



LSU Agricultural Center Industrial Hemp Informational Meeting
LSU AgCenter's Dean Lee Research Station
Alexandria, LA
Wednesday, November 13, 2019

Industrial Hemp Production

Opportunities and Risks



University of Nevada Reno.



VSC News.



West Virginia Gazette.

Dr. Michael Deliberto

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Presentation Outline

LSU AgCenter's Industrial Hemp Informational Meeting

- Legislative History
- Federal/State Laws
- U.S. Acreage
- Economics
- Market Potential
- Risks and Limitations



Source: Sunflower State Radio, April 15, 2019.

<https://www.lsuagcenter.com/topics/crops/industrial-hemp>

Important Takeaways from Today's Meeting

Three key components to remember

- Industrial hemp is “legal” but comes with a lot of federal and state legal strings attached
 - Individual must comply with permitting, acreage reporting, seed source, planting, harvesting, testing, transportation, etc.
- It is illegal to produce or process hemp w/o a license from LDAF
- Interested parties wanting to engage in hemp production or processing need to consult LDAF

The 2018 Farm Bill and Hemp

Current federal law and industrial hemp production

- Defined hemp and removed it from the Controlled Substances Act
- Established regulatory and licensing requirements for hemp producers
- Provided for inclusion of hemp in various USDA research and pilot programs

USDA Released Regulations for Hemp Production

Fed. Reg. 60-day public comment period until December 30, 2019

- Some key points from the regulations:
 - Clarification that interstate transportation of hemp is permitted
 - States and tribal governments that want to administer hemp programs are required to submit a state plan to the USDA for approval.
 - Elements required in the state plans include:
 - Licensing requirements
 - Way to track land used for production
 - Testing methods for THC
 - Disposal of plants that test above allowed THC level
- Labs that test for THC will need to register with the DEA
- The interim final rule governs the production of hemp under the 2018 Farm Bill.

Industrial Hemp in Louisiana

Program status and summary

- LDAF must submit a state industrial hemp plan to be approved by USDA and adopt regulations for the administration of the program.
- It is anticipated that Louisiana's state plan will be approved by the USDA and regulations will be in place to accommodate the 2020 planting season.
- Industrial hemp producers, processors, and transporters will be required to possess an annually approved license from LDAF prior to participation.
- LDAF will begin accepting license applications once the state plan is approved and regulations are in place.

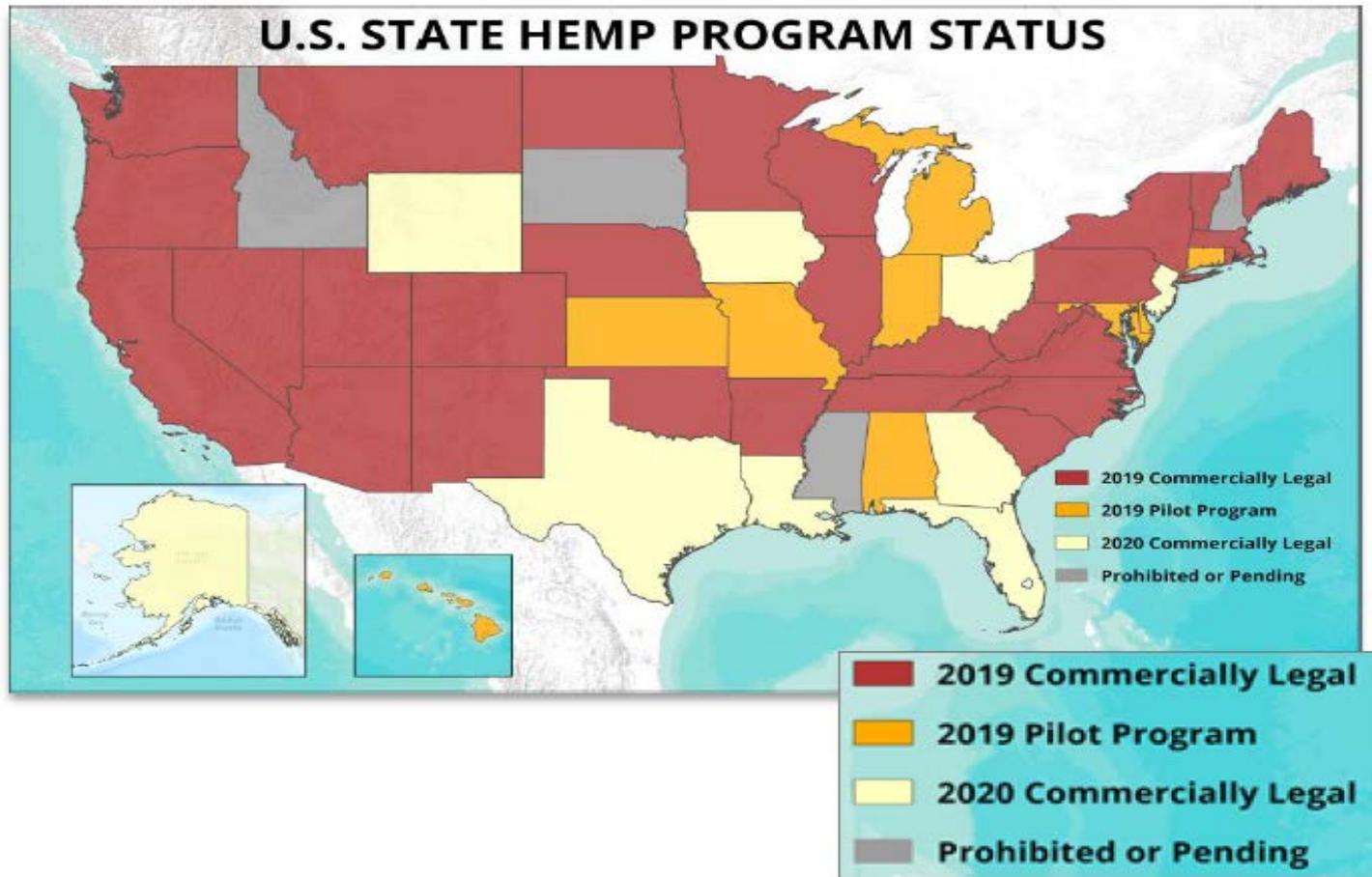
Louisiana Law

Frequently asked questions on industrial hemp

- Any person growing, handling, transporting or processing industrial hemp or hemp seed is required to possess a current license issued by LDAF's Industrial Hemp Program. Industrial Hemp (CBD) products fall under the authority of LDH, Alcohol and Tobacco Control.
- the Department will sample and test, or have tested all industrial hemp to determine THC concentration levels.
- The Act requires four separate industrial hemp licenses. 1) Grower License – authorizes the licensee to cultivate, handle and transport industrial hemp regardless of the intended use; 2) Processor License – authorizes the licensee to handle, process and transport industrial hemp; 3) Seed Producer – authorizes the licensee to produce, transport and sell industrial hemp seed, and 4) Contract Carrier – authorizes the licensee to transport industrial hemp; required when the transporter is not the licensed grower or processor of the plant material.
- All CBD products must be registered through LDH.

