NORCAL SELECT BREEDERS GUIDE

A brief history of American *Cannabis*

Historically, the *Cannabis* strains prevalent in North America until the late 20th century, such as Acapulco Gold, Thai, Panama Red, and Colombian, were slender-leafed (so-called ‘sativa’) varieties, which trace their origins back to Indian ‘ganja.' The common misconception that groups 'ganja' with hemp and wild *Cannabis* under the broad classification of *Cannabis sativa*, is an oversimplification based on leaf-shape, not the actual genetics. It turns out leaf shape can vary dramatically in a single population of *Cannabis* and the trait isn’t useful for systematics (genealogical relationships). In reality, ALL medicinal strains, both thin and thick leafed, are more closely related to each other than either is to hemp or wild *Cannabis*.'Ganja' refers to THC-rich *Cannabis* strains that hail from the tropical regions of the eastern Himalayas, as well as the foothills and plains of southern Asia. These 'ganja' strains, like all ancient medicinal strains from the Old World, underwent selective breeding through eons of open pollination within extensive plantings, where male and female plants coexisted. This process gave rise to heirloom *Cannabis* varieties known as 'land races', which exhibit a wide range of variation and many wild traits, like hermaphroditism, that modern cultivation practices deem undesirable. The initial introduction of 'ganja' land races to the Caribbean, and subsequently to the Americas, was through Indian laborers who worked in the colonies of the British Empire in the Caribbean during the 1800s.

While these 'ganja' land races are notable for their high THC content, the flowers and leaves have a less-dense coverage of trichomes (glands responsible for THC and terpene production) found in the central Asian hash plants, which were specifically cultivated for making sifted hashish. ‘Ganja’ varieties are traditionally used for bhang and other edibles, and the process of making ‘charas,' a hand-rubbed *Cannabis* concentrate, involves these thin-leafed ‘ganja’-style varieties, yet their trichome structure is not ideal for producing high-quality hashish, which requires a specific morphology and is best suited to cold, dry environments. The quintessential hash plant strains from cold and dry places like Afghanistan have very distinctive short, broad leaves and a squat structure. They are often incorrectly referred to as a distinct species, *Cannabis indica* and it is common to call them ‘indica.’ These broad-leafed hash plants were domesticated in the Central Asian steppes and mountains thousands and thousands of years ago, and they were introduced into North America by the hippie movement in the late 1960s and 1970s. Throughout the following decades the ‘indicas’ were hybridized with the more common thin-leafed American 'ganjas' to develop the foundational strains of modern North American *Cannabis*, such as Skunk and Northern Lights. It is the introgression of traditional, potent ’indica’ genetics and the discontinuation of commercial land race ‘ganja’ importation that has driven the recent rise in average THC level more than modern selective breeding.

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For many years, North American *Cannabis* breeders operated in secrecy, confined to indoor spaces and hidden outdoor locations due to legal restrictions. However, the breeding techniques used in modern times significantly diverge from the traditional outdoor pollination methods. North American strains have been finely tuned for plant structure, THC content and rich terpene profiles, but the genetic diversity seen in Himalayan hash plant land races was largely eliminated in the process of meeting the demands of covert cultivation during the era of drug prohibition. Also, this period saw a preference for smaller plants with larger, denser buds suitable for smoking rather than hash production. Hash did not become widespread in North America until the late 1990s.

Extreme restrictions on grow spaces continue to plague the *Cannabis* industry, and this has led to a culture of sharing exceptional and reliable "cuts" (clones) among cultivators, a practice that dates back to the 1970s. At this point, the cultivation community has had access to remarkable clones for some time, many of which are notoriously challenging to grow and may not reliably produce seeds. Professional growers, particularly those with sophisticated control over their growing environments, are willing to tackle these challenges if the end product's quality justifies the effort. Nowadays, most commercial cultivators work with a select group of clones, either by cloning the best specimens from a batch of seeds obtained from reputable breeders or by acquiring clones directly. Home growers just don’t have the same access.

The quest for high-quality seeds is complicated by the genetic and historical intricacies of *Cannabis* cultivation. Unlike many plants that predominantly self-pollinate, wild *Cannabis* spreads its pollen over vast distances, maintaining a broad genetic diversity within wild populations. The practice of aggressively inbreeding *Cannabis* to isolate specific traits has yielded strains with remarkable aromas but has frequently compromised overall plant vigor and seed quality via inbreeding depression. Additionally, some of the most celebrated clones can produce unpredictable offspring, and many top strains pose significant cultivation challenges.

