Industrial Hemp in Texas: 1. Preparing for an Industry





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A GRILIFE EXTENSION



Texas—January 2020

January 2020 This is part of a series, "Industrial Hemp in Texas"

- Part 1: Preparing for an Industry
- Part 2: Initial Growing Considerations
- Part 3: Business Considerations
- Check regularly for updated and new information.
- All three sections plus other resources are available at <u>https://agrilifeextension.tamu.edu/browse/hemp/</u>





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Texas A&M Agriculture's Role in Hemp

- Education
- Research
- Possible advice and input on policy, rulemaking, seed certification, etc.

Not regulatory

 Texas A&M AgriLife will likely be much more active than neighboring states' agriculture programs.



Texas A&M Agriculture's Role in Hemp

- There are no current funds of any size that we can tap specifically for these hemp tasks.
- AgriLife will pursue grant & other funding opportunities.
- The Texas A&M AgriLife Research "Variety Testing Program" will be used for conducting variety trials at 5 to 6 diverse locations across Texas.
- ⊙ Some fees potentially from educational programs.



Bushland AgriLife 0 Texas A&M AgriLife **O** Halfway 0 **Research & Extension Centers** Field Chillicothe-Vernon Lubbock State Headquarters Panhandle-Plains stern Sites **Research Stations** Dallas Stephenville Overton across El Paso San Angelo Bryan/ Pecos O College Temple Station Texas Far West Beaumont' Eagle Lake for Uvalde O Beeville O Potential Winter Garden & South Central Hemp Corpus Christi Testing Weslaco Lower Rio **Grande Valley**

Texas A&M AgriLife's Role in Hemp

- Past Session of the Texas Legislature (2019):
 - Neither for nor against legislation
 - Answer questions when asked and provide other input
 - Recognizing potential opportunity for Texas producers
- Texas A&M AgriLife does not take on a regulatory role—that is the responsibility of Texas Dept. of Agriculture. But AgriLife may advise on regulatory issues like seed quality and certification, possibly sampling for THC, etc.



Texas A&M AgriLife's Role in Hemp

- AgriLife Extension is an educational agency.
- AgriLife Research, AgriLife Extension & Texas A&M University (main campus) will actively engage in industrial hemp research.
 - We must be licensed like everyone else.
- In time AgriLife will develop Texas-based and researchbased resources and recommendations for industrial hemp production.



Texas A&M AgriLife's Role in Hemp

- Texas A&M AgriLife's role compared to other Land Grant institutions—
- It appears we will be much more involved than land-grant universities in other regional states.
 - To date Oklahoma State University has chosen not to develop a hemp program.
 - New Mexico State University has restrictions on employee activity in hemp (including a form each client must sign before an NMSU staffer can discuss and advise on the crop). They are interviewing for a hemp faculty position (Jan. 2019).
 - Colorado State University, where hemp have been grown now in its fifth year, has minimal activity.



Industrial Hemp Discussion Today

⊙ Explain

Question

Project

Anticipate

Think things through



Texas A&M AgriLife and Hemp

- We are not here to promote industrial hemp.
- We are here to help you decide if this is something you may want to try.
- We are here to help you learn more about some of the many considerations—agronomic, economic, farmer/contractor relationships, levels of risk—you face about this crop.



Preliminary Hemp Resources Read a lot. If you are truly interested in growing hemp read,

- Read a lot. If you are truly interested in growing hemp read, talk, ask. Get the answers you need. <u>It will require time</u>.
- Texas A&M AgriLife Extension agency website, <u>https://agrilifeextension.tamu.edu/hemp/</u>
 - This includes a list of Texas A&M AgriLife faculty and staff with roles in hemp education and future research.
- Consider private & commercial websites, but also especially <u>universities</u> and <u>state departments of agriculture</u> including Texas' hemp page and FDA hemp health & consumer page.
 - https://www.texasagriculture.gov/RegulatoryPrograms/Hemp.aspx
 - https://www.fda.gov/news-events/public-health-focus/fda-regulation-cannabis-andcannabis-derived-products-including-cannabidiol-cbd





TEXAS A&M

TENSION

Early Texas Buzz... Houston Chronicle: Hemp company to begin processing in old Maxwell House coffee plant in 2020



Erin Douglas July 25, 2019



Fiber Processing

• December 10, 2019



- ⊙ Panda family: Biotech, Energy, Power Funds
- Announced plans to construct a fiber processing plant in Lubbock Co.
 - Stimated production capacity, 130,000 tons/year.
 - Stimated acreage, 25,000-30,000?
 - How to procure hemp fiber production? Co-ops?