Hemp-producing States

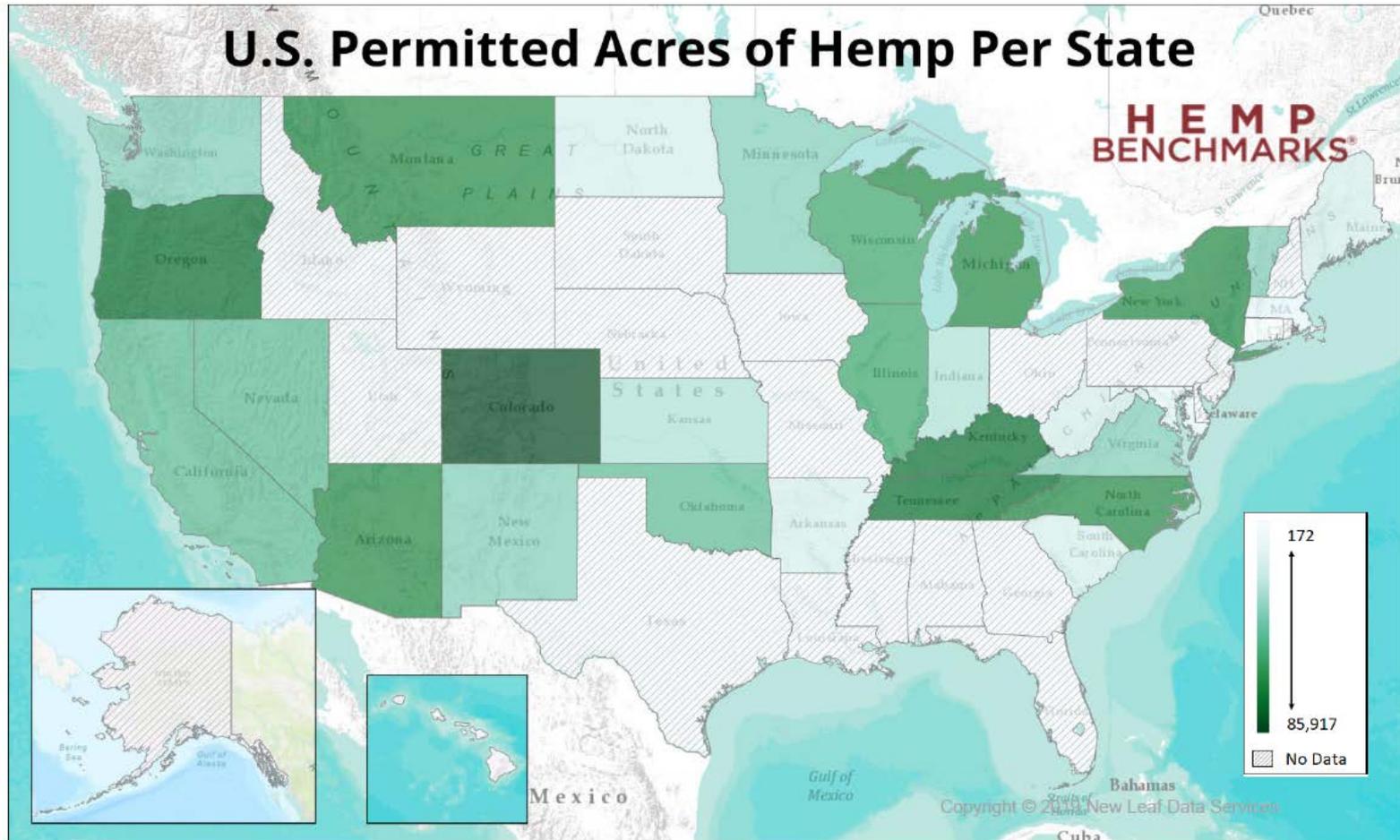
States with enacted hemp legislation



Source: Hemp Benchmarks, October 2019

Hemp Acres, by State

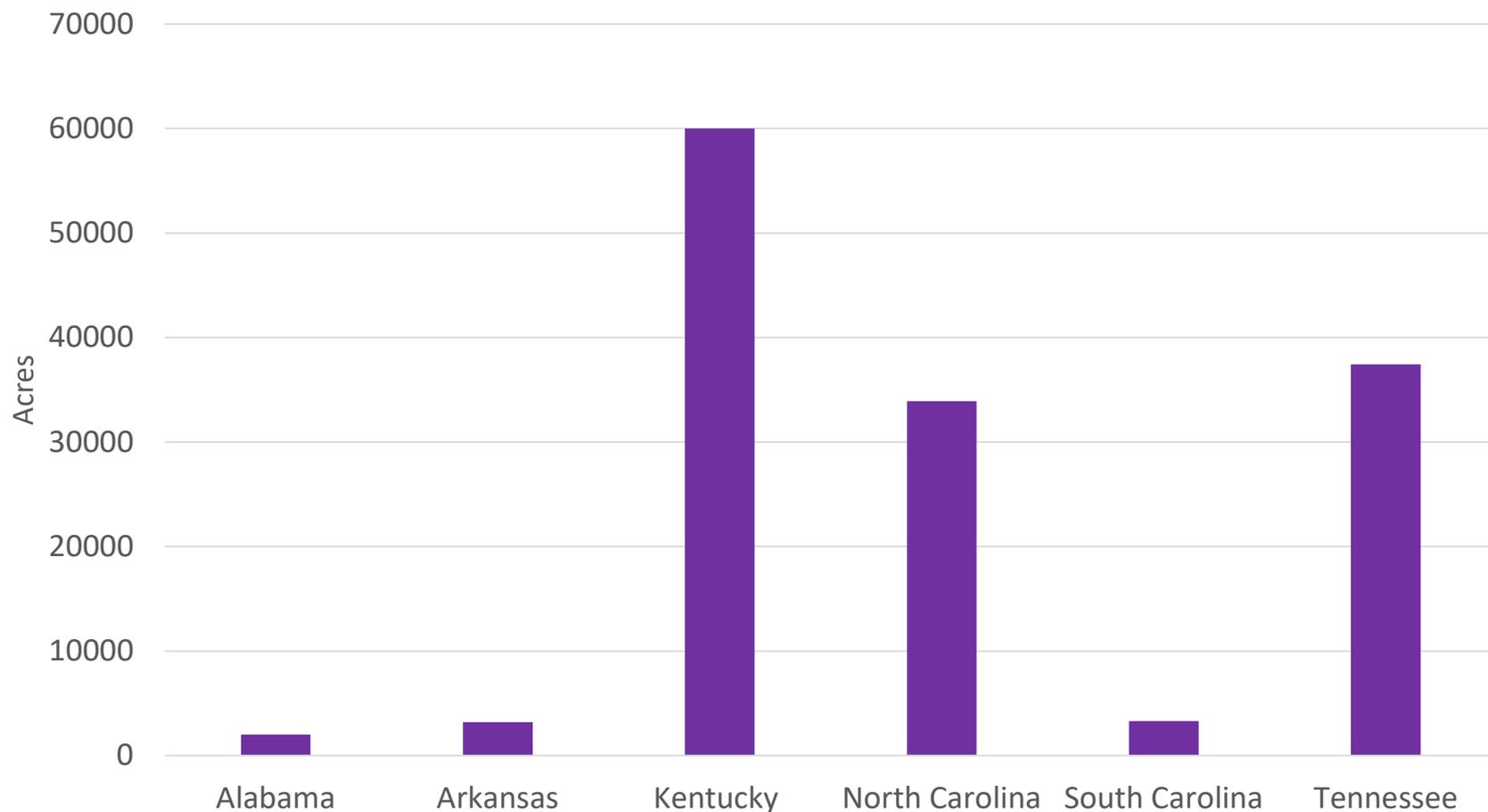
States with enacted hemp legislation



Source: Hemp Benchmarks, October 2019

Hemp Area, by Selected Southern U.S. States

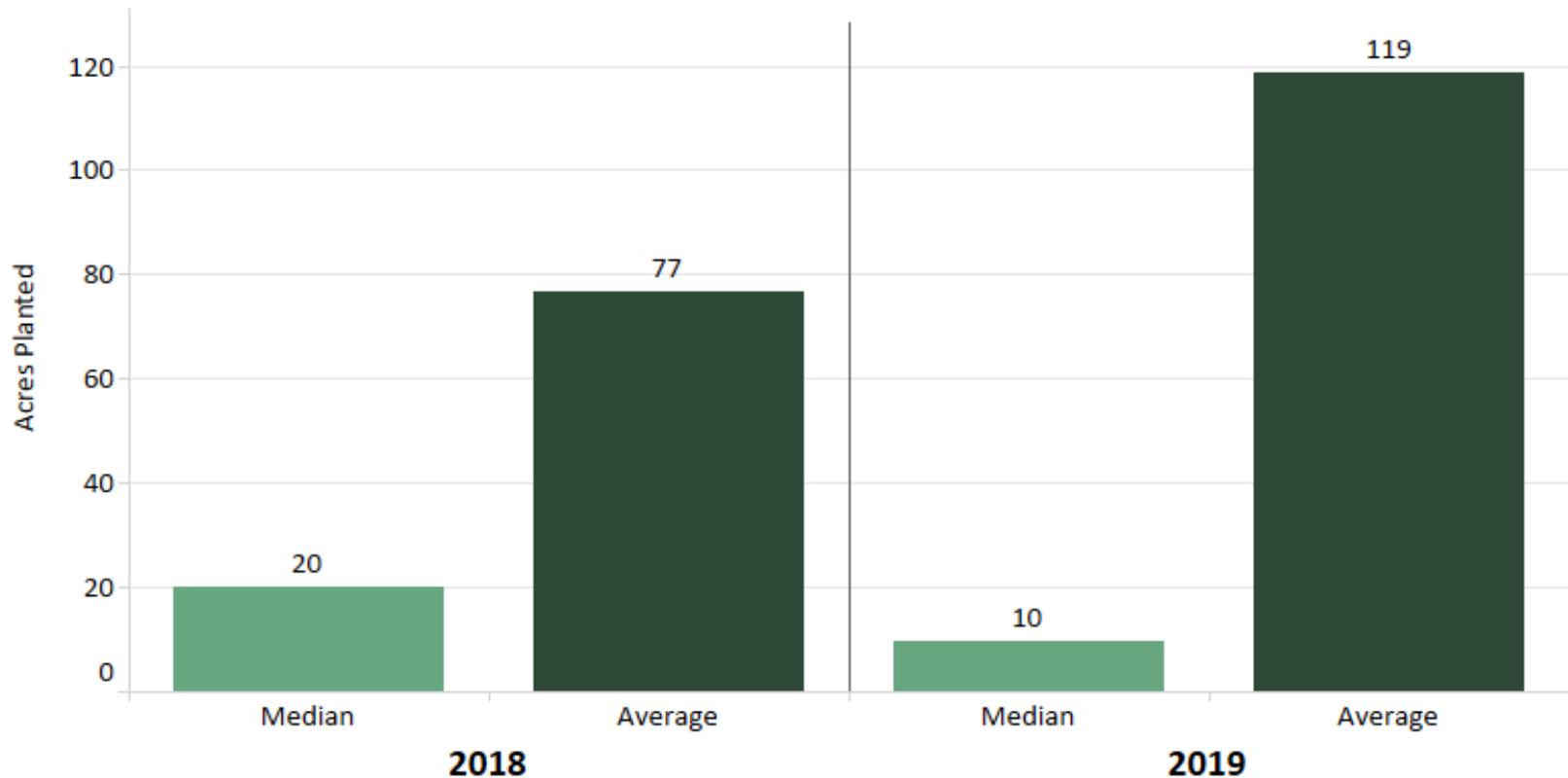
States with enacted hemp legislation



Source: Hemp Benchmarks, October 2019

Average and Median Hemp Acres Planted

2018 versus 2019, number of acres planted by hemp cultivators



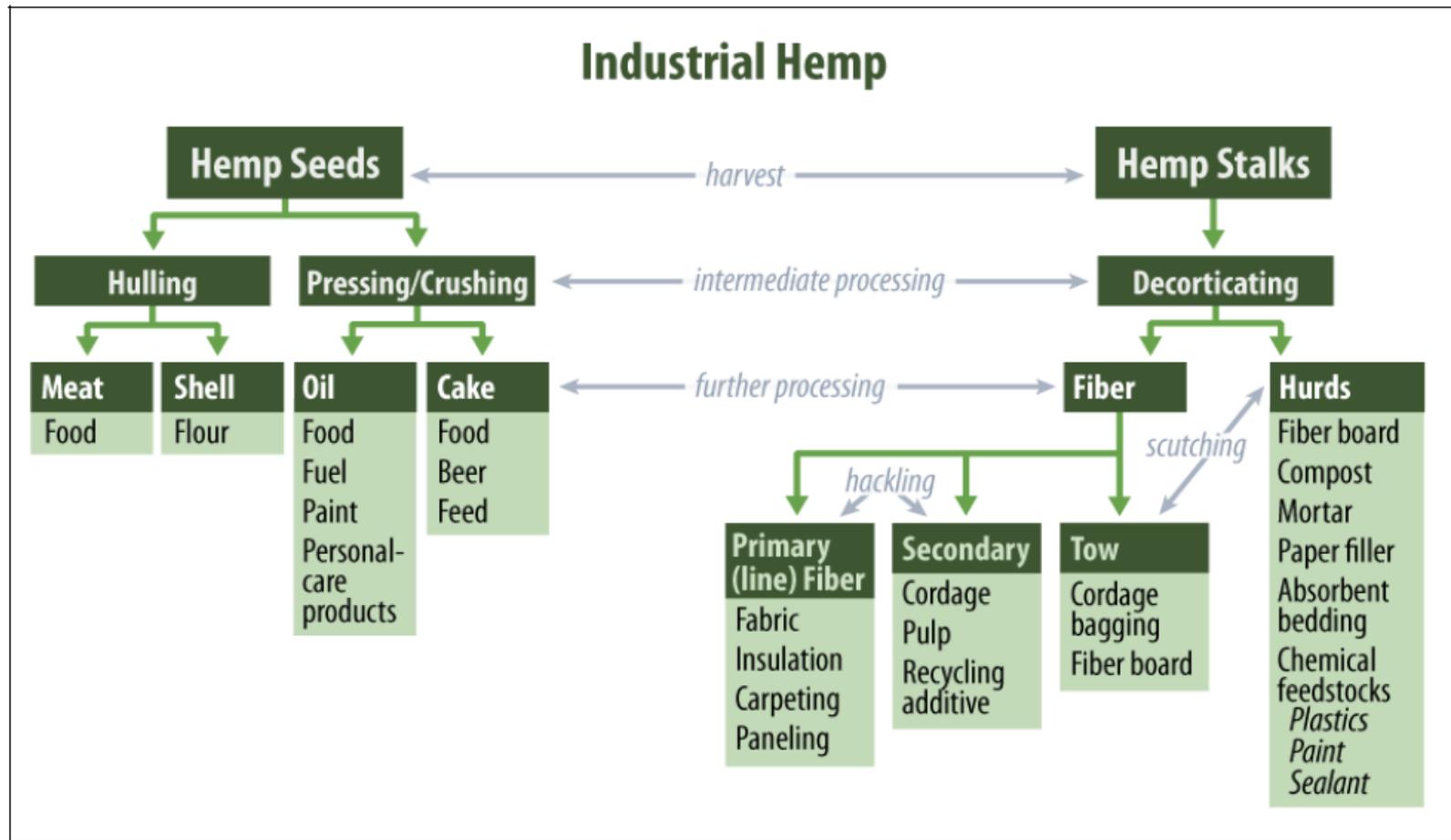
Source: 2019 Hemp Business Factbook

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Source: Hemp Benchmarks, October 2019

Flowchart of Potential Hemp Products

Hemp seed and stalks processing byproducts



Hemp for Fiber and Grain

What about the storage needs?

- Traditionally, industrial hemp has two main commercial uses: food and fiber.
- The two uses have distinctly different storage needs:
 - **Food:** Hemp grain storage is often kept on-farm. Canada requires hemp grain to be stored in clean, dry, aerated and locked bins. These can be similar to the steel bins used for corn, wheat and other crops. But unlike those grains, which are often heavily processed, hemp is served as a raw food.
 - **Fiber:** Similar to large, round bales used for storing hay as feed for animals, hemp bales can weigh up to 1,000 pounds and offer compact storage.

The Latest Emerging Market: Hemp

Private price reporting services and the potential that's being conveyed

