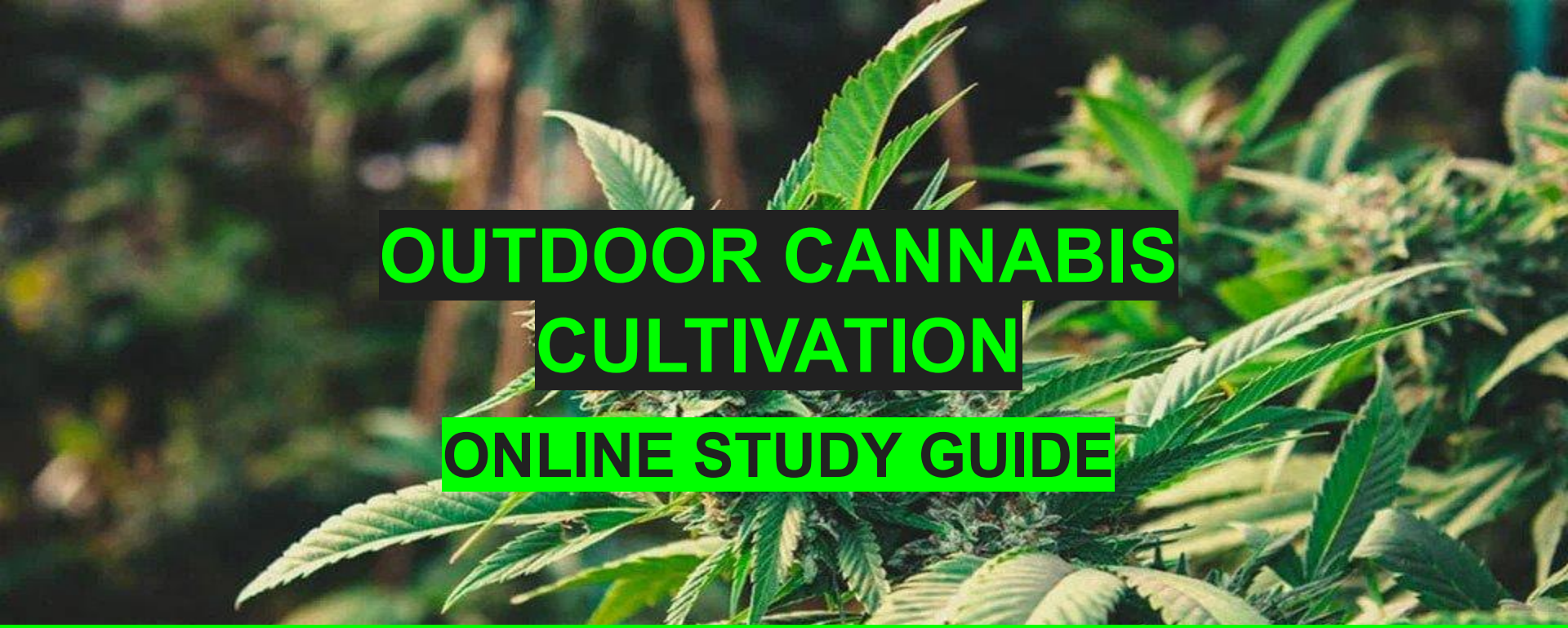

OUTDOOR CANNABIS CULTIVATION

ONLINE STUDY GUIDE

COMPILED BY

THECANNACLUB

IN PARTNERSHIP WITH

CHEEBA CANNABIS ACADEMY

welcome

Welcome to our free Theoretical Workshop! We are excited to offer this workshop as a way to help you expand your knowledge and skills. Our goal is to provide you with high-quality educational content that is accessible to anyone who wants to learn. Whether you're a student, a professional, or just someone who is curious about growing Cannabis, this course is for you. Throughout this course, you will learn about a variety of topics related to outdoor Cannabis cultivation. This course is compiled of various online articles to which you can find references to at the end of each section, we recommend you utilize these resources to further expand your knowledge. We give tribute towards all the original content creators featured in this workshop.

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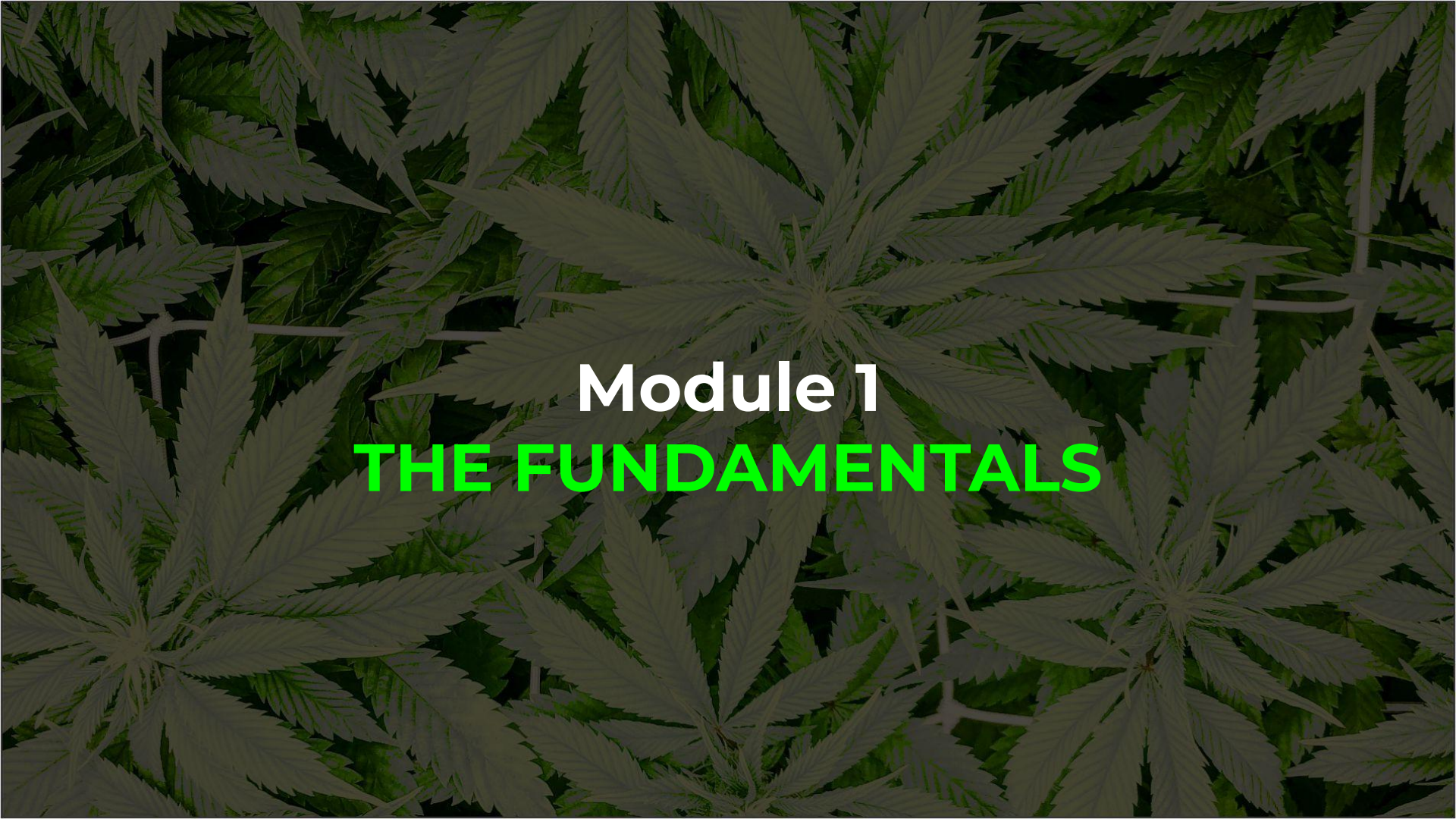

Module 1
THE FUNDAMENTALS

Genetics

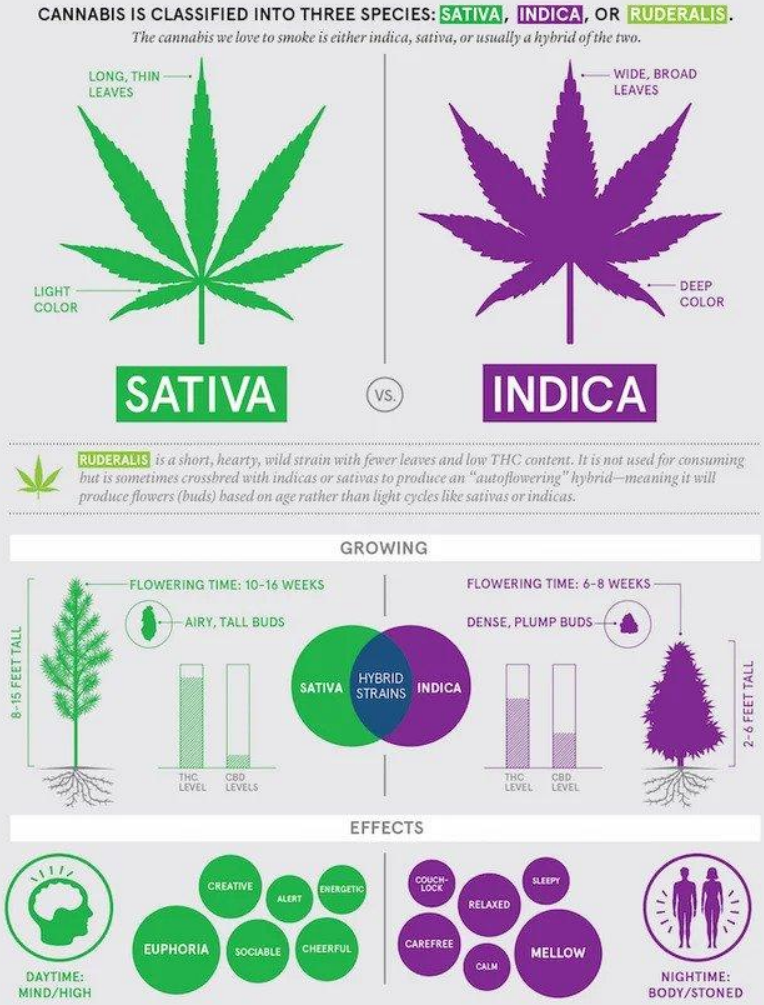
Cannabis is the genus of three species of flowering plants:
Sativa and **Indica** and ***ruderalis***

Female cannabis plants contain flowers which contain a percentage of cannabinoids and hold both medicinal and psychoactive properties. There are 488 chemical entities, and at least 66 are cannabinoid compounds. THC and CBD are not the only medicinally active compounds found in cannabis.

Sativa plant grows taller, are lighter in color. The plant takes longer to flower and produces more cerebral effects. This plant is the largest of the three families.

Indica plants are shorter, bushier and produce sedative physical effects.

Ruderalis is a low-THC species of Ruderalis Cannabis. Very small plant and fast growing. (Autoflowering)



Sativa

Tall in stature

Narrow leaves

- Longer flowering cycles
- Better suited for warm climates with a long season

Indica

Shorter in stature

Broad leaves

- Shorter flowering cycles
- Suitable for colder climates with a shorter season

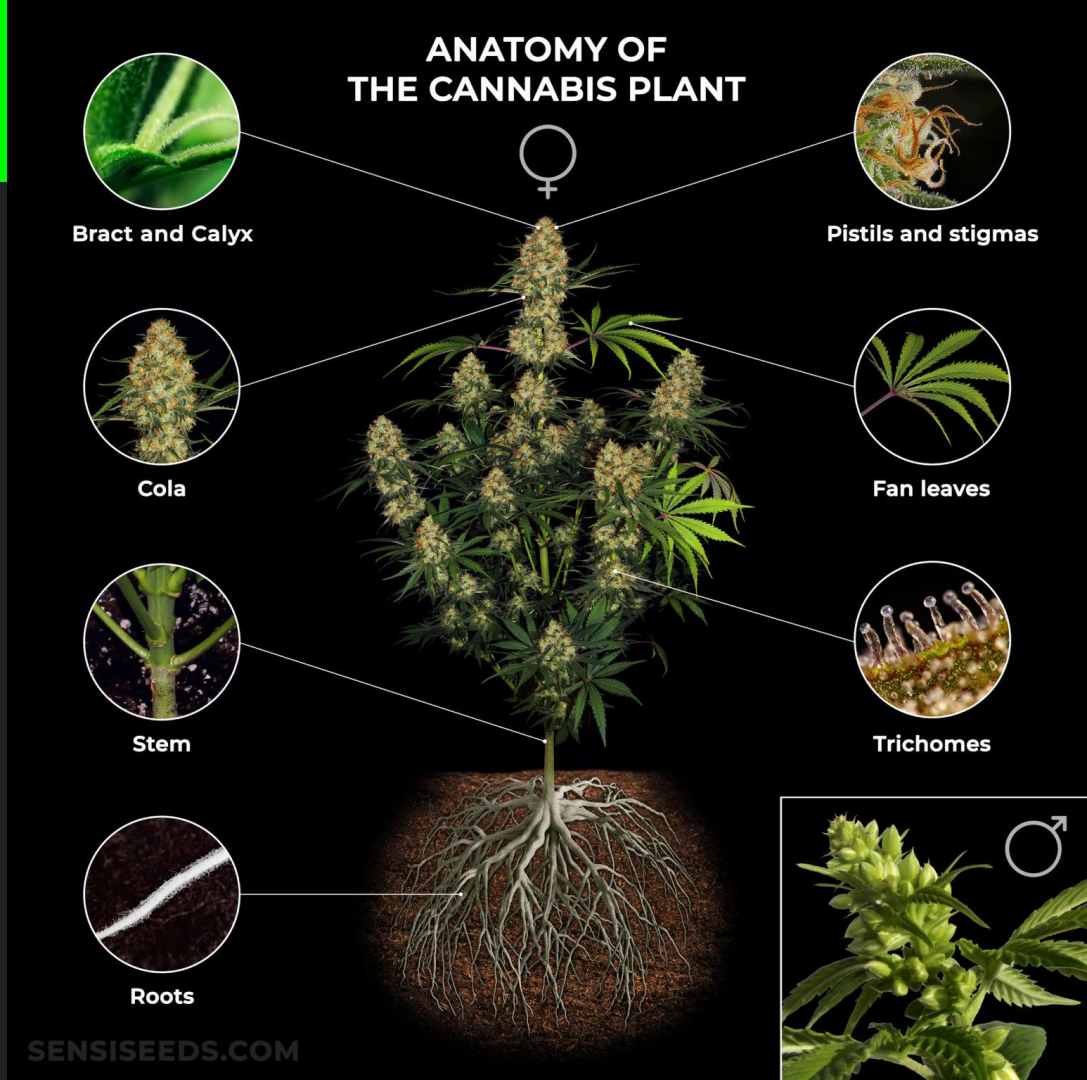
Anatomy

Although **most cannabis plants are grown for their buds or flowers,** there are more parts that make the cannabis plant what it is. What are the different parts of the cannabis plant and their functions, and what makes the anatomy of the cannabis plant?

In nature, cannabis plants are **annual flowering plants.** This means that they complete their life cycle, from germination to seed production, in one year.

Cannabis is usually a dioecious plant, which means that the plants can be either female or male. However, sometimes monoecious plants occur, often called hermaphrodites, because they have male and female parts.

Most people who are not cannabis growers are only familiar with two parts of the cannabis plant – the buds (or flowers) and the iconic leaves. But cannabis, like all other plants, consists of many more botanical elements.



Seed

Cannabis seeds are both the beginning and the end of the cannabis plant's life cycle. **Naturally, cannabis plants start from seed and end their life cycle when the plant has produced fully mature seeds.**

The embryo consists of an embryonic root, also called a radicle, an embryonic shoot and two cotyledons. The embryonic root first forms the main root, called the taproot, from which the root ball branches and forms.

The embryonic shoot also called the shoot tip, forms the stem of the cannabis plant. And the small cotyledons are the ones that photosynthesise and provide the nutrients for the seedling to grow.

Cannabis plants grown from seed grow faster, are stronger, produce a higher yield, and have better quality than plants grown from clones or tissue culture.

Cotyledons

The cotyledons are the first parts of the cannabis plant to appear above ground. As they already contain chlorophyll, they synthesise CO2, water and sunlight into sugars and nutrients that the young seedling needs to grow.

The cotyledons usually come in pairs, but it is not uncommon for an extra third leaf. Unlike all the other leaves, they are not serrated. After they have grown a little, a pair of true leaves appear in the middle.

As soon as the plant has used up all the stored nutrients in the cotyledons, they change colour and fall off.

Roots

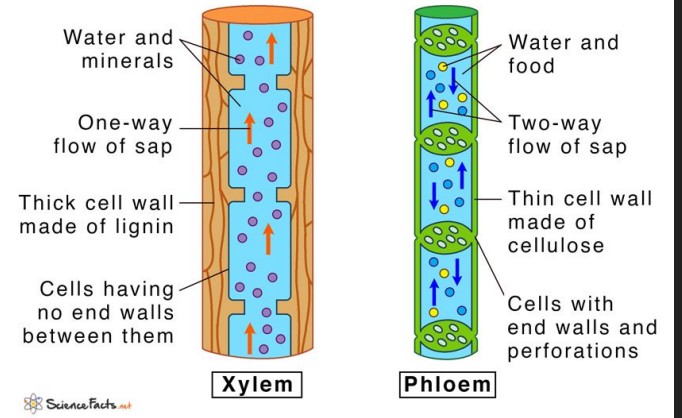
Although the above-ground parts get most of the attention and admiration, the roots are the **most important part of the cannabis plant.** Not only do they provide anchorage and stability for the plant, but they also **provide nourishment for the entire plant**.

The two most essential **functions of the roots are to supply the plant with water, nutrients, and oxygen and to transport the sugar stored in the leaves into the rhizosphere.**

Once the sugar has been transported into the soil, bacteria and other beneficial organisms such as fungi and worms will convert this sugar into usable food for the plant.

Stem

Xylem and Phloem



The stem or main stalk connects the roots and other parts of the plant. The main components of the stem are inside it and form the vascular system, which consists of the xylem and phloem.

The xylem is responsible for transporting water, minerals, and nutrients from the roots to the leaves, branches, and buds.

The phloem transports sugars, proteins and other organic compounds produced during photosynthesis to the roots and other parts of the plant.