Fluctuation in CBD Prices—2019

Early season spot market; after harvest spot market

This is a "cash" market in contrast to contracted price.

Biomass Spot F Source: F	Prici PanX	ng - Ma change	y 20)19						
Region	M	idpoint		Low			Hig	ıh		
Colorado (per % CBD Content/lb.)	\$	3.85	\$	3.	45	\$	1	4.25		
Kentucky (per % CBD Content/lb.)	\$	4.05	\$	3.	60	\$		4.50		
Oregon (per % CBD Content/lb.)	\$	3.90	\$	3.5		3.50		\$	4	4.30
Biomass Spot Pric Source: F	ing · PanXo	Novemi Change	oer 2	2019						
Region		Midpoi	nt		L	.ow	ł	ligh		
Colorado (per % CBD Content/lb.)		\$ 1.1	4	-47%	\$	0.93	\$	1.35		
Kentucky (per % CBD Content/lb.)		\$ 1.0	3.	-53%	\$	0.80	\$	1.25		
Oregon (per % CBD Content/lb.)		\$ 1.1	3 .	-45%	\$	0.85	\$	1.40		
Refined Product Pri	cing	- Novem	ıber	2019						
Product		Midpoi	nt		L	.ow	ł	ligh		

Overemphasis on Hemp for CBD?

⊙ In this information, there may appear to be a dominant emphasis on CBD aspects of hemp.

- This is where most interest currently lies thus also the greatest need for clarity in terms of what you read and here and the decisions you may make.
- As further information becomes available, this document will be updated regularly.



For You as a Prospective Hemp Grower

- Information to help you think through the many issues related to contracting, preparing for, growing, maintaining, harvesting, drying, and marketing industrial hemp.
- You may conclude that industrial hemp farming is <u>not</u> for you
 If so, then AgriLife is fulfilling its role in education.
- Realism
- Recognition and Pros & Cons of financial aspects



Recognizing Capabilities and Limitations of Typical Texas Producers

 \odot Is hemp farming for you?

• Why or why not?



Recognizing Capabilities and Limitations of Typical Texas Producers

- Trostle's 20+ years of experience in working with sunflower and conducting Extension programs on the crop: "Half the Texas farmers I know should never grow sunflower."
 - There are a couple of key management issues that often get messed up, leading to major economic losses.



 What about Texas farmers and industrial hemp? More than half?

We Can't Cover Every Topic Today



Industrial Hemp and YOU!

• What is YOUR objective?



Grateful Acknowledgement

 Dr. Curtis Bensch, professor of agronomy, Panhandle Oklahoma State Univ., Goodwell, OK provided information and some images used in several slides.



- OPSU as an educational institution with a plant science curriculum licensed 7 or 8 farmers for 2019 production under the auspices of the 2014 Farm Bill.
- One of the source of the sourc
- Dr. Bensch hosted Texas A&M AgriLife staff and participated in our first educational visit to observe field hemp (August 2019)

Learning about Hemp

There is a lot we do not know about hemp for Texas. Information from other regions may not be applicable.

(Learning how a hemp plant grows with Jack Rose, MM Hemp, Corona, NM; Sept. 20, 2019)



The Hemp Plant



- In contrast to most other plants, *Cannabis sativa* plants are either male or female. (Dioecious—male and female flowers are on different plants; other examples: spinach, cassava).
- A very few Cannabis plants have both male & female flowers on the same plant (monecious). Most growers wanting a female only field will rogue out any monoecious plants.



The Hemp Plant



- CBD and other cannabinoids are primarily sought from female plants. Female plants that are pollinated by the male will <u>purportedly</u> produce substantially less amounts of CBD.
 - Female plants free from pollination (no males in the field, no drifting pollen from miles away) thus unfertilized can remain in the flowering phase for several weeks longer (up to 8 weeks?), which could result in higher cannabinoid production.
 - But these same plants ALSO are more likely to develop higher THC levels. (Growers should monitor for THC at least weekly?)
- Is there a question about this commonly held belief? I believe it needs research to determine to what degree CBD production is curtailed due to pollination.

Male Hemp Plant

- For CBD production most hemp growers have a 'zero tolerance policy' for male plants. Pollination of female plants curtails further CBD production, thus reducing harvest CBD levels (common assertion). But large-scale farming might find a means to greatly reduce production costs (including clones or feminized seed) and reduce the cost of CBD.
- Hemp is a broadleaf, but not a legume.