- High prices for hemp, driven by demand for use in producing CBD, have driven increases in planting.
- Producer interest in hemp production is driven by the potential for high returns from sales of hemp flowers to be processed into CBD oil.

Production Economics

Cost identification and enterprise budget development

- Production methods (costs per acre) influenced by hemp's end-use
 - Grain production
 - Fiber production
 - Row crop model for CBD oil
 - Plastic-culture model for CBD oil
- Budget cost estimate exclude chemical control of weeds, insects, and plant diseases (no labels)

Industrial Hemp Production Considerations

Specialized crop requiring specific knowledge of production costs

- Timeliness of planting, depth, and density
- Seeded preparation and soil fertility
- No labeled herbicides, insecticides, fungicides for industrial hemp
- Harvesting practice
- Licensing fees and TCH testing fees
- Absence of an established market for selling grain, fiber, and CBD
- Secure a market with a known price per unit and/or seek contract opportunities

Production Economics

Identification of input quantity, input price, and total cost per acre

- Variable Expenses (*less chemicals*)
 - Transplants
 - Fertilizers
 - Fertigation and mulch
 - Irrigation pumping costs
 - Fuel
 - Labor (planting, in-season, rouging, harvest, post-harvest)
 - Drying/processing
- Marketing and Regulatory Expenses
 - Transportation
 - License fee
 - Sampling fee
 - Inspection fee
 - Cannabinoid test
- Fixed Expenses
 - Machinery ownership (and land rent)