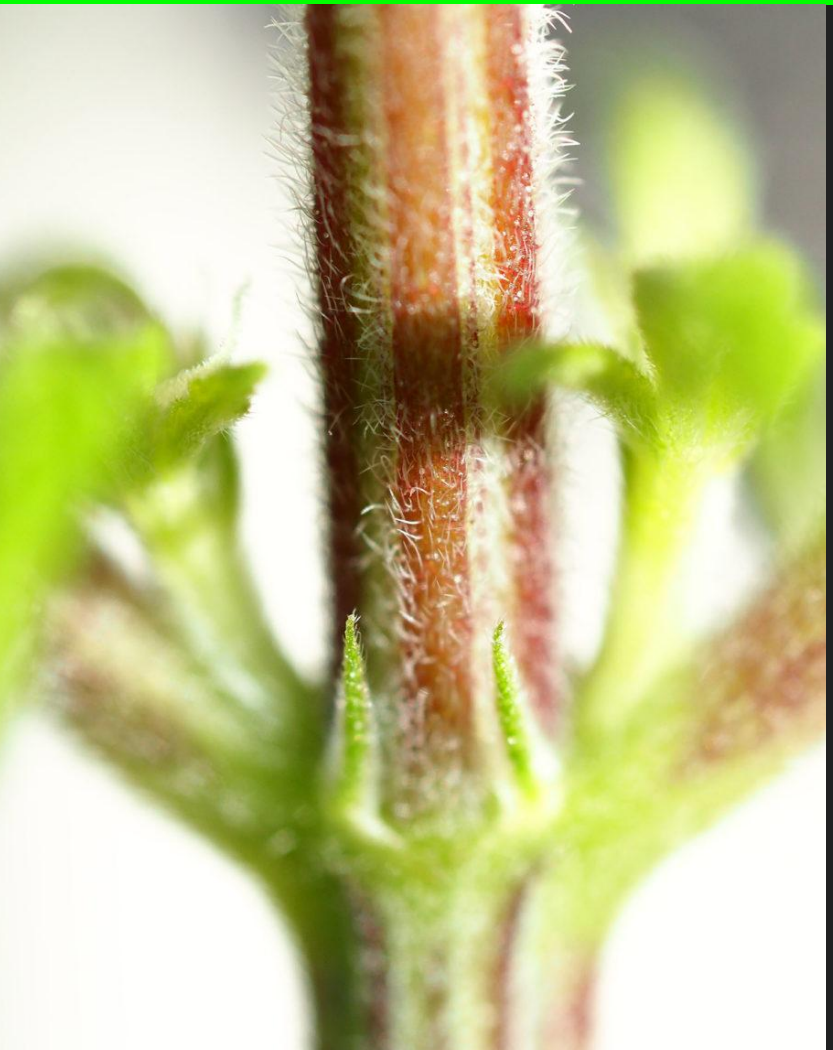
The function of the stem is to give the plant structure and stability. As it grows, it becomes thicker and more elongated.

Nodes and Internodes

Nodes are **where the branches or stalks of the leaves extend from the stem and other branches.**

Internodes or internode distances are simply the distances between the individual nodes.

The spacing between nodes is primarily genetic. Indica-dominant plants tend to have narrower nodes, while sativa-dominant plants tend to have larger internodes.



Stipule

Stipules appear at the nodes, usually in pairs, but they can also grow singly. **They look like tiny, thin leaves or daggers and can often be mistaken for pistils and signs of pre-blooming.**

The exact role of stipules in cannabis is unknown, although some botanists believe their role is to protect young, newly formed leaves. In other plants, the stipules typically grow into thorns.

Branches

Together with the stem, the branches form the structure of the whole plant. They are covered with leaves and later with flowers and form a dense canopy.

Stems and branches consist mainly of plant cellulose and calcium. The branches also contain xylem, which **transports food and nutrients from the roots via the main stem to the leaves and flowers.**

Leaves

The iconic serrated leaves of cannabis are the best-known parts of the cannabis plant. **Their main function is to photosynthesise and store sugar or food for the plant.** ***Think of them as organic solar panels that supply the entire plant with energy.***

The leaves of the cannabis plant are ***palmate or digitate***, which means they are divided into finger-like lobes that extend from the base of the leaf. The edges are often serrated, and the leaves typically grow in alternating opposite pairs.

Fan Leaves

Although the first pair of true leaves has only one lobe or blade, they have characteristic serrated margins and a pointed tip. With each new node that grows, the number of leaflets or leaf blades increases until they reach their maximum

Fan leaves are typically the largest part of the cannabis plant. ***They do not contain many cannabinoids or terpenes and are not covered with trichomes like sugar leaves.*** But fan leaves are an essential part of any cannabis plant

Their **main function is to store water, capture sunlight and produce food through photosynthesis.** They are also a **good indicator of the plant's health**. **Any nutrient deficiencies, drought or overwatering, pest infestation or signs of disease or stress will show up first on the leaves.**

Signs of discolouration, wilting or mechanical damage to the leaves indicate something is wrong with the plant. Keep a close eye on the leaves to ensure your plant's health.

The stomata are located on the underside of the leaves. Their job is to ensure the exchange of water vapour, oxygen, and carbon dioxide between the environment and the plant.

Sugar Leaves

Sugar leaves is a name for the **leaves that grow from the cannabis flowers.** They get their name from the trichome glands, which are more prominent on them than on other leaves. They also ***have a higher concentration of cannabinoids and terpenes***

Although they still perform the same function as other leaves, their appearance is slightly different. They are thinner, have fewer blades, and are shaped more like a spear.

Male vs Female Cannabis

Cannabis is a dioecious species, which means that there are male and female plants. With modern genetics, mostly due to stress or unstable genetics, cannabis plants can also be hermaphrodites. This means that they form female and male reproductive organs on the same plant.

As the cannabis plant matures and approaches flowering, the pre-sexual structures or "pre-flowers" appear. Pre-flowers are just the beginning of the female or male sex organs. Both the female and male structures appear at the nodes or where the branches meet the main stem.

Female plants have small pear-shaped structures with white hairs growing from the bracts. Male plants have fuller, convex structures from which no hairs grow.

Stamens – the Male reproductive organs

Male cannabis plants do not have flowers. Instead, **they have pollen sacs shaped like small balls or eggs**, usually about 5 millimetres in size, containing pollen grains. The stamen consists of the pollen sacs or “anthers” and the filament that holds the anthers to the plant.

As the male plant matures, the anthers open and release the pollen into the air and environment.

When the pollen lands on the pistils of a female plant, the female plant begins to produce seeds and reproduce.

Flowers

Flowers or “buds” are the parts of the plant that contain the most cannabinoids ***and are the reason most people grow cannabis plants.***

Female Cannabis Plants produce flower.
Their main function is to collect pollen and produce seeds. Average growers want to keep this from happening. Pollination would shift the plants energy into producing seeds and ruin the quality of the flowers.

Although buds appear as compact structures, they are made up of clusters of many smaller parts...

Anatomy of a Female Cannabis Plant

Trichomes
Frost-like resin glands on the flowers and leaves that contain the active chemical compounds in Cannabis.

Cola
Primary location at the top of the plant where the flower bud will start to form. Some refer to this as the “bud site”.

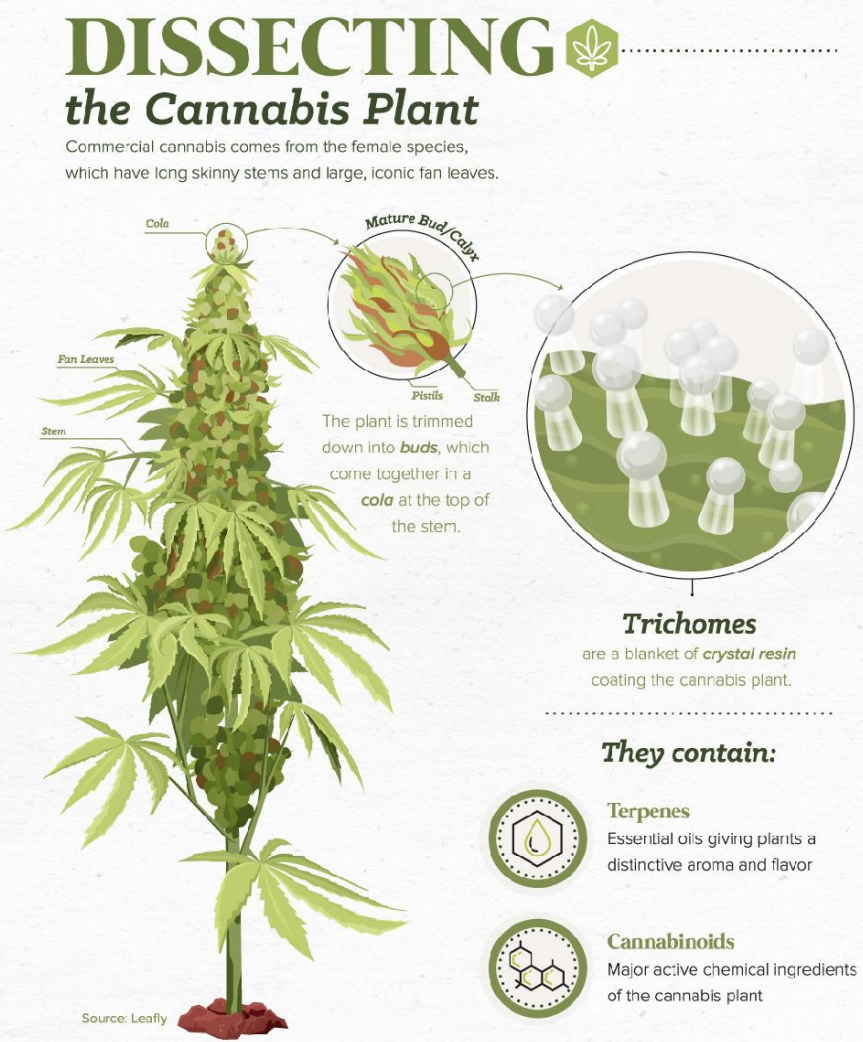
Calyx
Protective base holding up the flowering bud.

Pistil
Tiny colored hairs that grow from the calyx and are meant to collect pollen from male plants for reproductive purposes.

Nodes
Connecting points on a stem of a plant where leaves grow

Fan Leaves
The major function of fan leaves are to transfer light energy into chemical energy for the plant through the process of photosynthesis.

Stem
Provide the skeleton and support structure for all plant growth. They are also vital to transporting and storing fluids and nutrients from the roots to the rest of the plant



Cannabinoids

cannabinoid

/ˈkanəbɪnɔɪd/

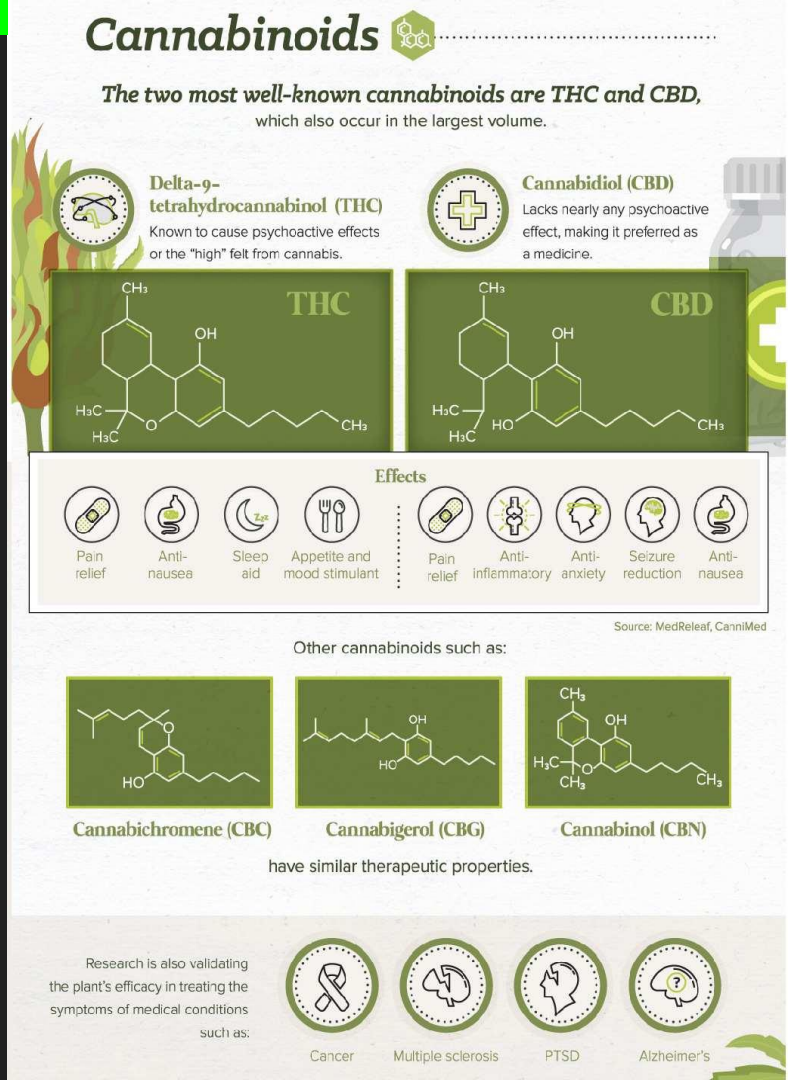
noun **CHEMISTRY**

plural noun: **cannabinoids**

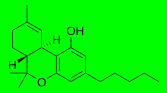
1. **any of a group of closely related *compounds which include cannabinol and the active constituents of cannabis.***

Cannabinoids (/kəˈnæbənɔɪdz, ˈkænəbənɔɪdz/) are several structural classes of compounds found in the cannabis plant primarily and most animal organisms (although insects lack such receptors) or as synthetic compounds.[1][2] The most notable cannabinoid is the phytocannabinoid tetrahydrocannabinol (THC) (delta-9-THC), the primary intoxicating compound in cannabis.[3][4] Cannabidiol (CBD) is a major constituent of temperate Cannabis plants and a minor constituent in tropical varieties.[5] At least 113 distinct phytocannabinoids have been isolated from cannabis, although only four (i.e., THCA, CBDA, CBCA and their common precursor CBGA) have been demonstrated to have a biogenetic origin.[6] It was reported in 2020 that phytocannabinoids can be found in other plants such as rhododendron, licorice and liverwort,[7] and earlier in Echinacea.

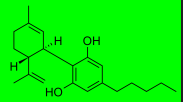
Phytocannabinoids are multi-ring phenolic compounds structurally related to THC,[8] but endocannabinoids are fatty acid derivatives. Nonclassical synthetic cannabinoids (cannabimimetics) include aminoalkylindoles, 1,5-diarylpyrazoles, quinolines, and arylsulfonamides as well as eicosanoids related to endocannabinoids.[3]



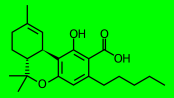
Cannabinoids



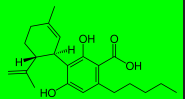
#1) THC *Tetrahydrocannabinol* is the main psychoactive compound in Cannabis. It's what makes people feel "high." We have two types of cannabinoid receptors in our bodies. THC binds with receptors -- mostly in the brain -- that control pain, mood, and other feelings. That's why THC can make you feel euphoric and give you that so-called high.



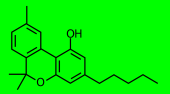
#2) CBD *Cannabidiol* is the **second most prevalent active ingredient in cannabis**. While CBD is an essential component of medical Cannabis,it is commonly derived directly from the hemp plant, a cousin of marijuana, or manufactured in a laboratory. One of hundreds of components in marijuana, CBD does not cause a "high" by itself.



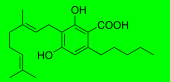
#3) THCA *Tetrahydrocannabinolic acid* is the acidic parent of THC found in the raw cannabis plant.
When exposed to heat will convert to THC.
THCA is non-psychoactive and is particularly useful for reducing nausea, reducing seizures, reducing muscle spasms, and fighting tumor and cancer cells.



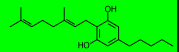
#4) CBDA *Cannabidiolic acid* is the acidic parent of CBD found in raw plant.
CBDA converts to CBD when it is exposed to heat, sunlight, or time.
Like THCA, CBDA is non-psychoactive. CBDA is also great for reducing nausea, reducing inflammation, and fighting tumor and cancer cells.



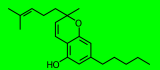
#5) CBN *Canabinol* is a breakdown product of THC.
As harvested cannabis ages, THC will gradually be converted to CBN.
CBN is known to be particularly useful for aiding sleep, and also good for reducing pain and muscle spasms.



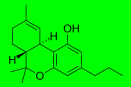
#6) CBGA *Cannabigerolic acid* is actually the precursor molecule that is turned into THCA and CBDA as the cannabis plant develops, so it is found only in tiny amounts in the mature plant. In the harvested plant, remaining CBGA converts to CBG with exposure to air and light.



#7) CBG *Cannabigerol* is useful as an antidepressant, a muscle relaxant, an antibiotic and antifungal agent, and as a blood pressure reducer.



#8) CBC *Cannabichromene* is also found only in tiny amounts in the cannabis plant.
CBC has pain reducing, anti-inflammatory, antibiotic, antifungal, and anti-cancer effects.



#9) THCV *Tetrahydrocannabivarin* does have psychoactive properties, but much less than THC.
THCV has been found to suppress appetite and can aid weight loss, and also has antiseizure effect.

