

## Growing Consensus Synopsis Paper

### Should Fan Leaves be Trimmed?

There are a number of theories why fan leaves should or should not be removed. The purpose of this paper is to analyze cannabis cultivation techniques that advocate for and against fan leaf removal. A summary of each theory is presented, followed by a review of fan leaf function. The different theories advocating for and against the removal of fan leaves are then discussed in the context of fan leaf function and cultivation techniques.

**THEORIES WHY TO TRIM FAN LEAVES**

**Increase Lower Bud Development** The fan leaves shade lower buds and that these buds do not develop to their full potential because of a reduction in lighting intensity due to shading from upper fan leaves. To conserve energy for upper bud development trimming fan leaves and lower, shaded branches focuses the plant's development on main top buds (Che Bleu, 03.13.2002). A plant wastes precious energy several ways. A tall plant needs to use energy to build extra stem, and then use extra energy to move water up higher, this is why I believe "scrog" methods are productive. An untrimmed bushy plant causes the plant to expend energy to build elaborate branches and leaves, and then has to use excess energy to supply all these structures. Careful trimming to remove unnecessary branches (which won't produce nice buds) and unproductive suckers will leave more energy for a larger yield. Suckers do exactly as their name suggests, they suck needless energy from the plant which can be put to better use, towards yield (Leaf, 03.13.2002).

**Reduce the Stretch** If fan leaves are trimmed during the early flowering stage, the stretch is reduced (Che Bleu, 03.13.2002). Reducing the stretch might be advantageous in certain cultivation conditions.

**Speeding Up The Flushing Process** Remove some of the fan leaves 14 days before harvest. It helps speed up the flushing process and or makes flushing unnecessary (HomemadePot, 03.13.2002).

**Reduce The Chance of Mould** Removal of dead fan leaves is necessary to reduce the risk of mould. Failing to "clear the airway" can lead to development of mould in the "crowded" areas of the plant (Jeast, 03.13.2002). Scrog growers may also reduce the chance of mould by removing fan leaves due to reduce the level of transpiration. This is because many scrog grows are in a confined space where humidity is a serious problem (DoctorDangerous, 09.04.2002). However with better ventilation it may be necessary to avoid the mould problem (Nietzsche, 09.04.2002).

**Increase root development on Clones** Fan leaves on clones should have their blades cut in half, to make the clone grow slowly while a root system develops (Weezil, 03.12.2002).

**HOW DO FAN LEAVES FUNCTION**

The large fan leaves have a definite function in the growth and development of cannabis. Large leaves serve as photosynthetic factories for the production of sugars and other necessary growth substances. Most cannabis plants begin to lose their larger leaves when they enter the flowering stage and this trend continues on until senescence (death of the plant). Fan leaves account for the greatest area for the reception of photons on a plant, thus they account for the majority of photosynthesis which occurs within a plant. Cells in the plant's leaves, called chloroplasts, contain a green pigment called chlorophyll which interacts with sunlight to split the water in the plant into its basic components. Leaves only absorb about 15% of the solar energy that hits them, the other 85% passes through-- but they reflect all the green light, which means it looks darker below the leaf to a human than it does to the plant because our eyes are most sensitive to the green spectrum (Shipperke, 03.15.2002). Photosynthesis occurs in all green parts of plants. The process has two stages, the light reactions and the Calvin cycle, that convert water and carbon dioxide into sugar and oxygen. These sugars are later used to power all the processes in the plant, including the synthesis of THC and other cannabinoids (Shipperke, 04.02.2002; Ca, 03.13.2002). Fan leaves possess the greatest number of stomata, which are small pores or valves on the underside of the leaf which water vapor and carbon dioxide diffuse during transpiration and photosynthesis (carbon fixation). Carbon dioxide first enters the leaf through the stomata and combines with the stored energy in the chloroplasts through a chemical reaction (the Calvin cycle) to produce a simple sugar. This sugar is unloaded into the tissues and transported through tubes in the leaf to supply the synthesized food to other plant parts such as growing or respiring tissues like young leaves, roots, and flowers of the plant. meristems (UK Tricky Knome, 03.14.2002). Removal of fan leaves will not only slow growth, but it will also hinder the plant's ability to rid itself of toxic gases, and also hinder the regulation of the plant's temperature via stomata. Changes in the plant's chemical metabolism caused by fan leaf removal causes the plant to work overtime to rid "toxins" with less leaves, as a result the plant may allocate more growth hormones into growing more leaves to make up for what has been lost (Equator, 03.15.2002). Removing large amounts of fan leaves may also interfere with the metabolic balance of the plant. Leaf removal may also cause sex reversal resulting from a metabolic imbalance.

