

### Industrial Hemp Farming & Common Questions for Texas—Part 3. Critical Questions about Farming the Hemp Plant.

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This is a list of questions I believe will help prospective hemp farmers, crop consultants, Texas A&M AgriLife personnel, and others better understand how hemp may be grown for CBD oil, fiber, or grain. The questions are grouped in general categories. From my 20+ years of alternative cropping experience these questions reflect how I approach cultivation of a new crop I am not familiar with. With time AgriLife and others will develop Texas-specific understanding of answers to these questions to better help prospective and active Texas farmers grow hemp. Revisit this document regularly as we gradually fill in answers.

We will color code new information with a key so if you look at the document six weeks later you can quickly find what is new.

For other Texas hemp resources see <https://lubbock.tamu.edu/programs/crops/hemp/> We will soon add an AgriLife system wide hemp webpage to serve as our primary resource webpage.

*Please submit hemp questions you may have that can be added to the list.*

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#### Hemp the Plant

- There are *sativa* and *indica* species of *Cannabis*. Which one(s) are used primarily for CBD oil, fiber, and grain production? If a state publishes a list of approved varieties will they all likely be *sativa*, which are primarily used for industrial hemp?
- All hemp is annual, not perennial?
- Is hemp a legume?
- Will hemp plants regrow after harvest for fiber, CBD oil, or grain? If so, would that enable a second harvest from the same plants?
- Hemp plants are generally considered “short-day” plants. What does this mean, and how might this be important for CBD oil, fiber, or grain production and the time of year a crop is planted?
- The literature suggests male plants shed their pollen and die several weeks prior to seed ripening on the female plants. Does this matter if producing hemp for fiber or grain? If the male plants die, then does this hurt the production of fiber or grain? (The optimum hemp crop for CBD oil will have no male plants or male flowers. If female flowers are pollinated from the males, then CBD oil production is lower.)
- What is the minimum soil temperature for rapid seed germination of multi-purpose hemp seed, feminized seed, or seedling and clone transplanting?
- What is the susceptibility of hemp to: a) late spring freeze, b) early fall freeze?
- What is the susceptibility of hemp to hail damage in the first 30 days (like cotton does it have a delicate terminal that if lost means the plant will never enter reproductive growth, might even die)? Later in the season?

- How tall will different hemp varieties get in higher rainfall regions (>35") vs. dry regions without irrigation (<20")? Does tall plant height affect the ability to rogue male flowers/plants from a field for CBD oil production? Does tall plant height interfere with the ability to harvest plants for fiber or grain?
- Is lodging (plants falling over) ever an issue with hemp?
- For each application, is there an increasing duration to harvest from fiber (stalk portion is the source of fiber) to CBD oil (harvest floral structures) to grain (harvest mature seed)? How many days difference might there be between these three uses? Will there be large variations among different varieties? How will I know the maturity range of hemp seed or transplant I use?
- Can the approximate days to flowering be reliably used to project when hemp plants should be tested for  $\leq 0.3\%$  THC?
- Has the concept of "heat units" been applied to hemp growth and development? If the information exists would it be useful to project when tests for THC should be initiated?
- What are the environmental conditions—drought, heat, maximum daytime temps, minimal night-time temps, etc. (if known) that may affect CBD oil content or fiber development in hemp?
- Are there any hot temperatures that would cause flower sterility, especially in females flowers for CBD, among some varieties of hemp?
- Are there rules of thumb to help a farmer estimate what projected yields should be? For example, for CBD (based on level of available water), how many lbs. of floral structures for harvest would be expected for each ton of growth? Or per acre? And what would the approximate %oil content be if there is no male pollination? For the grain what amount of retrievable fiber (bast or hurd) would be expected for each ton of growth? How much is hemp grain production per acre?
- Is there a resource available that describes the growth and development of hemp from seed, feminized seed, seedling transplant, or clone transplant? Documents exist like this for corn, grain sorghum, and sunflower. Is there one for hemp?