Terpenes

Like other plants, Cannabis also has terpenes, **organic substances that give the plant its specific flavor and scent.**

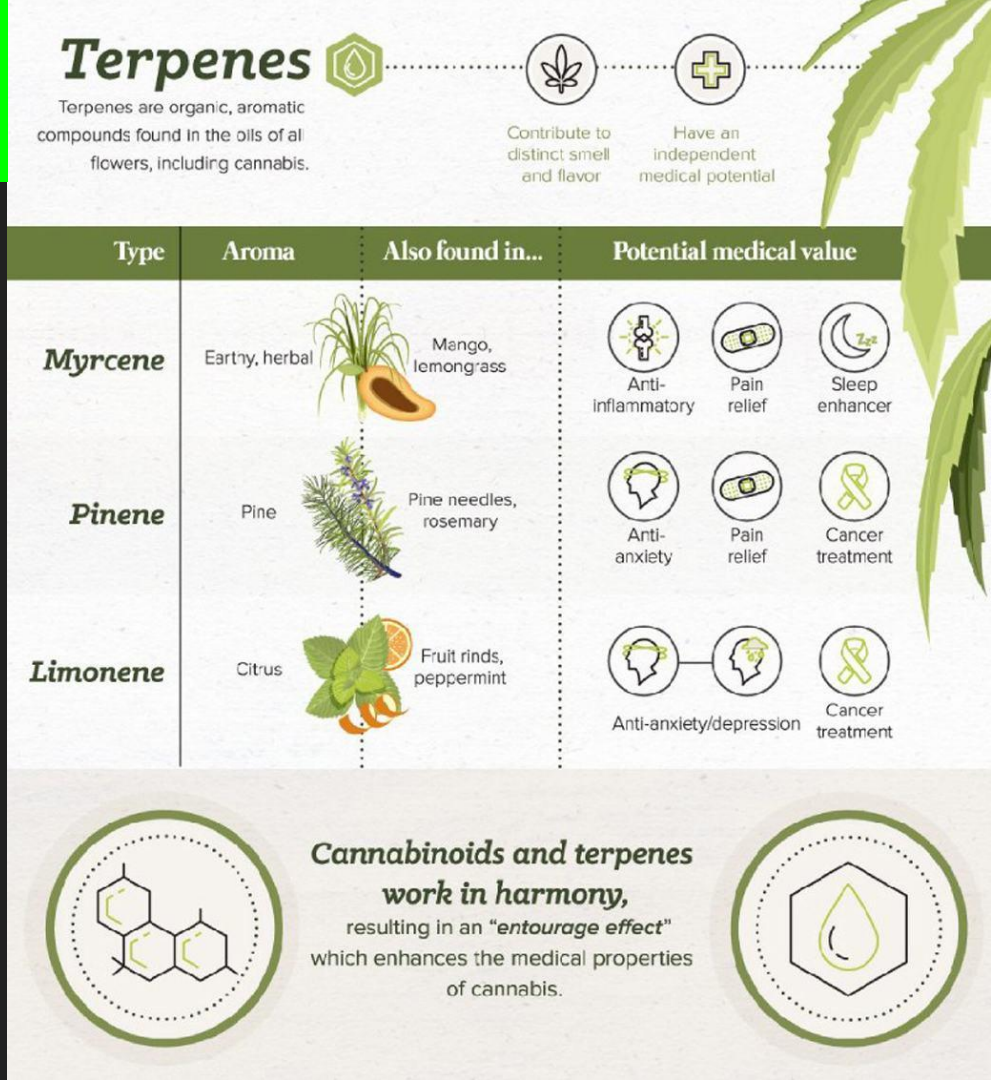
Cannabis terpenes are why every strain has a distinctive smell. You might feel the flavor of sweet berry, citrus, or pine, and it is these fragrance molecules that give that scent.

As for the **factors that affect Cannabis terpene levels**, those include:

- **Climate**
- **Soil type**
- **Harvest time**
- **Maturation level**

The reason plants develop terpenes in the first place is to attract pollinators and reject predators. Research suggests that these compounds can have medicinal properties, so they might be important for human use.

If we want to explain **terpenes and their effects**, it would be best to discuss their working process. The purpose of these substances is to exaggerate the effects of other compounds and support them in delivering their benefits. ΩThis is known as the **entourage effect**, and it describes a mechanism where cannabis substances work together to optimize the overall psychoactive benefits of the herb. The idea is that you want to find the best **terpenes-to-cannabinoids** ratio possible for your desired effect.



Terpenes commonly found in Cannabis

Calming ⟷ Energizing

Myrcene	Pinene	Caryophyllene	Limonene	Terpinolene
Herbal	*Pine*	*Peppery*	*Citrus*	*Fruity*
Also found in hops, mango, and lemongrass.	Found in pine needles, rosemary, basil, and dill.	Found in black pepper, cloves, and cinnamon.	Also found in fruit rinds, rosemary, juniper, peppermint.	Also found in nutmeg, tea tree, cumin, and lilacs.

Leafly

Where does Cannabis come from?

Cannabis is grown from one of two sources: a seed or a clone. Seeds carry genetic information from two parent plants and can express many different combinations of traits: some from the mother, some from the father, and some traits from both.

In commercial cannabis production, generally, growers will plant many seeds of one strain and choose the best plant. This is referred to as Pheno Hunting. They will then take clones from that individual plant, which allows for consistent genetics for mass production.

Cannabis seeds vs. clones

For the typical homegrower, it may be easier to obtain cannabis seeds rather than clones.

Growing from seed can produce a stronger plant with more solid genetics.

Plants grown from seed can be more hearty as young plants when compared to clones, mainly because seeds have a strong taproot. **You can plant seeds directly into an outdoor garden in early spring**, even in cool, wet climates.

If growing outside, some growers prefer to germinate seeds inside because they are delicate in the beginning stages of growth. Indoors, you can give weed seedlings supplemental light to help them along, and then transplant them outside when big enough.

How Seeds Work

Cannabis can be either **male or female**—also called ***"dioecious"***—but **only females produce the buds** we all know and love.

For reproduction, males have pollen sacs and pollinate females, causing female flowers to produce seeds.

Once cannabis seeds are mature, the female plant begins to die, and seeds are either dropped to the ground where they grow into new cannabis plants next spring and become the next generation of plants.

To get the buds found in medical and recreational Cannabis, **female Cannabis plants are grown in an environment without males**—or the males are removed from the area before they release pollen—so the females don't create seeds. **Females can then focus their energies on producing buds and not seeds** ***this high-potency Cannabis is traditionally known as "sinsemilla," meaning "seedless."***

Some varieties of cannabis can produce male parts alongside female flowers on the same plant, especially if exposed to environmental stressors. These plants are known as ***hermaphrodites***, and sometimes they can self-pollinate to create seeds.

How Clones Work

Aside from producing cannabis through seeds, or sexual reproduction, you can also reproduce the plant through cloning, or asexual reproduction. **A clone is a cutting that is genetically identical to the plant it was taken from—that plant is known as the "mother."**

Through cloning, you can **create a new harvest with exact replicas of your favorite plant.**

Because genetics are identical, a clone will give you a plant with the same characteristics as the mother, such as flavor, cannabinoid profile, yield, grow time, etc. **So if you come across a specific strain or phenotype you really like, you might want to clone it to reproduce more buds that have the same effects and characteristics.**

With cloning, you don't have to get new seeds every time you want to grow another plant—you just take a cutting of the old plant—and you don't have to germinate seeds or sex them out and get rid of the males.

Life cycle of a Cannabis Plant

Cannabis plants go through a series of stages as they grow and mature, and those different growth stages call for different amounts of light, nutrients, and water.

It's important to know these stages and how long each lasts to know what the plant needs and when. Knowing where your cannabis plants are in their life cycles will dictate when to prune, train, and trellis your plants, and when to harvest.

How long does it take to grow a Cannabis plant?

Generally speaking, it takes anywhere from **10-32 weeks**, **or about 3-8 months**, to grow a Cannabis plant from seed to harvest. It'll be quicker if you start with a clone or an autoflower seed.

When growing outdoors, you're at the whim of the seasons and will want to

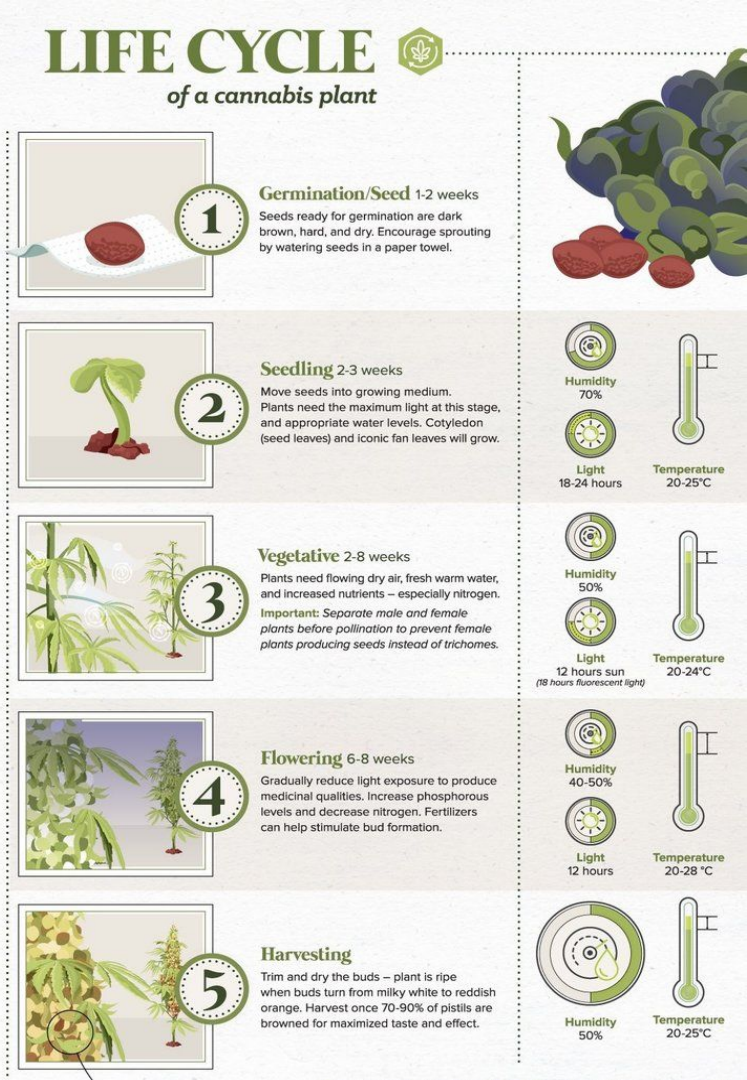
1. Plant your seed in Spring (September - November)

2. Go through vegetative state during longer days in Summer (December to February)

3. Flower as the sun starts to go down in the fall/autumn & then harvest (March - May)

However, one way outdoor growers can control the flowering cycle is by using light deprivation techniques.

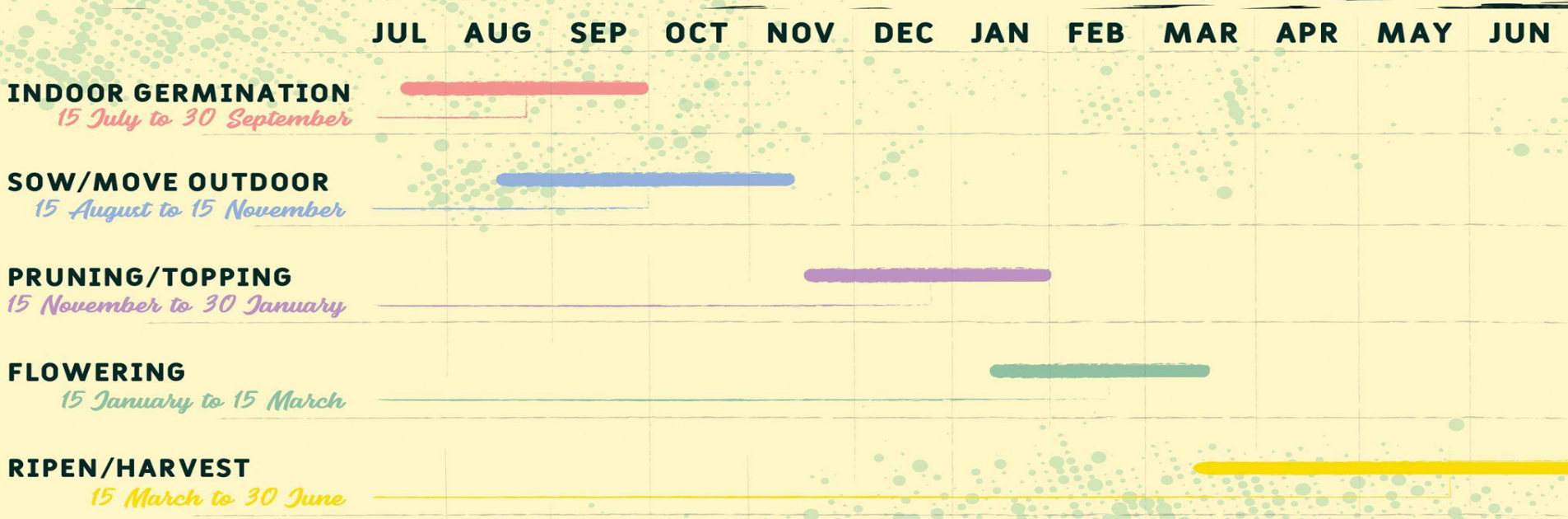
If you're growing indoors, you can force a Cannabis plant *to flower after only a few weeks when it's small or after several weeks when it's big.*



Green Smoke Room Seeds

Outdoor Grow Calendar

Southern Hemisphere



- Autumn Equinox — 19-21 March
- Winter Solstice — 21 June
- Spring Equinox — 21-23 September
- Summer Solstice — 21 December

www.greensmokeroomseeds.com

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Module 2
GROW LOCATION

Choosing a location

After deciding to grow outdoors, you'll need to decide where to position your plants.

Find an area that provides :

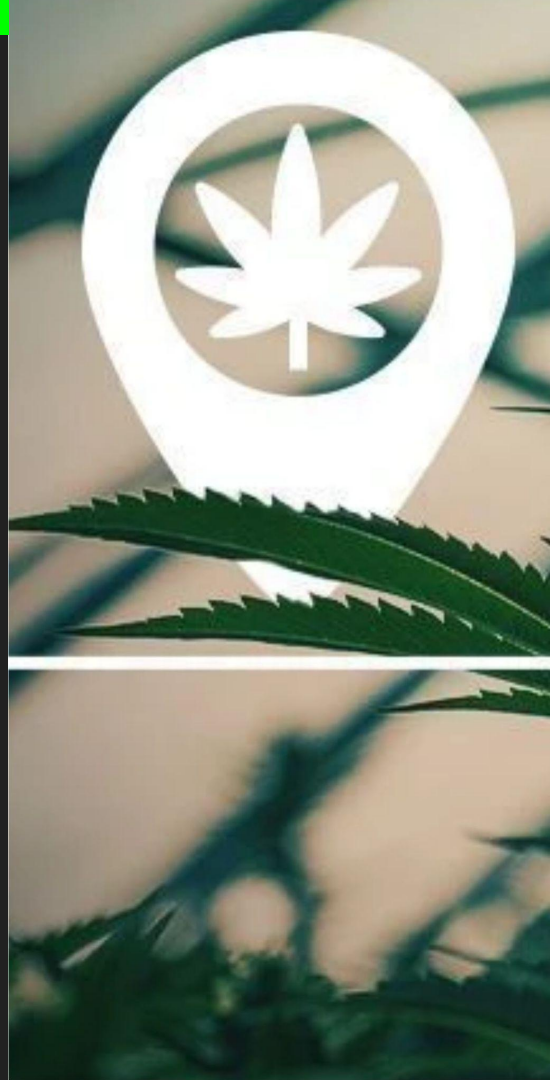
1. stable temperature

2. adequate sunlight

3. shelter from harsh weather.

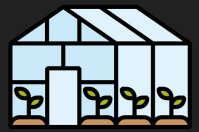
Make sure the area of your garden/position of your planting containers meets the following demands :

- Temperatures never drop below **12°C**
- Temperatures never exceed **30°C**
- **6–8 hours of direct sunlight** each day (north-facing location is ideal)
- **Shelter** from torrential rain and heatwaves (e.g. temporary tarpaulin, greenhouse)



Outdoor Grow location options

Private Garden Private gardens are one of the most pleasant places to grow cannabis. Cultivators often get lost in the tranquillity of tending to their crop in the summer months. ***Plenty of space - Chance of pests - Opportunity to grow companion plants in a polyculture - Risk of soil mould, such as Fusarium***



Greenhouse Greenhouses offer the best of both worlds. They make use of natural sunlight while offering the warmth and shelter of an indoor environment. ***Opportunity to extend the outdoor growing season - Plants may become stressed during heat waves - Protection against some species of pests - Air ventilation needs to be optimized.***

Balcony The accessibility of balconies makes them a great place to grow Cannabis. However, certain variables pose drawbacks that will significantly change the size of your harvest. ***Fresh air and natural light - North-facing balconies receive almost no direct sunlight - South-facing balconies receive sunlight all day - High-rise buildings expose plants to strong winds - Reduced water and electricity bills***

Rooftop / Terrace Growing Cannabis on a rooftop or terrace provides advantages that balconies lack. However, they do come with a few risks of their own. ***Rooftops receive sun all day long, considering they aren't blocked by taller structures - Good exposure to rainwater - Plants are more susceptible to storms and intense heat - More concealed to neighbours and the public than balconies***

Factors to Consider when choosing a location

Watering Watering can become quite the chore. Outdoor plants will receive rainfall, but also face the reality of droughts. While watering an entire cannabis garden or greenhouse each day can become a challenge, **setting up an irrigation system makes it almost effortless.**

Garden Beds or Pots? Pots allow growers to easily move their plants to safety when conditions get rough. Smart pots and air pots also help to minimise fungal infections and keep root systems aerated. On the other hand, ***raised beds enable growers to cultivate multiple companion species within the same block of soil. Not only does this enrich the biodiversity of the soil, but it also creates a shield of protective plants that fend off pests while attracting beneficial insects.***

Light Pollution **Excessive light pollution from street lights may cause cannabis to remain in (or revert to) a vegetative state.** Growers facing these conditions should consider autoflowering strains. These varieties grow rapidly and don't require a specific light cycle to begin and sustain flowering.

Factors to Consider when choosing a grow location

Wind Damage Those growing on balconies, rooftops, and in gardens should erect barriers and fences if they live in areas with strong winds. If you plan on mulching, go for heavier substrates pinned down with rocks, as opposed to straw and sawdust.

Hours of Light Aim to grow plants in the sunniest spot you have access to. **Cannabis requires a minimum of six hours of uninterrupted daily sunlight to perform well.**

Security If you're growing in an open garden, or your balcony is on the first or second floor, your plants will be exposed to other weed-lovers. Make sure to protect your plants from thieves and hungry animals alike.

Choosing a Container for your Cannabis plant

When it comes to pots, your cannabis wants one thing and one thing only: **a safe, healthy place for root development.** Without healthy roots, your cannabis will never thrive. Roots are in charge of water retention, nutrient absorption, anchoring the plant, and also facilitate vegetative growth. All of these functions must be considered when choosing a container.

