Industrial Hemp Farming & Common Questions for Texas—Part 2.
What's Next? Major Questions for a Texas Hemp Industry.

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(Texas A&M AgriLife resources for hemp in Texas will be posted initially at https://lubbock.tamu.edu/programs/crops/hemp then transferred to an AgriLife systemwide hemp webpage once it is established.)

Texas Gov. Gregg Abbott signed legislation June 10 legalizing production, processing and marketing of industrial hemp and products in Texas. This is only the beginning of an extended months' long process for regulatory provisions to be developed and put in place for Texas hemp. The process of permitting, issuing licenses, reporting, fees, inspections and guidelines for any hemp materials with ≤0.3% tetrahydrocannibinol (THC) will take some time to be developed and approved.

Prospective growers, processors and marketers must know hemp remains illegal for you or your business in Texas until you have a license. Under current proposed Texas guidelines, hemp production will only be legal when you have a license to grow it.

Below is a series of common questions about industrial hemp in Texas and what we anticipate moving forward.

Industrial hemp field crop (Univ. of Kentucky).

Is industrial hemp now legal in Texas?

Not yet. As noted above, the process by which guidelines will be determined for Texas hemp has just begun. This process will result in proposed guidelines for Texas involving application for a license, background check, fees, inspections, what plant parts must be tested for potential THC, and reporting. These guidelines will also address required destruction of hemp from the field, during processing, or its products if found to exceed the federally mandated maximum 0.3% THC. There is no recourse to this concentration requirement.

The Texas Department of Agriculture (TDA) is tasked with developing guidelines, which must be approved by USDA. Texas A&M AgriLife held a June 12 conference call with TDA assistant commissioner Dan Hunter. He noted USDA has not yet issued their own guidelines, which states must follow, in order to develop Texas guidelines. In fact, Mr. Hunter said USDA will not even consider states' guidelines until after USDA rules are released. Once released, we expect

a required public comment period (60 days?) on the proposed USDA guidelines. This will further delay Texas and other states formulating final hemp guidelines and submitting to USDA for approval. The federal posting for public comment, however, will give TDA a head start on developing needed guidelines to satisfy federal requirements. Once the comment period concludes, USDA will release final guidelines. Then states can submit their own plans quickly.

Producers and processors wanting a head start on seed delivery, raw materials for processing, etc. must wait until full regulatory approval is granted to Texas, regulations are in place and they become licensed. No, you can't plant a small plot of hemp seed in 2019 (or possibly even early 2020) to see how it will do.

How long until hemp guidelines are issued for Texas and license applications can begin?

We currently do not know. Realistically, the establishment process will not be complete until 2020. Southern regions of Texas might not receive approval for timely hemp planting (we will have to figure out when that will be) by spring 2020 (February or March). Overall, there must be necessary parallel hemp market development in Texas. It may be more practical to view 2021 as a likely start of significant initial Texas hemp field production. Hemp production in greenhouses can likely start any time following licensing. So, if individuals find the permitting process runs slowly and they are not able to meet a targeted field planting schedule, then greenhouse CBD hemp might become the primary Texas hemp for 2020.

TDA Commissioner Sid Miller noted June 11 (see "The Latest Agency News" at http://www.texasagriculture.gov) that TDA will move quickly once allowed to get Texas hemp guidelines submitted to USDA for approval. But Mr. Miller reiterates **"Until all rules and guidelines are finalized by USDA and the Texas state plan is approved, hemp cannot be grown in Texas."**

On March 8, 2019, Texas A&M AgriLife published initial questions-and-answers (Part I) about industrial hemp in Texas. These questions included:

- What is industrial hemp and how does it compare to narcotic/psychoactive marijuana?
- Has industrial hemp been grown in Texas before?
- Is industrial hemp adapted to Texas? (See added comment below on hemp water use compared to cotton.)
- What is the current and potential market for industrial hemp in Texas?
- If industrial hemp becomes legal in Texas, where will Texas farmers get seed? (partially a trick question—most hemp for CBD oil production is grown from expensive clone transplants).
- Under proposed legislation who will be allowed to grow industrial hemp in Texas?
- Will industrial hemp be eligible for crop insurance?

You may review the previous article in the Texas Row Crops Newsletter at https://agrilife.org/texasrowcrops/2019/03/08/industrial-hemp-farming-common-questions-first-texas-legislative-approval-is-required/

Now that Texas legislation for hemp production has been approved there are more questions about the crop and the route to growing hemp in Texas.

When/where will viable Texas commercial markets be developed for CBD oil, fiber and grain?