There is a relationship regarding the amount of carbohydrates a leaf produces and CO2 intake relative to outside forces. When you have a situation whereby the leaf is no longer productive for the plant for whatever reason that may be - low light, old age, disease, insect attack etc, the plant will discard it. (Thunderbunny as cited, by Nietzsche, 03.13.2002). Plants have two different kinds of vessels in their stems to move stuff around, xylem and phloem. Xylem runs from the roots up the stem carrying water and nutrients. Phloem runs both up and down to move sugars hormones, proteins, etc but mostly sugars. Each part of the plant can be either a sugar source or a sugar sink (Shipperke, 03.15.2002). Phloem moves from sources (areas of supply) to sinks (areas of metabolism or storage). Granted that the flowers can produce some photosynthate, but they are nowhere near as effective as fan leaves (resin glands significantly reduce light to the tissue they are found on). Flowers are sink tissues, leaves are source tissues. Sinks do not produce enough photosynthate, and are importers. Sources give photosynthate to sinks in closest proximity. Upper

leaves bring sucrose to shoot apical meristem and young leaves while lower leaves bring goodies to roots (UK Tricky Knome, 03.17.2002). Remove the source and the sink will be affected (Diels Alder, 03.15.2002). The leaves at the top of a plant tend to supply the top growing shoots. The leaves at the bottom of the plant tend to supply the roots. The middle leaves can go either way as the demand changes. During flowering and fruiting, only the very bottom leaves supply the roots and the rest of the leaves try to get as much energy as possible to the flowers or fruits. For this reason, the more leaves are unshaded and in good light, the more chance the plant has of creating extra storage of energy that will ultimately go into yield (Leaf, 03.13.2002). However Jeast (03.13.02) believes that the rich green leaves emerging from the bud are a sufficient energy source of solar energy for the plant's floral development. Therefore the old fan leaves are once again rendered useless and only drain energy from the developing part of the plant (Jeast, 03.13.02). Fan leaves store mobile nutrients, these stored nutrients are essential in the later stages of flowering. When flushing a plant the fan leaves will lose their color quickly. This is because the nutrients are being mobilized to the atypical meristem (grow tip, bud site). Draining your fan leaves with a flushing period will increase floral development (Ca, 13. 03.2002). Fan leaves therefore serve as a nutrient deficiency buffer zone for the plant (Higstar, 03. 13.2002). Nutrient burn usually causes bottom leaves begin to die however DaGnome (03.15.2002) observed that if you do not remove the leaves then they will absorb damage as premature removal generally results in more leaf loss. However if growing hydroponically under ideal conditions it could be argued that fan leaves serve as a nutrient buffer is a moot point.

**WHEN AND WHAT TO TRIM IF AT ALL** To trim or not to trim that is the question. Try everything for yourself. Try it all ways. (The Crazy Composer, 13.03.2002). Simply put there is no universal answer it depends on how you are growing when where and what you trim (Cardboardbill, 03.13.2002) Genetic Variance Cannabis phenotypes play a large part. A strain with very few leaves and long internodes will need a lot less trimming - if a trimming technique is even adopted. A strain with a surplus of leaves and short internodes would require more thinning to get the same amount of light to the lower buds (The Crazy Composer, 13. 03.2002). Cannabis varieties from high sunshine equatorial areas like Thai Sativa have thin leaves most likely due to more light than say an indica plant from Afghan regions have wider fan leaves due to less light intensity in their natural environment (Lebman, 03. 20.2002). Remove non productive &quot;dead&quot; leaf material Here are some signs to look for when removing foliage. Leaves that have reached their final size and are ageing will stop producing chlorophyll and start changing to a lighter color, often yellowing and showing purple petioles (leaf stems). This is when the leaves' capacity to produce sugars starts to diminish, so they are the ones to take out of the way to allow Sunlight to fall on the younger leaves that are producing at a higher rate. The older leaves, even though larger, are no longer very productive once they are not dark green anymore. By the time they start looking pale or discolored, they are not contributing anything to the plant at all. Obviously, the lower leaves are the oldest and the first to age. Old leaves can be removed at any time they are shading younger ones, but try to never remove a leaf in its expanding stage because it is producing at full power (Leaf, 03.13.2002). Outdoors, fan leaves serve an additional and very important purpose of protecting the buds from the elements and predators. These leaves often become damaged in the course of doing their duty, and will then wither or break off (Jeast, 03.13.02). However depending on the humidity of the growing climate Leaf (03.13.2002) suggests to trim most leaves that show signs of age, are dull in color, yellowing, and obviously any brown or spotted leaves that have bugs or bug damage to prevent mould. To Increase Lower Bud Development Light efficiency decreases with distance. The inverse squared light rule states that illuminance is inversely proportionate to the square of the distance from the light source. Removing the largest area of photosynthesis that is closest to the light source simply to benefit smaller leaves growing out of the bud sites that are further away is not logical when growing indoors" (Smokinrav, 03. 15.2002). Cultivating outdoors under the sun, the fan leaves don't create nearly as much shade as they do indoors (~shabang~, 03.13.2002). This is consistent with the inverse squared light rule; the sun is 149,597,890 km away so a few feet has no real effect on intensity. This suggests that a trimming benefit could be achieved outdoors as opposed to indoors however leaves only absorb about 15% of the solar energy that hits them, the other 85% passes through except for green light which is reflected, therefore removal of fan leaves would only provide a 15% increase light transmission outdoors (Shipperke, 03.15.2002).

