

HEMP VARIETY YEARBOOK 2020

The industry's first-ever guide
to responsibly sourcing
hemp genetics and live inputs
across different climates,
environments and markets.

1st Edition

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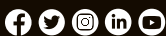
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YOUNG PLANTS SPROUT NEW POSSIBILITIES FOR HEMP FARMERS

Hemp became a legal commercial crop in the United States a little over a year ago. But since then, far too many stories have been told about farmers losing their crops to bad seed, wet weather, mold or spiking THC levels.

Among the highly publicized challenges facing hemp producers—from mastering the learning curve involved in growing a new crop in regions of the country where it hasn't been produced in decades to dealing with changing government regulations—the one common factor is the ability for farmers to source a consistent supply of predictable, reliable genetics.

The industry lives and dies by the quality of genetics available and farmers' success in producing them.

That's where we come in.

Welcome to *Hemp Industry Daily's* first Variety Yearbook, a comprehensive look at the newest hemp genetics on the market.

Consider this your buyer's guide for sourcing hemp genetics this year and a resource to look back on as you prepare for subsequent seasons.

Why compile a list of hemp genetics? Because this nascent industry needs a trusted resource to research and connect with breeders and young-plant suppliers.

In this yearbook, you'll find comprehensive information and insights on approaching your hemp production season and how to make decisions about the varieties you decide to grow, including:

- Varieties currently on the market, by purpose (cannabinoids, fiber and grain).
- Tips for selecting effective live inputs (seed, seedlings, cuttings and clones).
- How to source genetics.
- Resources.

The information provided by plant breeders about their respective hemp varieties will vary depending on date planted and the conditions and climate where it is produced, among other production factors.

Because data is limited for hemp production in many states and territories that have come online since hemp was legalized under the 2018 Farm Bill, the results of planting under good agricultural practices still could vary based on weather and climate.

For that reason, information in the Varieties Yearbook should not be considered the final word. Instead, consider the Varieties Yearbook a starting point for understanding the available hemp genetics before you contact individual companies with specific questions.

If you have any questions about the Varieties Yearbook or want to provide feedback, please contact me at laurad@hempindustrydaily.com.



Laura Drotleff
Hemp Industry Daily
Reporter

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Reporter

Meet the Mighty Hemp Seed.

DISCOVER THE POWER OF HEMP GENETICS

Since 2011, High Grade Hemp Seed has been developing best-in-class hemp cultivars. Our superior seed genetics are crafted to produce vigorous and compliant crops.



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HOW TO SOURCE RELIABLE HEMP GENETICS

Finding reliable hemp varieties that will produce the desired cannabinoid percentage and biomass volume, while also performing in the field and testing in compliance with federal THC limits, can feel like a tall order.

Here are some best practices for responsible selection of hemp genetics that can help save money—and potentially an entire hemp crop—at harvest.

DO THE RESEARCH.

Don't rely entirely on what the internet says will work for a certain climate or growing environment. Talk directly with plant breeders and learn about the varieties they produce.

Ask about:

- Minimum order quantities.
- Price per seed, seedling, cutting or clone.
- Availability.
- Shipping methods and costs.
- Policies for holding orders because of weather or other issues.



Photo by Matt Staver

NETWORK.

Talk with veteran farmers in your area or region. Find out what varieties they have produced and what the results were. Ask about the benefits and drawbacks for different genetics and if they're reordering or using different genetics or suppliers for this season and why.

Read, talk with university extension and industry consultants with knowledge about hemp production, and get on LinkedIn to connect with hemp professionals. Reciprocate with what you've learned.

REFERENCE STATE GUIDELINES.

Many markets have certifying agencies that provide a list of the varieties that farmers are allowed to use, as well as those that are on a watch list or banned from the state because of a tendency to test over legal THC limits.

If the genetics you want to source are not on the list for your state, talk with a representative from the agency to find out how to get those varieties approved or obtain an exception. Some states, such as Tennessee, do not restrict genetics, but it's important to understand your market's guidelines before you buy. If it doesn't restrict, look at neighboring states or others in your region for guidance or warnings.

SEEK CERTIFIED VARIETIES.

The Association of Official Seed Certifying Agencies (AOSCA) establishes minimum standards for genetic purity and identity, recommends minimum standards for seed quality for classes of certified seed and coordinates the efforts of seed-certifying agencies.

Most current AOSCA-certified varieties originate outside the United States and are produced for seed, grain or fiber. One U.S.-based company, Fort Collins, Colorado-based New West Genetics, recently received AOSCA certification for its NWG-Elite variety.

Hemp plant breeders can apply for AOSCA certification through the organization's Variety Review Boards. Companies that don't have AOSCA certification can access the organization's labs to help verify their seed for customers, in compliance with the Federal Seed Act, and avoid costly lawsuits that come with mislabeled or noncompliant crops, according to Wendy Mosher, president and CEO of New West Genetics.

VISIT UNIVERSITY TRIALS.

Many public universities have set up hemp variety trials over the past few years to test how genetics grow in their unique climates and conditions. Researchers and university extension specialists often host a series of field days in mid- to late summer, inviting industry members to learn about how the selected varieties perform. These include a range of criteria, such as:

- Crop time.
- Flower period.
- Pest and disease resistance or susceptibility.



Photo by Matt Staver

Contact your state's land grant university—and other research institutions focusing on hemp genetics—to find out about their trialing program and field days, and where they publish trial results.

VERIFY BEFORE TRUST.

Seed brokers and clone sellers relish the opportunity to share lab results showing how their varieties perform, but farmers should ask for at least three lab reports to verify results, advises Chris Boucher, who owns Farmtiva in San Diego.

Further, don't be afraid to ask more questions than the lab report can answer, especially about where a variety originated and how it was developed. Be cautious and check out the science behind the genetics you're selecting. If it sounds fishy, it probably is.

TEST SEEDS.

Farmers can take another step toward verifying genetics by having seeds tested through an independent lab, according to Jay Noller, a soil scientist at Oregon State University and head of the school's Global Hemp Innovation Center.

Third-party testing can be pricey, but it will provide insight into whether the CBD-to-THC ratio will cause the genetics to run hot. Testing the first or second true leaf of a plant will provide those ratios, as they are fixed into the plant's DNA, Noller said.

SET UP A TEST PLOT.

Before dedicating acres to hemp production, start with a small test garden or plot.

This is also a good practice for introducing new varieties, allowing producers to trial genetics in their growing climate and on their own land, according to Jeff Kostiuk, director of operations for Hemp Genetics International's Central Region and a longtime producer in Russell, Manitoba, Canada.

Farmers can learn successful hemp cultivation techniques—especially variety-specific practices—only by growing hemp on their own land, and the process will take two to three years.



Photo by Laura Drotleff

HOW TO CHOOSE THE RIGHT YOUNG PLANTS

Best practices for growing hemp are still practically a matter of interpretation, depending on the climate, growing environment, field or lot size—as well as several other factors that vary from one farm to another. So, when it comes to determining which young plants are best, there is no one-size-fits all approach.

A few options are available that growers can choose from, however, based on crop production needs.

Here are some factors farmers should consider when determining which young plants to use this season.

SEEDS

Seeds are typically the least expensive option, and they offer farmers a way to use mechanical planters in their fields on their own timeline. Because hempseed is less perishable than other live inputs, farmers have more flexibility in when they plant, which is valuable with unpredictable weather during planting season. That said, direct-sowing seed often takes the longest to establish.

Seed is often used for broad-acre or large-scale farming, so conventional farmers who are used to planting agricultural commodities, such as corn, wheat or soybeans, tend to prefer it.

Conventional agricultural plant breeding focuses on creating stable parent lines, a scientific process that can take an average of 5-10 years. Hybridizing seed from stable seed lines is a complex process that requires patience and skill, but it is the only way to create stable seed lines that are true to type, consistent and uniform. The hemp industry has few players who have been breeding long enough to produce seed lines through traditional agricultural practices.