The answer is unknown. There are many individuals or business entities that have stated plans to engage as hemp buyers and processors. But these entities are not yet in operation. Some are developing plans for infrastructure, and a few have started. This ranges from renovations of a large former coffee facility in Houston to conversion of multi-acre greenhouse space in West Texas that will have adjacent processing facilities. TDA's Miller warns that Texas could easily overproduce hemp in the first year or two of licensed production. Despite enthusiasm and interest, prospective Texas hemp growers must curtail plans to initiate hemp production until readily available markets are clearly defined. Otherwise, there could be significant grower losses of capital with no place to sell hemp raw materials. One hemp industry advisor offers prospective growers this caution: Be hesitant on any agreement to grow hemp unless you see physical facilities of your buyer in place.

How can I best sort through the common "hemp hype," especially for CBD oil?

This may be a challenge. Though we hear many claims about industrial hemp, its potential and its supposed profitability, it is essential for Texans to think through what you read and hear. The hype surrounding industrial hemp is mostly related to CBD oil. This is likely a small market for hemp in terms of acres in Texas and across the U.S. (in contrast to fiber and perhaps grain production). CBD oil production need not be restricted to greenhouses, but it may take a year or two to figure out optimal production for CBD in field settings.

Because of the extraordinary prices of current CBD products and the amount of potential revenue this could generate per acre, it is difficult to sort out what is realistic, especially as several fold more acres are produced and supply greatly expands. This is rightfully expected to significantly lower prices and potential profits. Dose rates in commercial hemp products are often 1 milliliter (1 cc) or less per day (29.6 mls per fluid oz), so the amounts of CBD oil in numerous uses is small. It won't take very many farmers nationwide, especially as some farms seek expansion to 1,000 acres and more (and have harvest equipment that can cover that acreage in contrast to growing 1-2 acres with largely hand labor), to meet or even exceed CBD demand.

The economics of hemp production, especially for CBD based on past results, could be outdated in as little as one year. Some hemp industry observers believe, with the advent of USDA guidelines and expected increased production in many states, that the lucrative economics of CBD oil are already past.

Worldwide, industrial hemp fiber and grain production already occur in many countries. The production of hemp in the U.S. for these two commodities will face world market challenges. There is already an established fiber supply and demand, so Texas farmers will need to compete largely on price to net a meaningful profit. U.S. hemp processors for fiber will have the option of purchasing and importing from the international market. This does not mean hemp production for fiber or grain is impractical. Just know the uniqueness of CBD oil does not extend to fiber and grain. In contrast, worldwide production of CBD oil is quite limited. So, there is a potential market expansion. It will take time, however, for the medical and research communities to further evaluate the many claims for CBD oil to ascertain which are real and which are not. (Medical research to date has documented CBD benefits for some epilepsy patients. There is anecdotal evidence that CBD has other benefits, but clinical trials have been inconclusive.) The

legalization of hemp with ≤0.3% THC should remove major obstacles the medical community itself faced in receiving funding and conducting research.

Observers of the Texas legislative process noted the testimony in committee hearings, other discussions and on the floor of the state House and Senate were absent typical balancing comments. Dr. Bryan Gensch, executive director, Texas Seed Trade Association, commented that TSTA staff observed virtually all hemp discussions at the capitol. He noted in a spring newsletter that not a single agronomist (or crop physiologist, insect or plant disease expert) testified to hemp's adaptability, potential production issues, etc. Testimony came from farmers or, more prominently, processors or providers of processing equipment and others who stand to profit from Texas farmers entering hemp production.

Are there major financial risks to CBD production if acres are greatly expanded?

Yes. It is difficult to project what the long-term value and market for CBD oil production may be. Many of the financial estimates offered during the Texas legislative session were incredible—and probably not credible—in the apparent expanding market of U.S. hemp production, particularly for CBD oil. Similar claims are found frequently online and in information meetings.

Currently, there are excessive costs in production and high prices in products. Some 2019 CBD growers in New Mexico, for example, mostly 5 acres or less, are reportedly spending over $15,000 per acre to establish the crop. They are paying $10 or more per single clone to transplant and using 1,000 to 1,500 transplants per acre. And though there are developing

A modified Gleaner combine harvests hemp for floral structures and grain near Springfield, CO., in 2018. The combine cuts the top of the plant and separates the flower bracts (containing CBD) and the grain. Flower bracts are discharged into a towed GEHL buggy that then hauls to a baler/compactor that wraps the small round bales in plastic.

businesses in the region that could purchase floral structures for CBD oil extraction, some NM producers have planted with no assurance of a market or a buyer for their crop. Furthermore, harvest equipment is already being used in some states that enable farmers to farm and readily harvest hundreds of acres for CBD oil production. This may not bode well in the future for many small-acre producers when buyers can simplify their procurement needs for raw materials from perhaps just a few growers.

