower and bud production. This enhanced flower production leads to daily swelling of buds and trichome formations that seem crystalline. Flush plants with water that is at a pH level of 6.5 at the end of the week.

7 A late flowering plant inside a Texas Hemp Cultivators greenhouse

Week 8 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	50%
pH Level Soil (pHS)	6.0-6.2
Nutrient solution (TDS/EC)	800/1.6
Watering Schedule (mL)	2500 mL per plant, every other day

You will want to have more potassium to help during this week of development. The buds are beginning to harden and need the extra K to do so. Increase the available potassium at this time with a soluble form of

potassium. The flowers become more pungent and almost 80% of fan leaves are now showing signs of yellowing. This is normal during this stage of flowering and bud development as the crystals now form on top of each other. If the red pistils are forming at 80% observed harvest time is near.

Week 9 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	40%
pH Level Soil (pHS)	6.2
Nutrient solution (TDS/EC)	750/1.5
Watering Schedule (mL)	2500 mL per plant, every other day

The buds will begin to swell in size and becoming more ripe and dense. The resin levels will be very high and a lot of “plumping” will be occurring. Allow the pistils to darken to brown and hold off on your harvest. Observe the trichomes formation and darkening. Flush plants with water that is at a pH level of 6.5 at the end of the week.

Week 10 Flowering

Light Quantity Percentage (LQ%)	100
Light Distance (Inches 400 Watt lamp)	Close as possible moving as the plants bloom
Light Duration (Photoperiod Hours)	12
Temperature Day/Night (TD/TN degrees Fahrenheit)	79ºF / 67ºF (26ºC/19ºC)
Humidity Level (RH%)	40%
pH Level Soil (pHS)	6.2
Nutrient solution (TDS/EC)	250/1.5
Watering Schedule (mL)	2500 mL per plant, every other day

Harvesting will occur this week. The pistils will be browning entirely and the trichomes will be amber hued. The plants will be drinking the least amount of water at this point. Lower the EC dramatically, so your plants won’t have the nutrients in them at the time of harvest. For the last few watering cycles, only give your plants pH 6.5 water absent nutrients.

8 A harvested plant from inside the greenhouse at Texas Hemp Cultivators