Production Economics

Costs of variable-related inputs

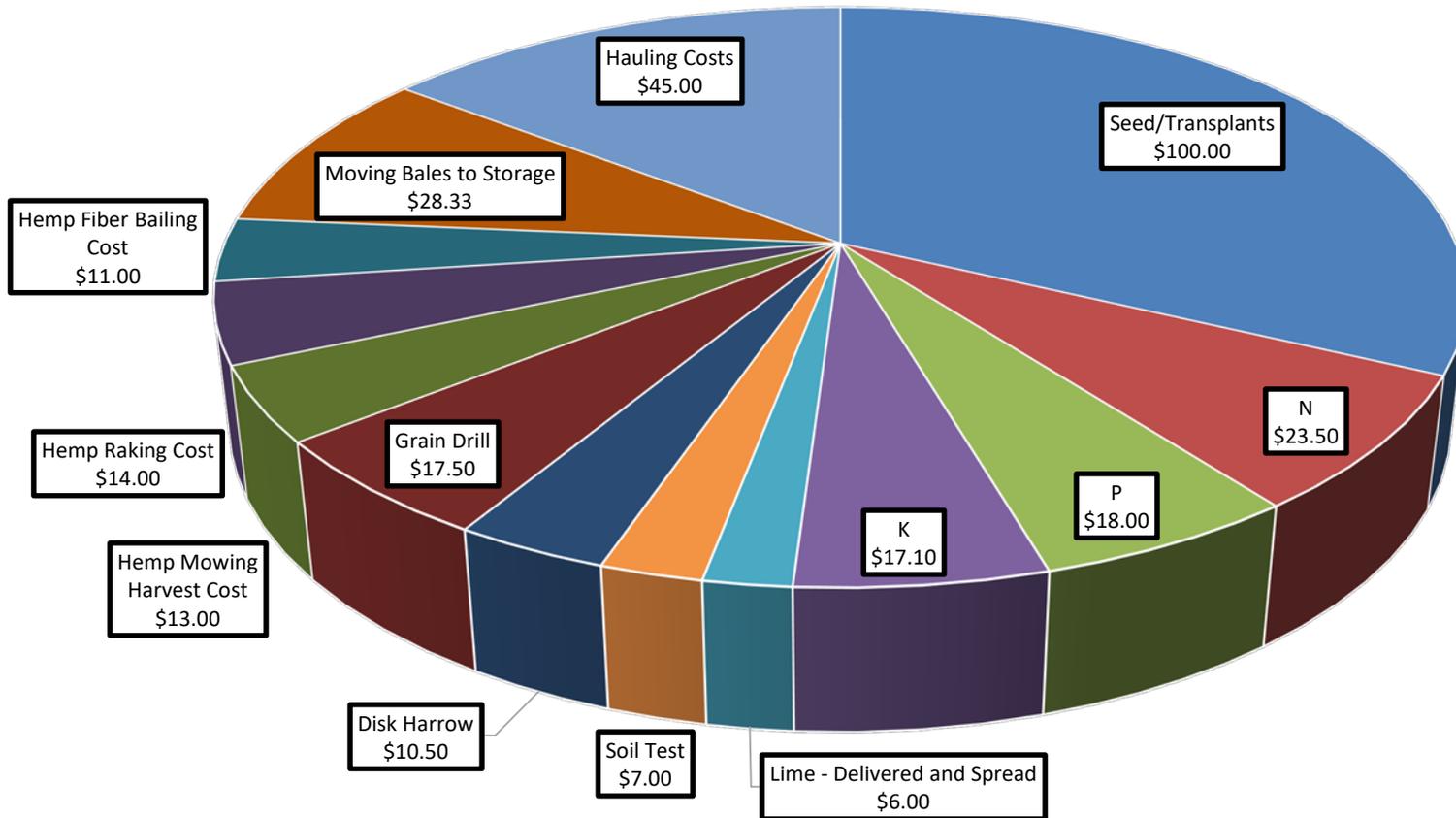
Field Activity	Estimated Range
Seed	\$60 - \$100
Transplants	\$5,000 - \$7,500
Field/Planting Operations	\$150 - \$350
Fertilizer	\$80 - \$120
Plastic/Mulch/Irrigation	\$300 - \$500
Harvesting	\$100 - \$400
LA Sample Testing fee	\$250
Total Est. Costs*	\$800 - \$9,000

Application costs for LA estimated at \$500.

No transportation, labor, and chemical costs are included. However, these components are expected to account for a significant portion of the operating costs per acre.

Estimated Variable Costs per acre for Fiber

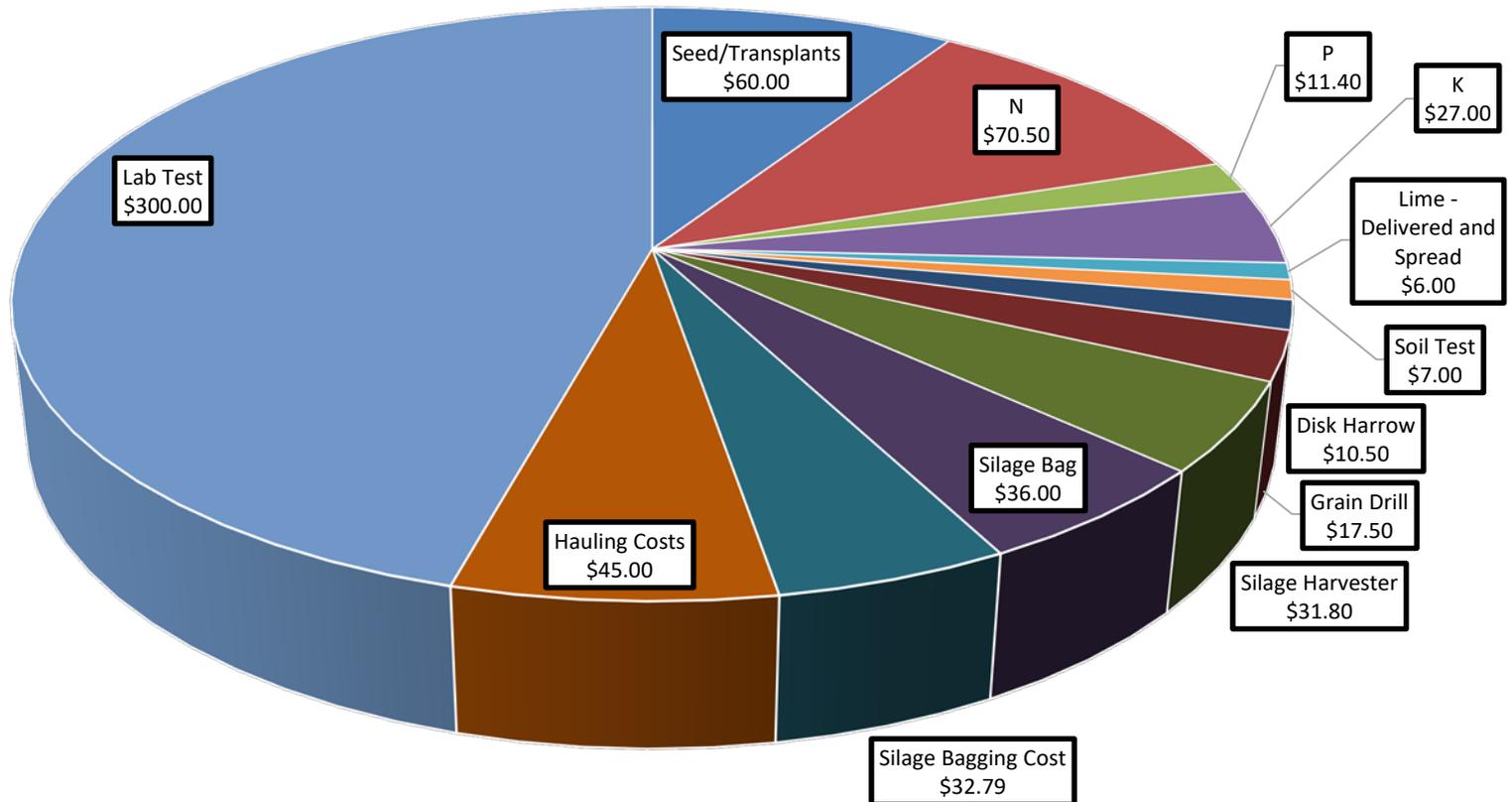
Row crop production system less labor and chemicals @ \$311



Sources: University of Kentucky, 2019.