Rabo AgriFinance, an international lender in agricultural markets, in a spring 2019 newsletter concurs that the U.S. may soon face an oversupply of hemp grown for CBD extraction. This could result in major losses for farmers once prices adjust. Texas attendees at an early June industrial hemp conference in Kentucky noted among producers in that same state, some are making money, some are breaking even, and others are losing money.

Furthermore, CBD, the most lucrative (initially) and hyped segment of the hemp industry, is currently not approved as a food additive or dietary supplement. If the U.S. Food & Drug Administration eventually approves CBD in the food supply, the approval process could take several years. Hence, that market is likely not a driver anytime soon of additional CBD oil demand.

Farm Journal published a concise summary of hemp risks. See “4 tips to navigate the hemp gold rush” at https://www.agweb.com/article/news-article/4-tips-navigate-hemp-gold-rush. Hemp production tips include using certified seed, taking a science-based approach, making a solid plant, and not investing more than you can afford to lose.

Are there special concerns or risks for hemp farming for CBD oil?

Yes. Agronomically, hemp production for CBD is heavily dependent on eliminating male flowers from the field. This is especially true where establishment costs are $10,000 or more per acre—there is a zero-tolerance policy for male flowers. This is likely done by hand. (We are unsure how this is done in operations of hundreds of acres where “feminized” seed is used in direct seeding or from transplants. Feminized seed in theory, if it is quality seed, should produce few, if any, male flowers.) Use of transplanted clones largely eliminates male flowers from the field, but this expensive approach essentially requires scouting all plants visually to remove any males. It is reported that a few male flowers per acre can pollinate much of the female flowers leading to a significant reduction in CBD oil. Feminized seed can be used, and it may cost up to $1 per seed. Clone costs might be dropping as one Colorado clone provider, looking at a potential West Texas market, is discussing clones in the range of $2 each.

Male and female reproductive structures of female (source of CBD oil) and male hemp plants. (C. Bensch, Oklahoma Panhandle State Univ.)

Oklahoma Panhandle State University professor and agronomy colleague Dr. Curtis Bensch notes some Colorado CBD hemp growers have had success planting for CBD from seed (likely multi-purpose varieties), but to date most Oklahoma growers have not. Transplanting of clones or seedlings is much more likely to result in a harvestable plant. Dr. Bensch believes spending so much money, however, under current economic circumstances for CBD oil production is unwise. In fact, he has pointed out how there may be little incentive for Oklahoma farmers to consider growing for CBD, at least in the current economic environment of excessive establishment costs. Seed varieties, which cost a lot less, may have lower CBD yield. But this may be a good trade-off if it greatly reduces establishment costs and you still successfully obtain a stand. Then you can accept lower CBD oil content.

An environmental concern to CBD oil production comes in at least two ways: 1) if another commercial field of hemp is within a couple miles then prevailing winds or bees could carry pollen to your field and diminish CBD oil production. Some states are mitigating this potential risk by establishing zones where only CBD hemp or fiber/grain hemp can be grown. 2) If you grow CBD hemp correctly, use an approved variety (if there is a list), etc., environmental conditions might still push you past 0.3% THC. In that case you are out of luck. The crop must be destroyed. This happened on limited acreage in Nevada in 2017. About 75% of the crop had to be destroyed.

These risks are in addition to the previously noted concerns about ensuring you have a buyer. A firm, legally binding contract, which you read and understand (and may ask an attorney to review), could reduce your risk as well. We will write more about possible contract considerations in a future edition.

Will hemp genetics and establishment for CBD oil improve in the near future?

As university breeding programs on hemp establish and established diversified seed companies enter the market, we believe soon there will be improved genetics. This will include genetic purity and uniformity of plants. Workers with much of the current hemp seed note that within one "variety" it looks like there is a lot of contamination or off types. One hemp industry observer with experience in Colorado and New Mexico comments this applies to both current multi-purpose varieties and feminized seed. Therefore, for the time being, there has been emphasis on using clones or planting improved feminized seed (more quickly improved genetic purity than regular seeded hemp). Due to some of the genetic sources possibly deriving from legal and illegal cannabis production, there has not been the commitment to breeding purity that a university or established genetics/seed company will have.