Many amateur breeders, however, have become volume suppliers within the industry, so farmers should choose carefully. While some varieties are tested and stable, others aren't, which means they can include several different phenotypes and will vary in quality and uniformity.

If a variety's parent lines are not true breeding, then seedlings will present variations of height, bloom time, quantity and cannabinoid analysis, ranging from high CBD to high THC in the same seed lot. In past seasons, many farmers lost money on unviable seed that did not germinate or on seed that was marketed as feminized but contained male seed.

Hempseed can be washed away if planted in wet fields or just before a rain, causing farmers to have to invest in more seed and replanting costs.

Feminized seed ratios range from 90% to 99%, which means that— in a seed crop grown for cannabinoids, with 2,000-2,500 plants per acre— there could be 20-225 males or hermaphrodites per acre that must be removed before the crop is pollinated. If pollination occurs, the crop will have lower cannabinoid levels, which is less acceptable to processors buying hemp for CBD products.



Photo by Matt Staver



Photo by Laura Drotleff

PLUGS

Farmers eager to get a jump on their season can buy seed to germinate into plugs or seedlings, or they can purchase seed starts from greenhouse growers.

Plugs provide farmers with up to a five-week head start because, once rooted in the field, the crop will take off faster. This is helpful when the season is delayed because of weather or regulations that cause late distribution of hemp production licenses. Further, unlike clones, plugs have a taproot, which serves as an early anchor to hold the plant upright—though this offers an advantage only if plants are healthy and well-grown.

Seedlings are only as good as the seeds they grow out of, so much of the same variability exists as it does with seeds. Seedlings also cost more than seeds because of the inputs used to produce them in plastic trays, including growing media, fertilizer, biocontrols and labor.

Without special equipment, seedlings require additional labor to plant by hand in the field, which will increase production costs.

UNROOTED CUTTINGS

Plant cuttings are taken from mother stock plants to root into soil in plug trays, creating liners or clones. This propagation method ensures plants are identical to the mother stock, which offers farmers more predictability—including crop stability, consistency and uniformity of growth, flowering time, yield and cannabinoid analysis—than many current seed varieties on the market.

Unrooted cuttings can be shipped from stock producers to farmers, who can root them on-site if they have a greenhouse or enclosed environment, or to greenhouse producers who specialize in liner (clone) production based on experience with other crops. Vegetative propagation is widely developed in ornamental crops, such as vegetative annuals, perennials and foliage plants. In these mature markets, many plant breeders and specialized plant producers have built offshore facilities in warmer countries with climate conditions that are ideal for year-round production and lower labor costs. This drives down the price of live inputs for growers.



Courtesy Photo

Some young hemp plant producers use tissue culture, a process by which plantlets are propagated in a lab from plant tissue. This helps produce clean mother stock plants for higher-quality unrooted cuttings and, ultimately, clones. Tissue culture plantlets are not sold directly as young plants, as they would be cost-prohibitive for growers.

Purchasing cuttings will cost less than liners or clones, but vegetative propagation takes time, equipment and expertise. Producers offer cuttings in small quantities stored in plastic bags, which are often shipped together in a cooler. They are perishable and require immediate propagation once they arrive.

LINERS OR ROOTED CUTTINGS

Commonly called clones in the cannabis industry, liners are rooted cuttings that are stuck—or vegetatively propagated—into soil or soilless media in plug trays. Farmers can buy cuttings to propagate or purchase liners through breeding companies, greenhouse producers or brokers. Liners are more expensive than seed, but they offer farmers a quick start to the season, an advantage when the season is delayed.

Specialized young plant producers have many years of experience optimizing rooting and growth for large-scale production, and more are looking to provide clones to the hemp industry. This increased volume should help with both availability and cost, though the specific genetics will also play a role.

Because rooted cuttings are clones of the mother crops, the resulting genetically uniform crop will grow and flower at the same time and produce a consistent cannabinoid analysis. Further, crops produced from liners are female because they are cloned from female plants.

Fewer young plants are needed per field, and they are often spaced farther apart than seeds. However, because there are few, if any, mechanical options available for planting clones, farmers must factor in labor costs for these live inputs to be planted by hand.

Most hemp genetics currently available in the United States are vegetatively propagated because of the time it takes to produce seed hybrids, and therefore, much of the genetics experience among farmers and breeders for cannabinoid production comes from crops produced from liners.



Courtesy Photo

IMPORTING GENETICS INTO THE US

Hemp varieties have long been sourced from outside the United States, primarily cultivars used widely throughout Canada, Europe and other parts of the world for fiber and grain.

However, most hemp varieties produced for high levels of cannabinoids have originated within the U.S.

In April 2019, the U.S. Department of Agriculture stepped in to assist hemp producers and exporters to bring hempseed to the United States.

In addition to removing hemp and its derived products from the U.S. Controlled Substances Act, the 2018 Farm Bill removed U.S. Drug Enforcement Administration authority to require hempseed permits for import. The USDA's Animal and Plant Health Inspection Service (APHIS) now regulates the import of all plants and seeds for planting to ensure safe agricultural trade.

Here are the basic requirements for safely importing hempseeds and plants into the United States from Canada and other countries:

USDA'S SEED IMPORT GUIDANCE

The USDA Agricultural Marketing Service **issued the following rules** for importing hempseed:

- Seeds imported from Canada must be accompanied by either a phytosanitary certification from Canada's national plant protection organization, verifying the origin of the seed and confirming that no plant pests are detected, or by a Federal Seed Analysis Certificate (**SAC, PPQ Form 925**).
- Seeds imported from countries other than Canada must be accompanied by a phytosanitary certificate from the exporting country's national plant protection organization to verify the origin of the seed and confirm that no plant pests are detected.
- Hempseed shipments may be inspected upon arrival at the first port of entry by U.S. Customs and Border Protection to ensure APHIS regulations are met, including certification and freedom from plant pests.

NEW RULES FOR LIVE PLANTS

The USDA issued guidance in October 2019 that living hemp plants and clones—not just seeds—can also be imported from other countries.

The new policy sets different rules for importing hemp plants from Canada and from any other country, including:

- Hemp plants may be imported into the U.S. from Canada if accompanied by a phytosanitary certificate from the Canadian Food Inspection Agency, which verifies plant origins and certifies that plants are free of disease.
- Hemp plants from all other countries must come with a phytosanitary certificate from the country of origin, along with a federal permit used for importing live plant material of any kind.

For questions or requests for information regarding importing hemp plants or seeds, contact APHIS Plant Protection and Quarantine's permit services by phone at 301-851-2046/877-770-5990 (toll free) or by email at **plantproducts.permits@usda.gov**.

CLIMATE CHALLENGES: HOW DO PLANT GENETICS AFFECT PERFORMANCE?

Farmers nationwide have experienced challenges related to growing hemp varieties not suited to their climate, state or growing region.

More than 50% of Hawaii's 2019 hemp crop had to be destroyed because of elevated THC levels, a problem that state agriculture officials attribute to a lack of cultivars suited to a tropical climate.

About 41% of Arizona's 2019 hemp plants tested above the 0.3% legal THC limit, according to the state Department of Agriculture's Plant Services Division. The agency attributed the failure rate to variable seed quality and genetic expression for hemp grown in Arizona's hot and dry climate.

Growers in other states have had issues managing the THC content of hemp plants, with crops in Nebraska and Nevada also testing too high.

In more humid areas of the United States, farmers have had difficulty working with hemp varieties that were bred for arid climates—which includes most varieties on the market.

ARE GENETICS TO BLAME FOR HIGH THC?

Research results unveiled by Cornell University in February determined that a hemp plant's genetics have more to do with it going hot—or testing higher for THC—than the stress response to field conditions.

The team, led by Dr. Larry Smart, conducted field trials at two New York sites, Ithaca and Geneva, to study the genetics and chemistry of 217 hemp plants.