The Hemp Plant



- ⊙ But not all hemp farming for CBD is female only fields.
 - Greenhouse production will focus on female only plants.
- Some field production occurs by planting regular (straight run) seed which then produces 50% each of male and female plants.
- Growers in this scenario may or may not remove (rogue) out the male plants. (What is their production goal?)
- Some hemp seed is "feminized" which is treated chemically and should develop only female plants (preferred for CBD production). These seed may retail for up to \$1 per seed, with 1,200-1,700 to perhaps 3,000 seeds per acre.

How is feminized seed produced?

- One means is spraying female breeding plants with a solution containing silver (usually thiosulfate); also by hormonal treatment.
 - The silver solution restricts ethylene production, which influences flowering.
 - The female plant becomes a <u>hermaphrodite</u> (has both female and male organs) but the entire plant is genetically female.
 - Odd: This female plant produces male flowers with pollen which has only female genetics. Thus when these flowers pollinate another female plant, the resulting seed is female.
 - This method controls the sex of a plant without DNA modification.
 - Industry reports that about 1 seed in ~5,000 may grow a male plant (watch for and rogue out).



The Botany of Hemp 1

- A summer or warm-season annual.
- Sturdy stalk, somewhat like cotton (or kenaf) that may range from a few feet to 12-15' tall depending on growing conditions and management.
- Literature suggests optimum growth conditions are about 70-80° F with moderate humidity, but there is wide range of suitable production conditions.
 - Texas A&M AgriLife is uncertain at this time about the relative performance of industrial hemp (especially for CBD and other cannabinoids) under conditions with temperatures regularly approaching 100° F.
 - We are also uncertain about the potential for hot production conditions to increase THC. (These hot conditions are a stress we have been cautioned about.)

The Botany of Hemp 2

 Most hemp varieties are photoperiod sensitive, meaning as days shorten (technically it is the increase in night hours) then flowering occurs.

 Some varieties are relatively insensitive to photoperiod (determinant, or autoflower). Texas A&M AgriLife will evaluate different types for growth performance in Texas. At this time we do not have an opinion on the possible pros & cons of either type.



Different Hemp Production Goals

- Grain or seed hemp production would have the highest yield by being mostly female with enough males to pollinate the crop.
 - In theory, for example, using an 8-row planter you could plant 7 rows of feminized seed, and one row of straight-run seed to provide some male plants to pollinate the crop. But the cost of feminized seed would be greatly prohibitive.
- In general fiber production uses both male and female plants in the field (straight-run seed; you would not use feminized seed) though it is reported that male plants have better quality bast fibers.

Hemp Products

○ CBD, a substance on the floral structures

There are other cannabinoids that may become important in time: CBG, CBN, etc. (and are currently far more valuable if you have a variety that produces them).

⊙ Grain

• Fiber

Bast—the external fibers, just under the bark

Hurd—woody core material inside the stalk



CBD Products

- ⊙ They are not regulated by U.S. Food and Drug Administration (FDA) or states.
 - If this occurs, then consumers will likely have better assurance of purity and product contents.
 - Regulation would increase costs to marketers and might curtail demand.
- ⊙ The price mark-up from farm to retail is excessive.
- If you buy a CBD product do you receive a guarantee of analysis? Or does the product have a 'lot number' and QR code on the container?



The Value of CBD Products a Farmer Gets

- Many consumers like to know that the farmer who produced the milk, the wheat in your bread, or the cotton in your jeans gets a good proportion of the sales revenue of a commercial product.
- This is often not the case.
- Examples:
 - Milk, a dairy farmer might receive about 1/3 of the sales price of a gallon of milk.
 - A \$2.19 loaf of wheat bread has about \$0.15 worth of wheat (7% to the farmer).
 - A pair of jeans that weighs 3 lbs. and sells for \$30, the cotton farmer gets about \$1.95 (~6-7%).
- What about CBD products?



CBD Retail

- Are CBD products over-priced?
- This certificate of analysis is for bottle labeled as 900 mg of CBD.
- It actually contains 1,010 mg (good).
- ⊙ The THC content is legal—0.118%.
- On sale for \$72 (0.8% to grower).