Genetic impurity of existing seeds, feminized seeds, and possibly clones is a major concern of Texas A&M AgriLife. The Texas Seed Trade Association issued a recent statement expressing common concerns that AgriLife, seed companies, and farmers will have. A significant means to control genetic purity may be requiring certified hemp seed. This is designated by an independent entity like a state department of agriculture (not the seed or genetics supplier) to reduce the risk hemp farmers may purchase poor quality or impure seed. Adaptation of these various varieties to Texas remain to be seen. For more thorough perspective, I suggest readers access TSTA's July 18, 2019 newsletter (Dr. Bryan Gensch) on their Facebook "Posts" link on at https://www.facebook.com/Texas-Seed-Trade-Association-275459169173495/

In the long run, the risk for CBD could be: A) high cost like we see now to establish the crop, especially if clones are the continued establishment method, and B) the likely scenario that seed

vigor and purity will improve and much, if not most, of hemp establishment may come from conventional, multi-purpose or feminized seed. Small acreage producers for CBD oil will likely focus on quality. Large-scale production will focus on quantity. Also, though we don't fully understand this currently, it is possible that large-scale hemp production for CBD oil may not require a zero-tolerance policy on male flowers in the field. Yes, CBD oil yields could be reduced, but the potentially huge cost savings of establishment from seed could still make this relatively favorable economically.

An overarching concern for the different potential production regions in Texas is hemp varietal adaptation. Varieties grown in Colorado may prove acceptable for the Texas High Plains. But what varieties currently being grown would be adaptable for the Coastal Bend or Lower Rio Grande Valley? We do not know. There is a good chance that many hemp varieties grown in other U.S. regions and Canada will not be a good fit for Texas. Furthermore, as TSTA's Dr. Bryan Gensch notes in his July 18, 2019 newsletter, there may not even be enough seed (or clone production) of any type—let alone good quality--to satisfy increased hemp planting in Texas and elsewhere.

Can CBD be manufactured synthetically, and is this a potential threat to the CBD oil hemp industry?

Several companies are pouring tens of millions of dollars into further research and large-scale synthetic production of cannibinoids especially CBD. There is a well-documented method of organic chemistry synthesis of CBD that appears to be more economical than growing hemp and extracting CBD. Research documents synthetic CBD acts similarly as cannabis (plant-derived) CBD. A major advantage of this synthetic approach is the potential to side-step federal regulations related to cannabis. Currently, as the U.S. government continues to consider cannabis an illegal drug, any pharmaceutical or other plant product derived from cannabis must be closely monitored to ensure regulatory requirements are met. This regulation and monitoring are apparently not required with synthetic CBD since it is not derived from cannabis. According to Chemical & Engineering News these companies are betting the future of cannabinoid therapeutics will be synthetic ("Natural extracts and synthetics square off as cannabinoid drugs," Nov. 21, 2018, see https://cen.acs.org/pharmaceuticals/pharmaceutical-chemicals/Natural-extracts-synthetics-square-off/96/i46).

Due to the current excessive costs of production of CBD oil, it is quite conceivable the chemical and pharmaceutical industries could match or beat plant-derived CBD on price. With the scaling up of hemp acreage and increased CBD supply then prices should fall. Time will tell which method will prove the most competitive, though medicinal uses may understandably prefer naturally produced CBD even though chemically synthetic CBD is the same molecule. CBD oil from hemp might have other constituents absent in synthetic CBD, which could have a positive synergistic effect. This could be a focus of medical research. If synthetic CBD appears to work just as well, then the source of CBD is moot. Some CBD users will still choose 'natural' CBD. But if CBD products remain expensive, then a CBD user, for an ill-defined or unproven medical or health remedy, may be inclined to purchase synthetic CBD products if they cost less.

What financial and budgeting information is available to prospective hemp farmers and processors?

Rabobank notes the hemp market is highly fragmented and there is no reliable source for pricing and production data. Dr. Gensch, TSTA, notes that realistic numbers for hemp

production are currently hard to come by and will remain so for some time to come. Numbers from other states like Kentucky and Colorado, if available, may help some. Texas A&M AgriLife Extension has not developed information on budgets, costs, prices for farming or processing hemp. Thus, those with hemp interests are encouraged to be methodical in evaluating their opportunities. If your budget numbers don't work out, don't try to massage it to fit the possible desire you may have to "make your money in hemp."

Prospective Texas farmers and processors may be best served by a wait-and-see approach. Going forward hemp is absolutely not a get-rich-quick scenario. Texas State Sen. Charles Perry, Lubbock, who helped craft legislation then shepherded it through the legislature, cautions prospective hemp farmers. He advised producers may not want to engage in hemp farming before the economics and markets are established and known.

What agronomic and per-acre yield potential information is available to prospective hemp farmers and processors?