Differences in growing conditions between the sites had no significant influence on which chemicals the plants produced. But the team found a high correlation between the plants' genetics and the chemicals they produced.

The university limited its trials to the two similar climates in New York, and the studies haven't yet been duplicated elsewhere in warmer, more humid and tropical climates and conditions, which means it's far from a definitive result for all genetics. So more research is needed.

Further, data from private breeding companies notes that genetics will express themselves differently in a variety of different environments.

RESEARCHERS TAKING THE LEAD

Plant breeders and university researchers have been working to develop varieties with desired traits that will adapt to the many unique climates and microclimates in the U.S.

Here is a sampling of research projects going on at public universities and private breeding labs across the country:

- Researchers at the University of Florida's Institute of Food and Agricultural Sciences are studying 40-50 different hemp varieties to determine which ones can withstand Florida's heat, humidity, pests and diseases. The research team also is measuring how genetics respond to Florida's light levels, including shorter days in the winter, and testing for invasiveness, yield and potency. Florida A&M University also has variety trials underway.
- A Western Illinois University professor is harvesting wild hemp to evaluate THC levels and other characteristics.
- Agronomists at the North Dakota State University's North Central Research Extension Center in Minot are planting hemp to support engineering of a reliable seed variety for the CBD market.
- Arcadia Biosciences, a California-based agricultural biotechnology company, is combining genome editing, phenotyping and conventional breeding through its ArchiTech platform to develop low-THC, disease-resistant hemp varieties with improved uniformity, stability, resiliency and yield.
- The U.S. Department of Agriculture is building a national hempseed bank at Cornell University, which will serve in developing a diverse germplasm resource that breeders across the country can use to advance hemp breeding efforts.
- Cornell University researchers are focusing on breeding high-yield, legally compliant hemp cultivars for CBD, grain and fiber that are adapted to New York's growing conditions. The team already has developed genetic markers to determine the sex of hemp plants before they flower, a useful tool for breeders who want to separate males and females early to control cross-pollination.
- Oregon State University launched the Global Hemp Innovation Center, devoted to hemp research worldwide, with more than 40 faculty positions across 19 hemp research disciplines. The new effort will also allow the university to begin certifying hempseed for planting in Oregon.
- A research center at Colorado State University dedicated to studying the chemical compounds in hemp and marijuana is expected to open this spring. The research facility in Fort Collins, Colorado, will allow faculty and students to study the formulation of cannabinoids, separation efficiencies and efficacy testing.
- Researchers from Virginia Tech have been tapped to predict the trajectory of wind-dispersed hemp pollen, a major concern for outdoor growers of flower varieties of hemp and marijuana. The U.S. Department of Agriculture has devoted \$500,000 to look at the path of hemp and switchgrass pollens.

HEMP RESOURCES FOR FARMERS AND BREEDERS

Because hemp is a legal agricultural commodity, federal and international resources exist to verify hemp genetics and improve farmers' chances to produce a successful crop.

AOSCA

What it is: The Association of Official Seed Certifying Agencies serves as a watchdog for the agriculture industry, promoting verified genetics by bringing together seed-certifying agencies from around the world, including the United States, Canada, Argentina, Brazil, Chile, Australia, New Zealand and South Africa.

Why it's important: The organization works with its certifying-agency members to promote seed certification, quality assurance, identity preservation and other services that help facilitate the production and distribution of seed and other plant products in local, national and international markets.

AOSCA-member agencies can evaluate, document and verify that a seed or plant product meets certain accepted standards and issue certificates that assure farmers they are buying quality seed and crop products that have met rigorous production and documentation requirements.

Among other roles, the AOSCA reviews agency genetic standards to ensure compliance with the Federal Seed Act. The AOSCA also cooperates with the Organization of Economic Cooperation and Development and other international organizations that develop standards and regulations to encourage international commerce for approved varieties.

Learn more about the AOSCA, its services and member agencies at aosca.org.

FEDERAL SEED ACT

What it is: The U.S. Department of Agriculture's Agricultural Marketing Service (USDA-AMS) enforces interstate commerce provisions of the Federal Seed Act (FSA) under the Agricultural Marketing Act.

Why it's important: The FSA regulates interstate shipment of agricultural seeds, requiring that seed be labeled with information that enables farmers and seed buyers to make informed choices about the varieties they purchase. Seed labeling information and advertisements pertaining to the seed must be truthful to help promote uniformity among state laws and fair competition within the seed trade.

The USDA-AMS provides information about the FSA such as regulations, past enforcement of variety labeling provisions, seed-company records and the Agricultural Marketing Act. Farmers or other seed buyers who believe they have been misled can also file a complaint or request testing services (for a fee) that includes:

- Purity
- Germination
- Moisture content
- Seed content
- Pathogens
- Variety testing

Learn more about the Federal Seed Act at <https://www.ams.usda.gov/rules-regulations/fsa>.

HEMP VARIETIES



CBD

COLORADO BREEDERS DEPOT CAÑON CITY, COLORADO

► BLACK JACK

Hybrid variety grown for flower or oil extraction

Cannabinoid profile:

- CBD: 10%
- THC: 0.2%

Test date: January 2020

Terpene profile:

- Sweet
- Skunky

Origin: Colorado (The Wife x Trump)

Female-to-male ratio: 99% female

Spacing: 4x4 feet

Size: 4-5 feet tall

Dormant/hard seed: 1%

Crop time, seed to harvest: Suggested June 1 planting; Sept. 21 harvest

Germination: 7-14 days, 98% rate

Flower period: 50-55 days

Yield range: 2-3 pounds per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via [Coloradobreedersdepot.com](https://coloradobreedersdepot.com); info@coloradobreedersdepot.com



► OTTO II BOAX

Non-feminized hybrid tri-crop variety grown for seed, fiber and CBD extraction

Cannabinoid profile:

- CBD: 10%
- THC: 0.2%

Origin: Colorado

Female-to-male ratio: 50-50

Growth habit/description: Tall with thick stalks; 10-foot females and 12-foot males grow in a sea of green

Spacing: 30-inch rows; 6 to 8 inches between plants (26,000 seeds or 1 pound per acre)



Size of plants: 10-12 feet tall; 1 foot in diameter

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via [Coloradobreedersdepot.com](https://coloradobreedersdepot.com); info@coloradobreedersdepot.com

CULTIVARIS HEMP SAN DIEGO

► ABACUS

Hybrid variety grown for flower

Cannabinoid profile:

- CBD: 11%-22%, depending on harvest time
- THC: 0.28%-0.7%, depending on harvest time



CBD-to-THC ratio: 23-1 to 30-1

Test date: 2020

Terpene profile:

- Berries
- Grapes
- Sweetness

Origin: Purple Mesa, Colorado

Female-to-male ratio: Female young plant virus-elite stock and tissue culture clones

Growth habit/description: Thick, resinous, dense purple buds form on a shorter, tighter, nodal spaced plant

Spacing: Plant 4 feet apart in rows that are 4 feet apart

Size: Plants are 5-6 feet tall, 4-6 feet around

Flower period: Photoperiodic flowering at 12-hour daylength

Maturity: 7-8 weeks

Net weight of dry mass: 2,500-3,000 pounds per acre

Yield range: 800-900 pounds per acre average

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct broker via [Cultivarishemp.com](https://cultivarishemp.com); info@cultivarishemp.com

► PURPLE MESA

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 10%-22%,
depending on
harvest time
- THC: 0.28%-0.7%,
depending on
harvest time

CBD-to-THC ratio: 25-1

Test date: 2018

Terpene profile:

- Grapes
- Black pepper

Origin: Purple Mesa, Colorado

Female-to-male ratio: Female young plant virus-elite stock and tissue culture clones

Growth habit/description: Slower in first two weeks of vegetation but will end up with heavy top side flower production, strong branching, tight and dense flowers