AURUMALABS

Certificate of Analysis

		Cannabin	old Potency a	and Contami	nant Analysis	Report		
Sample Name: Lot 07022019 - 900mg Sample Type: Ingestible, Tincture, Other Sample ID: 1907AU0183.09413						Gene	eral Processing I	LC
						18668	18668 B50 Rd	
Batch ID:	Batch ID:					Delta	CO 91416	
METRC Tag:	1A40007	1268136600	00001904			(970)	249-3398	
						Lic. #4	103H-75142.1	
	Cannab	inoid Profi	le		То	tal Cannabi	nolds	
Analyte	LOO Amou	int Amount			Analyte	e	Total*	
THCa	4.80 N	ND ND			тнс		35.30 mg/unit	1
Δ9-THC	4.80 35 .	30 1.18			IIIc			1
CBDa	4.80	ND ND	1		CBD	1,	010.08 mg/unit	
CBD CBDVa	4.80 1010 .	.08 33.67 ND ND			CBG		23.14 mg/unit	
CBDV	2.24	ND ND			- CDC		25 62 mg/upit	
CBN CBGa	2.24				CBC		35.62 mg/umit	
CBG	2.24 23	.14 0.77	1		CBD	V	<loq< td=""><td></td></loq<>	
CBCa	2.24 35	.62 1.19			*Total is the sum	of the neutral (acti	ve) cannabinoid and the	
CBL	2.24	ND NE)		comple	tely converted acid	lic cannabinoid.	
	San	anle Photo	ACAR DENIES		Resi	dual Solven	t Analysis	
	Jan	ipie Plieco		Analyt	8	100 1	imit Amount	
•								
and the second second					M	icrobial Cor	taminants	
	Fin	al Approva	1	Anal	uto .	Limit	Amount	
Results / Lucas h	Approved By: Mason, M.S. Director	- 6	Results Analyzed Joshua Reilly Analyst	IBy:	yte			
Received	07/23/201	9	Te	sted: 07/23	3/2019		Reported: 0	7/:
	product has been tested	Definitions: Li d by Aurum Labs using ted Uncertainty info	OQ= Limit of Quantital 19 validated testing meth 19 primation available upon	tion, ND = Not Detect nodologies (unless spe- request. Aurum Labs	ted, CFU/g = Colony Fe cified in this report) and a makes no claims as to the	orming Units per Gra a Quality System as re e efficacy, safety or ot full, with the written	nm quired by state law, Values her risks associated with an approval of Aurum Labs.	repo y del
This ; related	only to the product tes or non detected Aurum Labs 789 Tech Content	Drive Unit C	unds reported herein. Th				Confident Cannal All Rights Reserv	ois ed
The Value of CBD Products a Farmer GetsWhat about CBD products?

- For the previous example, I assume pricing of \$3 per lb. per each percent of CBD in dried material (1,000 lbs. of biomass per acre, 9% CBD, and 90% extraction efficiency).
- For the 900 mg product selling for \$72 the farmer receives only 60 cents of the retail value. That is about 0.8%!
 - A few products may net the farmer 1.5-2.0% of retail value.
- You can see the markup in retail CBD products.
- You can calculate this yourself with link at <u>http://lubbock.tamu.edu/hemp</u>
- A farmer in the above example growing 25 acres produces enough CBD for 1,000,000 bottles containing 900 mg CBD.
- You can see that it doesn't take that many acres to produce a massive number of retail CBD units.

The Value of CBD Products a Farmer Gets

- It doesn't take that many acres to produce massive amounts of CBD.
- This is another example of AgriLife's concerns about over supply of CBD due to more states now growing hemp and a significant increase in acres which have already led to lower farm prices.
- How will or should this affect retail CBD sales prices?
 - To date (Dec 2019) retail prices have not changed much.
 - This may be a result of bottlenecks in extraction of the higher farm CBD supply.

Vertical Integration of CBD Production

- Farmer
- Contractor/Buyer
- Extraction
- Purification
- Transportation/Wholesale
- Retail

⊙ Some of these steps may involve the same entity.



Vertical Integration of CBD Production

- Producers of CBD (or grain and especially fiber, where revenues and margins are much lower) seek to participate in the value-added chain (price increases) after farming and growing.
- Co-ops or grower associations?
- The longer the grower can retain ownership or have a financial stake in additional steps then the financials are better.
 - This is especially important now that CBD prices have dropped so much.
 - It could also be important in the hemp fiber industry.

CBD as Medicine and Consumers

- In medical trials, the "placebo effect" (the fact that a patient received something, even if a sugar pill) resulted in a 10 to 30% improvement in some epilepsy studies, and the potential improvement is higher in other maladies.
- Claims, doses, even the accuracy of the amount of contents in CBD products are unregulated by the U.S. Food & Drug Administration (FDA).
- What happens to the CBD market if FDA (or states) decide to regulate?



CBD as Medicine and Consumers

- Proven uses in epilepsy and some seizures (Epidiolex), research rates were 680 to 2,040 mg for a 150-lb. person.
- Many "doses" in common CBD usage are about 25 to 100+ mg per person of any size.
 - Products you buy at a CBD store, even the local convenience store.
- Research trials that are "double blind" are the most trustworthy. In these trials both the researcher AND the patient do not know who gets the drug and who gets the placebo.
- More medical research is needed. Do the testimonials pass muster?