Like financial and budgeting concerns, Texas A&M AgriLife is not yet able to project yield per acre of CBD oil, fiber or grain. We desire simple rules of thumb to enable us to estimate what a grower might expect in terms of CBD oil yield per acre or pounds of biomass and resulting fiber production. We are not yet comfortable with making estimates though some numbers from Colorado and Kentucky may prove helpful. A private New Mexico researcher (approximately 3,000 acres licensed in 2019 under provisions from the 2014 federal Farm Bill) suggests an individual hemp plant for CBD may produce 0.5-1 lb. of flowers, or 750-1,500 lbs. per acre if CBD is 15% in the floral structures. (How soon the flowers are processed may have an effect, though, as there is believed to be a loss of CBD oil with time.)

We would like similar numbers to gauge the yield and potential value of fiber per acre. But simple calculations may also need to reflect the possible time of the biomass curing in the field. Is this possibly several months? The "rhetting" process allows time for degradation or rotting of softer non-essential components, but that may require moisture, hence it could be quite different depending on your Texas location. This would potentially add costs to your production if your land remains unavailable to plant another crop. Conversely, there is also baling of hemp for fiber, but how and when that is appropriate vs. field curing, we do not yet understand for Texas environments.

How will hemp production be financed?

This is another question that may have no immediate answer. We spoke with a Lubbock region farmer who is a Texas Farm Bureau representative. He is also a board member of a major South Plains banking network whose loan portfolio is about half agricultural. Walt Hagood notes that those looking to borrow money for production or purchasing/processing hemp face the major uncertainty of lack of information and precedent. Growers and processors would be expected at his bank to provide significant collateral—land, savings, farm equipment, a cow herd or other investments—to secure a loan for hemp production.

It is likely that producers interested in a few acres, even expensive CBD, must put up their own money without financing.

What is the status of potential crop insurance?

We have read the federal intent may be to view hemp as a program crop. We are not sure. Whether hemp is a potential program crop or not, federally approved or supported crop insurance normally requires a feasibility study, pilot test program, revisions, etc. before it is offered to the public, if at all. This would be several years away. A few private insurance policies on farm-scale hemp have been issued in Kansas. But the cost was high, in the range of several hundred dollars per acre.

If and when crop insurance is available for hemp production, what will it cover? Common perils like insect or disease damage, hail and other storm damage are assumed. But what if a farmer has a crop that tests >0.3% THC and must be destroyed? Would it matter if a farmer planted a hemp crop that was a variety from a likely forthcoming list of approved varieties from TDA? What if the variety was a certified variety (much higher assurance of genetic purity) that was widely known to be consistently if not reliably ≤0.3% THC?

Depending on the type of hemp grown, how soon would farmers expect payment for a CBD, fiber or grain crop?

We are not currently aware of the norm in states like Kentucky or Colorado. Due to different post-harvest requirements like storage, time to CBD extraction, curing of fiber, etc. we understand the commercial “sale” of hemp might not occur for months after harvest. Will farmers accept this when they are often accustomed to payment within a few days or at most 30 days after a crop is delivered? This would be a criterion to define in a legally binding production contract with a buyer/processor. We do not understand yet how quickly processing for CBD oil or fiber may occur after harvest, but it appears there can be a significant delay.

Likewise, buyers/processors may find they will need to pay the producer prior to the sale of their processed hemp products. This may require their own bridge financing until sale to a wholesaler or end user occurs.

How will hemp production with its level of regulations compare to growing other major or alternative Texas crops?

Hemp offers a potential alternative in the rotation and may very well prove a profitable crop to include in the mix. But hemp will be grown in a regulatory environment, unlike any other commercial Texas crop. There will be a significant amount of paperwork. This might be comparable to what organic producers experience. Crop rotation opportunities are insignificant if only growing a few acres for CBD oil. Entry costs, at least currently, will be high. Not only will record keeping be important but licensure requirements must be in order. Though we have discussed how hemp with >0.3% THC would require crop destruction, regulatory infractions could potentially incur the same result pending forthcoming guidelines.

With a 20+ year career as an alternative crop specialist for Texas A&M AgriLife, Dr. Trostle works with numerous lesser or alternative crops where there is less information about production, economics, agronomics, etc. In many of these individual crops, most farmers probably are better off choosing not to consider production. They will not take the needed time or make the essential commitment to follow best practices (if they are known). Thus, some alternative crops often prove a disappointment.

The best example may be winter canola. Compared to winter canola, growing winter wheat is relatively simple. The management decisions are basic. Winter canola requires an earlier planting date, has specific insect and possible disease issues farmers have never encountered before, is relatively difficult to harvest, and is more vulnerable to storm damage. Canola farming does offer some significant rotation advantages, however, which contribute to cropping system profitability. But there are few Texas famers who have grown winter canola that stay with it more than a few years.