Spacing: Plant 4-5 feet apart in rows that are 4-5 feet apart

Size: Plants reach 5-7 feet tall and 4-6 feet around

Flower period: Photoperiodic flowering at 12-hour daylength

Maturity: 7-8 weeks

Net weight of dry mass: 2,750-3,000 pounds per acre

Yield range: 700-800 pounds per acre average

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct broker via [Cultivarishemp.com](https://cultivarishemp.com); info@cultivarishemp.com



► SCARLET

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 10%-18%,
depending on
harvest time
- THC: 0.28%-0.67%,
depending on
harvest time



CBD-to-THC ratio: 24-1

Test date: 2018

Terpene profile:

- Strawberry
- Goji berry
- Cherry

Origin: Purple Mesa, California

Female-to-male ratio: Female young plant virus-elite stock and tissue culture clones

Growth habit/description: Semi-bushy; will grow taller, like a hybrid

Spacing: Plant 4-5 feet apart in rows that are 4-5 feet apart

Size: Plants reach 5-6 feet tall and 6-9 feet around

Flower period: Photoperiodic flowering at 12-hour daylength

Maturity: 7-8 weeks

Net weight of dry mass: 2,750-3,000 pounds per acre

Yield range: 800-900 pounds per acre average

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct broker via [Cultivarishemp.com](https://cultivarishemp.com); info@cultivarishemp.com

FARMTIVA SANTA YSABEL, CALIFORNIA

► AUTOTIVA

Hybrid autoflower variety
grown for flower

Cannabinoid profile:

- CBD: 10.5% -14%
- THC (average): 0.25%

Terpene profile:

- Dense, prolific aromatic buds

Origin: Redkross x Baox x Finola x Cherry strains

Spacing: 2,500-4,800 seeds per acre recommended, depending on time of year

Maturity: 85-100 days, allowing for multiple crops per season

Purchase: Direct via [Farmtiva.com](https://farmtiva.com); info@farmtiva.com



FRONT RANGE BIOSCIENCES

LAFAYETTE, COLORADO

► ABIGAIL (SUPERFIT SERIES)

Hybrid variety grown for flower or oil

CBD-to-THC ratio: 24-1, with best-management practices

Terpene profile:

- Spicy clove
- Earthy hops
- Undertones of citrus

Growth habit/description: Upright, vigorous plant structure

Crop time, seed to harvest: Early to late planting time, depending on location; harvest in late October

Flower period: Late maturity, flower initiation at 12.5 hours daylength

Purchase: Rooted cuttings through broker or direct via frontrangebio.com



► ANNA LEE (SUPERFIT SERIES)

Hybrid variety grown for flower or oil

CBD-to-THC ratio: 24-1, with best-management practices

Terpene profile:

- Spicy clove
- Earthy hops
- Undertones of citrus

Maturity: Late

Growth habit/description: Upright, vigorous plant structure

Crop time, seed to harvest: Early to late planting time, depending on location; harvest in late October

Flower period: Initiation at 12.5 hours daylength

Availability: Rooted cuttings

Purchase: Through broker or direct via frontrangebio.com



► ATHENA (SUPERFIT SERIES)

Hybrid variety grown for flower or oil

CBD-to-THC ratio: 24-1, with best-management practices

Terpene profile:

- Peppery
- Pungent hops
- Earthy undertones

Growth habit/description: Superior branching

Crop time, seed to harvest: Early to late planting time, depending on location—works for staggered harvest dates

Flower period: Mid to late maturity, flower initiation at 13 hours daylength

Yield: Potential high-yielding variety

Purchase: Rooted cuttings through broker or direct via frontrangebio.com



► INDOOR ANGIE (SUPERFIT SERIES)

Hybrid variety grown for flower or oil for indoor and greenhouse production

CBD-to-THC ratio: 24-1, with best-management practices

Terpene profile:

- Upfront smell of lemony citrus
- Earthy, herbaceous undertones

Growth habit/description: Upright, open-growth habit

Yield: Long bud structure with high-yield potential

Purchase: Seeds, seedlings and rooted cuttings through broker or direct via frontrangebio.com



HIGH GRADE HEMP SEED

LONGMONT, COLORADO

► BERRY BLOSSOM

Full-term variety grown for flower

Cannabinoid profile:

- CBD: 9.76%
- THC: 0.24%

Terpene profile:

- Extremely floral smothered in exotic overtones of candied raspberries and acai berries

Test date: March 3, 2020

Origin: Colorado

Female-to-male ratio: 4,000 females-1 male

Spacing: 2,000-3,500 plants per acre

Germination: 48 hours at 95% average rate

Flower period: Late September-early October, depending on region

Maturity: 8-9 weeks

Potential yield: Average 2,500-3,000 pounds of dry whole plant material per acre

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via highgradehempseed.com; info@highgradehempseed.com



Female-to-male ratio: 4,000 females-1 male

Germination: 48 hours at average 95% rate

Spacing: 2,000-3,500 plants per acre

Flower period: Late September- early October, depending on region

Maturity week: 8-9 weeks

Yield range: 2,500-3,000 pounds of dry whole plant material per acre

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via highgradehempseed.com; info@highgradehempseed.com

► MERLOT

Full-term variety grown for flower

Cannabinoid profile:

- CBD: 9.50%
- THC: 0.24%

Test date: March 3, 2020

Terpene profile:

- Freshly opened tennis balls
- Orange peel
- Underscored with rich tones of chocolate and cherries jubilee

Origin: Colorado

Female-to-male ratio: 4,000 females-1 male

Spacing: 2,000-3,500 plants per acre

Germination: 48 hours at average 95% rate

Flower period: Late September-early October, depending on region

Maturity: 8-9 weeks

Potential Yield range: 2,500-3,000 pounds of dry, whole plant material per acre

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via highgradehempseed.com; info@highgradehempseed.com



► CHARDONNAY

Full-term variety grown for flower

Cannabinoid profile:

- CBD: 9.34%
- THC: 0.29%

Terpene profile:

- Piercing overtones of fresh strawberry rhubarb jam and candied raspberries

Test date: 2019

Origin: Colorado



► RED BORDEAUX

Full-term variety
grown for flower

Cannabinoid profile:

- CBD: 8.67%
- THC: 0.25%

Test date: March 3, 2020

Terpene profile:

- Fresh-cut strawberries
- Crushed lavender
- Hints of cherry and gasoline

Origin: Colorado

Female-to-male ratio: 4,000 females-1 male

Spacing: 2,000-3,500 plants per acre

Germination: 48 hours at 95% average rate

Flower period: Late September-early October,
depending on region

Maturity: 8-9 weeks

Yield range: 2,500-3,000 pounds of dry whole plant
material per acre (dry whole plant material)

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via highgradehempseed.com;
info@highgradehempseed.com



Flower period: 6-8 weeks, depending on the
time of year

Maturity: 10-12 weeks from germination

Net weight of dry mass: Dried, trimmed flower
2-4 ounces; biomass 4-6 ounces

Yield range: 2-4 ounces of dried biomass per plant

Compliance: 2014 and 2018 Farm Bill

Purchase: Through reseller or direct via
hilo hempseed.com; sales@hilo hempseed.com

► GARLIC JAM

Hybrid variety
grown for flower

Cannabinoid profile:

- Total CBD: 6.1%
- Total CBDV: 4.3%
- Total THC: 0.23%

Terpene profile:

- Beta-caryophyllene
- Limonene
- Humulene
- Myrcene

Cannabinoid ratio: CBD to THC 26.5:1;
CBDV to THC 18.7:1; CBD+CBDV to THC 45.2:1

Test date: February 2020

Origin: California

Spacing: 3 feet by 3 feet to 6 feet by 6 feet,
depending on planting date

Flower period: 8 weeks

Maturity: 8 weeks from flower initiation

Yield range: 1,000 to 4,000 lbs. per acre

Compliance: 2014 and 2018 Farm Bill

Purchase: Direct via hilo hempseed.com;
sales@hilo hempseed.com



HILO SEED COMPANY EDENTON, NORTH CAROLINA

► AUTOPILOT

Autoflower variety
grown for flower

Cannabinoid profile:

- Total CBD: 7.7%
- Total THC: 0.294%

CBD-to-THC ratio: 24-1

Origin: North Carolina

Female-to-male ratio:
3,000-1

Growth habit/description: Short and squat,
strong central cola with decent lateral branching

Spacing: 18-24 inches

Size: 3-4 feet tall, 2 feet in diameter

Dormant/hard seed: 0%

Germination: 3-4 days at 98% rate



► GUAVA JAM

Hybrid variety
grown for flower

Cannabinoid profile:

- Total CBD: 7.3%
- Total CBDV: 3.2%
- Total THC: 0.275%

Cannabinoid ratio: CBD
to THC 26.4:1; CBDV to
THC 11.7:1; CBD+CBDV to THC 38:1



Terpene profile:

- Beta-caryophyllene
- Limonene
- Humulene
- Linalool

Test date: March 2020**Origin:** California**Spacing:** 3 feet by 3 feet to 6 feet by 6 feet, depending on planting date**Flower period:** 8 weeks**Maturity:** 8 weeks from flower initiation**Yield range:** 1,000 to 4,000 lbs. per acre**Compliance:** 2014 and 2018 Farm Bill**Purchase:** Direct via hilohempseed.com; sales@hilohempseed.com**KAYAGENE**

SALINAS, CALIFORNIA

► MAVERICK

Hybrid, autoflower variety grown for flower

Cannabinoid profile:

- CBD: 8%-14%
- Total THC: 0.25% -0.5%

Test date: Days 70-75**Origin:** California**Female-to-male ratio:** 99.9% (1:2,000-1:4,000)**Growth habit/description:** Bushy, with good stem-to-leaf ratio. Purple; full of trichomes and terpenes**Size:** 3-5 feet tall and around**Dormant/hard seed:** 2%-3%**Germination:** 5-7 days at 97% rate**Spacing:** Plant 17 inches apart in line**Flower period:** 50 days**Maturity week:** 85 days**Net weight of dry mass:** 4-6 ounces per plant dry weight**Yield range:** 2,000-5,000 pounds per acre, depending on planting density**Compliance:** 2014 and 2018 Farm Bill compliant**Purchase:** Through broker or direct via kayagene.com; george.workman@kayagene.com**► PIPELINE**

Hybrid autoflower variety grown for flower

Cannabinoid profile:

- CBD: 7%-10%
- Total THC: 0.2% - 0.4%

CBD-to-THC ratio: 24-1**Test date:** Days 65-70**Terpene profile:**

- Cinnamon
- Myrcene
- Pinene
- Caryophyllene

Origin: California**Female-to-male ratio:** 1:2,000-1:4,000 (99.9%)**Growth habit/description:** Tall, upright, uniform crop**Spacing:** Plant 12 inches apart in line**Size:** 3-4 feet tall, 3-4 feet in diameter**Dormant/hard seed:** 2%-3%**Germination:** 5-7 days at 97%**Flower period:** 40 days**Maturity week:** 75 days**Net weight of dry mass:** 3-5 ounces per plant dry weight**Yield range:** 1,800-4,500 pounds per acre, depending on planting density**Compliance:** 2014 and 2018 Farm Bill compliant**Purchase:** Through broker or direct via kayagene.com; george.workman@kayagene.com**OREGON CBD**

INDEPENDENCE, OREGON

► LIFTER

F1 hybrid variety grown for flower

Cannabinoid profile:

- CBD: 14%-16% in manicured flower with outliers in low-20% range; biomass 7%-12%
- Total THC: 0.5%-0.7%; biomass 0.3%-0.5%



CBD-to-THC ratio: 28-1

Terpene profile:

- Myrcene
- Caryophyllene
- Broader terpene profile is terroir dependent

Origin: United States

Female-to-male ratio: 1 phenotypically male in 4,000 plants

Growth habit/description: Vigorous, bushy plants

Spacing: Plant 4 feet between plants, 6 feet between rows for June 1 planting

Size: 4-6 feet

Dormant/hard seed: Less than 5%

Germination: 5-10 days under optimal conditions, 95% rate

Flower period: Mid-July to mid-September

Maturity: 8 weeks

Net weight of dry mass: 2-4 pounds

Yield range: 1-4 pounds

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct via oregoncbdseeds.com; info@jackhempicine.com

► **SOUR SPACE CANDY**

F1 hybrid variety grown for flower

Cannabinoid profile:

- CBD: 14%-16% in manicured flower with outliers in low-20% range; biomass 7%-12%
- Total THC: 0.5%-0.7%; biomass 0.3%-0.5% total THC

CBD-to-THC ratio: 28-1

Terpene profile:

- Myrcene
- Farnesene
- Caryophyllene
- Broader terpene profile is terroir dependent

Origin: United States

Female-to-male ratio: 1 phenotypically male in 4,000 plants

Growth habit/description: Vigorous, bushy plants

Spacing: Plant 4 feet between plants, 6 feet between rows for June 1 planting



Size: 4-6 feet

Dormant/hard seed: Less than 5%

Germination: 5-10 days under optimal conditions, 95% rate

Flower period: Mid-July to mid-September

Maturity: 8 weeks

Net weight of dry mass: 2-4 pounds

Yield range: 1-4 pounds

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct via oregoncbdseeds.com; info@jackhempicine.com

► **SUVER HAZE**

F1 hybrid variety grown for flower

Cannabinoid profile:

- CBD: 14%-16% in manicured flower with outliers in low-20% range; biomass 10%-12%
- Total THC: 0.5%-0.7%; biomass 0.3%-0.5% total THC



CBD-to-THC ratio: 28-1

Terpene profile:

- Myrcene dominant
- Broader terpene profile is terroir dependent

Origin: United States

Female-to-male ratio: 1 phenotypically male in 4,000 plants

Growth habit/description: Vigorous, bushy plants

Spacing: Plant 4 feet between plants, 6 feet between rows for June 1 planting

Size: 4-6 feet

Dormant/hard seed: Less than 5%

Germination: 5-10 days under optimal conditions, 95% rate

Flower period: Mid-July to mid-September

Maturity: 8 weeks

Net weight of dry mass: 2-4 pounds

Yield range: 1-4 pounds

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct via oregoncbdseeds.com; info@jackhempicine.com

NBS AGTECH

HENDERSON, NEVADA

➤ MK4

Full-season variety grown for flower

Cannabinoid profile:

- CBD: 13%
- THC: > 0.3%
- CBG & CBC: minor production

CBD-to-THC ratio: 25-30:1

Terpene profile:

- Subtle earthy, citrus smell
- Hint of floral incense

Origin: feral hemp variety x WW2 Time x Master Kush from Hindu Kush Mountains

Female-to-male ratio: 60-40 Dioecious; 99.9% feminized

Growth habit/description: Tall and bushy

Spacing: 5 feet x 5 feet or 6 feet x 6 feet

Size: 6-8 feet tall by 6 feet wide

Crop time, seed to harvest: 120 days

Germination: 3-5 days at more than 95% rate

Flower period: 8 weeks to flower (~60 days), depending on photoperiod (late September-early October)

Net weight of dry mass: 2-4 pounds per plant

Yield range: 2,000-4,000 pounds per acre

Compliance: 2018 Farm Bill

Purchase: Direct via nbsagtech.com; info@nbsagtech.com



CBD-to-THC ratio: 21-1

Test date: September 2019

Terpene profile:

- Myrcene-dominant

Origin: Colorado

Growth habit/description: Tall, tree-like habit; moderate numbers of medium, early finishing flowers