Estimated Variable Costs per acre for CBD Row Crop

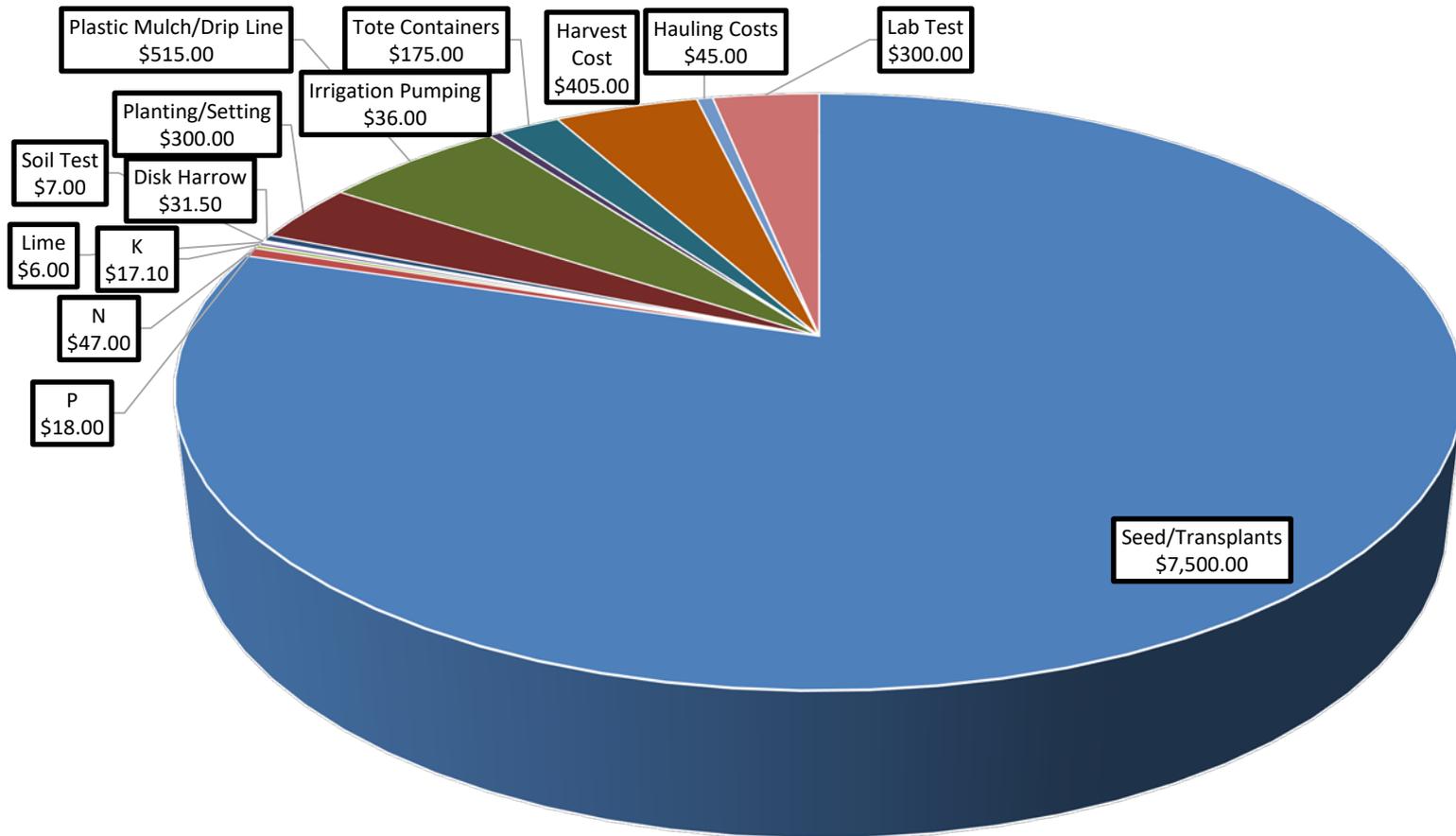
Row crop production system less labor and chemicals @ \$656



Sources: University of Kentucky, 2019.

Estimated Variable Costs per acre for CBD

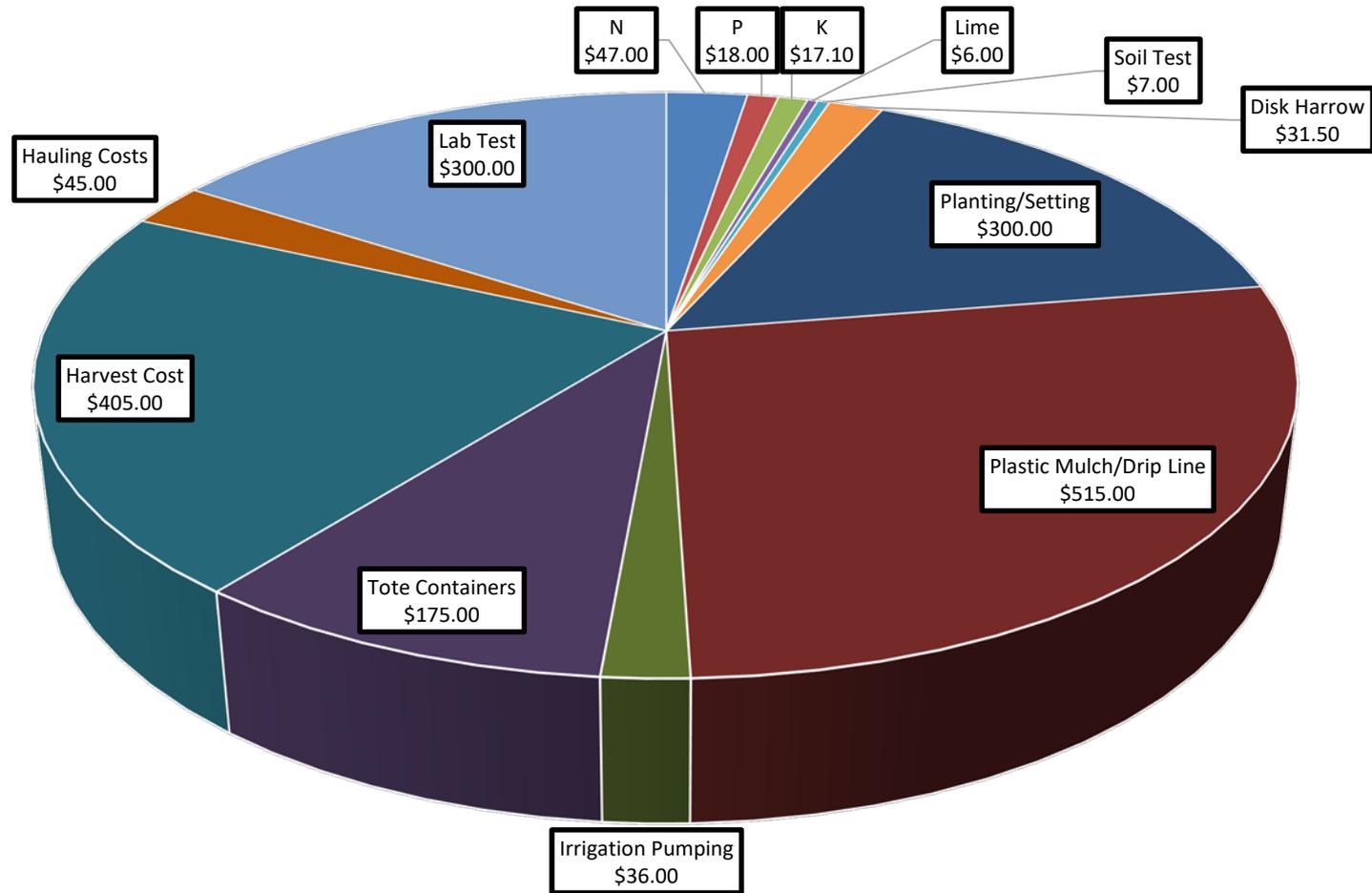
Plasticulture production system with specialized labor @ \$13,611



Sources: University of Tennessee, 2019.

Estimated Variable Costs per acre for CBD-less plants

Plasticulture production system with specialized labor @ \$13,611



Sources: University of Tennessee, 2019.

Marketing Considerations

Lack of market data and contract structuring are major risks

- Markets and prices have not been well established, so variability in prices is likely. Prices may change dramatically between planting and harvest.
- The percent of CBD oil is a key determinant in price and is variety and environment dependent. Significant variability in CBD oil content may occur.
- Processors may have minimum CBD oil thresholds to purchase the crop. Discussions regarding processor requirements (minimum CBD percentage, production methods, and delivery and payment terms) are strongly advised prior to planting the crop.
- A floral dry matter yield of 1 pound per plant is assumed; however, plant weights can vary.