The challenges of hemp farming may be several-fold what a Texas farmer encounters with his or her current cropping. Yet, there is Texas market potential for hemp if producers seek the best information, filter out the hype, ask serious questions and apply sound marketing and management practices.

Does hemp truly require only one half the water of Texas cotton?

This comment is noted among several sources online. However, growers and irrigation personnel who work with hemp in nearby states suggest numbers for hemp water use do not support this claim. Hemp can readily use if not require over 2" of water per week. It has been documented that drought stress can cause physiological changes that increase THC levels above 0.3%, thus requiring crop destruction. It remains to be seen if hemp will be a viable dryland crop without irrigation in drier regions of Texas where rainfall is less than 25" a year and especially less than 20"/year. This is a potential area of initial hemp research for Texas A&M AgriLife.

Is all the hype surrounding hemp, especially for CBD oil, just like the Texas emu fiasco in the late 1980s and early 1990s?

Possibly. Emus in Texas were the new, healthier meat. Emu oil was purported to have many potential uses. Excessive prices were being paid, over $20,000 for a breeding pair of emus. But the markets for emu meat and emu oil never materialized. A breeding pair of birds became worthless. Suppliers of breeding birds made a lot of money. Those who bought the birds lost their money. In December 2018, The Economist (London) published a review "The great Texas emu bubble." You can read about it at https://www.economist.com/christmas-specials/2018/12/18/the-great-texas-emu-bubble (available if registering for five free articles per month, or by subscription).

With the emus there was a lot of hype and little information to support the claims. It was highly speculative. Was anyone truly surprised how it ended?

So, is industrial hemp in Texas and other states like the emu craze? As noted above, the hype where the economics, specifically for CBD oil, have approached ridiculous levels in some cases, is similar. But we believe it is different moving forward. Industrial hemp—whether for CBD oil, fiber or grain—has intrinsic value in a way the emus did not. The value and utility for hemp fiber and grain is known, although it is less certain for CBD oil.

We believe there is a better example to compare the potential Texas hemp industry to. In the late 1990s, the winegrapes industry was expanding in Central Texas and the lower High Plains region. There were many small vineyards installed at a cost of $7,500-10,000 per acre. It was highly labor intensive. But farm folk felt accustomed to hard work and long hours. By the early 2000's in the Lubbock region, many of these small 0.5 to 2-acre vineyards were being

abandoned. It was too much work. There were larger vineyards being planted that could supply winegrapes in much larger volume. Those smaller acres likely never recaptured their up-front costs.

Will herbicides, fungicides and insecticides be readily available for hemp production?

No. There are only a few crop protection products labeled, some under state registrations, for hemp. And these may be organic, and not widely effective. First, until we learn more, hemp is probably not for your weedy ground. Hemp can develop a thick canopy in fiber and grain production, but the wide spacing of plants in CBD production invite unchecked weed infestations.

It normally takes several years to register a new pesticide for a crop. First, a company—usually the registrant who is responsible for label information—must be interested in the crop and willing to spend the money to develop new label guidelines. This may require field research for labeling of chemical rates, application timing, etc. Or it may require food safety or allergenic tolerance research. Then there is the often-lengthy process of getting the label approved. The IR-4 program for pesticide registration in specialty or limited-acre crops might be applicable to hemp, but that still involves a delay. We do not know if Kentucky has considered the IR-4 approach.

The reason you may not have heard about significant pests in hemp is because hemp is new. Insects and diseases have not yet identified hemp as a desirable host. As more hemp is grown, we anticipate this will change. The current lack of crop protection products for hemp farming is a major concern (see the TSTA newsletter noted above). The hemp industry and growers may farm underestimate the limitation this will have. Dr. Gensch notes reports that cutworms are now an issue in some Midwest hemp. Also, illicit cannabis growers for marijuana where plants are crowded together are reporting disease issues.

Back to the above winegrapes example, in Central Texas when winegrape acres were established, no one knew the ”sharpshooter” insect would become a problem. Research found this insect transmits Pierce’s disease, which greatly limited production and profitability in that region. Since hemp has not been grown at all in most Texas regions, this same principle could be in place. With no current knowledge of pests specific to hemp, there is always the possibility a crop-specific insect or disease could develop with a significant impact on Texas hemp production and profitability.

What precautions should a prospective hemp producer take in agreeing to produce for a hemp buyer/processor?