Hemp Uses







Dehulled hemp seed (hearts)

Industrial Hemp Facts Grain & Seed Oil

- Hemp grain, specifically the internal 'hemp heart' is very nutritious and may have use in specialty foods.
- ⊙ Ameranth may have comparable grain nutritional profile.
- Hemp hearts have a somewhat nutty taste and can be incorporated into many food preparations.
 - Itigh in Omega-3 and Omega-6 essential fatty acids in a ratio favorable for human health.
 - 25-30% protein, with a good amino acid profile.
- ⊙ Hemp seed can yield ~50 gallons of <u>seed oil</u>/acre
 - Uses are varied. May be found in larger grocery and specialty food stores. Would not have cannabinoids in seed oil.



Hemp Fibers







Hurd (wood core) fiber board mulch insulation fuel hempcrete paper



cloth/textiles composites/plastics

Bast Fiber

Industrial Hemp Facts *Fiber*

- Hemp for fibrous material—very versatile:
 One acre of hemp may produce as much woody matter as four acres of timber in 60-90 days.
 - "Bast" is the external fiber of the core, underneath the bark. It is not like bark, which strips off the outer stalk (upper right).
 - "Hurd" is the internal core of the stalk (it is also woody in nature, not soft like 'pith').
 Sometimes considered waste, but hurd has significant industrial uses (lower right).





Key Process in Hemp Fiber—*Retting*

- Barky material on the exterior of the stalk must be separated from the underlying bast fibers. Retting is a process that relies on moisture/drying cycles and microbial activity to dissolve or 'rot' cellular tissues & pectins around the bast fiber. This makes separation easier.
- It is unknown at this point what conditions in Texas may lead to optimum retting. Industry sources believe that dry conditions in West Texas will not hinder sufficient retting. How long retting will require (weeks? a couple months?) is not known.



Key Process in Hemp Fiber-Retting

- Crop maturity at harvest, retting method, and environment (heating/precipitation/drying) and microbial bacterial/fungi impact retting.
- Fiber harvest at initial flowering enhances fiber strength and quality, but total fiber yield might be lower with this earlier harvest.
- Research is needed in Texas!



Subsequent Hemp Fiber Processing

- After retting, hemp fiber is decorticated, scutched, hackled, and combed.
- This require specialized equipment.
 - Decorticate: machine striping of bast fiber containing bark off woody stalk.
 - Scutch: separation of fiber by beating.
 - Mackle/Comb: comb-like instrument to separate fibers.





What would hemp fiber replace?

 A significant goal of hemp fiber production and use is to reduce reliance on petroleum-based materials including extremely slowly degradable plastics.



Multi-purpose Hemp Crops?

- Growers, most likely using certain varieties, may harvest two or even three types of hemp product from the same crop.
 - Grain and dry material for CBD. (Usually with a combine for grain and the remaining biomass is collected and dried for CBD extraction. This practice occurs on a few farms.)
 - Grain & fiber (though fiber might be lower quality?)
 - Remember that the longer the crop matures then the possibility of higher levels of THC also exist, which may risk >0.3%. (Farmers should have instrument-tation to monitor THC levels over time.)

What are other sources of similar fibers like industrial hemp?

- Jute
- Sisal
- ⊙ Kenaf
- None are subject to the regulatory environment that industrial hemp is (no THC concerns).
- Thus these fibers might be more economical even if they perform at a slightly lower level.
- Can the same fiber processing equipment for industrial hemp be used (kenaf in particular)?



A Common Question... "What about Kenaf?"

- Kenaf, *Hibiscus cannabinus* (no relation to *Cannabis indica* or *Cannabis sativa*) is a plant in the family <u>Malvaceae</u>. Native to southern Asia.
- Current world uses include rope, cordage, cloth, packing and sorption materials, and yes, car parts (Ford Escape in 2013, BMW i3 electric car).



A Common Question... "What about Kenaf?"

 Kenaf research was conducted by Texas A&M in the late 1990s at Beaumont.
 Research has resumed at the Texas A&M AgriLife Research Center, Weslaco (Dr. John Jifon, john.jifon@ag.tamu.edu).



- ► Well adapted to heavy clay soils, grows well, 8-12' tall.
- Likely requires more water than industrial hemp, potentially best adapted in the eastern half of Texas (>30" annual rainfall).
- ► No regulation.
- \odot Decortication equipment is needed.
- Length of season to harvest could be long. Some kenaf is harvested green, but mature stalks can be 100 to > 180 days.