For a root system to develop and thrive, they will need the following:

Drainage: Water retention is paramount for healthy plants—without it, your cannabis will wither and die. But too much water will waterlog your plant and lead to root rot, killing roots.

Oxygen: Plant roots require oxygen to function properly. Choose a container that facilitates enough oxygen for root development without overexposing them to the elements—containers do this though various styles of perforation.

Nutrients: Roots require optimal conditions for nutrient absorption to occur. This includes pH balance, optimal temperatures, and nutrient availability.

Space: Roots need plenty of space to branch out. A container that is too small will cause it to become rootbound and choke the plant.

Common pots used for Cannabis

Garden centers and grow supply chains offer different pots that vary by material composition, shape, size, and perforation style.

Plastic Pot

Standard plastic containers are a popular option for growers operating on a budget. These pots are inexpensive, but still provide the essentials for your plants.

Pros

Low overhead costs
Solid drainage (plus it's easy to add more holes)
Transplanting is easy and inexpensive

Cons

Inability to protect root systems from temperature fluctuations
Lack of durability which can cause cracks and structural damage over time
May have airflow issues depending on the grow medium

Ceramic Pot

Otherwise known as terra cotta, ceramic pots offer a unique set of benefits to growers in hot climates.

Pros

Absorb moisture and retain lower temperatures during hotter days
Heavy weight helps to anchor larger plants

Cons

Less than optimal drainage; drilling holes into clay pots is possible but requires special tools and is more labor-intensive
Heavy weight makes it difficult to transport plants

Fabric Plot

A relatively new innovation in container gardening, roots in fabric pots grow to the outer edges and attempt to bypass the porous fabric wall. Instead, they are cut back, allowing new growth to occur. This process, called "air pruning," results in a denser root composition which promotes healthy growth and development.

Pros:

Promotes dense, healthy root systems
Increased airflow to the roots
Excellent drainage ideal for carefully-maintained gardens

Cons:

Requires more attention and maintenance as the pots dry out quickly. Note: you can use larger pots to help slow drying out.
Flimsy structure can make plant support challenging

Planting directly into the ground

Growing cannabis outdoors in the ground is undoubtedly the easiest, cheapest and most environment-friendly way of growing marijuana, since with very limited means you can get great yields.

Aspects to consider to grow Cannabis in the ground properly

The distance between plants should be at least 2 meters otherwise, they can't fully develop.
It is preferable that you also grow other varieties of plants in your garden, as they will help to create a suitable microclimate as well as enhancing the biological richness of the environment. It will also help us conceal our secret crop.

If your garden is very sunny and it's very warm throughout the day, it would be a good idea to refresh the plant leafs by spraying them with water in the mornings and afternoons/evenings, always before the onset of the flowering phase, especially during June and July, when there is more proliferation of red spider mites.

If your garden is very exposed to strong winds, stones and ropes will be necessary to support or fix your plants, preventing them from falling.

References

33 Choosing a Grow location
Information obtained from Royal Queen Seeds

34 Outdoor Grow location options
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35 - 36 Factors to consider when choosing a Grow location
Information obtained from Royal Queen Seeds.

37 Choosing a container for your Cannabis plant
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38 Common pots used for Cannabis
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39 Planting directly into the Soil
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Module 3
SOIL BASICS

Soil Variations

If you're using store-bought potting mixes, these are already optimally "tuned" for growing. Different story if you're growing organically, though. Natural soil comes in four varieties: sandy, silty, loamy, and clay. But know that most soils consist of varying ratios of these soil types. For example, a soil may be clay and loamy, or sandy and silty.

SANDY

Sandy soil is coarse with good drainage, but has poor water retention. When watered, nutrients such as nitrogen will also quickly get washed away. Sandy soil is easy to work with and is a viable choice for cannabis growers.

Coarse structure
Low pH
Pros: Good drainage, keeps soil airy, high oxygen levels, easy to work with
Cons: Poor water retention, needs frequent watering

SILTY

Silty soil is a medium-coarse soil type that's rich in minerals and organic particles. Its water retention is good, yet it has adequate drainage. Silty soils are very easy to work with. The minerals and organic substances within make it one of the most fertile soil types.

Medium-coarse
Pros: Contains minerals and nutrients, retains water well
Cons: Fair drainage

LOAMY

Loamy soil is a combination of sand, silt, and clay soils with added organic compounds. It is one of the best soil types for growing cannabis as it offers optimal water retention and drainage, and it's rich in nutrients and oxygen. Downside: This type of soil can be expensive.

Mixture of sand, silt, and clay
Pros: Excellent water retention and drainage, contains nutrients, high oxygen levels
Cons: Expensive

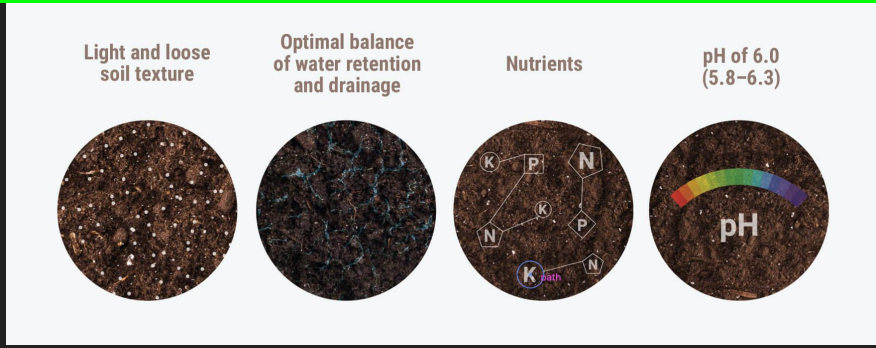
CLAY

Clay soils consist of fine mineral particles. This type of soil is heavy and not easy to work with. It is very rich in nutrients and minerals, which makes it a good option to include in organic grows. Clay soil retains water well, but has poor drainage.

Fine particle size
High pH
Pros: Rich in nutrients, retains water
Cons: Poor drainage, heavy and compact, hard to work with

Factors to Consider with Soil

Not every soil is suitable for growing cannabis, and not all cannabis requires the same type of soil. Picking the optimal soil depends on the type of cannabis you're growing, your climate, whether you're growing at home or in the wild, etc. Aside from these factors, there are some common traits among all cannabis soils. Let's take a look at them:



Texture

Cannabis prefers a **light and loose soil** texture. A light texture promotes root development, and it ensures more oxygen reaches the roots for optimal growth and health.

Drainage ability

Cannabis soil needs to have **excellent drainage.** When you water your plants, it shouldn't pool on top of the soil. If the soil has poor drainage, your plants will get sick and turn out subpar yields, or die.

Water retention

Just as important as good drainage is water retention, which is the soil's ability to hold water. Good cannabis soil has an **optimal balance of water retention and drainage**.

pH value

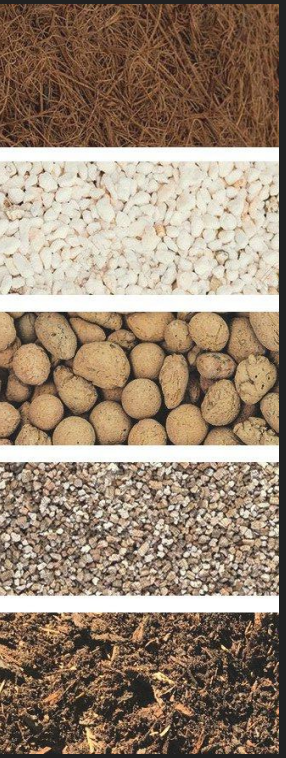
pH is a chemical scale that indicates how acidic or alkaline something is. This is important, as cannabis only does well within a small pH range. A good soil for weed has a pH of about 6.0. **A pH of 6 –7** will be fine, but if it fluctuates too far outside of this range, you will get diminished yields. If the pH is seriously off, your plants will die.

Nutrients

Cannabis soil needs to contain nutrients so your plants can grow. Fortunately, almost all soils you can buy already feature them. Know, however, that these nutrients will often last only 3–4 weeks. Around the time your plants start to flower, the nutrients in commercial soils will likely be depleted. This is when you should begin to add nutrients. If you're growing without additional nutrients, your soil needs to contain organic substances such as humus, compost, worm castings, guano, etc. Microorganisms in the soil will turn these substances into nutrients for your plants to access on demand.

Amendments to Improve Soil

If you're working with natural soil, chances are it won't be perfect for growing cannabis—not from the start, at least. The texture may not be optimal or it may have poor drainage, for example. But you can improve any type of soil by adding amendments, most of which can be found in your local grow shop.



COCO COIR
Coco coir (coco fibre) is made from coconut husks. These light fibres **provide excellent water retention and can lighten compact soils.** Some use a pure coco substrate with special nutrients to cultivate their weed. But to amend existing soil, it's a good idea to add anywhere up to 30% coco coir, depending on the composition of your base soil.

PERLITE
Perlite is the most widely used soil amendment. Perlite consists of very light, bright-white rocks that greatly **improve the drainage and airiness of the soil.** Perlite also has decent water retention. To amend your soil with it, add 10–15% of perlite. You can add more, but then your soil may become too light and nutrients may leach out. Good-quality commercial soils often come with added perlite.

CLAY PEBBLES
Most cannabis growers are familiar with using clay pebbles as part of a hydroponic setup. But did you know they can also be used to enhance soil structure? Adding clay pebbles to the bottom of your raised beds and containers will **assist with drainage and prevent water from pooling at the base**—a large risk factor when it comes to root rot.
Growers can also add clay pebbles to the top of containers and beds to serve as a mulch. Here, they help to trap moisture in the growing medium by preventing excess evaporation. Clay pebble mulch also casts shade over the top layer of soil, suppressing weeds and keeping beneficial microbes sheltered from the hot rays of the sun.

VERMICULITE
Vermiculite, just like perlite, is a heat-treated mineral you can use to make your soil lighter.It is also excellent at retaining water. Although vermiculite shares some characteristics with perlite, the two have opposite uses: Use perlite to increase drainage and airiness, and use vermiculite to increase water retention. Luckily, you can use both, as perlite and vermiculite work well together. Around 10% vermiculite is beneficial.

WORM CASTINGS
Worm castings are normally seen more as a nutritional soil amendment as they contain a plethora of useful microorganisms that benefit growth. But worm castings will also improve the texture, drainage, and water retention of your soil. When amending your soil with worm castings, use about 25–30%.

Basic Cannabis Soil Recipe

INGREDIENTS

1 part vermiculite
1 part coco coir peat
2 parts compost
½–1 cup worm castings (or humus)

DIRECTIONS

1. Sieve the compost to remove larger chunks.
2. Soak the coco coir peat in warm water. Check the directions of the product to see what kind of volume you will be getting.
3. Use a bucket and mix the coco coir peat with the vermiculite.
4. Add the compost.

Done! Double-check the pH value of your homemade soil. It should be in the range of 5.8–6.3.

The above is a basic soil recipe that will serve you well for most grows, indoors and outdoors. But you can further enhance your soil mix by adding organic fertilisers.

Bat guano is an excellent and inexpensive organic fertiliser for flowering marijuana. You can add it to a soil mix or spread it on the topsoil and water in later. You can also look into time-release nutrients such as Easy Boost Organic Nutrition pellets. Add a cup of these to your soil to feed your plants for their whole life cycle—100g is enough for 2–3 cannabis plants. All that's left to do is water!

References

42 Soil Variations
Information obtained from Royal Queen Seeds

43 Factors to Consider with Soil
Information obtained from Royal Queen Seeds

44 Amendments to improve Soil
Information obtained from Royal Queen Seeds.

45 Basic Cannabis Soil Recipe
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Module 4
GERMINATION

Germination

Germination is the process in which a seed sprouts and begins to grow into a new plant.

Also referred to as “popping,” germination is the very first step in starting your Cannabis grow.

Cannabis seeds can be acquired from an array of sources and can vary in quality.

Cannabis seeds require three things to germinate: water, heat, and air.

Giving your cannabis seeds the best possible start on their journey to bulging buds is a surefire way to encourage a healthy and robust plant.

Small, fragile, and in desperate need of a helping hand, there are several ways you can germinate your cannabis seeds. All methods have varying degrees of success, with both advantages and disadvantages. **It is important to note that even with advanced growing expertise and top-of-the-line equipment, you may still end up with a few failed seeds.** This is a natural part of dealing with a living organism.

What to look out for in Seeds

Regardless of where you get your seeds from, it is best to **give them a slight (and delicate) inspection before planting.** Most of the time, all seeds will germinate; however, poor-quality seeds will produce a weaker plant. Unfortunately, that is something you will not find out until well into the vegetative and flowering stages.

To avoid disappointment, **seeds that have a darker colouration stand a better chance of germinating, while pale green or white seeds are likely to fail. Even if dark seeds look slightly damaged, they should be planted anyway**. There is a good chance they will still germinate, even if the outer shell is somewhat crushed.

Germination - Ideal Conditions

Before we jump straight into the germination methods, there are a couple of germination golden rules. For the best results, we recommend staying within these guidelines, no matter how you choose to germinate. That being said, of all the factors to consider, temperature is one of the most critical. Seeds will always seek out even the smallest amount of moisture, but they use temperature as a sign that they need to do so.

- The **ideal temperature** is **between 22° and 25°C** (71–77°F)
- Your growing environment whilst germinating should be damp/moist, but never wet
- **Relative humidity** range should be between **70% and 90%**
- Seeds favour fluorescent lighting (Cool White code 33)
- Minimise the amount of seed handling you do
- In hydroponic/rockwool plugs, the ideal PH value is 5.8–6.2

Germination - Time

Three fundamental principles will trigger that first small taproot to appear: **warmth, moisture, and darkness**. With the promise of moisture, a single root will take shape before slowly developing into the cannabis plant we know and love.

In the right conditions, seeds will begin to develop within 12–36 hours of moisture being introduced to them.

Timescales can vary, as it all depends on how ideal your germination environment is (see the golden rules above). Even the worst grower could make a seed germinate, but it may take a few weeks and, of course, increases the risk of a weaker plant.

Germination Method 1 - Wet Kitchen Towel

Probably one of the most common methods of germination. The kitchen towel method comes in several iterations. Some growers use cotton wool pads or absorbent pieces of paper. For this guide, we will be using kitchen towel as it is readily available and holds moisture relatively well.

Place one sheet of damp kitchen towel on a flat surface. Space your seeds a few centimetres apart before placing the second piece of kitchen towel over the top. **You need to ensure both pieces are damp, not wet**. Once again, when the white root tips reach 2–3mm, move the seeds (carefully) to soil pots.

Germination Method 2- Planting directly into soil

Planting directly into your growing medium prevents having to move seeds when they are at their most fragile. That first root tip is covered with microscopic filaments that are easily damaged. Given that both a cup full of water and moist paper towels are more prone to temperature fluctuations from their environment, planting in soil is a much safer option.

Start by filling pots with a premium-quality soil that has been soaked in water. Many growers also choose to lace the water with a root stimulator. Make a hole roughly 10–15mm deep. This will be your seed's new home. Remove the seeds from their packet and place them into the pre-dug holes. **Loosely cover the seeds, but be careful not to compress the soil above the seed too much**. The root will struggle to penetrate solid soil, slowing plant growth. Lightly spray the top of where you placed the seed so that your growing medium stays moist.

If you don't like the idea of pre-soaking your soil, you can use a spray to moisten the holes before you plant each seed. With enough moisture surrounding your seeds, you can still encourage a root to develop.

Your growing pots will need to be placed in a damp climate that is within the temperature range listed. After 4–10 days, you should see a young seedling sprout, while the roots will have begun to develop underneath the soil. The entire plant and its soil can now be transferred to a larger pot, where normal growing routines should start.

Don’t panic, where possible roots will always grow downwards. It is not necessary to try and reposition the seed yourself. Disturbing the seed at this crucial time will do more damage than good. In most scenarios, what you are actually seeing is not a root protruding from the top of the seed, but the stem of a cannabis plant.

If you are ever unsure, always wait a few days for the first leaves **(cotyledons)** to appear. As long as a seed’s requirements have been met, the seedling should sort itself out. The best approach is not to panic; follow the golden rules and your young seedling will be ready to transfer to a larger pot in no time.

References

48 Germination
Information obtained from Royal Queen Seeds

49 What to look out for in Seeds
Information obtained from Royal Queen Seeds

50 Ideal Conditions for Germination
Information obtained from Royal Queen Seeds

51 Germination time
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52 Germination Method 1 - Wet Towel Method
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53 Germination Method 2 - Direct into Soil
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Module 5
VEGETATIVE STATE

Entering Vegetative stage

The first few weeks of a seedling's development require very little interference. In most cases, **you will not need to supply any nutrients for the first 2–3 weeks.**

However, now that your seed has germinated, you have a few weeks of grace. **Sit back, relax, and enjoy your cannabis plant taking shape.**

During germination, always remember the golden rules, and if in doubt, ask yourself if you have created "springtime conditions". If you are confident everything is on track, all you need to do is observe and marvel at the creation of your very own cannabis plant.

What is the Vegetative stage

The vegetative phase is a period of the growing cycle that takes place after germination and before flowering.

After your cannabis seeds germinate, they'll emerge from the soil as seedlings. These youngsters feature a short stem and two rounded cotyledons. Eventually, the first "true" leaves will form. Over the subsequent **2–3 weeks,** seedlings will start to mature and produce a large number of fan leaves—structures required for photosynthesis. This marks the beginning of the vegetative phase.

The **vegetative phase can last anywhere between 3–16 weeks (or longer)**, depending on the genetics of a cultivar and the goals of the grower. Explosive growth occurs during this time. Plants are typically transplanted into larger containers at the start of the vegetative phase to give their root system more room to expand. The main stem will ascend, and the space between nodes will increase dramatically. Indica cultivars will remain short and put out lots of lateral growth, whereas sativa varieties grow taller with much less ramification. For photoperiod varieties, **the vegetative phase ends when the light cycle shortens,** this happens as the seasons change from summer to autumn..

Importance of the Vegetative State

The vegetative phase is a vital period in the life cycle of a cannabis plant. **Growers need to provide optimal environmental conditions for their plants to grow as large and healthy as possible**. **Size often equates to yield.** The bigger plants become, the more nodes or “bud sites” they develop, and the more flowers they’ll be able to produce. But size isn’t the only factor.