Yields and Farm Prices for Hemp Products

Output assumptions (yields) and farm gate prices from existing research

Product	Yield	Farm Price
Grain	1,200 pounds per acre	\$0.70 per pound
Fiber	10,000 pounds per acre	\$0.07 per pound
CBD	3% per pound dry matter	\$1.00 to \$5.00 per %

Description	Quantity	Unit
Projected CBD % dry matter	10%	% dry matter
Price per % CBD oil	\$1.50	\$ per %
Total Plant Population	1,500	Transplants per acre
% Transplants Harvested	95%	%
Dried Floral Material per Plant	1.00	Pounds per plant
Harvested Dried Floral Material	1,425	Pounds per acre

Source: University of Kentucky and University of Tennessee, 2019.

Returns from Industrial Hemp Extract (CBD)

Estimating the net returns per acre of production @ \$13,611 per acre

		Yield (lbs per acre)								
		800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400
Price (\$ per lb)	\$5.00	-\$9,611	-\$8,611	-\$7,611	-\$6,611	-\$5,611	-\$4,611	-\$3,611	-\$2,611	-\$1,611
	\$7.00	-\$8,011	-\$6,611	-\$5,211	-\$3,811	-\$2,411	-\$1,011	\$389	\$1,789	\$3,189
	\$9.00	-\$6,411	-\$4,611	-\$2,811	-\$1,011	\$789	\$2,589	\$4,389	\$6,189	\$7,989
	\$11.00	-\$4,811	-\$2,611	-\$411	\$1,789	\$3,989	\$6,189	\$8,389	\$10,589	\$12,789
	\$13.00	-\$3,211	-\$611	\$1,989	\$4,589	\$7,189	\$9,789	\$12,389	\$14,989	\$17,589
	\$15.00	-\$1,611	\$1,389	\$4,389	\$7,389	\$10,389	\$13,389	\$16,389	\$19,389	\$22,389
	\$17.00	-\$11	\$3,389	\$6,789	\$10,189	\$13,589	\$16,989	\$20,389	\$23,789	\$27,189

Source: University of Tennessee, 2019. USDA AMS. Federal Register Vol. 84, No.211. Thursday, October 31, 2019.

Returns from Industrial Hemp Extract (CBD)

Estimating the net returns per acre of production above TSC @ @14,000+

		Yield (lbs per acre)								
		800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400
Price (\$ per lb)	\$5.00	-\$11,611	-\$10,611	-\$9,611	-\$8,611	-\$7,611	-\$6,611	-\$5,611	-\$4,611	-\$3,611
	\$7.00	-\$10,011	-\$8,611	-\$7,211	-\$5,811	-\$4,411	-\$3,011	-\$1,611	-\$211	\$1,189
	\$9.00	-\$8,411	-\$6,611	-\$4,811	-\$3,011	-\$1,211	\$589	\$2,389	\$4,189	\$5,989
	\$11.00	-\$6,811	-\$4,611	-\$2,411	-\$211	\$1,989	\$4,189	\$6,389	\$8,589	\$10,789
	\$13.00	-\$5,211	-\$2,611	-\$11	\$2,589	\$5,189	\$7,789	\$10,389	\$12,989	\$15,589
	\$15.00	-\$3,611	-\$611	\$2,389	\$5,389	\$8,389	\$11,389	\$14,389	\$17,389	\$20,389
	\$17.00	-\$2,011	\$1,389	\$4,789	\$8,189	\$11,589	\$14,989	\$18,389	\$21,789	\$25,189

Source: University of Tennessee, 2019. USDA AMS. Federal Register Vol. 84, No.211. Thursday, October 31, 2019.

Returns from Industrial Hemp Fiber

Estimating the net returns per acre of production @ \$311 var. cost per acre

		Yield (lbs per acre)								
		1,000	2,500	4,000	5,500	7,000	8,500	10,000	11,500	13,000
Price (\$ per lb)	\$0.05	-\$261	-\$186	-\$111	-\$36	\$39	\$114	\$189	\$264	\$339
	\$0.06	-\$251	-\$161	-\$71	\$19	\$109	\$199	\$289	\$379	\$469
	\$0.07	-\$241	-\$136	-\$31	\$74	\$179	\$284	\$389	\$494	\$599
	\$0.08	-\$231	-\$111	\$9	\$129	\$249	\$369	\$489	\$609	\$729
	\$0.09	-\$221	-\$86	\$49	\$184	\$319	\$454	\$589	\$724	\$859

Source: USDA AMS. Federal Register Vol. 84, No.211. Thursday, October 31, 2019.

Returns from Industrial Hemp Fiber

Estimating the net returns per acre of production @ \$560 var./reg. costs per acre

		Yield (lbs per acre)								
		1,000	2,500	4,000	5,500	7,000	8,500	10,000	11,500	13,000
Price (\$ per lb)	\$0.05	-\$511	-\$436	-\$361	-\$286	-\$211	-\$136	-\$61	\$14	\$89
	\$0.06	-\$501	-\$411	-\$321	-\$231	-\$141	-\$51	\$39	\$129	\$219
	\$0.07	-\$491	-\$386	-\$281	-\$176	-\$71	\$34	\$139	\$244	\$349
	\$0.08	-\$481	-\$361	-\$241	-\$121	-\$1	\$119	\$239	\$359	\$479
	\$0.09	-\$471	-\$336	-\$201	-\$66	\$69	\$204	\$339	\$474	\$609

Source: USDA AMS. Federal Register Vol. 84, No.211. Thursday, October 31, 2019.

Returns from Industrial Hemp Grain

Estimating the net returns per acre of production @ \$311 var. costs per acre

		Yield (lbs per acre)								
		700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
Price (\$ per lb)	\$0.30	-\$101	-\$71	-\$41	-\$11	\$19	\$49	\$79	\$109	\$139
	\$0.40	-\$31	\$9	\$49	\$89	\$129	\$169	\$209	\$249	\$289
	\$0.50	\$39	\$89	\$139	\$189	\$239	\$289	\$339	\$389	\$439
	\$0.60	\$109	\$169	\$229	\$289	\$349	\$409	\$469	\$529	\$589
	\$0.70	\$179	\$249	\$319	\$389	\$459	\$529	\$599	\$669	\$739

Source: USDA AMS. Federal Register Vol. 84, No.211. Thursday, October 31, 2019.

Returns from Industrial Hemp Grain

Estimating the net returns per acre of production @ \$560 var./reg. costs per acre

		Yield (lbs per acre)								
		700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
Price (\$ per lb)	\$0.30	-\$351	-\$321	-\$291	-\$261	-\$231	-\$201	-\$171	-\$141	-\$111
	\$0.40	-\$281	-\$241	-\$201	-\$161	-\$121	-\$81	-\$41	-\$1	\$39
	\$0.50	-\$211	-\$161	-\$111	-\$61	-\$11	\$39	\$89	\$139	\$189
	\$0.60	-\$141	-\$81	-\$21	\$39	\$99	\$159	\$219	\$279	\$339
	\$0.70	-\$71	-\$1	\$69	\$139	\$209	\$279	\$349	\$419	\$489

Source: USDA AMS. Federal Register Vol. 84, No.211. Thursday, October 31, 2019.