Sunn Hemp (*Crotalaria juncea*)

- Sunn Hemp is NOT related to any Cannabis species such as marijuana or industrial hemp lines.
- Sunn hemp is used as a fast-growing cover crop in warm regions. It is a legume and if properly nodulated may fix atmospheric nitrogen into a form the plant can use, which may increase soil nitrogen.
- A Texas sheriff's deputy did not understand sunn hemp is not *Cannabis* and implied a local grower would be arrested if planted (2019).



What about hemp byproducts and waste materials for animal feed?

- Because Cannabis was a federally controlled substance (drug) any changes in rules that would allow use of foliage, grain, left-over meal after CBD extraction, etc. have not yet been addressed.
- So currently hemp is not approved federally for use in animal feed.
- Texas A&M AgriLife has not yet studied any available published scientific reports that discuss potential feed value, palatability, etc.
 - Colorado growers report that cattle do not appear to readily graze hemp forage.

Trostle Thoughts as Extension Agronomist

- Sobering—there is so much to learn, there are far more considerations for a farmer/grower.
- ● But not pessimistic.
 - What could stir pessimism? Continued hype about CBD profits in spite of much lower prices to the farmer that already may make CBD hemp uneconomical for many prospective growers.
- Sometimes feel overwhelmed—it feels like 1999 all over again when I was new to the Texas High Plains.
- A huge challenge.
- AgriLife won't have significant data and research for up to two years.
- Do we step out on a limb some to try to help prospective growers as best we can?

Trostle Thoughts as Extension Agronomist

 For the people our clientele deal with: Do contractors, buyers, those who say they are building a processing facility—do they truly have the grower's best interest in mind?

 There are a lot of non-producers circling around hemp—what part of the \$ pie are they wanting? What are they contributing?



Key Comparisons and Chemicals of Hemp

- All hemp, whether for drug use or industrial uses, is either Cannabis sativa or Cannabis indica. There is conflicting information in the literature if these types are separate species or rather subspecies of the same plant.
 - The legal definition of "hemp" or "industrial hemp" is that it contains ≤0.3% THC (technically, this is the narcotic delta-9 THC plus the acid non-narcotic form THCa, which is readily converted to THC).
 - This is the <u>only</u> difference between marijuana and hemp.
 - One cannot look at a Cannabis plant and know if it is marijuana or hemp. These different plants often look and smell the same when growing.
 - Also, there is a misconception among some that male plants are hemp and females are marijuana—this is not true.

Key Comparisons and Chemicals of Hemp

- Cannibinoids are a large class of similar compounds found in the Cannabis plant. There are over 100, often nearly identical in chemical makeup.
- There are many potential uses for cannabinoids in health, chemical, and industrial applications that are being researched, and many more to be discovered.



Key Comparisons and Chemicals of Hemp

- THC, or tetrahydrocannabinol, specifically the Δ⁹-THC, or "delta-9" form, which is psychoactive. There are slight variations (isomers) of this chemical. Legally in 2018 Farm Bill regulations it is Δ⁹-THC + acid form THCa that will be tested to determine legality of ≤0.3%.
- CBD, or cannabidiol. Non-psychoactive. This cannabinoid has some proscribed medical uses for epilepsy and a few other conditions. It is the subject of other research, but many more health claims.
- Other cannabinoids may become important in the future including CBG, CBN, etc.







Industrial Hemp Facts

- Legal hemp cannabidiol (CBD) is NOT an oil in the traditional sense like an oil pressed from seed (which hemp seed has); although CBD is a lipid (fat) upon extraction from biomass, particularly floral structures, it can be refined into a crystalline form, then reconstituted in a carrier oil (like coconut)—hence CBD oil.
 - It is proscribed medically for epilepsy, seizures; other uses need further research, but there is some promise as an anti-inflammatory aid.
 - The production of industrial hemp would permit the procurement of the CBD from a non-narcotic cannabis plant.
 - The chemical industry is scaling up to produce CBD synthetically (what will this mean for the hemp CBD industry?).
 - Increasingly you will hear of other cannabinoids, e.g. CBG, CBN, etc. that might in time be of even greater interest than CBD.



Uses for Industrial Hemp

- For a more thorough list of industrial hemp uses, see <u>https://en.wikipedia.org/wiki/Hemp</u>
- Industrial hemp can be used for the production of CBD and other cannabinoids (CBG, CBN), grain, and fiber.
- The uses are many, but there have been few products made in part due to the lack of enough available material to supply potential high-volume uses like building products.
- Fiber uses: 'Hempcrete' and other building products (many of which are fireproof when mixed with lime), plastics and composite materials, paper, cordage, animal bedding, soil and water filtration, biofuels, etc.



