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TRAINING GUIDE

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Day by Day Cannabis Production Guide

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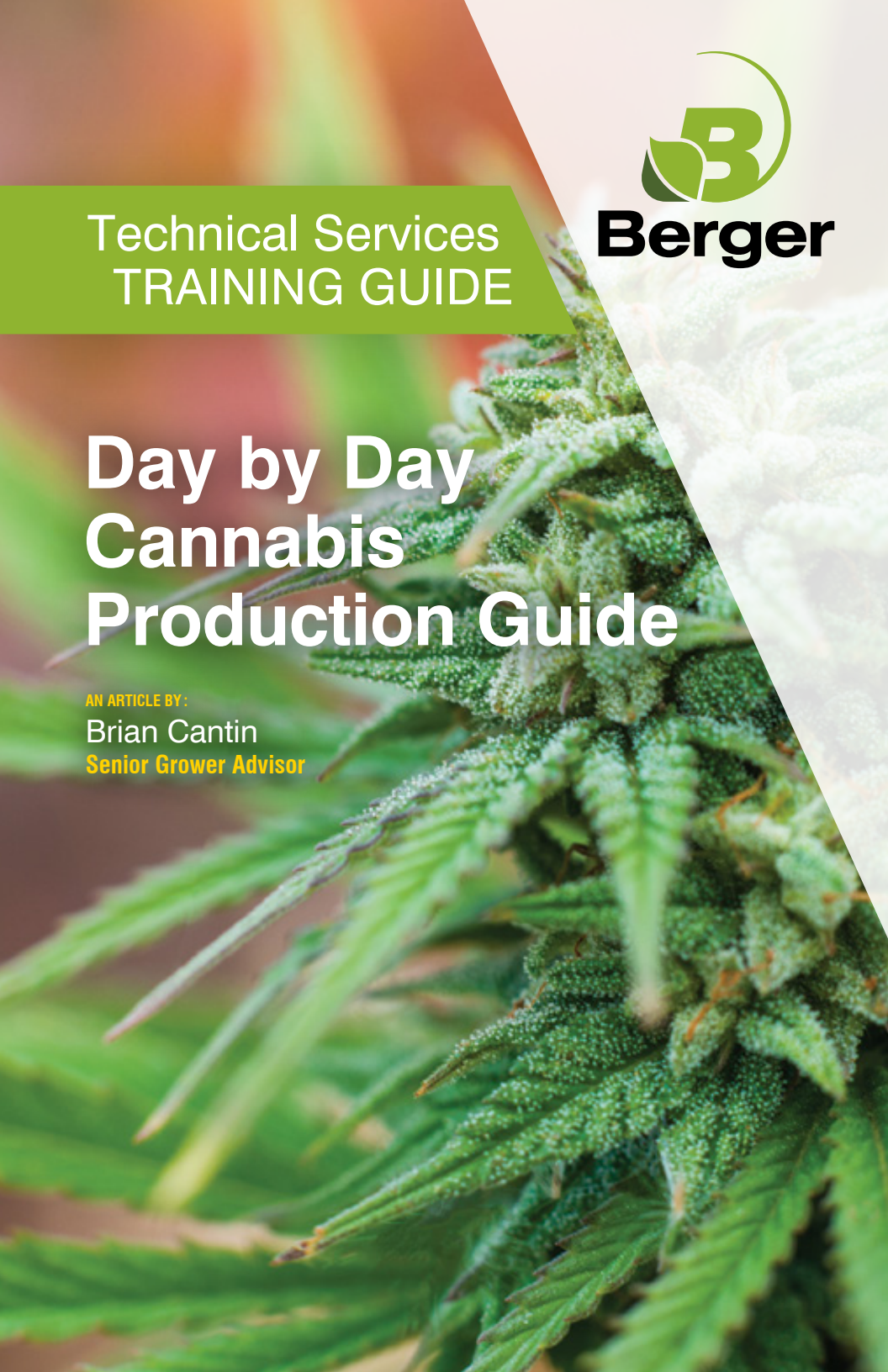

Your Expert

Brian Cantin graduated from the University of Guelph with a Honors Science Degree in Environmental Horticulture. He majored in Plant Physiology, with a minor in Plant Protection (plant pathology and plant entomology).