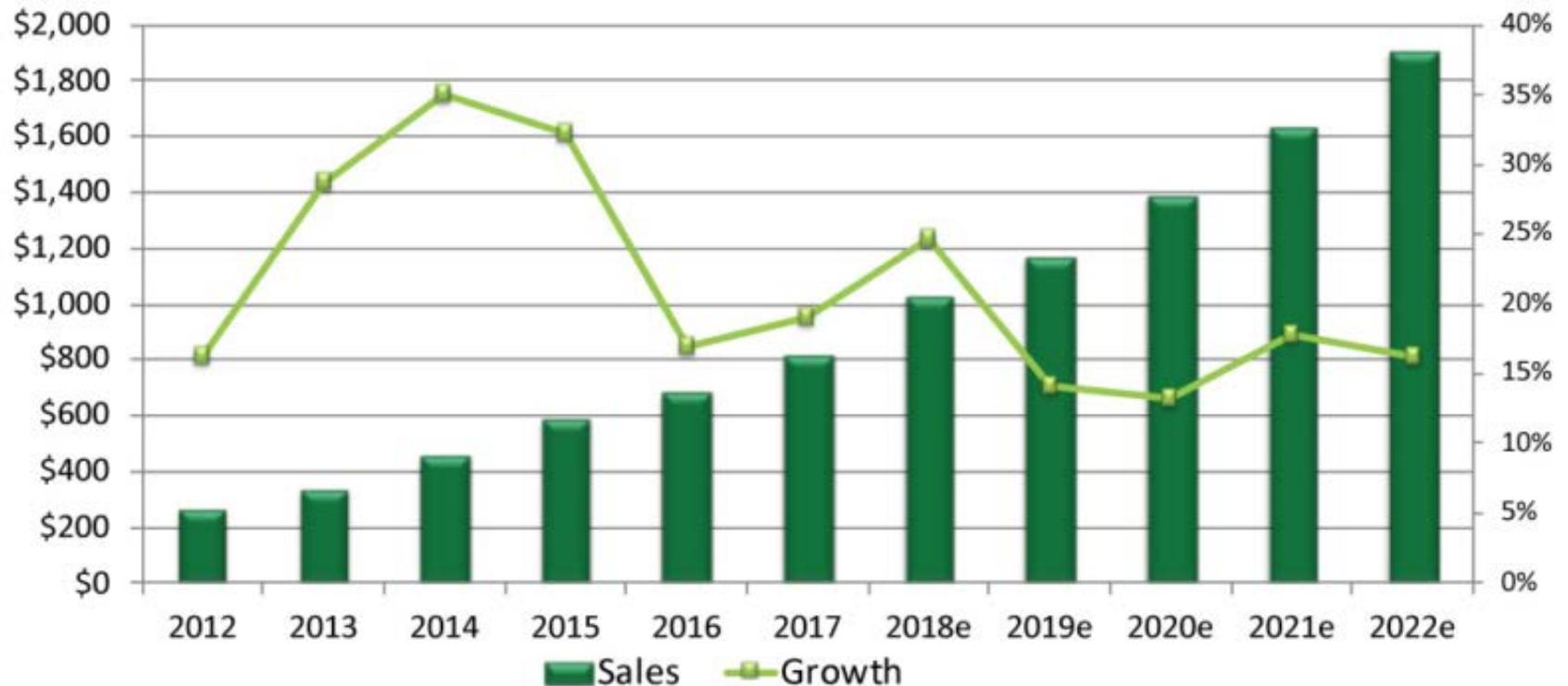
Grower Difficulties

Some of the remaining business risks

- Sourcing hemp seed...
 - How much and are they creditable?
- Processing contracts...
 - Template to use?
 - Confidentiality clauses are often present
- Pesticide usage and approval for hemp...
- Federal lobbyists...
 - 116 groups have hired Federal lobbyists for the 2Q of 2019 alone...

U.S. Hemp-based Product Sales

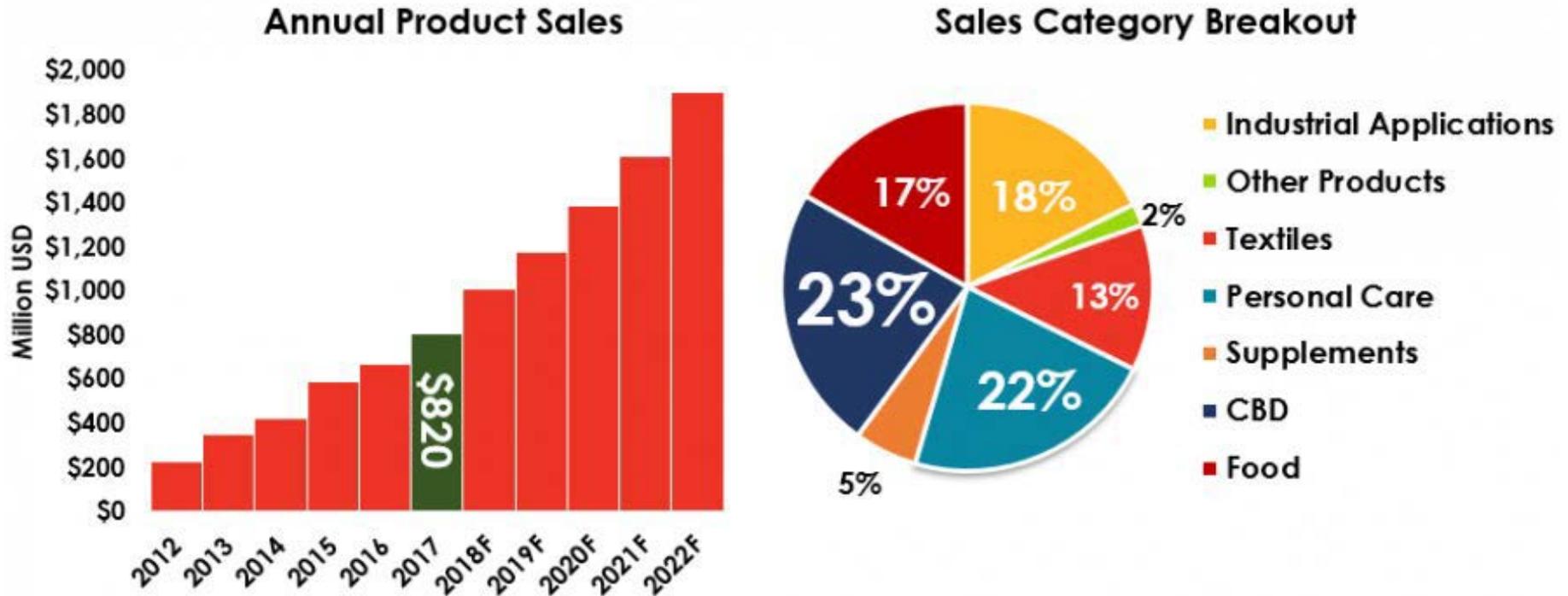
2012 to 2022 estimate (\$ mil., consumer sales)



Source: Hemp Business Journal.

U.S. Hemp-based Product Sales by Category

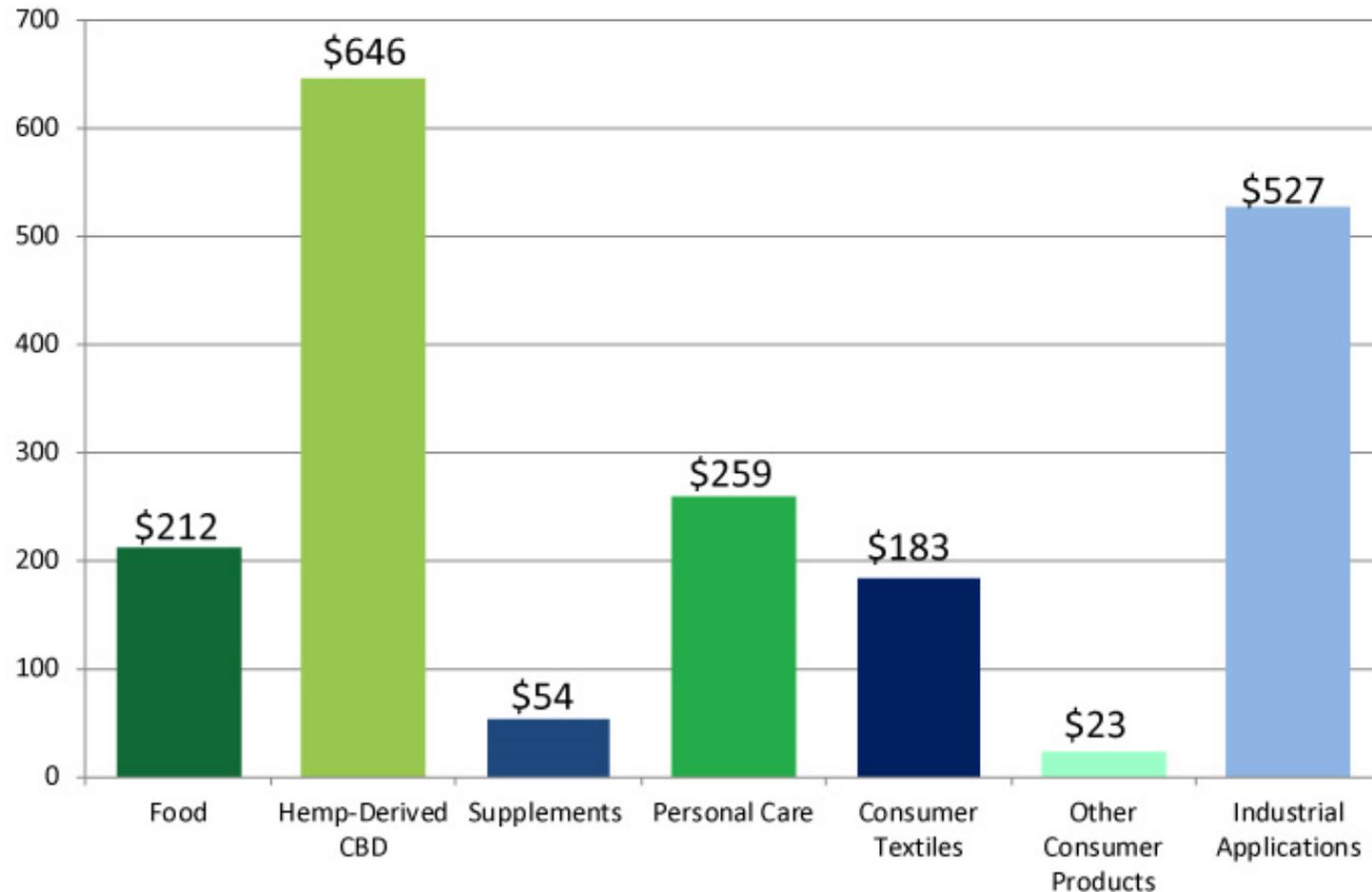
Sales data based on 2017 sales of \$820 M



Source American Farm Bureau, 2018.