Some growers prefer to keep their plants small while still achieving excellent yields, which can be done by training plants. These **techniques need to be implemented in the vegetative stage** before the first flowers begin to emerge. Many essential physiological functions are underway during the vegetative stage. Fan leaves are working hard to convert light and CO_2 into energy. The root system is expanding and providing a firm anchor to prevent the plant from toppling over; the roots also work to uptake vital nutrients and water.

To meet the demands of plants during this time, growers need to ensure they provide the correct amount of **light, water, and nutrients.**

Cultivators also need to be aware of pests and pathogens, and do their best to prevent these threats from damaging or even killing their crop. Ultimately, the vegetative period sets the stage for flowering. The healthier plants are during this time, the more prepared they will be for flowering and a bountiful harvest.

Factors to consider during Vegetative stage

GROWING MEDIUM
Cultivators can raise plants in a variety of media, including soil and water (hydroponics). The growing medium provides a space for roots to grow, and—in the case of soil—provides organic matter and nutrients. Consider introducing **microorganisms** such as mycorrhizal fungi into your soil to form a beneficial relationship with your plants.

LIGHTING
Light is one of the most important factors when growing cannabis. Alongside water and CO_2, it's a significant player in the process of photosynthesis. **Photoperiod strains require 18 hours of light per day during the vegetative phase.** The more light exposure a plant receives, the faster it'll grow. **Most cultivators vegetate their plants for 4–8 weeks.**

NUTRITION
Cannabis plants have specific nutritional demands, and their requirements differ during the vegetative and flowering phases. **During the vegetative period, plants require higher levels of nitrogen**, which contributes to the growth of stems and leaves. They'll also need adequate levels of **potassium** to regulate the opening and closing of stomata, and to produce energy. Vegetating plants also require the right amount of **magnesium** to power photosynthesis, and calcium for cell wall health. Cultivators can purchase vegetative nutrient formulas to make things simple.

WATERING
Water—the liquid of life. Cannabis plants depend on water to absorb nutrients in both soil and hydro grows. During the process of transpiration, water moves up the stem of the plant to the leaves, transporting nutrients to where they are needed. However, too much water can be a bad thing. Overwatering can starve the roots of air and lead to the development of root rot. When watering your plants during the vegetative phase, wait for the top ~3cm of soil to dry outbefore watering again.

TEMPERATURE
Vegetative plants thrive in temperatures of 20–30°C. Luckily for indoor and outdoor growers, this is quite a broad range. Vegetative plants can tolerate quite high humidity. Don't let levels drop below 40%, though. Both temperature and humidity can be measured using a thermometer/hygrometer.

AIRFLOW
Airflow is vital to keep vegging plants in good health. Airflow will also help to **prevent mould formation**. If you're growing outdoors in a polytunnel, it's a good idea to set it up in the direction of the wind or to install some fans to keep the air moving.

TRAINING
Training allows growers to morph and shape plants to their will. It opens up the canopy and lets more light penetrate through. Training can also **boost yield** while keeping plants at manageable heights. Methods such as low-stress training can be used to change the shape of plants by bending and tying down the stems and branches.

Factors to consider during Vegetative stage

SPACING

Each plant needs its own space. Crowded plants will end up overshadowing each other and blocking out light. Many variables come into play here. The genotype of a strain will dictate how large it grows, however, plants can be tamed using training methods.Cultivators can plan their grow space by figuring out how many plants to grow per square metre.

- Using the SOG technique, growers can usually fit 4–16 plants per m². This involves potting many small plants in close proximity to form an even, horizontal canopy.
- As mentioned above, low-stress training (LST) is another technique used to tame plants. It will enable growers to fit approximately four plants per m².
- Finally, the ScrOG method can be used to boost yield, although only a single plant will fit per m².

TOPPING

Topping is a tried and tested method of controlling the height of a cannabis plant while **boosting yield potential**. By pruning the top of the main stem, growers can promote lateral growth, which in turn can enhance yield. Growers can perform topping as soon as a plant has 3–5 nodes.This is a technique for the vegetative growth phase. Cultivators should start with a sterilised pair of scissors and snip off the tip of the main stem, causing it to diverge. Growers can repeat this process again and again to produce more bud sites, however, plants need a period of “recovery” after each time you top, which will inevitably extend the length of the veg phase.

SEXING

Sexing cannabis plants is **vital to prevent males from pollinating the grow space.** If the goal is to produce resinous flowers, cultivators need to identify and remove males as early as possible. Once their pollen fertilises a female flower, they’ll start to produce seeds and stop resin production.**Sexing can be conducted around four weeks after germination. Both male and female plants will start to produce pre-flowers—small pieces of tissue that signify sex.**Male plants produce pre-flowers that are more spherical, whereas female pre-flowers resemble the shape of a teardrop. Growers can use a magnifying tool such as a jeweller's loupeto get a closer look at the nodes. If a male is identified, it should be removed from the grow space. It can be kept separate for breeding purposes or disposed of.

How to achieve ideal Vegetative growth

The factors mentioned previously (**light, water, and nutrients.**) apply to every cannabis grow. When cultivators manage to strike the perfect balance between all of these variables, remarkable growth becomes possible during the vegetative phase.

Achieving ideal vegetative growth outdoors mostly lies in boosting your plants' defences. There are a lot of critters out there that will happily chow down on your plants for lunch. Small creatures such as insects can burrow into leaves and munch into roots, whereas animals such as birds and deer can do some severe damage to leaves and stems. Humid environments also increase the risk of fungal infections. **Biological controls such as predatory insects can be introduced to the garden to eliminate pest species,** and companion plants can be grown to deter them. Netting and fencing are an effective line of defence against larger animals. Foliar sprays can help to keep mould away. Growers should also place their crop in an area of the garden that receives good airflow, and avoid stagnant areas.

References

57 Entering Vegetative stage
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58 What is the Vegetative stage
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60-61 Factors to consider during Vegetative stage
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Module 6
WATERING CANNABIS PLANTS

Watering Cannabis Plants - Introduction

Your cannabis plants need water in order to thrive. Seems simple enough, doesn't it? But did you know that incorrect watering is the most common reason for plant health issues? Learn how and when to water your plants so you can avoid any problems before they have a chance to happen!

Watering cannabis plants seems like the easiest thing to do, yet many growers, especially those new to cannabis cultivation, make mistakes with watering. Overwatering is one of the most common reasons for all sorts of growing troubles such as nutrient deficiencies and cannabis diseases, although giving your plants too little water can also negatively affect their growth.

How much should you water Cannabis plants?

One issue with watering plants is that it isn't really an exact science, and **many different factors contribute to how much you should administer**. As an obvious example, **as your plants get bigger, their watering needs will change.** But there are other, more complex variables that also determine how much or little you should drench your plants. Let's discuss some of the most vital:

Stage Of Growth

Cannabis plants have different watering demands depending on their stage of maturity. The specific guidelines which follow apply to mature vegetating and flowering plants. Seedlings and clones require much less water.

In the early stages, avoid watering your plants with a powerful stream that might knock them over and disturb developing roots. Instead, use a light mister to gently moisten the substrate.

Wait for the soil to dry out completely before repeating the procedure. How quickly the soil will dry will depend on your environmental conditions, but this roughly translates to watering/misting once **every 1–3 days**.

How much should you water Cannabis plants?

Growing Medium

The type of growing medium you use largely determines how much water the soil can hold, and drainage plays a huge role in how often/how much you water your plants. **Cannabis likes rich yet airy and "fluffy" types of soils that are well-draining.** As another consideration, the growing containers themselves must have holes punctured in the bottom to allow the water to escape. More compact soil mixes will hold moisture much longer, so they require less frequent watering as a result. Otherwise, moisture can linger in the soil for some time, which can lead to nutrient deficiencies, root rot and fungus, pests, and a whole lot of other problems.

Here is a quick way to check if your water is draining properly: If it takes several minutes for water to drain after drenching the soil, and/or if it takes longer than 3–4 days for your soil to dry out, it's likely that you have a drainage issue. Even if you don't see adverse symptoms now, it could definitely lead to more problems down the line. In this case, you can add perlite or something similar to your soil to aerate the mix and improve its drainage ability. Perlite ensures that water doesn't stay too long in your pot. The key to good soil for cannabis plants, whether store-bought or homemade, is to balance moisture retention with water drainage. This usually means soil that is dark and rich, but amended with perlite and/or other substances to promote a healthy and efficient medium for plants to grow.

Size Of Container

Then of course, the dimensions of your container will also **affect the overall balance between moisture retention and drainage**. If you have a tiny plant in a huge pot, drenching the whole substrate is going to drown the poor thing before it gets a chance to flourish. Similarly, you might experience the opposite issue with huge root-bound plants stuck in minuscule pots. This is also the reason that growers normally start seedlings in smaller pots, then up-pot them later as the plant grows. A small seedling pot makes it much easier not to overwater the sensitive seedling.

Outside Temps And Light Intensity

Cannabis plants don't always grow at the same pace. A plant in a cooler environment, for example, will grow much slower than one under balmier conditions. Light intensity plays another big role here. Plants that receive more heat and light are bound to have higher water and nutrient requirements than those with meagre light and chilly temps.

Health Of Cannabis Plants

The general health and vitality of your plants will also determine how much water they require. If growth is slow or stunted, or if a plant is afflicted with diseases or pests, it will likely not need as much water as one that is thriving.

How to water Cannabis plants

Here is a simple rule: Water less, but water well!
Rather than giving your plants a little bit of water often, treat them to a healthy, less frequent soak. But how much water is sufficient?

A good soak means watering the medium to **25–33% of the pot capacity.** This amount of water will provide the root system with all it needs, without causing pooling and potential fungal issues.

When watering, aim for the middle of the substrate first. After letting the roots breathe, water the edges of the container too. This approach will encourage the root ball to reach to the edges of the pot, and also shuttle nutrients sitting in the top of the medium down to the root system below.

This method will deliver the correct amount of water, without creating pools in the substrate. Excess water creates a humid environment—a perfect breeding ground for fungal pathogens that lead to root rot.

How to identify a thirsty plant

You now know about the factors that determine how much and how often cannabis plants need water, and how these factors can be different for everyone. So now, how can you tell exactly when you should water?

Here are some **signs that your cannabis plants are thirsty:**

Drooping, Weak Plants

If your cannabis plants are very thirsty, they will droop. The whole plant will appear rather sickly and lifeless, so it's difficult to overlook this sign. One catch here though is that thirsty plants can look very similar to those that are drooping because of overwatering. The difference here is that the leaves of overwatered plants are usually dark green and form a "claw" where they curl and bend downwards, so the whole plant takes on a heavy and waterlogged appearance. If you're somewhat experienced, you should be able to tell these conditions apart. Most of the time, it should be obvious if the drooping is from over or under-watering: If the soil is bone-dry and you know you haven't watered in quite some time, the sickly appearance of your plants is less likely from overwatering.

Yellow Or Brown Leaves

Along with your thirsty plant wilting and drooping due to a lack of water, it may also display discoloured leaves in shades of yellow and brown. While it is perfectly normal for plants to develop yellow leaves during the final weeks of bloom, a healthy vegetating plant shouldn't have any/many dry, yellow, or brown foliage.

Just Check The Soil!



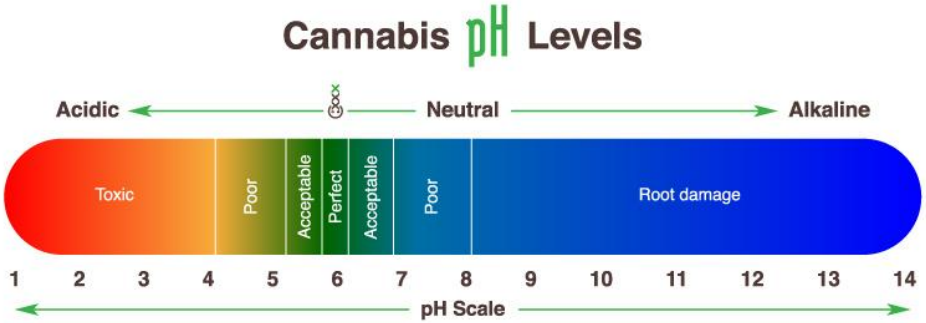
The Importance of PH

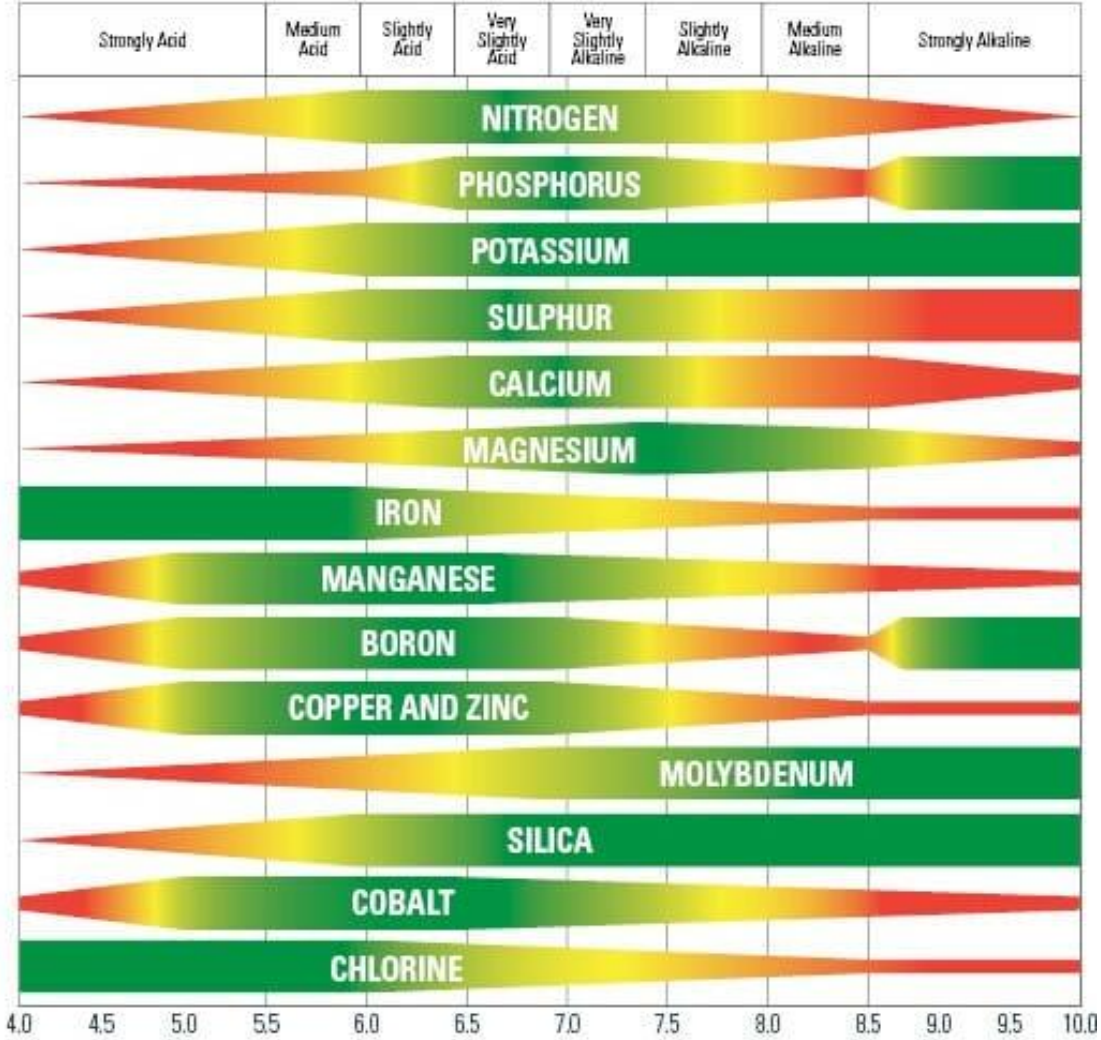
Cannabis plants have a limited pH window where they are able to take in nutrients. If the pH level of the water is either too high or too low, the plants are unable to take in nutrients even if they are present, a phenomenon known as nutrient lockout.

When you grow in soil, **the pH range of your water should be 6.3–6.8.**

To test your water pH, use a **pH measuring stick** or pH measuring drops. If the pH is too high or too low, use some drops of “pH down” or “pH up” to adjust your water to the right level. Most of the time, if you’re using tap water, your pH will likely be too high.

Also, if you’re adding cannabis nutrients to your water, **measure the pH after each feed**. This will give you accurate data of how you have influenced the soil. It will also let you know if you need to add more nutes, or modify the dose during next feed.