Spacing: 2,000-4,000 plants per acre

Size: 4-6 feet tall; diameter dependent on planting density

Flower period: 15 hours daylight

Maturity: Early September (dependent on location)

Net weight of dry mass: 1.33 pounds per plant

Yield range: 0.7-1.7 pounds per plant (dependent on location)

Compliance: 2018 Farm Bill

Purchase: Direct via sunrisegenetics.com; info@sunrisegenetics.com

➤ FL49

Variety grown for flower and fiber

Cannabinoid profile:

- CBD: 7%-13%
- THC: 0.3%-0.5%

CBD-to-THC ratio: 22-1

Test date: October 2019

Terpene profile:

- Myrcene-dominant

Origin: Colorado

Growth habit/description: Bushy, medium-large plant with small numbers of dense, large flowers

Spacing: 2,000-4,000 plants per acre

Size: 3-5 feet tall; diameter dependent on planting density

Flower period: 14 hours daylight (dependent on location)

Maturity: Mid- to late September (dependent on location)

Net weight of dry mass: 1.17 pounds per plant

Yield range: 0.2-2.3 pounds per plant

Compliance: 2018 Farm Bill

Purchase: Direct via sunrisegenetics.com; info@sunrisegenetics.com



SUNRISE GENETICS

FORT COLLINS, COLORADO

➤ CJ2

Variety grown for flower and fiber

Cannabinoid profile:

- CBD: 4%-8%
- Total THC: 0.2%-0.6%



► **FL58**

Variety grown for flower and fiber

Cannabinoid profile:

- CBD: 5-11%
- THC: 0.19-0.4%

CBD-to-THC ratio: 22-1

Test date: October 2019

Terpene profile:

- Myrcene-dominant

Origin: Colorado

Growth habit/description: Compact, bushy, habit that is resistant to lodging; medium plant with small numbers of dense, large flowers

Spacing: 2,000-4,000 plants per acre

Size: 3-4 feet tall; diameter dependent on planting density

Flower period: 14 hours daylight (dependent on location)

Maturity: Late September (dependent on location)

Net weight of dry mass: 1.04 pounds per plant

Yield range: 0.3-2.5 pounds per plant

Compliance: 2018 Farm Bill

Purchase: Direct via sunrisegenetics.com; info@sunrisegenetics.com



Spacing: 2,000-4,000 plants per acre

Size: 4-6 feet tall; diameter dependent on planting density

Flower period: 14 hours daylight

Maturity: Mid-September (dependent on location)

Net weight of dry mass: 1.35 pounds per plant

Yield range: 0.3-2.3 pounds per plant (dependent on location)

Compliance: 2018 Farm Bill

Purchase: Direct via sunrisegenetics.com; info@sunrisegenetics.com

► **SB1**

Variety grown for flower and fiber

Cannabinoid profile:

- CBD: 8%-13%
- THC: 0.2%-0.6%

CBD-to-THC ratio: 23-1

Test date: October 2019

Terpene profile:

- Caryophyllene dominant

Origin: Colorado

Growth habit/description: Small, wide, yet compact habit; moderate numbers of dense, early finishing flowers

Spacing: 2,000-4,000 plants per acre

Size: 2-3 feet tall; diameter dependent on planting density

Flower period: 15 hours daylight

Maturity: Early September (dependent on location)

Net weight dry mass: 1.5 pounds per plant

Yield range: 0.6-2.7 pounds per plant (dependent on location)

Compliance: 2018 Farm Bill

Purchase: Direct via sunrisegenetics.com; info@sunrisegenetics.com

► **FL71**

Variety grown for flower and fiber

Cannabinoid profile:

- CBD: 8%-13%
- THC: 0.3%-0.6%

CBD-to-THC ratio: 21-1

Test date: October 2019

Terpene profile:

- Myrcene-dominant

Origin: Colorado

Growth habit/description: Open-bush; large plant with large numbers of small flowers



THE HEMP MINE

FAIR PLAY, SOUTH CAROLINA

► SOUTHERN BELLE

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 8%-12%

CBD-to-THC ratio: 26-1

Test date: 2019

Terpene profile:

- B-Myrcene dominant
- Nerolidol 2 second-most dominant
- Smells like Juicy Fruit

Origin: South Carolina

Growth habit/description: Bushy, high-yielding, disease-resistant variety that stacks early and spikes late in total THC

Spacing: 5 feet

Size: 5 feet tall, 5 feet in diameter

Crop time, seed to harvest: 8-9 weeks

Flower period: 14:18 (H:M)

Yield range: 2.5-4.5 pounds dry weight per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Clones direct via thehempmine.com; sales@thehempmine.com



► SOUTHERN CAT DADDY

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 7%-15%
- CBG: 1%
- CBC: 1%

CBD-to-THC ratio: 22-1

Test date: 2019

Terpene profile:

- B-Caryophyllene dominant

Origin: South Carolina

Growth habit/description: Bushy, dense, frosty flower; performs well outdoors but ideal for greenhouses and indoor growing

Size: 5 feet tall, 5 feet in diameter



Spacing: 5 feet

Crop time, seed to harvest: 7-8 weeks

Flower period: 14:00 (H:M)

Yield range: 2-3 lbs. dry weight per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Clones direct via thehempmine.com; sales@thehempmine.com

► SOUTHERN LUCK

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 12%-18%
- CBG: 1%
- CBC: 1%

CBD-to-THC ratio: 26-1

Test date: 2019

Terpene profile:

- B-Myrcene dominant

Origin: South Carolina

Growth habit/description: Bushy, high-yielding, disease-resistant variety that stacks early and spikes late in total THC

Spacing: 5 feet

Size: 4 feet tall, 5 feet in diameter

Crop time, seed to harvest: 7-8 weeks

Flower period: 14:18 (H:M)

Yield range: 2-5 pounds dry weight per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Clones direct via thehempmine.com; sales@thehempmine.com



► SOUTHERN OG

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 8%-19%
- CBG: 1.5%
- CBC: 1%

CBD-to-THC ratio: 27-1

Test date: 2019

Terpene profile:

- B-Myrcene dominant



Origin: South Carolina

Growth habit/description: Bushy, disease resistant and high yielding; ideal for delta-9 states

Spacing: 5 feet

Size: 5 feet tall, 5 feet in diameter

Crop time, seed to harvest: 8-9 weeks

Flower period: 14:10 (H:M)

Yield range: 2-5 pounds dry weight per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Clones direct via thehempmine.com; sales@thehempmine.com

► SOUTHERN SUNSET

Hybrid variety grown for flower

Cannabinoid profile:

- CBD: 11%-18%
- CBG: 1%
- CBC: 1%

CBD-to-THC ratio: 25-1

Test date: 2019

Terpene profile:

- B-Caryophyllene dominant

Origin: South Carolina

Growth habit/description: Upright and bushy late bloomer—finishes 3-4 weeks later; works well for stagger harvesting and reusing drying space

Spacing: 5 feet

Size: 6 feet tall, 5 feet in diameter

Flower period: 13:24 (H:M)

Crop time, seed to harvest: 8-9 weeks

Yield range: 2-3.5 pounds dry weight per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Clones direct via thehempmine.com; sales@thehempmine.com



TRILOGENE DENVER

► AQUAWOMAN

Hybrid variety grown for flower

Cannabinoid profile:

- CBD: 11.39%
- THC: 0.27%

CBD-to-THC ratio: 42-1

Test date: February 2020

Terpene profile:

- Pinene
- Myrcene
- Humulene

Origin: Longmont, Colorado (Sangria Bx3 x Superwoman Bx3)

Female-to-male ratio: 99% female

Growth habit/description: Uniform, bushy habit

Spacing: 5 feet apart with rows 5 feet apart (5x5)

Size: 8 feet tall, 5-6 feet in diameter

Dormant/hard seed: 0%

Crop time, seed to harvest: 16 weeks

Germination: 1-3 days at 94% rate

Flower period: Early August-early October (photoperiod dependent)