Jeast (03.12.2002) removes fan leaves that are yellowing or starting to yellow (these are usually on the lower stems) and also mid-stem fan leaves that are shading buds. He always try to retain the upper 2 - 3 sets of fan leaves indoors as he believe they are the ones that are truly "working". The concept of the upper fan leaves doing all the work is consistent with effect of the inverse square rule on lighting intensity indoors and the flow on effect for photosynthesis. In support for trimming HyGradeChronic (03.25.2002) states selective trimming benefits lower floral development, allowing the buds to fill out and tighten up better. However he does mention that humidity must be kept to a minimum as leftover stems from the leaf can develop mould unless kept at optimum humidity. Another flow on effect to leaf trimming mentioned by HyGradeChronic is that it takes seven to ten days longer for floral development to finish, but the resulting florescence is at it's peak from top to bottom. An alternative to trimming to increase light to lower floral clusters is to use a light mover on a single plant the results are better thanks to the better penetration of light at different angles. Even simple under lighting and side lighting works well to counter fan leaves by adding extra light where it would not normally get (Vapour, 03/13.2002). Increase upper bud development What folks need to focus on is the causes of premature leaf drop as that negatively affects yields. If you've read my posts over the years, I try to pound that issue home whenever given a chance. After a good root development, the most important element in floral production is the retention of healthy leaves (Thunderbunny as cited, by Nietzsche, 03.13.2002). Green Reaper (03.12.2002) suggests that large leaves actually take more energy to maintain than they produce. In contrast Thunderbunny (as cited, by Nietzsche, 03. 13.2002) states that when a leaf no longer serves a productive purpose, the plant will remove the leftover metabolites from the leaf, which causes the old spotty, yellowing, necrotic image and then the leaf drops. Once

that leaf is gone, a percentage of what would be available carbohydrates for future plant growth is diminished in direct relationship to the loss. The mobility of plants sugars and nutrients suggests that fully developed fan leaves are sources not sinks. Whether developing fan leaves are a sink or a source however is not as clear. An actively growing leaf may be a sink, using energy from the other parts of the plant to fuel their development (George, 03.20.2002). Older developed leaves and that are sources. However there is no evidence to support that during the plants life cycle the development of fan leaves takes more energy than a fully developed fan leaf provides, that is to say sink phase is greater than the source phase (Nietzsche). It would also seem illogical from an evolutionary point of view that a plant would evolve to produce leaves that take more energy to sustain then they produce (~shabang~, 03.13.2002). Trim fan leaves in the last 14 days to help speed up flushing It helps speed up the flushing process and or makes flushing unnecessary (Homemadepot, 03.13.2002). However the leaves should naturally yellow, too much green in the leaves translates to too much "green" taste in the leaves in my opinion (Bigislandbud, 03.14.2002). Reducing the Stretch If trimming fan leaves reduced the stretch it is likely that this occurred because it takes away from the plant's available energy stores and energy generators (~Shabang~, 03.13.2002). This method of reducing the stretch should only be used if absolutely necessary, other options include chemical treatment may be a more viable option.

**HOW TO TRIM IF YOU CHOOSE TO DO SO** If you decide to trim your fan leaves, one should always do it by clipping the petiole about halfway between the base of the fan leaf and the stem/branch. Allow the remainder of the petiole to dry up and fall off on its own. This will help protect the plant from risks of infections. They should never be stripped or broken off at the base of the petiole as that would be expose more chance of infecting the plant. Petiole is the the foot stalk of a leaf (10k, 03.16.2002) Leaf (03.13.2002) believes that excessive leaf trimming and branch pruning will cause the plant to use extra energy to repair itself. However, trimming must be done from time to time, for the longer a plant is left untrimmed, the more material must be removed at one time, therefore the greater the damage that the plant will need to repair. Do not trim fan leaves during veg either, unless they turn yellow. The first real pruning starts when going into 12/12 (Jeast, 03.13.2002). When trimming and pruning, I try to ensure that I do not cause the plant to 'bleed'. Leaf tries to pinch off shoots and leaves with my fingernails as opposed to leaving a clean cut. One thing to remember is every time you cut into any part of a plant, you are exposing the inside of the plant to fungus and bacteria (Leaf, 03.13.2002). Tuck instead of trimming Another method is to tuck your fans leaves under to expose the buds, don't forget that even though they wont be getting as much light they are still photosynthesizing and more importantly exchanging gases storing nutrients, and building sugars which the bud then converts into THC and other cannibinoids (Ca, 13.03.2002) This Synopsis paper, is a consensus of opinions compiled in the Overgrow Growing.