Strongly Acid
Medium Acid
Slightly Acid
Very Slightly Acid
Very Slightly Alkaline
Slightly Alkaline
Medium Alkaline
Strongly Alkaline
NITROGEN
PHOSPHORUS
POTASSIUM
SULPHUR
CALCIUM
MAGNESIUM
IRON
MANGANESE
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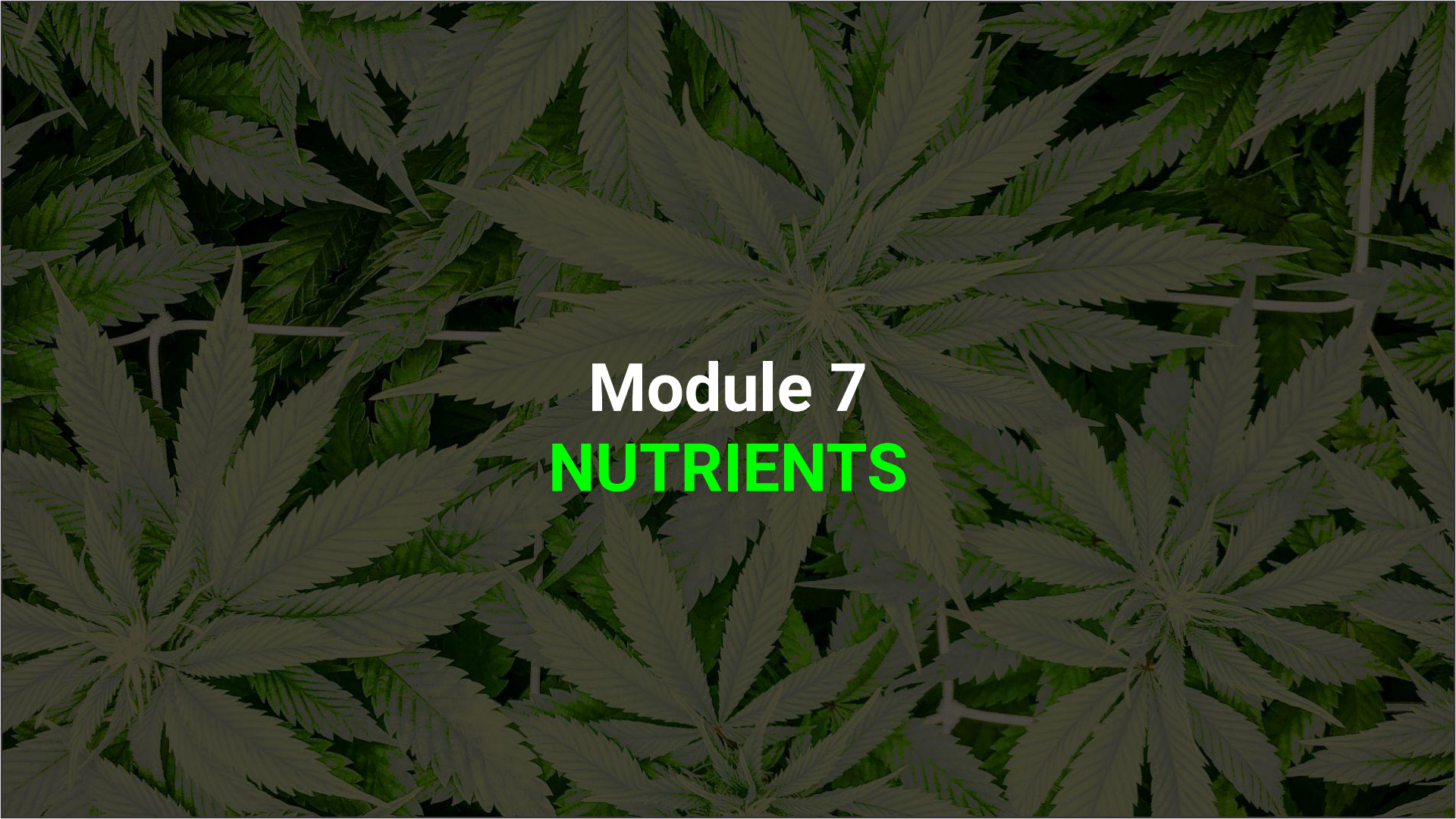
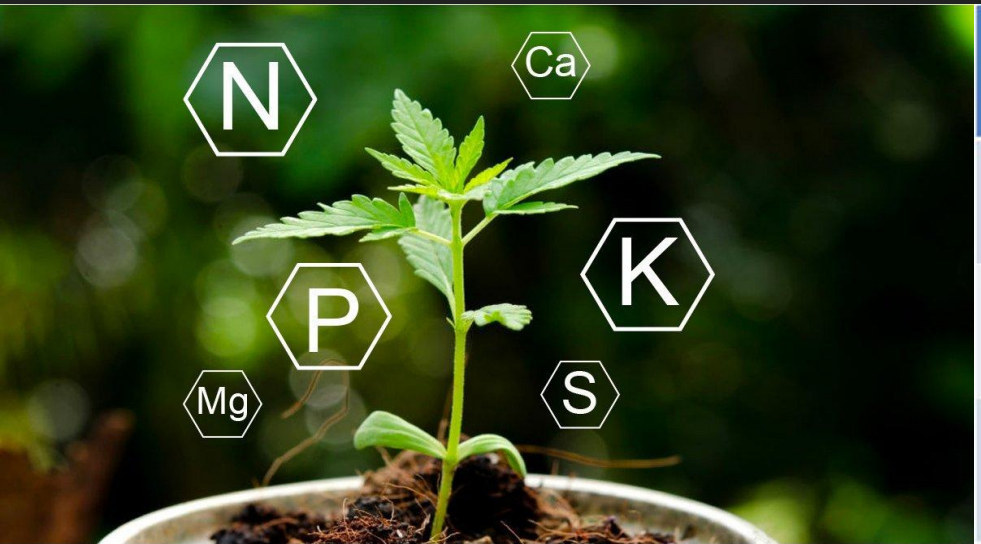

Module 7
NUTRIENTS

Nutrients - Introduction

All the nutrients needed for cannabis plant development are naturally present in the environment. However, to help your plants develop even faster and produce a better end product, you'll want to feed them with **fertiliser—concentrated nutrients.**

In this module, you'll find all the information you need to know about when, how, and how much to feed your cannabis plants.



Optimal NPK Values for Growing Cannabis			
Life Stage	**N**	**P**	**K**
Vegetative	High	Medium	High
Flowering	Low	Medium to High	High

Understanding Macro & Micro Nutrients

Cannabis plants require three nutrients in large quantities.

These **macronutrients** are **nitrogen (N), phosphorus (P)**, and **potassium (K)**, and they form the cornerstone of cannabis plant health. As such, these three nutrients usually feature front and centre on fertiliser products in the form of an **NPK ratio**. The higher the number for each value, the higher the concentration of that particular nutrient.

However, cannabis needs more than just three nutrients to survive and thrive. It also counts on **secondary nutrients** like **calcium**, **magnesium**, and **sulfur** to play vital roles in plant growth:

- **Calcium** is important for cell wall development, can help reduce soil salinity, and improves water penetration when used as a soil amendment.
- **Magnesium** plays a key role in photosynthesis and carbohydrate metabolism, and also helps with the stabilisation of plant cell walls.
- **Sulfur** is necessary for the formation of chlorophyll and the production of proteins, amino acids, enzymes and vitamins, and protects plants against disease.

Beyond this, plants also make use of several other nutrients in small quantities (**micronutrients**) that are nevertheless extremely important. These include **boron, chlorine, copper, iron, manganese, molybdenum, and zinc**. While these aren't the main nutrients plants use for food, they still play very important roles in various aspects of plant health.

Cannabis Fertilisers

NOT ALL CANNABIS FERTILISERS ARE MADE EQUAL
There are many different brands of cannabis nutrients on the market, and they can differ considerably.

Typically, cannabis fertilisers will vary in the four following areas:

Nutrient ratio: Different brands use different nutrient ratios they consider optimal.

Ingredients: Different fertiliser brands can achieve the same nutrient ratios using completely different ingredients, ranging from the most chemical (or “artificial”) to the most natural.

Soil or hydro: Soil nutrients are very different from hydro or soilless nutrient solutions. Make sure you only use fertilisers designed for your growing medium.

Supplements: Many fertiliser brands also make “supplements”. These products typically contain low NPK ratios and instead feature other nutrients designed to boost certain aspects of growth. Some supplements, for example, are essentially molasses.

In general, we recommend you focus more on meeting your plants' demands for macro and secondary nutrients before pumping them full of supplements. Going overboard with nutrients can result in chemical interactions or nutrient burn, which can significantly impact the size and quality of your yield.

Once you’ve nailed feeding your plants with these core nutrients, feel free to move on to a more complex feeding schedule to produce bigger, more potent harvests.

Nutrient Requirements for Cannabis Seedlings

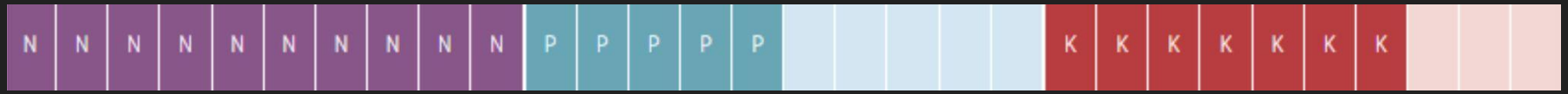
Cannabis seedlings get all their nutrients from their seed, and absorb water via their leaves as their root system develops (that's why it's important to keep them in a warm, humid environment).

You won't need to start feeding your seedlings until they're about 3–4 weeks old, at which point they'll have developed 3–4 true leaves, thus entering the vegetative growth phase.

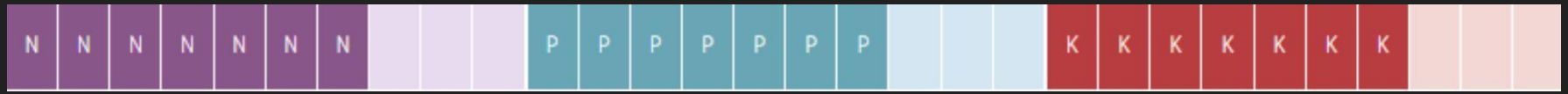
Nutrient Requirements for Vegetative Stage

Some growers opt to start their plants off on a light **2:1:2 fertiliser** (there's that NPK ratio) for one week just when their seedlings start to enter their vegetative growth phase. This step can be a great way to introduce your plants to their fertiliser and avoid nutrient burn. However, some growers see great results immediately starting their plants on a **4:2:3 fertiliser** to kickstart growth.

By the **mid-vegetative phase** (roughly 6 weeks after germinating), you'll want to aggressively increase your plants' nutrients to help them develop strong, healthy foliage. Most growers opt for a **10:5:7 fertiliser** by this stage.



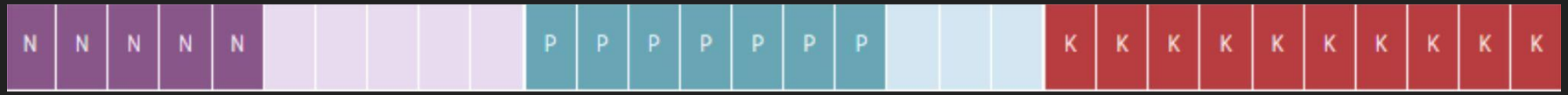
These heightened levels of **nitrogen will help your vegging plants produce luscious, green foliage and develop plenty of bud sites** in time for flowering. Towards the **end of the vegetative phase**, it's a good idea to start lowering your nitrogen levels and preparing your plants for the switch to their bloom booster. Most growers use a **7:7:7 fertiliser** in the last week of the vegetative phase



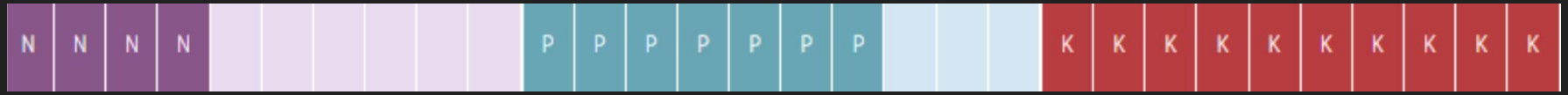
Veg feeding recommendations: • Early veg: 2:1:2 – 4:2:3 • Mid-veg: 10:5:7 • Late veg: 7:7:7

Nutrient Requirements for Flowering Stage

Flowering cannabis plants need less nitrogen and more potassium to promote the growth of big, resinous flowers. During the first two weeks of flowering, most growers feed their flowering plants with a **5:7:10 fertiliser.** From here on out, it's common practice to keep dialling up the nutrients on all fronts, always keeping potassium concentrations higher than the rest. By mid-flowering, most growers will be using a **6:10:15 nutrient solution**.



During the last weeks of flowering, growers will drive down their nutrients to smooth out the transition to the pre-harvest flush. By this stage, it's common to use a milder fertiliser with an **NPK ratio of 4:7:10.**



Flowering feeding recommendations:

• Early bloom: 5:7:10 • Mid-bloom: 6:10:15 • Mid–late bloom: 4:7:10 • Late bloom: pH balanced flush

How to prepare Cannabis Nutrients

A potential nutrient slip-up, after all, can completely thwart your harvest. But feeding your cannabis plants can be very straightforward. Just follow these steps:

1. **Prepare your water.** If possible, heat your water to about 19 – 21 °C to increase absorption by the roots.
2. **Add your nutrients** according to the instructions on your fertiliser, and stir. Use a PPM or EC meter to get exact readings.
3. **If necessary, adjust the pH** of your feed using a nitric or phosphoric acid pH down supplement.
4. Once your PPM, pH, and temperature are right, **feed your plants and measure** your runoff using your PPM or EC meter to ensure your plants are taking up their nutrients properly.

THE IMPORTANCE OF PPM, PH, AND WATER TEMPERATURE

EC is abbreviation or **electric conductivity**, **PPM** for **parts per million**.

Both are used for a measurement of how much nutrients are present in your water or grow medium. To avoid over or underfeeding your plants, it's a good idea to ***always measure EC or PPM of your soil or grow medium to see if it still contains nutrients.*** If there are nutrients present in your medium at the time of your next feed, subtract your medium's values from values recommended by your feed chart to avoid overfeeding.

pH and **temperature** are equally important metrics when feeding your plants. If either is off even slightly, your plants might struggle to absorb their nutrients. Hence, whenever it's feeding time, **keep your nutrient solution at the pH suggested by your fertiliser brand and your water temperature at 19 - 21°C**.

Tips for better feeding

Embrace chelation

Most high-quality nutrients will contain chemical chelates. If you're an organic grower, you can use natural chelates like fulvic and humic acid to **help your plants better absorb mineral nutrients** like iron or zinc. Chelates work by surrounding positively charged nutrients with a negative or neutral charge, allowing them to pass through the plant pore barrier.

Try foliar feeding

Foliar spraying—spraying cannabis leaves with a fine mist—can be a **great way to tackle nutrient deficiencies or pests/disease**. It is also particularly effective for short-term feeding with secondary nutrients like magnesium or calcium, or micronutrients zinc, iron, and manganese.

Always flush

Nutrients are super important, but you don't want any of them leftover in your harvested bud. That's why it's important to **flush your plants with pH-neutral water for at least one week before harvesting**. Flushing forces your plants to consume any leftover nutrients they've stored, resulting in a clean, smooth smoke.

Nutrient Deficiencies

Just like us, cannabis plants require a varied and healthy diet to survive and thrive. They need the right amount of nutrients to fulfil important physiological functions, and if they lack just one piece of the puzzle, growth will slow down and yields may be affected.

Luckily, the cannabis plant does a pretty good job of communicating what it needs. If nutrient deficiency strikes, it often sends out a signal—wilting, discolouration, curled leaves—to inform the cultivator of what it requires.

Before we dive into how to prevent and fix each nutrient deficiency, they are a few important things you should know.

MACRO VS MICRO NUTRIENTS

Macronutrients are minerals that cannabis plants require in large amounts. These include nitrogen, phosphorus, and potassium. Just like fats, carbs, and protein form the cornerstone of the human diet, cannabis needs these important minerals in large quantities to carry out key processes.

Micronutrients are minerals and elements required in much smaller amounts. However, they are just as vital to plant health. These include iron, zinc, sulphur, boron, and others. Think of them like minerals and vitamins in the human diet. We don't need much of them, but without them, it wouldn't take long to fall ill.

MOBILE VS IMMOBILE NUTRIENTS

Learning the difference between mobile and immobile nutrients can help growers diagnose deficiencies more accurately.

Mobile nutrients are minerals that can be shuttled throughout the plant to areas that need them the most. For example, phosphorus stored in older fan leaves can be directed towards newer growth if a deficiency occurs. Therefore, deficiency of a mobile nutrient will first become noticeable in older growth.

Immobile nutrients remain locked in place and plants cannot redistribute them. For example, if a zinc deficiency takes hold, the signs will first show in the newer growth as the plant can't relocate its mineral stash.

Nutrient Deficiencies

NITROGEN

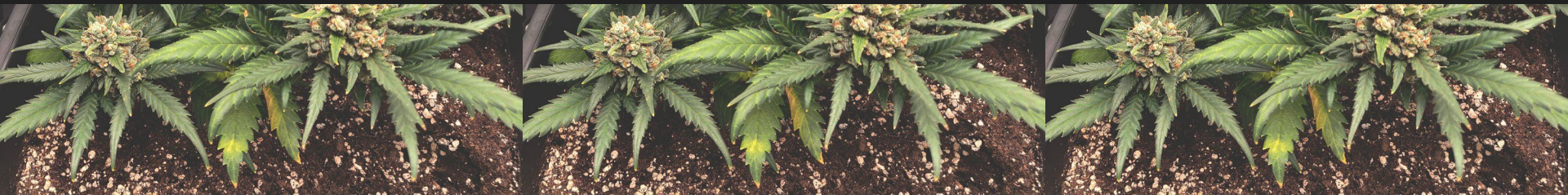
A mobile macronutrient, nitrogen plays a major role in photosynthesis and the formation of vital plant proteins. Nitrogen deficiency can result in yellowing older leaves, older leaves dropping off, eventual discolouration of the entire plant, and reduced yields.

How to prevent

- Keep pH within an optimal range (6.0–6.5).
- Start off with a nutrient-dense potting mix.
- Start composting to ensure a nutrient-dense medium in the future.
- Mycorrhizae are associated with nitrogen-fixing bacteria. Add them to your soil to boost nitrogen levels.

How to fix

- The majority of organic fertilisers contain enough nitrogen to fix the deficiency: Try fish meal, manure, alfalfa, or feather meal.
- Adjust pH accordingly.
- Apply compost tea as a foliar spray for a fast-acting solution.
- Increase the amount of nitrogen in your compost using kitchen scraps, fresh prunings, and grass clippings.



Nutrient Deficiencies

PHOSPHORUS

Phosphorus also acts as a macronutrient in the cannabis plant. Being a mobile nutrient, plants can direct the mineral to the areas that need it most. Phosphorus plays an essential role in photosynthesis and protein synthesis, and it's a crucial component of DNA. Phosphorus deficiency can manifest as red/purple stems, brown spots on leaves, and dry leaves.

How to prevent

- Utilise soil high in organic matter.
- Increase the absorption rate by using well-aerated soil.
- Use mycorrhizal fungi in your soil to improve phosphorus uptake. These microbes help to turn insoluble phosphates into available molecules.
- Add more manure to your compost.

How to fix

- Nudge pH up to the higher end of the spectrum—your plant will have an easier time absorbing it.
- Add worm castings and fish meal to your soil.
- Apply an organic fertiliser high in phosphate.
- You may be overwatering. Only water when the top 3cm of soil is dry to avoid making the medium overly compact.
- Move your plants to a warmer location or erect a tarp to trap heat. Plants find it harder to uptake phosphorus in temperatures below 15°C.

Nutrient Deficiencies

POTASSIUM

The third and final macronutrient. It helps to regulate CO_2 uptake and plays a role in photosynthesis. The mobile nutrient also helps in the production of ATP (the cellular unit of energy). Potassium deficiency appears as brown and yellow leaf tips and edges, curled-up leaves, and stretching.