Maturity: 8 weeks

Potential Yield range: 2-4.5 pounds per plant

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Via broker or direct via trilogenseeds.com; sales@trilogenseeds.com



► GNO

Hybrid variety grown for flower

Cannabinoid profile:

- CBD: 11.34%
- THC: 0.29%

CBD-to-THC ratio: 39-1

Test date: February 2020

Terpene profile:

- Caryophyllene
- Pinene
- Humulene



Origin: Longmont, Colorado
(Superwoman Bx3 x Sangria Bx3)

Female-to-male ratio: 99% female

Growth habit/description: Uniform, proportionate, bushy

Spacing: 5 feet apart in rows 5 feet apart (5x5)

Size: 8 feet tall, 5.5-6 feet in diameter

Dormant/hard seed: 0%

Crop time, seed to harvest: 16 weeks

Germination: 1-3 days, 90% rate

Flower period: Early August-early October
(photoperiod dependent)

Maturity week: 8-9 weeks in flower cycle

Yield range: 2-5 pounds per plant

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Through broker or direct via
trilogenseeds.com; sales@trilogenseeds.com

► SANGRIA S1

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 9.75%
- THC: 0.19%

CBD-to-THC ratio:
49-1

Test date:
February 2020

Terpene profile:

- Myrcene
- Linalool
- Pinene

Origin: Longmont, Colorado
(Sangria Bx3 x Sangria Bx3)

Female-to-male ratio: 99% female

Growth habit/description: Uniform and bushy habit

Spacing: 5x5

Size: 6-7 feet tall, 5 feet in diameter

Dormant/hard seed: 0%



Crop time, seed to harvest: 16 weeks

Germination: 1-3 days, 91% rate

Flower period: Early August-early October
(photoperiod dependent)

Maturity: 8 weeks

Yield range: 2-5 pounds per plant

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Through broker or direct via
trilogenseeds.com; sales@trilogenseeds.com

► SUPERWOMAN S1

Hybrid variety
grown for flower

Cannabinoid profile:

- CBD: 14.45%
- THC: 0.34%

CBD-to-THC ratio: 43-1

Test date: February 2020

Terpene profile:

- Pinene
- Limonene

Origin: Longmont, Colorado
(Superwoman Bx3 x Superwoman Bx3)

Female-to-male ratio: 99% female

Growth habit/description: Uniform habit but
grows tall

Spacing: 5x5

Size: Up to 10 feet tall, 6 feet in diameter

Dormant/hard seed: 0%

Crop time, seed to harvest: 18 weeks

Germination: 1-3 days, 90% rate

Flower period: Early August-early October
(photoperiod dependent)

Maturity week: 9 weeks

Yield range: 2.5-5 pounds per plant

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Through broker or direct via
trilogenseeds.com; sales@trilogenseeds.com



CBG

COLORADO BREEDERS DEPOT CAÑON CITY, COLORADO

► LA CREMA

Hybrid variety grown for oil extraction

Cannabinoid profile:

- CBD: 18.5%
- THC: 0.15%

CBD-to-THC ratio:

55-1

Terpene profile:

- Low-profile; CBG content does not promote rich smell like CBD plants

Origin: Colorado

Female-to-male ratio: 97% female

Growth habit/description: Bushy, but determined by spacing

Spacing: Outdoor recommendation is 4x4

Size: 5-6 feet tall and 4 feet in diameter when spaced 4x4, or 6-7 feet tall and 6-7 feet in diameter when spaced 2x2

Dormant/hard seed: 2%

Crop time, seed to harvest: Determined by earliness of planting.

Germination: 10-14 days at 92% rate

Flower period: 55-65 days

Maturity: 55-65 days after photosynthesis, depending on climate

Yield range: Determined by spacing. Based on pounds per square foot, plant produces 0.2-0.3 pounds; 4x4 spacing produces 2.5 pounds per plant.

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct via [Coloradobreedersdepot.com](https://coloradobreedersdepot.com); info@coloradobreedersdepot.com



FRONT RANGE BIOSCIENCES LAFAYETTE, COLORADO

► PANAKEIA

Hybrid variety grown for flower and oil

Cannabinoid profile:

- CBG: High (up to 18%)
- THC: 0.00% THC

Growth habit/

description: Upright, vigorous plant with high-yield potential

Crop time: Early through late planting time, depending on location

Flower period: Early to midseason maturity, flower initiation at 13.5 hours daylength

Purchase: Rooted cuttings through broker or direct via Front Range Biosciences, frontrangebio.com



HIGH GRADE HEMP SEED LONGMONT, COLORADO

► MATTERHORN

Hybrid variety grown for flower and oil

Cannabinoid profile:

- CBG: 12.46%
- THC: 0.09%

Test date:

March 2, 2020

Terpene profile:

- Effervescent notes of citrus, lemon and lime

Origin: Switzerland

Female-to-male ratio: 4,000 females-1 male



Growth habit/description: Uniform shape, vigorous growth and high yield

Spacing: 2,000-3,500 plants per acre

Germination: 48 hours at average 95% rate

Flower period: Late September, depending on region

Maturity: 8-9 weeks

Yield range: 2,500-3,000 pounds of dry whole plant material per acre

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via highgradehempseed.com; info@highgradehempseed.com

OREGON CBD INDEPENDENCE, OREGON

► WHITE CBG

F1 hybrid variety grown for flower

Cannabinoid profile:

- CBG: 10%-15% in manicured flower with outliers in low-20% range
- Total THC: 0.1%-0.2%; biomass 7%-12%; 0-0.1% total THC

CBD-to-THC ratio: 90-100: 1

Terpene profile:

- Creamy lemon
- Caryophyllene dominant
- Broader terpene profile - terroir dependent

Origin: United States

Female-to-male ratio: 1 phenotypically male in 4,000 plants

Growth habit/description: Vigorous, bushy plants

Spacing: Plant 4 feet between plants; 6 feet between rows for June 1 planting

Size: 4-6 feet

Dormant/hard seed: Less than 5%

Germination: 5-10 days under optimal conditions, 95% rate

Flower period: Mid-July to mid-September

Maturity: 8 weeks

Net weight of dry mass: 2-4 pounds

Yield range: 1-4 pounds

Compliance: 2014 and 2018 Farm Bill compliant

Purchase: Direct via oregoncbdseeds.com; info@jackhempicine.com

THE HEMP MINE FAIR PLAY, SOUTH CAROLINA

► JANET'S G

Hybrid variety grown for flower

Cannabinoid profile:

- CBG: 12%
- THC (maximum total): 0.15%

Test date: 2019

Terpene profile:

Pinene dominant

Origin: South Carolina

Growth habit/description: Upright and bushy, high disease resistance and medium-high yields; doesn't require early harvest

Spacing: 5 feet

Size: 4 feet tall, 4 feet in diameter

Crop time, seed to harvest: 7-8 weeks

Flower period: 14:10 (H:M)

Yield range: 2-3 pounds dry weight per plant

Compliance: 2014 and 2018 Farm Bills

Purchase: Clones direct via thehempmine.com; sales@thehempmine.com



GRAIN AND FIBER

BIJA HEMP, A SUBSIDIARY OF INTERNATIONAL HEMP SOLUTIONS DENVER

► BIALOBRZESKIE

Monoecious variety grown for fiber and grain

Origin: Institute of Natural Fibers and Medicinal Plants of Poznań, Poland



Female-to-male ratio: Less than 5% female to male; greater than 94% hermaphroditic plants

Size: Plants will reach 7-11 feet tall, depending on production practice

Spacing: Plant 55 pounds per acre

Dormant/hard seed: Less than 7%

Crop time, seed to harvest: 75 days for fiber; 105-110 days for grain

Germination: 7-10 days from seeding, at 87%-93%

Flower period: 70-75 days

Maturity: 11 weeks for fiber; 15 weeks for grain

Yield range: Average straw yield 10 tons per acre; raw fiber content 2 tons per acre; grain yield 1,025 pounds per acre