Norcal Select is acutely aware of these complexities and works in close partnership with breeders who possess an in-depth understanding of *Cannabis* genetics. Our focus is on cultivating distinctive and potent strains that stand out from the rich tapestry of Northern California *Cannabis*, in collaboration with experts tied to the California *Cannabis* industry. We select strains that not only thrive in indoor and backyard setups but also prioritize potency, terpenes, and trichome production, while steering clear of varieties that are overly difficult to cultivate or prone to significant genetic variability. Our feminized seeds are bred to yield exceptional buds blanketed in trichomes and are tailored for a quick turnaround, with flowering times between 55 to 65 days. With a particular interest in bubble hash production, our selection criteria include favorable trichome structure, ensuring our strains meet the high standards of quality and productivity demanded by both legacy and professional cultivators alike.

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Reversing females to produce feminized *Cannabis:* The STS (Silver Thiosulfate) method

'Reversing' *Cannabis* plants is a method to induce female plants to produce pollen using Silver Thiosulfate (STS). The pollen produced by reversed females, when used to fertilize *other* female plants, will result in all-female seeds, which is highly desirable for many growers. The use of STS is a popular method for feminization because it's effective. Colloidal silver, a more popular method among amateurs, doesn't require as much attention to chemistry, but the results are less reliable and it produces less pollen. Below is a basic protocol for feminizing *Cannabis* plants with STS. Please note that this protocol is for informational purposes only and should be undertaken in a laboratory respecting all local laws and regulations.

Silver Nitrate

Danger!

Consult SDS for additional information on hazards.

Hazard Statements:

Oxidizer. Corrosive. May intensify fire. Causes severe skin burns and eye damage. Harmful if swallowed. May be corrosive to metals.Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects. Incompatable with amines, reducing agents

Precautionary Statements:

Take all precaution to avoid mixing with combustibles. Keep away from heat/sparks/ open flames/heat sources. No smoking. Avoid release into the environment. Avoid breathing dust. Use in a well ventilated area. Wear protective gloves/ protective clothing/ eye protection/ face protection. IF ON SKIN OR HAIR. Immediately remove all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Get medical attention. IF SWALLOWED: give water or milk and get medical attention. DO NOT INDUCE VOMITING. Store in locked cabinet. Dispose of contents/container in accordance with local/regional/national/international regulations

Safety Precautions:
-Silver nitrate is toxic and causes severe skin irritation.
- Always wear protective gear when handling chemicals (see below).
- Work in a well-ventilated laboratory or under a fume hood.
- Dispose of any chemical wastes properly, according to local regulations.

Wear safety goggles
Wear long gloves made of nitrile rubber, neoprene, butyl rubber, or PVC.
Wear lab coat with long sleeves.
Wear facial protection.

Materials Needed:
- Silver Nitrate ($AgNO_3$)
- Sodium Thiosulfate ($Na_2S_2O_3$)
  - (Anhydrous or Pentahydrate)
- Distilled Water
- Dark-colored bottles
- PPE (gloves, goggles, mask)

STS Solution Preparation:

Step 1: Make and Store Separate Solutions (Solutions will keep for about a month in the refrigerator after mixing.)

1. Silver Nitrate Solution (0.1M): Dissolve 1.7 grams of silver nitrate in 100 ml of distilled water. Store this solution in a black or brown glass bottle to keep it from light.
2. Sodium Thiosulfate Solution (0.1M): For anhydrous $Na_2S_2O_3$, dissolve 15.8 grams in 1000 ml of distilled water. For the pentahydrate form, dissolve 24.8 grams in 1000 ml of distilled water. This solution is more stable and can be stored in a clear glass bottle.

Step 2: STS Working Solution
- Mix equal volumes of the silver nitrate solution and sodium thiosulfate solution. This mixture creates the STS working solution. Prepare this immediately before use, as it degrades over time.

Application Protocol:
Step 1: Selection of Plants
- Choose healthy female *Cannabis* plants that are in the vegetative stage, *before* the light cycle is changed to induce flowering.

Step 2: Application
1. Ensure the plants to be treated are well-hydrated a day before application.
2. Spray the STS solution evenly on the plants, focusing on the lower branches and nodes (you can use a syringe or dropper for the nodes). The application should be done in the evening or when the lights are off to avoid light degradation of the solution and reduce stress on the plants.
3. Avoid over-saturating the plants. A light, even coating on the surfaces is sufficient.

Step 3: Post-Application Care
- After spraying, avoid watering the plants for at least 24 hours to prevent washing away the STS solution.
- Monitor the plants closely for any signs of stress or damage. Some slight yellowing or leaf drop is normal, but extensive damage may indicate over-application.