There are many companies, perhaps most of them startups, that are entering the hemp business at some level. Kentucky has approved 42,000+ acres of production for 2019. Over 100 companies there applied for permits to work with the crop as a buyer, processor, etc. Some of these companies probably don’t make it past being in name only or perhaps have a webpage. Producers must look for companies that have substance: physical facilities, names and contact information, and Texas licenses when they become available, etc.

A good question for a prospective hemp farmer to ask of a hemp company might be: “How will you share in the risk I face as a grower in producing hemp?” We are not even sure what the answers to that might be. But if a company doesn’t have any skin in the game, then you could be left holding the bag—a crop with no market outlet. Does the company have field

representatives? Do they have working capital to conduct their business? Are they already engaged in the hemp business elsewhere (e.g., have experience in hemp)? How will they help you manage your risk? If a hemp business is only a marketer of products or services for hemp production, how do these add value to the farm? Are these reasonably priced? If you are looking at materials, genetic stock and services, are these available somewhere else at lower cost?

If you are considering entering an agreement with a buyer to produce hemp, then shop around. In a future edition, we will discuss with the help of Texas A&M AgriLife assistant professor of agricultural law Tiffany Dowell Lashmet what is needed for hemp farmers to protect themselves from unscrupulous companies and individuals who may not have their best interest in mind. This will include advice about legally binding contracts for production that define terms, standards, prices, obligations, payment, contract voidance conditions, and other important issues. If a company balks at having a contract with a producer, says they have never had to do that before, etc., then beware. If there is a potential crop in Texas that merits a well-defined contract to help protect the producer and buyer, it is hemp.

What will Texas A&M AgriLife's role be in the future of hemp farming and hemp processing in Texas?

Texas A&M AgriLife will not be involved in development or enforcement of regulatory processes for industrial hemp in Texas. As an agency, our employees will generally be required to follow the same regulatory guidelines as producers and processors for permitting, licensing, testing, etc.

The first task for AgriLife Extension will be to develop and provide a training program, in conjunction with TDA, to help hemp industry clientele, especially farmers, understand the regulatory requirements if they choose to try growing hemp. This training program could mirror the partnership between TDA and Texas A&M AgriLife for auxin herbicide trainings that are required for application of dicamba or 2,4-D herbicides specific to their respective herbicide-tolerant cotton varieties.

Further AgriLife activity will include helping prospective producers evaluate the pros and cons—the benefits and risks—of hemp farming and if it is suitable relative to other cropping. This could include developing production budgeting templates to help initial hemp farmers estimate costs and revenue. Unfortunately, it will be uncertain how to populate these budgets with realistic numbers until hemp has been grown in Texas for at least two years.

Thirdly, with the leadership of Dr. Redmon, our state AgriLife hemp program coordinator, AgriLife is investigating potential partnerships and funding sources to initiate an agricultural research program on hemp. Hemp research will cost much more than other Texas crops. We do not know yet how this effort may be focused among CBD oil, fiber or grain. This initial effort may include the testing of genetic materials to ascertain suitability for Texas production environments, if they meet the requirements under Texas production conditions to maintain ≤0.3% THC, etc. Hemp production regulations are expected to require use of approved domestic certified genetic varieties (clones, feminized seeds, conventional seeds). This could include varieties certified by the Association of Seed Certifying Agencies (http://www.aosca.org). Texas A&M AgriLife may assist establishing a recommended or approved variety list as we review research conducted in other regional states in conjunction with our own research.

A key question for Texas hemp will be “which varieties?” Colorado and Kansas have an approved list of varieties for hemp, but how did they determine which ones? Those states do not specify the use of the varieties or whether these varieties are privately owned or public varieties.

Soon we expect that domestic, certified varieties, which will have improved genetics and improved uniformity, will facilitate hemp production and reduce the risk of planting a poor variety that has >0.3% THC. In Colorado in 2016, about 25% of the state crop was destroyed due to high THC, but that was reduced to less than 8% in 2017. Colorado Department of Agriculture attributes most of the failed acres to seed sources that had suspect genetic purity or farmer-saved seed.

Hopefully, development of suitable public varieties in Texas will provide growers better assurance of genetic purity and possibly less regulation on their use. Ideally, public varieties might have lower cost, but this remains to be seen as the development costs for Texas A&M AgriLife breeders remain unknown.

Our overarching concern within Texas A&M AgriLife is that Texas producers are faced with the choice of entering hemp production without established numbers for financials. Furthermore, the first commercial hemp in Texas will be grown possibly in 2020 and certainly by 2021 with no research-based Extension recommendations, though we will work to establish preliminary suggestions for production.