Compliance: 2014 and 2018 Farm Bill compliant; previously listed on OECD-Seed Scheme; total THC COAs available for multiple jurisdictions

Purchase: Direct via bijahemp.com; info@bijahemp.com

► HENOLA

Monoecious variety grown for grain

Origin: Institute of Natural Fibers and Medicinal Plants of Poznań, Poland



Female-to-male ratio:

Less than 5% female to male; greater than 94% hermaphroditic plants

Size: Plants are shorter than most grain varieties, growing 6 feet tall with tight panicle development

Spacing: Plant 20 pounds of seed per acre

Dominant/hard seed: Less than 5%

Crop time, seed-to-harvest: 105-110 days

Germination: 7-10 days from seeding, at 87%-93%

Flower period: 70-75 days

Maturity: 11 weeks for fiber; 15 weeks for grain

Yield range: 3,050 pounds per acre average

Compliance: 2014 and 2018 Farm Bill compliant; previously listed on OECD-Seed Scheme; total THC COAs available for multiple jurisdictions

Purchase: Direct via bijahemp.com; info@bijahemp.com

MULTIPURPOSE

COLORADO BREEDERS DEPOT CAÑON CITY, COLORADO

➤ OTTO II BOAX

Non-feminized hybrid tri-crop variety grown for seed, fiber and CBD extraction

Cannabinoid profile:

- CBD: 10%
- THC: 0.2%

Origin: Colorado

Female-to-male ratio: 50-50

Growth habit/description: Tall, with thick stalks; 10-foot-high females and 12-foot-high males grow in a sea of green

Spacing: 30-inch rows; 6-8 inches between plants (26,000 seeds or 1 pound per acre)

Size of plants: 10-12 feet tall; 1 foot in diameter

Compliance: 2014 and 2018 Farm Bills

Purchase: Direct via Coloradobreedersdepot.com; info@coloradobreedersdepot.com



HEMP GENETICS INTERNATIONAL SASKATOON, SASKATCHEWAN

➤ CFX-1

Photoperiod-dependent variety grown for flower, seed, grain and fiber

Cannabinoid profile:

- CBD: 0.5%-2.7%
- THC: < 0.3%

CBD-to-THC ratio: 6-12:1 (variable)

Test date: 10 years of data

Female-to-male ratio: 60% female

Growth habit/description: Tall, dual-purpose variety used for grain and fiber production; high yield

Spacing: Density depends on end purpose and production system



Size: 59-57 inches (150-170 centimeters) tall (Canada)

Crop time, seed to harvest: ~110+ days

Kernel weight: 0.7 of an ounce (20 grams) per 1,000 seeds

Germination: 3 days at 85%-95% rate

Flower period: 55 days after seeding

Maturity (Canada): ~110+ days

Net weight dry mass: 4,470 pounds (2,028 kilograms) variable

Yield range: 2,052 pounds (930.7 kilograms) of grain per acre

Purchase: Through approved U.S. seed distributors or direct via hempgenetics.com

➤ CFX-2

Dioecious variety grown for flower, seed, grain and fiber

Cannabinoid average:

- CBD 0.5%-2.7%
- THC: < 0.3%

CBD-to-THC ratio: 6-12:1 (variable)

Test date: 10 years of data

Female-to-male ratio: 60% female

Growth habit/description: Vigorous grower during establishment and tall stature provide weed control and allows plant to absorb nutrients when soil fertility is limited

Spacing: Density depends on end purpose and production system.

Size: 130-150 cm tall (Canada)

Kernel weight: 16 grams/1,000 seeds

Crop time, seed to harvest: ~103+ days

Germination: 3 days at 85%-95% rate

Flower period: 53 days after seeding

Maturity (Canada): ~103+ days

Net weight dry mass: 4610 lbs. (variable)

Yield range: 1949 lbs. of grain per acre

Purchase: Through approved U.S. seed distributors or direct via hempgenetics.com



► CRS-1

Dual production variety grown for CBD, grain and fiber

Cannabinoid profile:

- CBD: 0.5%-2.7%
- THC: < 0.3%

CBD-to-THC ratio:

6-12:1 (variable)

Test date: 10 years of data

Female-to-male ratio: 60% female

Growth habit/description: Used in organic production systems for additional weed competition thanks to its tall stature

Spacing: Density depends on end purpose and production system

Size: 59-79 inches (150-200 centimeters) tall (Canada)

Kernel weight: 0.7 of an ounce (20 grams) per 1,000 seeds

Crop time, seed to harvest: 110+ days

Germination: 3 days at 85%-95% rate

Flower period: 55 days after seeding

Maturity (Canada): ~110+ days

Net weight dry mass: 5,914 (variable)

Yield range: 1,891 pounds (858 kilograms) of grain per acre

Purchase: Through approved U.S. seed distributors or direct via hempgenetics.com



► GRANDI

Photoperiod-dependent variety grown for flower, seed, grain, fiber

Cannabinoid profile:

- CBD: 0.5%-2.7%
- THC: < 0.3%

CBD-to-THC ratio:

6-12:1 (variable)

Test date: 5 years of data

Female-to-male ratio: 60% female

Growth habit/description: Medium, developed for regions further south

Spacing: Density depends on end purpose and production system

Size: 31-51 inches (80-130 centimeters) tall (Canada)

Flower period: 55 days after seeding

Crop time, seed to harvest: ~105+ days

Kernel weight: 0.5 of an ounce (15 grams) per 1,000 seeds

Germination: 3 days at 85%-95% rate

Maturity (Canada): ~105+ days

Net weight dry mass: 3,302 pounds (1,498 kilograms) variable

Yield range: 1,729 pounds (784 kilograms) of grain per acre

Purchase: Through approved U.S. seed distributors or direct via hempgenetics.com



► KATANI

Photoperiod-dependent variety grown for flower, seed, grain and fiber

Cannabinoid profile:

- CBD: 0.5%-2.7%
- THC: < 0.3%

CBD-to-THC ratio:

6-12:1 (variable)

Test date: 5 years of data

Female-to-male ratio:

60% female

Growth habit/description: Medium-sized, high-grain yielder. Best suited for northern states and southern Canada

Spacing: Density depends on end purpose and production system.

Size: 28-43 inches (70-110 centimeters) tall (Canada)

Kernel weight: 0.5 of an ounce (15 grams) per 1,000 seeds

Crop time, seed to harvest: ~105+ days

Germination: 3 days at 85%-95% rate

Flower period: 55 days after seeding

Maturity (Canada): ~105+ days

Net weight dry mass: 470 pounds (2,028 kilograms) variable

Yield range: 1,820 pounds (826 kilograms) of grain per acre

Purchase: Through approved U.S. seed distributors or direct via hempgenetics.com



► PICOLO

Photoperiod-dependent variety grown for flower, seed, grain and fiber

Cannabinoid profile:

- CBD: 0.5%-2.7%
- THC: < 0.3%

CBD-to-THC ratio:

6-12:1 (variable)

Test date: 5 years of data

Female-to-male ratio: 60% female

Kernel weight: 0.4 of an ounce (13 grams) per 1,000 seeds

Germination: 3 days at 85%-95% rate

Growth habit/description: Short. Designed for production under irrigation and northern latitudes; high grain yielder.

Spacing: Density depends on end purpose and production system.

Size: 26-41 inches (65-105 centimeters) tall (Canada)

Crop time, seed to harvest:

Approximately 110+ days

Flower period: 53 days after seeding

Maturity (Canada): ~105+ days

Net weight dry mass: 3,291 pounds (1,493 kilograms) variable

Yield range: 1,686 pounds (765 kilograms) of grain per acre

Purchase: Through approved U.S. seed distributors or direct via hempgenetics.com