Subsequently, Mr. Cantin took on a greenhouse research position with the Brooks Horticultural Research centre in Brooks, Alberta. During his tenure, he continued post-graduate studies, majoring in soil sciences and substrates, at the University of Alberta and Texas A&M University.

After his studies, Mr. Cantin took a position with the R&D division of the Alberta Gas Trunk line. He collaborated with other associates to design and develop waste heat greenhouses that could harness the energy from pumping stations. Once greenhouses in Princess and Joffre Alberta were built, he continued to manage two waste heat projects.

Mr. Cantin was then hired by Yoder as Head Grower and Manager of Technical Support. While at Yoder, he conducted applied research, which eventually turned into a consulting business, Applied Techniques.

Today, Mr. Cantin is a grower advisor at Berger, transforming his vast background in horticulture into inestimable value for the company's customers. He helps customers to resolve their cultivation challenges and improve their growing practices. Mr. Cantin also ensures that all client trials are conducted with the highest of Berger's standards.

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Day by Day
Cannabis Production Guide

As the title indicates, this is only a guideline which can vary from day to day based on the strains grown, i.e. indica, sativa or hybrid strains. Not all strains and hybrids develop at the same pace. The day to day plant development and progression presented here, is more of an informative log as to what to look for as the plants respond to the environmental and cultural practises that you provide. Daily variances and overall days to harvest will be dictated by your greenhouse temperatures, the type of lamps and light quality you provide, the proximity of lamps to the plants, injecting CO_2, and the overall fertigation program. Even the substrate that you choose can affect the overall growth. The substrate should be able to hold sufficient moisture, provide sufficient drainage and supply a good reserve of nutrients in between watering.

1 Week N° 1 Vegetative Phase

All energy goes into germination, root establishment and seedling development. Maintain 18 hours of light and DT/NT of 75/65 °F (24/18°C). Too much heat can kill seedling, R.H. 80%, media pH 6.0-6.2, EC – no nutrients, rely on pre-charge. Apply CO_2 @1200 ppm only during 18 hours lighting period. CO_2 is heavier than air; utilize HAF fans to mix CO_2. Monitor media moisture; do not let young roots dry out. By day 7 be ready to adjust lamp height. Your choice of lamps for supplemental lighting will depend on what provisions you provide via exhaust and cooling systems to prevent blistering and scalding of leaves. HPS lamps produce heat while CFL is a cooler producing light system.

Day 1

Germination process is initiated and under normal conditions occurs within the 5-7 days.

Day 3

Optimal benefits of photosynthesis occur at **74 – 80 °F** (24-27 °C). Avoid temperatures below **65 °F** (18.5 °C) or above **80 °F** (29 °C). Too much heat can kill a seedling. Extreme changes in day and night temperatures can create moisture due to condensation on the leaves which is conducive to fungus and moulds.

Day 5

If germination has been successful and growing conditions have been good, a good percent of the seedlings are on their 3rd set of leaves.

Day 6-7

Young seedlings are establishing roots. Testing run-off water is a good way to measure pH of root environment. At this point in time, a pH of 6.5 is good. The young plants need water every couple of days; do not let young fragile roots “dry out”. Water judiciously, media should be moist but not soggy or saturated.

2 Week N° 2 Vegetative Phase

All energy goes into leaf unfolding and leaf expansion, and continuous root development. During this early phase, if there is a need to feed, give higher ratio of N and only modest amounts of P and K. Maintain DT/NT of 74/65 °F (24/18 °C), R.H. 80%, continue CO_2 fertigation, air movement and HPS or CLF lamps. Monitor soil moisture, larger containers may require ½ gallon of pH adjusted water. The use of pH buffered water is to prevent pH drift and keeps media pH on track.

Day 8 & 9

The young plants have survived germination and the seedling stage has now come to an end. The two to three sets of leaves that have unfolded during day four to five have been growing steadily and expanding their leaf surface under good light conditions.