Some "First Things" to Remember...

- There is an incredible amount of hype in industrial hemp, especially surrounding CBD.
- There are some producers that have in fact made some of the high revenue and profits you have heard about—but they were first adapters, and the economics have already greatly decreased. The potential to saturate the hemp market for CBD is real. Some CBD hemp growers & businesses in other areas of North America are already exiting.
- A lot of mis-information and even fraud around hemp.
 - Expensive seed that is not what it is claimed to be.
 - Promises of profits that are not realized; producers do lose money.
 - Consider openness and verification of possible partners.



Texas A&M AgriLife and Hemp

- As of December 1, Texas A&M AgriLife has no public agreement or contractual relationship with any hemp organization, company, or individual.
- O Claims that Texas A&M AgriLife is "working with" a particular individual or entity are not true.
- Texas A&M AgriLife does not have our own research yet, and it will take a couple of years to develop data; we will help clientele assess potential opportunities, identify pitfalls, and provide professional assessment within limits for agronomics, economics, etc.



How We Got Here: 2018 Farm Bill

- ⊙ The Hemp Farming Act of 2018 removed hemp (defined as cannabis with ≤ 0.3% THC) from the list of <u>Schedule I</u> <u>controlled substances</u> and making it an ordinary agricultural commodity. Its provisions were incorporated in the <u>2018</u> <u>United States farm bill</u> that became law on December 20, 2018.
- However, it is still illegal to grow hemp in Texas until the regulatory process is established by the State of Texas and approved by USDA. And you have your own license.



2018 Farm Bill & TDA Rules

- USDA issued their interim rules Oct. 29, 2019, which is in the midst of a 90-day public comment period (was 60 days)
 - https://www.ams.usda.gov/rules-regulations/hemp/rulemaking-documents
- ⊙ Texas Dept. of Agriculture sent their initial proposed rules to USDA 12/2/2019.
 - https://www.texasagriculture.gov/Portals/0/Files/ACP/TDA%20Hemp% 20State%20Plan.pdf
 - Mid-December 2019: TDA withdraws proposed rules from Texas Register.
- Once USDA finalizes (early February 2020?), then USDA can review state plans.
 - Texas' plan will also require a public comment period (30 days)?
- Eventually among states: application, fees, background checks, what plant part to test for THC, etc.

Texas Dept. of Agriculture & Hemp

- It is uncertain when this overall process will be completed or if it may not be completed in time for optimal production timing (planting dates) in Texas for 2020.
- Texas Dept. of Agriculture legal counsel Tim Kleinschmidt said 11/5/2019 TDA may not be able to start reviewing hemp license applications until March. He hopes it is sooner. How much longer after that before a license is issued is uncertain.
 Others say review will be up to a month sooner
- This may place initial planting of field hemp in Texas behind, even well behind, what AgriLife currently believes may be optimum planting dates.
- Farmers will face pressure to "get started now", or investors may demand they plant anyway even if agronomically too late (lessons learned from nearby states).

The Earlier 2014 Farm Bill

- This explains why there is industrial hemp for up to 5 years in Colorado, Kentucky, Oregon, North Dakota or even with initial 2019 crops in New Mexico, Oklahoma.
- Those states at some point in 2015-2018 implemented a program to begin hemp research. As a cooperating institution farmers could be permitted under the institution to farm hemp.
 - Rules included the testing of hemp for THC and crop destruction if THC > 0.3%.



Industrial Hemp Facts

- O Hemp (≤0.3% THC? No THC?) can be imported into Texas and manufactured into retail goods sold in the US, but Texas growers are still prohibited from its cultivation <u>until rules are approved</u>.
- Industrial hemp is on the way to legal production in all but three U.S. states (Dec. 2019).
- Can be grown in cotton, corn, or wheat regions with conventional equipment.


- Is industrial hemp now legal in Texas? Not yet. Awaiting issuance of final rules.
- How long until hemp guidelines are issued for Texas and license applications can begin? Probably not until late winter or even spring? For 2020 field production we might miss the optimum planting window (which increasingly appears it may be early) in southerly Texas regions.
 - For the Texas High Plains possibly early planting some time in late March? This is based on what AgriLife has learned talking to farmers in eastern New Mexico and southeast Colorado. April seems more realistic to avoid cold conditions.