Step 4: Pollen Collection and Use
- Treated plants will start producing pollen sacs instead of flowers. Once these sacs mature, open, and start dropping pollen, you are ready to pollinate.

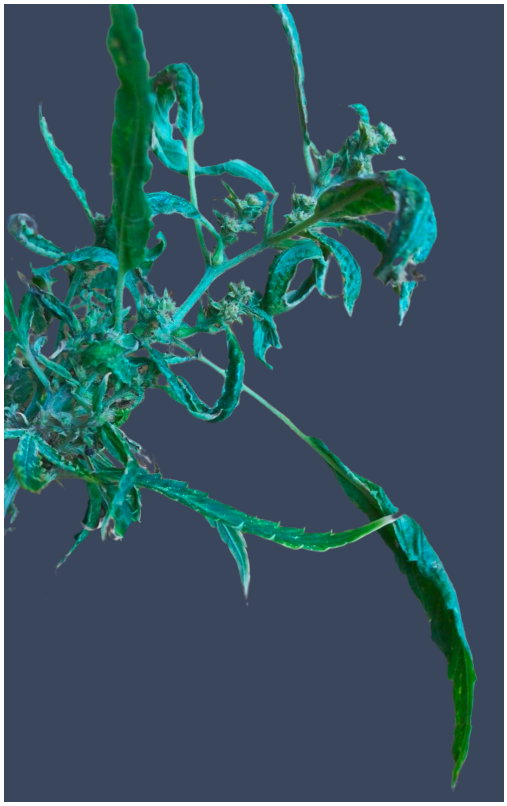
Safety Precautions:
- Always wear protective gear when handling chemicals (see above).
- Work in a well-ventilated laboratory or under a fume hood.
- **Dispose of any chemical wastes properly, according to local regulations.**

Preventing HLV and other diseases

If your grow has plants with strangely small leaves that look resemble chestnut or buckeye leaves and fragile branches with excessive lateral growth structured like a candelabra you might have Hop Latent Viroid (HLV). In the realm of cannabis cultivation, the specter of HLV looms large, a silent adversary that compromises plant vigor, diminishes yields, and degrades quality. To combat this threat, a meticulous approach emphasizing hygiene and plant vitality is paramount. The cornerstone of this strategy involves a rigorous protocol designed to thwart the transmission and establishment of HLV.

At the forefront of our defense is the sterilization of cutting implements. Before embarking on this crucial task, one must assemble all necessary tools, including shears, knives, and scissors, while eschewing alcohol-based sterilants in favor of those lethal to HLV (and kind to the tools). Bioesque Solutions and RMR Botanical sterilant are exemplary choices, offering effective sterilization without the corrosive effects associated with bleach solutions (bleach is VERY effective, but hard on equipment and poisonous to plants). The ritual of sterilization is simple yet profound: immerse the tools in the chosen solution, diligently wipe them down, and, if bleach is used, ensure a final rinse with sterile water to obliterate any lingering chemical residue. This practice is not a one-time affair but a continuous commitment, with sterilization occurring both before and after each use to erect an impenetrable barrier against cross-contamination.

The sanctity of the grow tent is another barrier against the incursion of HLV. The tent should be sealed as much as possible as a barrier against the incursions of pests and pathogens. The air coming into the tent should be filtered through HEPA filters, purging it of unseen microbial threats. Within this sanctuary, a regimen of cleanliness prevails, with regular disinfection of every surface and the vigilant removal of plant detritus to deny pests and pathogens a foothold.



New clone arrivals need a quarantine protocol to insure that only healthy cuts join the collective, safeguarding against the insidious spread of HLV.

The essence of this protocol lies in nurturing the plants themselves, fostering resilience through meticulous care. A balanced diet tailored to the unique requirements of each strain fortifies them against stress and disease. Water, must be administered with precision, its pH finely tuned to about 6.0, with a delivery method designed to minimize moisture on the leaves, thus reducing disease risk. The overarching strategy encompasses an integrated pest management (IPM) approach, eschewing the heavy hand of chemical interventions in favor of targeted, judicious measures that preserve the ecosystem within the tent.

In conclusion, the battle against Hop Latent Viroid in cannabis cultivation is waged on multiple fronts. It is a holistic endeavor that integrates the sterilization of tools, the preservation of a sterile grow environment, and the cultivation of robust plant health. This tripartite strategy is not merely a defense mechanism but a foundation for thriving cannabis production, ensuring that plants not only survive but flourish, free from the shadow of HLV.