### Fields, Soils, Fertility

- Is hemp suitable for all soil textures? If not, which soils are less desirable?
- Can hemp be planted on "marginal" soils?
- Is it OK to plant hemp on soils that do not drain well?
- What are the projected fertilizer recommendations for N-P-K per unit of hemp fiber, grain, or CBD oil production? If there are no soil fertility guidelines is there a crop that can be used as a proxy for the estimated level of required nutrients for hemp production?
- Are there any lesser nutrients like calcium, magnesium, potassium or micronutrients (especially iron and zinc) to which hemp is susceptible to deficiencies?
- What is the optimum range of soil pH for hemp production?
- Is hemp susceptible to iron chlorosis on high pH soils >7.5 and especially >7.8?

### Farming the Hemp Crop

- What appears to be an optimum rotation for larger acres of hemp production in each region of Texas? Would grasses like corn, grain sorghum, and wheat be more suitable rotations than other broadleaf crops like cotton, soybean, or sunflower?
- Is there any data on crop rotation yields after hemp production?

- If growing for CBD oil, how readily can the rest of the field be used for fiber after CBD harvest?

### Genetics, Seeds, Clones

- Are most hemp varieties similar in terms of maturity or are there large differences? How might this matter if growing for CBD oil, fiber, or grain?
- How will I be able to ensure that multi-purpose seeds, feminized seeds, or seedling & clone transplants are genetically uniform? Will each class offer certified seed or genetics?
- Will there be significant differences in variety performance and adaptation in different growing regions of Texas? Do we know if any current hemp varieties will be adapted to Central Texas, the Coastal Bend, and Lower Rio Grande Valley? Are varieties grown in Colorado and Kansas likely suitable for the Texas High Plains?
- Is there any independent data (a university system, private consulting service, etc.) a hemp farmer can access to understand the potential performance of individual hemp varieties for CBD oil, for fiber, or for grain?
- Hemp growers report that clone transplants do not develop a tap root but have a lot of adventitious roots, likely near the soil surface. Would this prevent mechanical cultivation of younger plants before they are ~3' tall?
- Do hemp crops grown from seedlings or transplants suffer transplant shock? If so, can it be minimized?
- Do hemp crops grown from seed vs. transplants reach harvest stage about the same time? Or are transplants sooner?
- How do I arrange and how far in advance must I plan if using feminized seed, seedling transplants, or clone transplants?
- Are clones for transplanting and feminized seed approved for organic production?

### Hemp and Weeds

- What residual herbicides would hemp be susceptible to? Is there another crop that responds similarly that I could use as a proxy to ascertain if a chemical label's rotation restriction may be a concern for hemp?
- There are no registered herbicides for hemp. With the wide spacings regularly suggested by CBD oil hemp farmers in other states (60" rows with plant spacing of 4-5'), then weeds will have ample opportunity to grow before any suppression might occur. How quickly or is there canopy closure in CBD production?
- How susceptible is hemp to glyphosate (Roundup), dicamba, or 2,4-D drift?
- How long will it take before there will be residual herbicides and over-the-top herbicides for use in hemp production?

### Hemp and Insect/Animal Pests

- What known insect issues are there in hemp in other states? Is there a particular family, genus, or species of insects more likely to be a problem in hemp?
- Are worms ever an issue, either in the stalk, feeding on the leaves, or feeding on the floral structures? How will worms like fall army, beet, cotton bollworm/corn earworm, etc. respond to hemp?
- Is hemp susceptible to any species of aphid?
- Is hemp generally a good host for beneficial insects?

- Is hemp seed susceptible to wireworm feeding? Or other soil borne insects like carrot beetles, chewing worms, etc. that could feed on expensive seeds or seedlings?
- Is hemp susceptible to root knot or reniform nematodes sometimes found in cotton fields?
- Are rodents a potential pest to hemp seed or hemp seedlings?
- Do wild hogs or deer damage hemp crops? Until this is known should I fence high-value CBD oil production sites?