How to prevent :

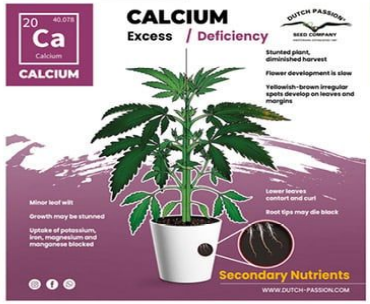
- Be careful when using fertilisers. Feeding your plant too often can cause salt to build up and interrupt potassium uptake.
- Bolster your compost with hardwood ash and kelp meal.
- Don’t overwater.

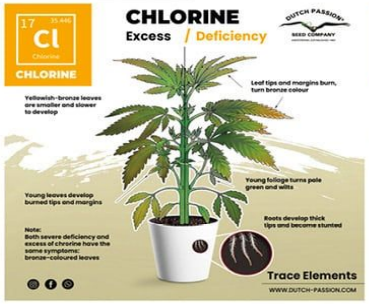
How to fix :

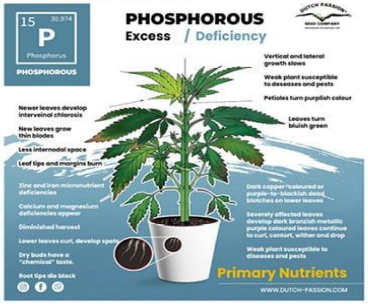
- Flush the medium.
- Measure and adjust pH to correct possible nutrient lockout.
- Add chicken manure to the soil.
- Apply organic seaweed as a foliar spray.

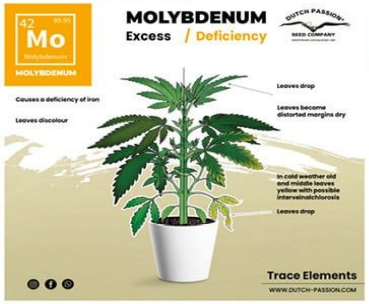


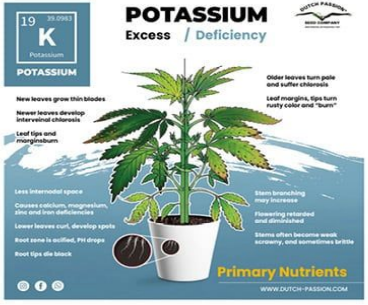
Cannabis nutrient deficiencies & excesses

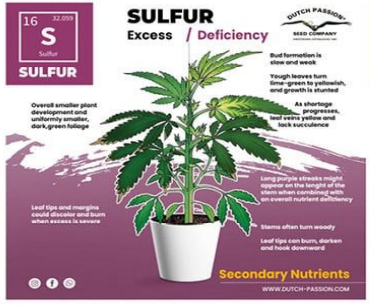


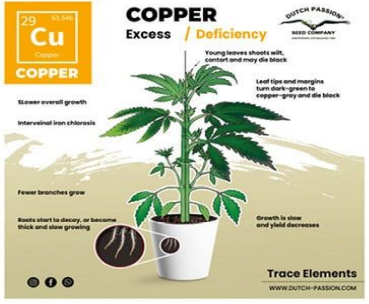












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Module 8
ORGANIC PEST CONTROL

ORGANIC PEST CONTROL

Pests of any variety can quickly become a mountain of stress for any home grower. While solutions such as synthetic pesticides and inert growing mediums can play a role in mitigating pest damage for those who choose to use them, for the organic grower these remedies simply will not do.

Fortunately, there are a variety of available solutions for organic growers to use in order to minimize damage and prevent pests from taking over a grow space. By incorporating organic systems into a gardening schedule, you can minimize the damage that pests can cause by controlling their populations down to a manageable degree, all without worrying about causing damage to your cannabis plants.

ORGANIC INTEGRATED PEST MANAGEMENT (IPM)

Integrated pest management (IPM) is a broad horticultural term used since the 1930s that essentially includes any system designed to control pest populations in order to minimize their overall damage output. IPM is a multidisciplinary reference that encompasses pest control solutions ranging from mechanical to biological and virtually everything in between.

Non-organic IPM solutions can include biologically engineered plants designed with modified genetics and synthetic insecticides, both of which can be incredibly effective at minimizing or even completely eradicating pest populations. However, because these pest control methods are counterintuitive to principles of organic farming, other options must be considered.

Thankfully, there are many effective organic pest control methods for organic home growers. Here are three examples of how you can incorporate organic IPM into your garden practices.

ORGANIC PEST CONTROL

Organic IPM Tactic #1: Foliar Sprays for Cannabis Pests

Once left to their own reproductive devices, pests can very quickly overtake a garden. Too often are gardeners left in a compromising position where they're forced to react to pest damage, only to find that it's already too late. With traditional non-organic IPM methods, synthetic and systemic insecticidal foliar sprays are frequently used to control and eradicate a growing infestation. However, foliar applications are not limited to synthetics and can be designed to only utilize biological resources in order to control and eradicate pests.

There are generally two directions one can take when building an organic IPM foliar spray. The first is to eradicate an existing pest population, and the second is for preventative measures.

For existing pest populations, the idea with a foliar spray is to introduce a biological solution designed to prevent reproduction. Once you have identified the pest, it's important to then use a biological control mechanism conducive to eliminating that particular variety.

Fungus gnats, for example, are a major pest problem that affect growers in droves. Possible biological pesticide solutions for fungus gnats include the biological larvicide "bacillus thuringiensis" (Bt-i), often found in ready-made organic foliar sprays. This bacteria essentially controls larvae populations without damaging the plant itself, and is an example of a specific biological remedy for controlling a specific species of pest. It's important to research which biological remedy will work for your specific pest problem before moving forward in your garden.

For those who want to use foliar sprays proactively in their garden, organic pest repellants may be used as well. Highly aromatic essential oils such as cinnamon oil, peppermint oil, or clove oil are all effective in deterring pests from taking an interest in your plant. These oils are generally safe for cannabis and can deter pests when used in manageable doses.

Since plants uptake nutrients through their leaves as well as their roots, incorporating IPM solutions into compost teas and other foliar applications is also highly effective.

ORGANIC PEST CONTROL

Organic IMP Tactic #2: Companion Planting Pest Control

Another great way to control pest populations in your garden organically is by companion planting. The idea behind companion planting is to build a dynamic ecosystem within your garden, where the presence of certain varieties of plants can be leveraged to protect your garden from potential hazards, pests included. By choosing to cultivate other varieties of plants either near or within the same growing medium as your cannabis, you can build an extra layer of defense against a variety of different pests.

For example, highly odiferous plants like lavender, basil, sage, and rosemary may be planted as a cover crop to your cannabis, effectively reducing pest traffic by making your grow space undesirable to pests. Thrips, aphids, and beetles are all examples of pests easily deterred by aromatic plants of this variety.

Companion planting may be much more readily available for outdoor growers who are cultivating in larger beds, but this shouldn't deter the indoor grower from utilizing this method within their gardens. Many plants grow small and compact in order to complement an indoor grow space. Marigolds, for instance, are a bright, colorful, and compact companion plant fantastic for lining cannabis pots. They not only grow beautiful and short, but are bright and attractive to pests that may otherwise be looking at your cannabis for their snack.

ORGANIC PEST CONTROL

Organic IMP Tactic #3: Predatory Mites for Controlling Other Pests

When the going gets tough, the tough organic growers get predator mites! Granted, predatory insect applications are *not* ideal for indoor growers who work in a tight space, but for outdoor and greenhouse growing, this method can be highly effective at eradicating existing pest populations when used correctly.

There are several caveats to consider when looking to purchase and unleash predator insects into your cannabis garden. The first is choosing the right tool for the job. For instance, Stethorus punctillum, a species of beetle that resembles a small black lady bug, is perfect for controlling spider mites. However, for fungus gnats, the soil predator Gaeolaelaps may be a better option because they not only eat other mites, but fungus gnats as well.

Additionally, there are many varieties of predatory insects and nematodes available, and choosing which one is right for your garden will come down to which one likes to snack on the pests you have.

Predator insects must be shipped and stored under optimal conditions in order to be effective, so it's incredibly important to find a reputable supplier that can get you your insects in tip-top shape; otherwise, you'll be wasting your money purchasing a pile of dead bugs to fight the living ones in your garden. When applying predatory insects, always follow the recommendations of your supplier, as not every application is the same across the board.

Between incorporating foliar solutions, companion planting and using predatory insects to home cannabis garden IPM schedule, the need for synthetic insecticides and chemical solutions can be effectively diminished. These three garden practices are not limited to organic only growers and can be incorporated into any garden. Whether you are confronting a head on infestation or attempting to prevent one, remember that organic pest management is a viable option to consider, especially when your goal above all is to protect the integrity of your precious cannabis plants.

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Module 9
TOPPING & TRAINING

TOPPING

To obtain higher yields, the most productive growers manipulate their plants into a low, wide, and flat canopy with multiple flowering sites at the 'same' vertical height. This allows a larger proportion of your plant to bask in the sweet zone, enjoying optimum light levels within a temperature range that is ideal for photosynthesis.

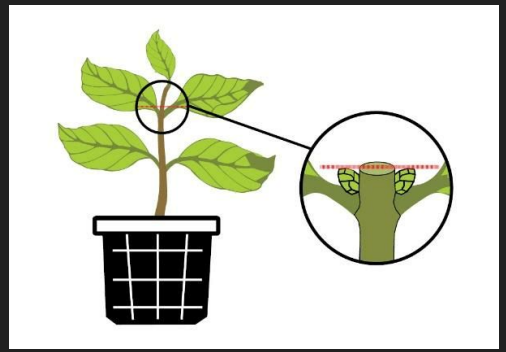

Fig 1. Topping above the second node. The two axillary buds highlighted will grow into two new branches.

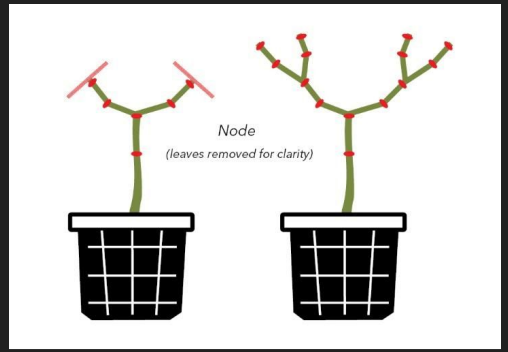

Fig 2.a. A second round of topping at the new second node. 2.b. Four resulting branches ready for low-stress training

Topping: When and How

Topping is best done when a cannabis plant is very young (less than two to three weeks old) and has only two to five nodes in total. Topping is the removal of the plants' top growth just above a node **(Fig 1).** Once topped, the two axillary buds immediately below the cut will then grow out into two new branches. Once these new branches grow out to one or two leaf sets (or nodes), they can be topped again **(Fig 2a)**. This second round of topping will grow out to form four evenly sized branches **(Fig 2b)**.

Important points for topping include:

1. Topping can be done more than twice, however, doing so will increase time in the vegetative phase. Test to see what is most productive. Some experienced growers will top up to five times (or more) to obtain 32 branches and can be well rewarded for their efforts.
2. Healthy cannabis plants usually take two to three days to recover from topping. After topping, do not remove the leaves from that node as these are needed to power growth of the branches from that node. Never top during flowering as it causes too much stress, which slows growth and inhibits yield. Do not top unhealthy plants. Also, avoid topping older, thicker growth as this takes longer to heal.

LOW STRESS TRAINING

After topping, there are four quality branches (or bud sites) growing vertically from what was originally the top node. LST involves pulling these branches downwards (to horizontal) and outwards (i.e. a "star" configuration) so that all four branches are spread apart from one another, horizontal, and at the same height **(Fig 3)**. The lower branches from the nodes 'below' where topping occurred are now also closer and more exposed to the light. As these grow up, they can be topped and manipulated using LST.

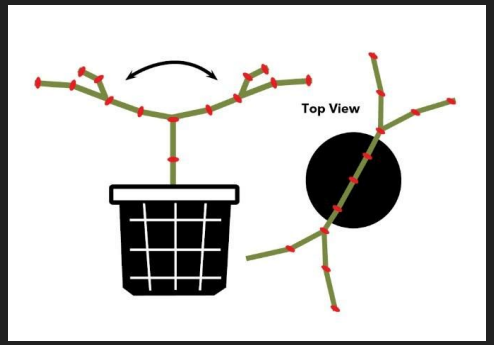

Fig 3. Low-stress training applied to the resulting four major branches.

Important points for LST include:

LST should be started as soon as possible during the vegetative phase. Flowering phase can commence once all major branches are horizontal and level with each other. Budding can be triggered by switching lights to 12-on/12-off. LST should continue during early flowering as vegetative growth continues. Maintain a flat, level branch structure. Vegetative growth will eventually stop when the plant is putting most of its energy into flowering. Minimal adjustment is required after this point — apart from keeping shade away from key areas. It can be beneficial to remove small, lower growth as this helps improve ventilation through the canopy and prevents infestations or infections due to foliage being in contact with soil.

Young growth is easier to bend than older growth. Also, some cannabis strains are easier than others. Do not rush to get branches horizontal; do this in stages. When a branch is first bent, growth will be slowed. Foliage will re-orientate towards the light, then eventually start to grow. LST again once it grows another three inches or so.

Fig. 4 - A screen or netting can be used to low-stress train branches outwards as they develop.

How to secure branches during LST:

Adopt a method that is strong enough to support the plant during flowering and allows access to manage the growing plants, conduct cleaning, and other maintenance. Some prefer gardening wire or landscape stakes. This method is effective during the early growth stages soon after topping. Branches can be held in place with wire that is anchored to screws in the pot, or some other structure. As the plant grows the wires need to be tightened, however, ensure the main stem remains vertical.

Others prefer screen or netting. A square or rectangular frame needs to be securely erected with either netting stretched over it or create a grid pattern using string woven through eyelets that are screwed into the frame. The holes in the grid or netting need to be at least 2×2 inches. Depending upon the species, the screen is normally mounted low enough (approximately one to one-and-a-half feet) from the plant's base so all the lower branches can grow up to the screen and gain access to direct light **(Fig 4)**. As the plant grows, the growing tips need to be lowered back under the netting and directed into the next empty space in the screen.

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95 Module 9 - Topping & Training

96 Topping

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Module 9

FLOWERING STAGE

FLOWERING STAGE

When the light cycle provides your cannabis plants with longer hours of uninterrupted darkness, they enter the flowering stage. Your plants will stop growing and instead put their energy into producing buds (flowers). Outdoors, this will normally happen when the days get shorter around the end of summer.

For most cannabis strains, the **flowering period will last about 7-9 weeks,** although some sativas require even longer for their buds to mature.

What happens during flowering and at what exact time can somewhat vary depending on the particular strain you are growing. So don’t expect your plants to follow this schedule to the T; see it more as a general guideline that you can go by. Let us look at the flowering phase of cannabis week by week.

FLOWERING (WEEK 1)

Week 1 (Transition Stage and Stretch)

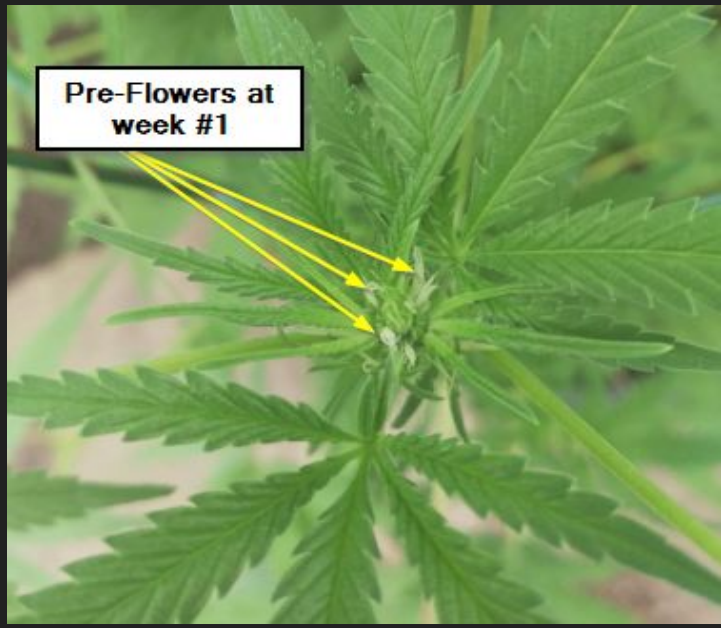
In the very first weeks of flowering, your cannabis plants will be in the transition stage. Thinking that winter is not far away and that she will soon have to carry a big load of bud, your plant will likely grow rapidly. Some strains can almost **double in height during this time.** Because of the fast growth that your plant is undergoing now, this early flowering phase is also known as the stretch phase.

While your plant is putting in quite some overtime to gain size and height, she will grow a number of new leaves mostly at the top of the main colas. Your cannabis plant is busy growing “green stuff,” like leaves and stems so she can become stronger and sturdier.

Important things to know in this early stage of flowering.

Although your plant has officially entered the flowering phase, **she will now have an increased need for growing nutrients.** You should not abruptly change your nutrient schedule and use flowering nutrients from one day to the next. It is usually recommended that you continue to give growing nutrients for at least one more week once flowering starts.

With the stretching of cannabis in early flowering, **you may possibly want to think about training techniques** such as low stress training (LST). This is where you bend the stems down and away from the centre of the plant so you can get an even canopy for a more efficient use of your grow lights. This can help you obtain much better yields later on.



FLOWERING (WEEK 2-3)

Week 2

In week 2 of flowering, you may spot the first white pistils growing on your female cannabis plants. These fine and wispy white hairs will develop at those locations where the big fan leaves meet the main stem. It is these fine hairs that will later become buds.

If your cannabis plant happens to be a male, it won't grow these "hairs," but will instead grow small pollen sacs. Should you grow regular, non-feminized plants where you don't know their gender, now is the time when you should "sex" your plants so you can separate the males from the females. The males won't grow buds and will also pollinate your females, causing them to grow seeds. This is something you do not want to happen.

To properly feed your plants once they start to flower and to initiate the first signs of growing buds, you should check your nutrient manufacturer's schedule. It is normally around this time at week 2 where you will have to increase flowering nutrients to help your plants reach their maximum yield potential.