 How can I best sort through the common "hemp hype," especially for CBD oil? Patience required. Be skeptical? Talk to others with experience, especially if they are not in promotion or sales. Read lots. "If it sounds too good to be true..." Know that 2019 economics will be outdated by 2020 (and hemp prices decreased).



- Are there major financial risks to CBD production if acres are greatly expanded? Absolutely! It is uncertain how much market there really is for CBD. Technically, anyone making medical and health claims for CBD are in violation of U.S. Food & Drug Administration (FDA) guidelines. In 2018 there were about 78,000 acres of industrial hemp production approved in the U.S. (almost all for CBD). In 2019 states issued permits for over 500,000 acres though much of that (even 2/3) was probably not planted. Oversupply can happen quickly. There may not be enough processing capacity.
 - Oversupply is not a concern for fiber (little current processing capacity) and grain.

- Can CBD be manufactured synthetically, and is this a potential threat to the CBD oil hemp industry? Yes.
 Synthetic CBD should be free of the rules or hemp CBD though there is a question about chemically converting CBD into THC.
- What agronomic and per-acre yield potential information is available to prospective hemp farmers and processors? There is no Texas data. Some info. from Kentucky might be applicable in East Texas. CO & NM data for West Texas. We can't say yet what these numbers will be.



• What is the status of potential crop insurance?

- Hemp is not a program crop in the traditional sense. In August 2019 <u>USDA Risk Management Agency announced provisions</u> for Whole Farm Revenue Protection (WFRP) for hemp insurance in 2020.
 - Limited coverage NAP may also be available.
- Must have five years of farm income & production history.
- Growers must have a contract for sale of the hemp crop before they can apply for hemp insurance coverage.
- Hemp crops that test >0.3% THC ("hot") and must be destroyed—This is NOT an insurable loss.
- There is some private crop insurance available, but desired protection levels may be \$\$\$ (well over \$1,000 per acre) KAS A&M

 How will hemp production with its level of regulations compare to growing other major or alternative Texas crops? Record keeping will likely be similar to organic farming. Much more effort, including when industrial hemp is transported.

A page from Texas House bill HB 1325, which is the basis for Texas rules to meet USDA guidelines.

Sec. 122.301. MANUFACTURE. (a) Except as provided by Subsection (b), a state agency may not prohibit a person who manufactures a product regulated by the agency, other article regulated under Chapter 431, Health and Safety Code, from applying for or obtaining a permit or other authorization to manufacture the product solely on the basis that the person intends to manufacture the product as a nonconsumable hemp product. (b) A state agency may not authorize a person to manufacture a product containing hemp for smoking, as defined by Section 443.001, Health and Safety Code. Sec. 122.302. POSSESSION, TRANSPORTATION, AND SALE Notwithstanding any other law, a person may possess, transport, sell, and purchase legally produced nonconsumable hemp products in 14 15 this state. 16 (b) The department by rule must provide to a retailer of nonconsumable hemp products fair notice of a potential violation 17 concerning hemp products sold by the retailer and an opportunity to 18 cure a violation made unintentionally or negligently. 19 Sec. 122.303. RETAIL SALE OF OUT-OF-STATE PRODUCTS. 20 nonconsumable hemp product manufactured outside of this state may 21 be sold at retail in this state unless: 22 23 (1) the hemp used to manufacture the product was cultivated illegally; or 24 (2) the retail sale of the product in this state 25 26 violates federal law. 27 Sec. 122.304. TRANSPORTATION AND EXPORTATION OUT OF STATE





 Is all the hype surrounding hemp, especially for CBD oil, just like the Texas emu fiasco in the late 1980s and early 1990s?
 For CBD possibly so. The discussion and projection of excessive revenue and profit leads many individuals to make poor, uninformed decisions. Grain and fiber—no. What is different is hemp grain, CBD, and the fiber all have <u>inherent</u> value in a way that emu oil and emu meat never achieved.



Preliminary Hemp Resources Read a lot. If you are truly interested in growing hemp read,

- Read a lot. If you are truly interested in growing hemp read, talk, ask. Get the answers you need. <u>It will require time</u>.
- Texas A&M AgriLife Extension agency website, <u>https://agrilifeextension.tamu.edu/hemp/</u>
 - This includes a list of Texas A&M AgriLife faculty and staff with roles in hemp education and future research.
- Consider private & commercial websites, but also especially <u>universities</u> and <u>state departments of agriculture</u> including Texas' hemp page and FDA hemp health & consumer page.
 - https://www.texasagriculture.gov/RegulatoryPrograms/Hemp.aspx
 - https://www.fda.gov/news-events/public-health-focus/fda-regulation-cannabis-andcannabis-derived-products-including-cannabidiol-cbd





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