## Hemp and Diseases

- What diseases have been observed in other states or might be expected in Texas hemp?
- Would there be a large potential difference in diseases in stalk, foliar, and floral structures for dry vs. humid environments?
- Is hemp better suited to a dry environment with lower humidity?
- Are there any diseases that would specifically affect the floral structures of hemp for CBD oil?
- Would planting early or late better manage potential disease issues? What hemp farming factors will mitigate disease potential?
- Are there diseases in cotton that could potentially carry over to hemp (e.g., Verticillium)? Diseases from other crops?

## Planting

- Hemp planting seed is small. How many seeds per lb.? Is hemp seed more like alfalfa seed (~220,000 seeds/lb.), sesame (~120,000 seeds per lb.), or hybrid pearl millet (70,000 to 90,000 seeds per lb.)? Are there planter disks for air vacuum planters that will work on hemp seed?
- What is the projected optimum date (within a range of +/- three weeks) within different Texas regions for a) transplanting hemp seedlings or clones, or b) planting seed for hemp production? Does this vary if planting for CBD oil, fiber, or grain?
- If hemp is a short-day plant, then how does this affect the optimum planting date? For different areas of Texas, like the High Plains vs. the Lower Rio Grande Valley, could the flowering characteristics vs. geographic location make it possible that hemp farming in far south Texas could grow more than one crop per year?
- How will we know if the planting patterns used in other states (e.g., 60" rows X 4-5' spacing) for CBD oil production are suitable for Texas? Would these conditions change based on different production conditions of arid vs. humid, or where there is low rainfall/irrigation vs. Texas regions with >35" of annual rain?
- Because hemp seed is so small, what is the deepest I can likely plant hemp if growing from seed? 1/2"? Maybe 3/4"? Likely never 1"? Will this likely shallow seed planting depth make it difficult to plant in a dry region unless I am irrigating?
- Are row spacing and plants per acre tighter for hemp fiber and grain production (compared to CBD production)? Is this enough to suppress weeds?

## Minimal Rainfall and Irrigation

- What is the risk of growing dryland hemp on less than 20" or annual rainfall? Less than 25"? Are these dryland conditions unsuitable for hemp CBD oil production?
- What is a practical minimal level of seasonal moisture use I should project for hemp?

- Could I use initial sprinkler irrigation then move to drag socks like in LEPA irrigation? Would some hemp still get too tall for this?
- Some farmers and sale staff to the hemp industry advocate drip irrigation is better, if not essential, for hemp. This in part potentially reduces wetting of the soil surface that might foster weed germination. Will sprinkler irrigation make my weeds worse?

### Markets, Budgets, and Risks

- Is hemp suited to organic production? If so, is CBD oil the most likely area of demand?
- Can I get private crop insurance for hemp, especially if growing for CBD oil?
- Because of the greater risk of hail in the southern High Plains in May and June, is it too risky to grow the crop here? Or would delayed seeding/transplanting reduce the risk?
- Several hemp industry staff and neutral observers believe the CBD oil market is headed to saturation. About how many acres of hemp would satisfy the current and projected level of CBD oil use in the U.S.?
- When will AgriLife develop budgets for hemp farming in Texas?
- How much labor cost and time per acre should be budgeted for hemp CBD oil production in a small-acreage setting (<5 acres) versus a farmer with hundreds of acres?

### Crop Insurance

- What kind of crop insurance (federal or private), if any, will be available for hemp production?
- What perils will crop insurance cover?
- If a hemp crop has >0.3% THC and must be destroyed, will that be an insurable loss? Will it matter if the hemp variety is a certified variety approved by Texas Department of Agriculture for hemp production (deemed to be consistently ≤0.3% THC)?
- If hemp becomes a federal “program crop” how many years will that take?

### Other Questions

- When Texas A&M AgriLife begins research on hemp CBD oil, fiber, or grain production what topics most likely should be researched first?
- Another plant, kenaf, has similar uses as hemp for fiber. With the coming infrastructure to handle hemp processing for fiber, would kenaf instead be a more economical crop, free from regulatory issues? Does kenaf produce more fiber per acre than hemp? How would the economics compare depending on where kenaf might be grown? (The crop was researched by Texas A&M at the Texas A&M AgriLife Research & Extension Center, Beaumont, in the 1990s).

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