Day 10

Many of the plants will have 4-5 nodes under a photoperiod of 18 hours of light, 6 hours of dark. Ideally the young cannabis plant only needs 16 hours. of lighting during the vegetative stage. Maintain temperatures of **69 -75 °F** (21-24 °C). Do not keep media too wet; excess moisture around the stem can lead to stem rot at this young stage

Day 11 - 14

Visually observe plant at this early stage for any signs of stress and nutrient deficiencies. A healthy plant remains green through the early growth. The onset of early nutrient stress is often caused by pH levels that are falling outside the range that cannabis prefer, i.e. 5.9 -6.5 Continue to maintain optimal temperatures of **70-80 °F** (21-27 °C) to encourage fast growth and reduce the risk of moulds and mildew. By day 14, plant will begin to grow at a dramatic pace.

Week N° 3
Flowering Phase

Maintain media pH of 6.0-6.2, E.C. of 1.2 mmhos/cm, R.H. 70%, DT/NT of 77/65 °F (25/18 °C). Continue CO_2, HPS or CFL supplemental lighting and promote air movement via fans. Keep lamps as close as possible to plants without overheating and burning leaves. Still maintain higher dose of N since young plants still have to put on mass and size. Be prepared to water at least 2 liters of water if necessary. Duration of watering should allow 10-20% leaching out the bottom of the container to reduce the build-up of salts, especially if feeding additional nutrients.

Day 14

By the end of day 13, the photoperiod now switches to 12 hours of uninterrupted blackout followed by 12 hours of daylight for the rest of the production cycle. Check for any light leakage during the blackout period. The number of nodes on a plant at the start of the flower bud initiation will reflect plant maturity at the onset of the reproductive stage. The young plants by day 13-14 should have an average of 4-6 primary nodes originating from the main leaf axils of the plant.

Day 15

Observe a change in the growth pattern, each new set of fan shaped leaves will be larger than the previous set. Under optimal conditions, new growth should always be bigger. If new growth appears weak and smaller than the previous set, this can be an indicator that a problem may exist such as overwatering, improper media pH and or over feeding.

Day 16-17

Air movement through the plant as the leaf and foliage canopy gets thick is very beneficial. The growth rate is at its peak and plants will continue at this very rapid rate until the third or fourth week of flowering. During this rapid growth phase, water requirements, room temperature and airflow should be monitored. Leaves should be dark green, brown tips may be an expression of nutrient overdose “Nute-burn”.

Day 18

Forcing a plant out of its vegetative growth as early as day 14 is by design. The vegetative stage of Medical marijuana production in a greenhouse facility unlike cannabis plants grown under natural outdoor conditions has a very short vegetative stage i.e. 14 -16 days under long days. Forcing the plant into its flowering stage early helps to control excessive vegetative growth and produce a shorter open plant where light is able to penetrate beyond the top canopy, and expose developing buds to quality light for heavier bud and yield production.

Day 19 - 21

On a 12/12 light/ darkness cycle, a plant will quadruple in size. Most of its vertical growth occurs in the first 2-3 weeks after the onset of a 12/12 light regime. As plants grow, adjustments of lights above the plant should be checked daily. The main objective is to keep light as close as to the plants without burning foliage. One has to remember that HPS lamps give off a great deal of heat.

Week N° 4
Flowering Phase

Maintain media pH 6.0-6.2, media and/or leachate E.C. of 1.3 mmhos/cm, R.H 70%, DT/NT of 78/65 °F (26/18 °C). Remain on high N feed regime. Vigorous growth, substantial leaf surface area and a high transpiration rate under HPS lamps will necessitate up to ¾ - 1 gallon of water. There is a big difference between drying down and drying out the media. Monitor moisture frequently. Continue CO_2 application and utilize air circulation and gentle air movement to scrub the leaves in an effort to cool down the leaves heated by the close proximity of the lamps.

Day 22-25

Depending on the strains of cannabis being grown, as early as day 20, look for potential male plants that demonstrate aggressive traits such as wider spacing between nodes and or taller plants within the same strain. Male plants develop pollen sacs that resemble little round green nodules at the base of the nodes. Diligent surveillance during these 4-5 day period is important since male plants usually show their sex before the female plants. Remove male plants as soon as they are identified to prevent future pollination of female flowers. The location of the lamps as close to the top of the plant canopy has now produced a short compact chassis with a head diameter of 16 inches, a plant that is totally receptive to light penetrating through and down to the bud supporting branches.