Week 3

Your cannabis plants have still not entirely stopped growing and will now be about 50% bigger than what they were just three weeks earlier. Although still stretching a bit, the stretch will now gradually slow down and soon come to a complete halt.

At the locations on the plant where you previously saw some hairs, you can now see the first signs of real buds developing. There still won't be many resin glands and trichomes on your plants, which means that the smell won't be too pungent yet either.

This phase of flowering where your plant is starting to spend increasingly more energy on growing flowers is particularly critical. Make sure that the nutrients you give are appropriate and check the labels for the recommended dosages.

As your plants become more picky, you should check for potential deficiencies that could manifest in various ways, such as discoloured, yellowing leaves or loss of leaves entirely. At the same time, you should also check your plants for signs of possible overfeeding ("nutrient burn") that could show up around this time as well. Nutrient burn will usually show in the tips of the leaves becoming discoloured. If this happens, you need to cut down on feeding.

FLOWERING (WEEK 4-5)

Week 4

At week 4 of the flowering stage, your cannabis plants will likely have stopped growing altogether and are now spending all their energy on growing buds. There will still be white hairs sticking out from the buds, but the buds themselves will become bigger and fatter with each day. With more and larger buds growing, your plants will now produce more trichomes, making the odour a lot more noticeable at this stage.

Since your cannabis plant will have stopped growing, you won't have to pay attention to training your plants any longer. Where you bent down branches before, now you may possibly consider holding them up should they require structural support.

Week 5

In week 5 of flowering, you can observe the buds all over your plant becoming thicker. You may also spot new buds growing in new places such as along the main cola. With buds abounding, your cannabis plants will get fatter every day. This is a surefire sign you are in full flowering mode. At this point, your plant will have a very intensive odour. Ensure that you have a good ventilation system in place if you grow indoors or in a region that doesn't allow for legal cultivation.

Some of your cannabis plants' previously white pistil hairs may now be turning darker into a brownish or amber colour. At the same time, when you check the trichomes of your plant, you may spot some of them becoming opaque. The trichomes becoming milky white and the hairs turning darker are all signs of your plants not being too far from harvest.

FLOWERING (Weeks 6, 7 and 8 (Late Flowering Stage, Right Before Harvest)

Not all cannabis strains require the same amount of time for their flowering, but many varieties will be ready to harvest in these last three weeks. There are, however, not too many strains that will be ready before week 8.

Flushing Your Cannabis Plants

Depending on the flowering time of your particular strain, the time for flushing your cannabis plant is normally two weeks before harvest. When you "flush," you stop administering nutrients and give the plant only plain, pH-balanced water in these final weeks. This will get rid of (flush out) salts and minerals in the soil which will make for a better and more pure-tasting bud. Otherwise, your smoke will be quite harsh and can have an unpleasant, chemical taste.

Check Your Plants For The Right Harvest Time

To find out when it's time to harvest your plant, you can use a jeweller's loupe or a small microscope to regularly check your plants' trichomes. You can observe whether the trichomes turn from clear to a milky white colour. If many of the trichomes you see are still clear and transparent, it means it's still too early for harvest. But when most of the trichomes have an amber colour and an opaque clarity, this means that the THC content of the buds is at its maximum and the plant is ready for harvest.

FLOWERING TIPS

Sexing Your Plants
Most growers identify the sex of their plants in the final week of vegging or the early weeks of flowering. Remember, males develop pollen sacs that look like small balls, and need to be culled or separated from your females if you want to avoid them getting pollinated.

Also, keep an eye on your female plants as they flower to catch any hermaphrodites. While it's not common, some cannabis plants may develop both female and male flowers, while others may develop stamen (colloquially known as "bananas") as a final attempt to create seeds in response to heavy stress.

Fix Problems Before Flowering
If you're an indoor grower, you have the advantage of controlling when your plants start to flower. Make sure to use this to your advantage and only ever flip your plants to flowering when they're 100% healthy. You don't want to be correcting nutrient deficiencies or fighting pests and diseases while your plants are budding.

If you're growing outdoors, you have less control over when your plants start to flower. Instead, you'll want to pay close attention to the calendar and fix any issues before the end of summer.

Make The Transition Into Flowering As Smooth As Possible
Flowering plants require different humidity levels and temperatures than vegging plants. Rather than changing the temperature, humidity, and light cycle at the same time, we recommend gradually changing the temperature and humidity over two days, then letting your plants grow accustomed to these changes by leaving them in veg for just a few extra days before flipping your lights.

Don't Transplant Close To Bloom
Transplanting shocks your cannabis plants. Always avoid transplanting right before or during the flowering phase to avoid damaging your yield potential.

Trim Excess Foliage
Before flowering, make sure to train and trim your cannabis plants a bit to allow as much light as possible to reach its bud sites. Now, every grower has their own approach to trimming, but we like Kyle Kushman's recommendation: "If the tip of a branch doesn't break at least 50% of the height of the plant, it's gone". The idea here is to help your plant concentrate its energy only on the bud sites that'll produce the best product.

Also, remember to always trim yellow or dead foliage during flowering. While your plants should stay lush and green up until about week four, some of their foliage will stop thriving as they devote more energy to bud production. This is completely normal, and you can safely remove any leaves that turn yellow or dry out completely.

FLOWERING TIPS

Keep Humidity At 45%
Bud rot is a serious issue that can ruin an entire harvest. To protect your plants and optimise their growth, keep the relative humidity of your grow room at 45%.

Closely Monitor Temperature
Flowering cannabis plants like daytime temperatures of 20–23°C and nighttime temperatures of around 15–18°C. Make sure to watch out for sudden drops or spikes in temperature when you turn your lights on/off. Sudden drops can shock your plants, while sudden rises can cause condensation to form on the surfaces of your buds, leading to bud rot.

Avoid Nutrient Burn
You can’t compensate for nutrient burn during flowering. Make sure to follow a strict feeding calendar and remember to stop feeding two weeks before harvest and flush your plants.

Support Heavy Buds
It’s not uncommon for flowering plants to buckle under the weight of their buds. Use bamboo stakes and string to support heavily loaded branches and ensure they get as much light as possible.

Avoid Light Burn
Like with nutrient burn, you can’t compensate for light burn during flowering. Remember to keep your lights a good distance from the top of your canopy. Light burn not only damages healthy foliage but can cause calcium deficiencies in the early flowering phase. If the tops of your plants start to bleach during flowering, it's likely you need to lift your lights!

Use Fulvic Acid During Preflowering
Using fulvic acid in the late veg/early bloom phase can help increase the size of your buds early on. Also, remember to give your plants more calcium during bloom in both hydro and soil setups.

References

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101 Flowering Week 1

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99 Module 10 - Flowering

100 Flowering Stage Introduction

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103 Flowering Week 4-5

104 Flowering Week 6, 7 and 8

105 - 106 Flowering Tips

Module 11

HARVESTING CANNABIS

HARVESTING CANNABIS

WHEN IS THE RIGHT TIME TO HARVEST?

The first step in the harvest process involves removing flowers and branches from your plants. But when is the right time to do this? Well, it depends. Harvesting at different times will drastically alter the characteristics of your flowers. Everything from taste to psychoactive effect can be modulated depending on how early or late you choose to harvest.

In general, every strain has its own estimated flowering time. This statistic can be useful in preparing for harvest, but it's not always accurate. Environmental factors can extend or shorten the blooming phase. Indica strains mature faster and will flower for 6–8 weeks, whereas their sativa counterparts typically take 8–12 weeks.

There's another way to detect when harvest is closing in. Some basic knowledge of plant anatomy can help growers spot these shifts. Certain parts of the cannabis plant begin to change in appearance as they ripen. Rather than relying on guesswork alone, you can use these botanical landmarks as indicators. First, you'll need to get familiar with certain tissues, glands, and organs, so you know what to look out for.

HARVESTING CANNABIS

FAN LEAVES WILL START TO YELLOW

Yellow leaves are usually a sign of nutritional deficiency or the presence of a pathogen. However, they are perfectly normal during the end of flowering. Fan leaves are the large, broad leaves that emerge during the vegetative phase. These organic solar panels work to convert light into sugars required for energy. These structures will begin to turn yellow and may even drop off when harvest time is approaching. Don't be alarmed. This happens because plants are disregarding these tissues to divert as much energy as possible toward the flowers.

TRICHOMES BEGIN TO CHANGE IN APPEARANCE

Trichomes are the tiny, mushroom-shaped glands that can be seen shimmering on sugar leaves and flowers. These small chemical factories churn out cannabinoids and terpenes in the form of a viscous resin. In nature, these substances protect plants against heat, predators, and pests. But to growers, this resin is the primary reason for cultivating weed.

Monitoring trichomes is an accurate way to detect how close your flowers are to becoming fully ripe. Doing so will also give growers the freedom to harvest flowers at a time that suits their individual preference.

Trichomes are apparent to the naked eye, but you'll need to use a magnifying device to properly analyse them. A cheap magnifying glass will do the trick, and is the tool of choice for many budget growers. Green-fingered photographers can take a snapshot with a macro lens. This will also enable them to track colour change over time. Commercial growers and those with more cash to spare can opt for a microscope. These lab-grade devices offer an extremely detailed view of trichome structure and colour.

Trichomes appear clear and translucent during the early stage of flowering. This indicates that they are still young and will only be producing low levels of cannabinoids. Flowers will also be physically smaller—an obvious sign that it's not yet time to harvest.

Later down the line, these glands begin to become more cloudy or milky in colour. This change in complexion signifies increased cannabinoid production. Keep a close eye on these structures as this milky colour begins to dominate. Trichomes will reach maximum THC production when over half of the glands have become cloudy. Buds harvested during this time will provide a potent head high defined by euphoria and increased energy.

If you prefer a more mellow and sedating experience when you smoke, wait for the trichomes to display an amber colour. This indicates decreased levels of THC and increased amounts of CBN, a cannabinoid produced as THC degrades.

TRIMMING CANNABIS

Most growers agree that harvest time is the most rewarding part of the growing cycle. After months of raising your seedlings into mature, bud-laden plants, you're finally able to sample the fruits of your labour!

However, you still have work to do; you'll need to properly prepare your flowers for drying, curing, and storage. Do it correctly, and you'll have buds that look, taste, and smoke better. Trust us; it's worth your time and effort.

A key step, of course, is trimming the sugar leaves off your buds after clipping branches off the plant. Remember those pristine and nugget-like buds at your local dispensary or coffeeshop? Those are the result of manicuring—another word for trimming. Moving past aesthetics, these buds will also smell better, smoke better, and stay fresher after a good trim.

Let's dive deeper into why you should trim your harvest, and consider different techniques used to get the job done.

TRIMMING CANNABIS

WHY SHOULD YOU TRIM CANNABIS BUDS?

Trimming those sugar leaves off will help ensure your flowers are free of mould and excess plant material. If you need more convincing, let's break down the main reasons to trim.

AESTHETICS

Taste, aroma, and effects are the most important aspects of cannabis. However, looks don't fall far behind. After all, nothing feels as good as pulling pristine, manicured buds out of a stash jar. Trimming your flowers will transform them from rugged nugs into those worthy of a spot on the top shelf.

AROMA

Every strain offers a unique blend of terpenes that underpin its aroma. With the sugar leaves out of the way, terpenes will be that much more front and centre. Trim at the right time so you can avoid dislodging too many trichomes—the glands that produce these aromatic molecules.

SMOOTH SMOKE

Lingering sugar leaves are harsh on the lungs when smoked, and they have far less THC, so it's best to toss them aside. Once you trim your buds, they'll hit as smooth as the best you'll find in the dispensary.

TRIMMING TOOLS

CURVED TRIMMING SCISSORS

To start, any grower will tell you that curved trimming scissors make both harvesting and trimming so much easier. The rounded blades fit perfectly around the base of buds, allowing you to safely snip them off the branches.

They also cut flush against the natural curve of cannabis buds, allowing growers to remove sugar leaves without damaging flowers. Trimming plants can wear down your hands, though, and calluses are common. Thankfully, these scissors feature a comfortable PVC grip and spring resistance to help counter those issues.

ROLLING TRAY / COLLECTION TRAY

You'll also want to trim your flowers over a collection tray so you can save the sugar leaves for later. If you don't know where to start looking, our line of rolling trays feature vivid designs and raised edges that will prevent spillages and mess. You also have the option of selecting your favourite colours and sizes.

SUITABLE STASH JAR

Where do you plan on putting all of that processed bud? You can't leave it lying around on your coffee table! You'll need something airtight, spacious, and convenient. T

WET TRIMMING

Wet trimming refers to cutting away sugar leaves immediately after harvesting your flowers. Because they still hold a lot of water, the flowers remain wet and ultra-sticky.

1. Harvest your buds

Cut each branch near the node using your curved trimming scissors. Each branch will hold several buds. Keep them attached to the branch during trimming to make your life easier. Place your bud-laden branches into a large jar or bucket until you strip the entire plant.

2. Collect your tools and prepare your hands

Gather your scissors and tray, turn on a podcast, and drink some coffee to help you plough through the task ahead. Wash your hands and dry them well. Then, put on a pair of latex gloves to prevent your hands from getting caked in resin.

3. Trim

Pick up each branch, one by one, and use your curved scissors to carefully cut away all of the small sugar leaves on each bud. Many growers like to start at the base and work their way upwards in a circular fashion to ensure even, rounded edges. Some of the sugar leaves will be almost entirely concealed by the body of the bud. Remove as much as possible without damaging the flower. There will always be traces of sugar leaves left behind—don't worry!

4. Drying and curing

Of course, you'll need to dry and cure your manicured buds before you blaze them up. Place them on a drying rack in a lightly heated room with a fan. Once dry, remove individual buds from their branches before placing them into jars for curing.

DRY TRIMMING

Dry trimming, in contrast, takes place between drying and curing. Dry buds are much less sticky, but a little more tricky to trim. Here's how to do it.

1. Harvesting and drying

Cut your plant at the base, and hang it upside down in a warm room with a fan.

2. Processing

Once completely dry, cut off each individual branch and set them aside for trimming.

3. Collect your tools

Get comfy, put on a podcast, and grab your scissors. Wash your hands and put on a pair of gloves here too.

4. Trim

Once you're settled, cut away all of the sugar leaves from each bud. Use your scissors to cut each bud away from the branch, one at a time. This will make them easier to cure and store.

5. Start the curing process

Load your buds into their curing jars for smoother hits and better flavour.

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115Dry Trimming

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Module 12

DRYING & CURING CANNABIS

DRYING & CURING CANNABIS

What's The Difference Between Drying and Curing?

Drying, as the name suggests, involves drying fresh buds so they contain less moisture and can be smoked or vaporized properly. Curing, on the other hand, involves storing your buds in closed containers over a period of at least two weeks. This helps develop the flavour and aroma of your buds as they mature.

Why Do I Need To Dry And Cure My Cannabis?

Drying your cannabis flowers serves several important functions that ultimately increase the quality and shelf-life of the end product.

Freshly harvested cannabis buds contain a significant amount of moisture, which needs to be dealt with before smoking. Why? First, smoking fresh buds serves up harsh hits with little flavour—if the buds are able to ignite at all. Removing moisture helps to tone down the harshness and let the terpene profile shine. Second, fungi thrive in dark and moist conditions. By drying your flowers correctly, you'll dramatically reduce the chances of mould striking your stash.

By placing individual buds on a drying rack—or hanging entire branches in a drying room—you'll reduce the water content of your buds by 10–15%. This process removes water from the outer layers of each flower, but you'll need to cure your stash to rid moisture from deeper within the buds.

Curing is super important because it helps preserve your weed so it can be stored over time—while still retaining its unique flavour and maximising potency. When you harvest your buds, they contain excess sugars and starches that eventually come under attack from airborne bacteria and enzymes. By curing your buds, you actually encourage the degradation of these nutrients, making for a smoother, better-tasting final smoke.

DRYING & CURING CANNABIS

After I've Harvested And Trimmed, How Do I Best Dry My Buds?

In order for your buds to dry evenly, you'll want to ensure that air can move freely, coming into contact with them on all sides. The best way to do this is to string up your cut and trimmed branches, or to use wire racks if you're working with individual buds or small branches. If you choose to use racks, keep in mind that you'll need to flip your buds regularly to ensure they don't flatten on one side.

What Humidity Level Should You Aim For When Drying Cannabis?

For best results, you should hang or otherwise position your trimmed buds in a dark room with good air circulation and a relative humidity of about 45–55%.

When Do I Know My Buds Are Properly Dried And Ready To Cure?

There's a simple test to know if your buds are dry: Simply take a small branch and try to bend it. If it snaps, your buds are dry and you're ready to move on to the curing process. If they bend, your buds need a little longer to dry.

How Do I Cure My Buds?

If you trimmed your buds wet, you'll be ready to move on to the curing stage as soon as your buds have dried. If you choose to trim dry, on the other hand, you'll want to do this before moving on to curing.

Once your buds are dry and trimmed, place them in big, wide-mouthed jars (mason or jam jars work great). Fill the jars about ¾ of the way so there's room for additional air, and to reduce the risk of mould or mildew ruining your harvest. Once you've filled up your jars, store them in a dry, dark environment (like a kitchen cupboard) and check on your buds at least once per day for two weeks.

DRYING & CURING CANNABIS

During this check-up, keep your jars open to allow for air exchange, and inspect each bud individually for signs of mould. If you find an infected bud, make sure to remove it from its jar immediately to avoid the fungus spreading.

This process of consistently checking in on your buds will pull excess moisture out of your jars and allow fresh air to hit your buds. After about two weeks, you can start enjoying your harvested weed, but the longer you wait, the better.

DRYING & CURING CANNABIS

What's The Best Humidity Level For Curing Cannabis?

You should aim for a humidity level of around 62% when curing your flowers. This increase in moisture content will slightly re-hydrate your flowers, improving their taste and smoothness while still preventing mould formation.

How Long Does The Curing Process Take?

Most growers will cure their weed for around a month; however, curing for 4–8 weeks will really get the most flavour and aroma out of your buds.

How Do I Best Store My Buds Once They Are Dried And Cured?

Once you've finished your cure, you can keep your bud in the same jars, in a cool, dark, and dry place. You no longer need to check on your buds as frequently, so make sure to keep your jars well-sealed to prevent your flowers from drying out too much. If you have a lot of weed, consider investing in humidity packs or something similar to keep your flowers fresh over long periods of time.

References

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Information obtained from Royal Queen Seeds