What resources are available for learning about how to grow industrial hemp where legally approved? (update from March 2019)

Though many states’ agricultural programs are working on research, few comprehensive production resources are yet available. There is no production information in Texas. Consult these sources for further information:

- Colorado Department of Agriculture, https://colorado.gov/pacific/agplants/industrial-hemp, has numerous resources regarding production, licensing, CDA approved hemp varieties, etc.
- New Mexico Dept. of Agriculture, http://www.nmda.nmsu.edu/ Hemp information provides an example of how NM is regulating the crop, a statement of hemp cultivation rules, and examples of application forms for ‘Continuous hemp cultivation’ and ‘Annual hemp production’ (both seven pages).
- The University of Kentucky leads American institutions in industrial hemp research. Access their research and extension information at https://hemp.ca.uky.edu/ Note the link on the main page to “An Introduction to Industrial Hemp and Hemp Agronomy” (2018).
- Penn State University has published “Industrial Hemp Production,” updated July 2018. Read, print, or download at https://extension.psu.edu/industrial-hemp-production (Focus is on seed and fiber production only.)
- The Purdue University Hemp Project, https://purduehemp.org/
- The Canadian Hemp Trade Alliance, http://www.hemptrade.ca/, including the “Grow Hemp” link contains a wealth of information on the crop from Canada that provides useful background information including uses of hemp fiber and grain.
- http://www.hemptrade.ca/grow-hemp
- The National Hemp Association’s “Hemp Roundtable”, https://hempsupporter.com/, provides information on many aspects of the hemp industry and hemp production.

- Commodity information organizations: National Hemp Association, https://nationalhempassociation.org/, and the Hemp Industries Association, http://thehia.org (much information is from Canada, the Texas state chapter is , http://www.txhia.org).
- The publications of Farm Journal, see http://www.agweb.com

Keep in mind these resources represent production conditions different from Texas, so some information may not be applicable. Colorado agronomic production information is at least partially applicable to the Texas High Plains. Kentucky information may be a useful guideline for East Texas.

Future editions of "Industrial Hemp Farming & Common Questions for Texas" will include a discussion of:

- Basic agronomics of hemp production in Texas for CBD oil, fiber and grain.
- Guidelines for production contracts between grower and buyer.
- Elaboration on emerging details on proposed Texas guidelines set forth by TDA and approved by USDA.
- Additional assessment on the viability of Texas hemp farming and needed precautions for prospective growers that will help manage their risks of production.

Final Thoughts

Everyone must be realistic when it comes to hemp production and its potential for Texas. This especially applies to hemp for CBD oil, where we have likely heard of the high profits some early adapters made. Know well, however, that the inflated economics of CBD oil as recently as last year probably no longer apply. There will be individuals and companies that will probably continue to promote these past economics and inflated claims. So, beware the hype. What happens if the medical community and the U.S. Food & Drug Administration find that real health benefits of CBD oil are somewhat limited to specific conditions?

It is our collective responsibility to ensure that hemp and CBD oil do not become a fiasco like emus did in Texas, as noted above.

It is our goal to help Texas clientele understand more about hemp production. We cannot emphasize enough that the economic and agronomic information you normally access and rely on for your other farming is sparse for hemp. For many obvious reasons there is risk involved at a level that Texas producers do not face with their other crops.

A recent daylong hemp information meeting in Lubbock approached the topic with the goals of "Inform. Warn. Enable." The meeting was by invitation only, primarily to about 30 West Texas farmers, but word spread about the meeting, and 54 attended. But only about 12 were farmers. The rest were hemp industry, marketers, and those with business and legislative interests, etc. Despite the organizer's objective to focus on the fiber and grain potential of hemp, much if not most of the conversation evolved to CBD oil.

For a sampling of additional educational comments see "Industrial Hemp Informational Meeting Summary, Lubbock, TX 24June2019" at https://lubbock.tamu.edu/programs/crops/hemp

Finally, the above meeting generated many questions from AgriLife about production, adaptability, practice and perils of hemp farming from a strictly crop perspective. For example:

- Is hemp susceptible to nematodes?
- What about injury from dicamba drift? Or hail damage?
- What is the approximate growing season for each objective of fiber, CBD oil, and grain?
- Based on what we know, what appears to be the optimum window for planting in different regions of Texas?

The answers to these and other questions are not known yet.

We have created a summary of initial crop questions we in Texas A&M AgriLife seek to answer in the months and years to come about hemp cropping in Texas. See “Initial Hemp Cropping Questions for Texas” at https://lubbock.tamu.edu/programs/crops/hemp.

We welcome your cropping questions as well. We look forward to partnering with Texas clientele as hemp returns to Texas for the first time in over 75 years. Please contact us.

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