Day 25 - 28

As early as day 25, some cultivars of cannabis may display white hairs (pistils) at the axis of new stems originating from the main stem of the plant indicating a female plant. Only female plants produce sensimilla (seedless marijuana) buds that have not been fertilized. Female plants are normally shorter than male plants. Short stout growth is common among female plants. Collecting vegetative cuttings for cloning make be taken at this time. Target lower branches that do not get quality light since it will not greatly affect overall yield. Clones are exact duplicates therefore taking cuttings from a female plant insures that the clones will be female.

5 Week N° 5 Flowering Phase

Maintain media pH 6.0-6.2, media E.C. and/or leachate of 1.4 mmhos/cm, R.H. 60%, DT/NT of 78/65 °F (26/18 °C). Maintain high N, moderate P and K feed regime. Monitor E.C. of media or leachate of runoff to decide whether to supplement additional nutrient or plain water that has been pH adjusted. Continue with CO_2 enrichment at 1200 – 1300 ppm.

Day 29 - 31

By this stage of growth, water consumption is at least 3-4 liters of pH adjusted water at 6.5-6.8. Stem thickness should be at least ½ inch (1.5 cm). Vertical growth literally stops three weeks after the 12/12 photoperiod regime was initiated so it is safe to say that the plant is done stretching. Female plants are now beginning to swell, tips of branches are bunching together and white pistils are abundant and quite visible to the eye. The future cola of the marijuana plant actually consists of different parts that now coming together to develop bud sites. Single female flowers are brought together to form buds. On the female flowers, stigmas are now formed in which pollination would occur if allowed to be fertilized by male plants. The white stigmas are now abundant and quite visible and producing a pungent odour. These minute stigmas are two hairs which originate in pistils.

Day 32-35

All branches including top stems should be pure green. Growth should be vigorous and explosive at every node which will transfer into heavy yields. Foliage now extremely dense on short stocky internodes that produces a dense top canopy that obscures any lower stalks.

6 Week N° 6 Flowering Phase

Maintain media pH 6.0-6.2, media E.C. and/or leachate of 1.5 mmhos/cm, R.H. 50%, DT/NT of 80/65 F° (27/18 C°). Walk crop and check for any visible signs of nutrient deficiencies and or other leaf abnormalities. Continue to apply CO_2 and change nutrient regime to target high P and low N&K. A plain water rinse with buffered pH was applied near the end of week 3 flowering stage to flush out N and prepare the plant for maximum uptake of P. Maintain the lamps as close to the plants as possible without scalding from the heat of the lamps.

Day 36 - 42

The main cola can have as many as 20 pistils. It is this main cola that will produce the largest buds. Watch for brown leaf scalding/blistering across leaf surface which may be due to heat from lights. A couple of burned leaves do not warrant repositioning the light fixtures too high above the canopy. Monitor water uptake and dry down and be prepared to apply another ¾ – 1 gallon of water pH adjusted to 6.5 -6.8. Please note that the frequency of watering is dependent on plant size, temperature, air movement and container substrate. As temperatures rise above **80 °F**, a plant may need twice as many watering's as it would at temperatures as low as **70 °F**. Lower leaves are starting to turn yellow and brown. Plant has no need to sustain these leaves as it flowers.

7 Week N° 7 Flowering Phase

Maintain media pH 6.0- 6.2, media and/or leachate E.C. of 1.6 mmhos/cm, R.H. 50%, DT/NT of 80/65 °F (27/18 °C). Continue to feed high phosphorous. Production of leaves has now slowed down due to a good leaching rinse during the previous week which has created a low status of N in the media and a high reserve of P to enhance flower production. Monitor dry down of media to stay on top of water demand by the plant. Provide optimal conditions i.e. good air circulation, lamps close to the plants, optimal day time temperatures all are conducive to transpiration and rapid water loss. Under these conditions a plant can take up ¾ – 1 gallon of water.

Day 43 - 49

Buds continue to swell daily. Crystal is starting to appear on plants and will be abundant by day 48. These crystals are actually trichrome, tiny crystal-like hairs that cover the buds and contain anywhere from 25-30% THC of dry weight at harvest time. Odour produced by buds is much more obvious and more potent when plants are disturbed. Maintain lights as close as possible to the plants without causing too much scalding or blistering due to high heat produced by the lamps. As much as 75-80% of fan leaves now show signs of yellowing which is typical at this stage of flowering and bud development. Crystals now forming on top of each other.

8 Week Nº 8 Flowering Phase

Maintain media pH 6.0-6.2, media and/or leachate E.C. 1.7 mmhos/cm, R.H. 50%, DT/NT of 80/65 F° (27/18 C°). If monitoring pH and EC, make a decision to stabilize EC and pH levels by either supplementing nutrients and or rinsing with buffered pH water. The plant's water uptake is basically ¾ – 1 gallon as the plant is expending a lot of energy under optimal growing conditions.

Day 50 - 52

Water another ¾ – 1 gallon of pH adjusted water at 6.5-6.8. Plants are now into several weeks of intense flower production where lower leaves below the buds are turning yellow. Begin to remove these leaves for better light penetration, better air flow and to reduce any incidence of moulds and fungus. Swollen buds on each node starting to bunch up creating a cola of buds. If lamps can be repositioned, direct the lamp towards the perimeter of the plants to increase secondary cola production. Main cola is straight and is filled out completely under ideal conditions possessing lots of hair stigmas and heavy crystallization.

Day 53-56

The large heavy colas are a result of adequate HPS lighting. If cultural practises have gone as scheduled, dense heavy colas on both main and secondary stems are quite evident. Buds have nearly reached full size. Most noticeable change in buds between now and harvest time will be the change in pistil colour from white to reddish brown. This colour change is normal and what is to be expected as the flowering stage comes to an end.

9 Week Nº 9 Flowering Phase

Maintain media pH 6.0-6.2, media and/or leachate E.C. 1.6, R.H. 40%, DT/NT 82/65 F° (28/18 C°). Plants still require N and P but now in low amounts, the nutrient regime now focuses on potassium. Watch temperatures closely to avoid any daytime temperatures above 85 F° (29.5 C°). Test media or leachate for E.C. in preparation for a flush prior to harvest.

Day 57- 63

More pistils are turning reddish brown day by day. Please note that too high of a temperature within the plants can increase water consumption due to a rapid water loss through the leaves, creating potential bud loss due to bud dehydration. Utilizing circulating fans to generate air movement and cool the leaf surface, can help to reduce bud damage. Continue deleafing and removal of dead brown leaves to open the plant, allow deeper light penetration and create more air movement throughout the plant. Try to maintain house temperature below **85 F°** preferably **80 F°** if possible. Good air flow and ventilation is beneficial on hot days.

10 Week Nº 10 Flowering Phase

Maintain media pH 6.0 -6.2, media and/or leachate E.C. 1.5 mmhos/cm, R.H. 40%, DT/NT of 82/65 F° (28/18 C°). Continue to water with pH buffered water, any nutrient supplements may be too late if nutrient deficiencies have gone unnoticed.

Day 64-70

CO_2 still is applied during daylight hours @1000-1300ppm. Depending on the strains being grown, up to 40% of hairs have now turned reddish brown. The colas are now producing a very pungent identifiable odour and colas are very sticky to touch. Optimized growing conditions have produced one main cola and 4-5 secondary colas.

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It is now important to flush i.e. to reduce EC during the final one or two irrigations, give the plants plain water. Direction and proximity of lamps overhead in contrast to side lighting will mature the main cola first. Sometimes plants will be harvested over a period of time as secondary colas ripen after the main cola. CO_2 is now turned off. The plant will be weaned off of water day by day.

Day 71 - 60% of hairs have changed colour to reddish brown on every cola. Under magnification, glands called trichomes are standing erect, filled with resin that changes from clear to amber or milky white. It is these glands found on both leaves and buds that contain THC. The transformation of the resin from clear to milky white is a sign that harvest will be occurring in the days to come.

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