U.S. Hemp-based Product Sales by Category

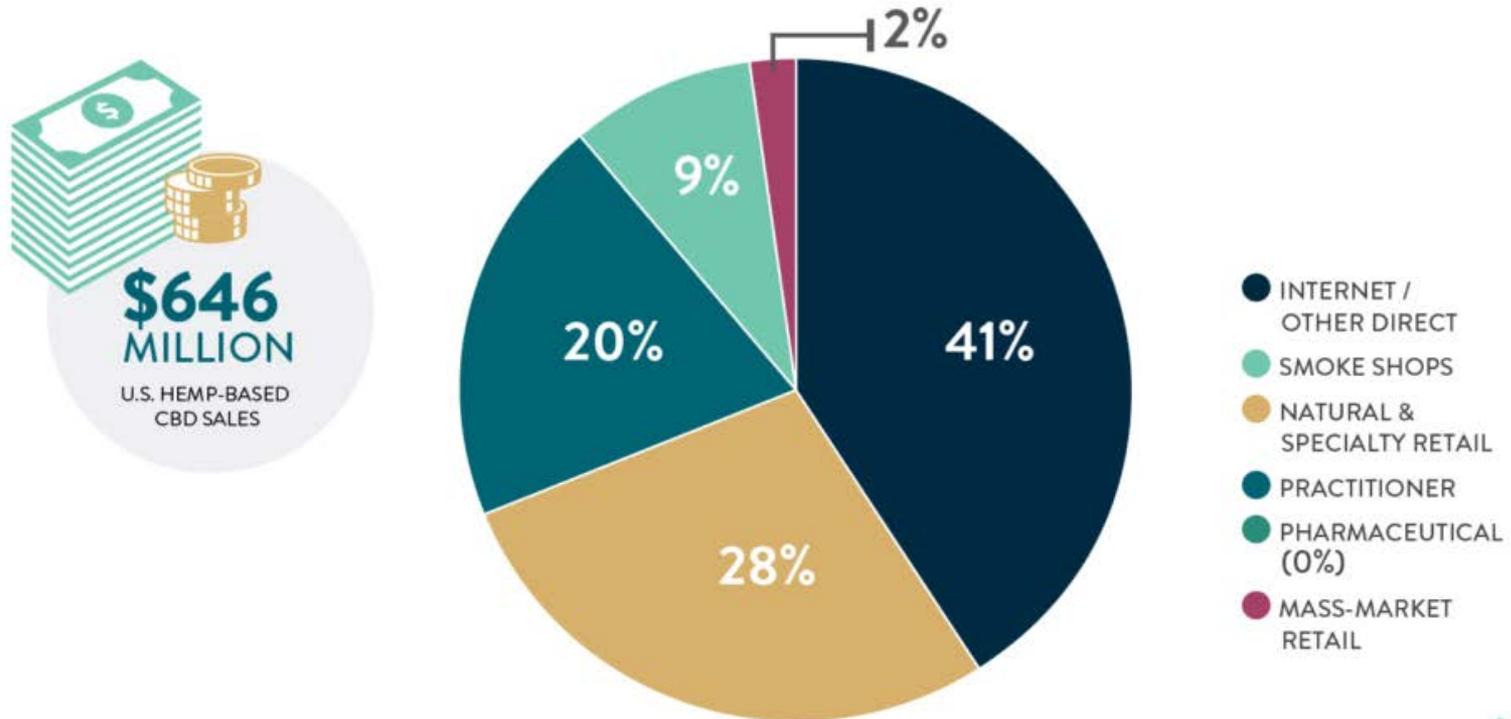
\$1.9 B estimated by 2022 (\$ mil., consumer sales)



Source: Hemp Business Journal.

U.S. Hemp-based CBD Sales by Channel

\$648 M estimated by 2022

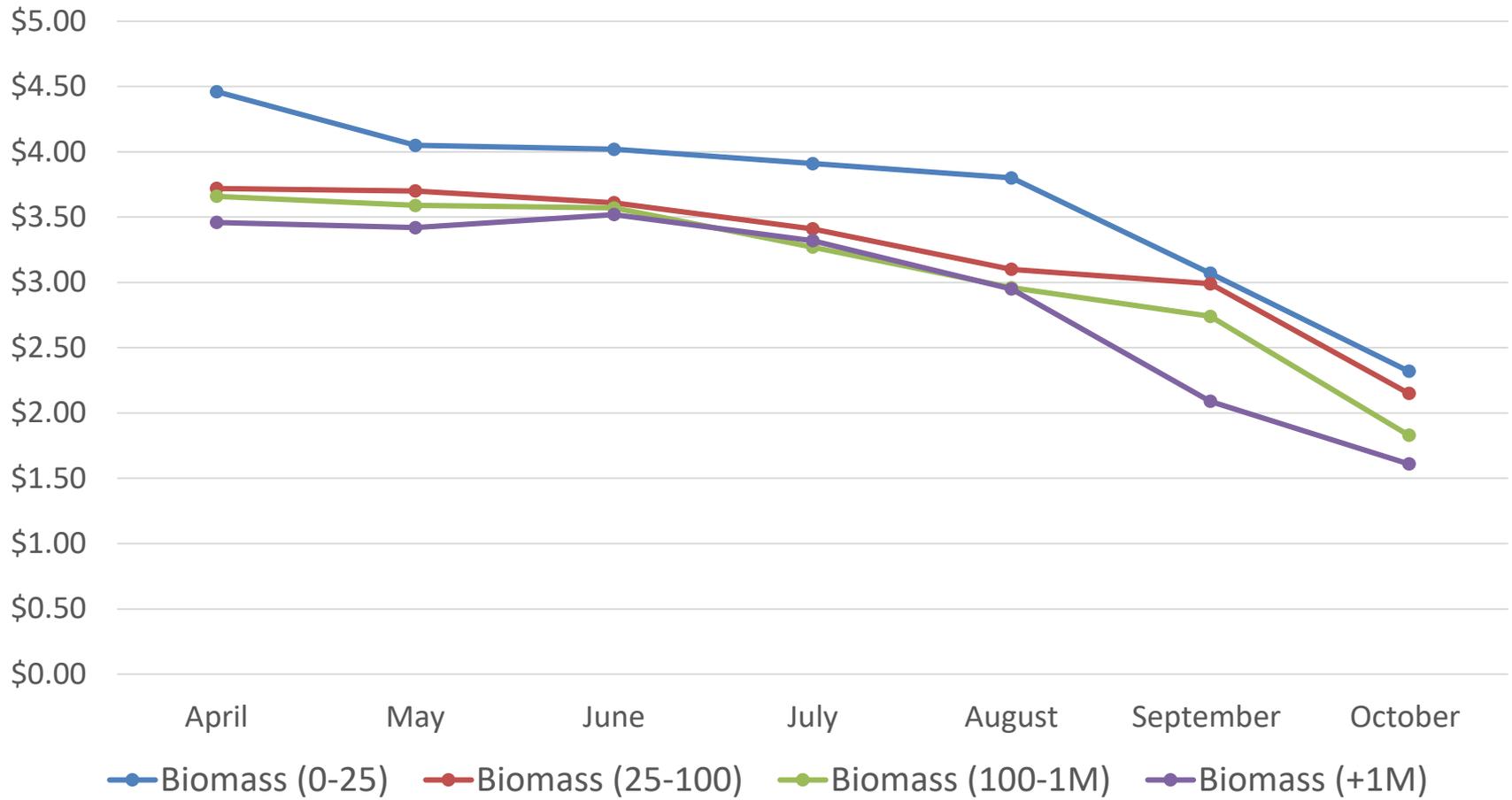


© 2018 New Frontier Data | Source: Hemp Business Journal estimates (consumer sales) and SPINS.

Source: Hemp Business Journal.

Wholesale Prices for Hemp Biomass

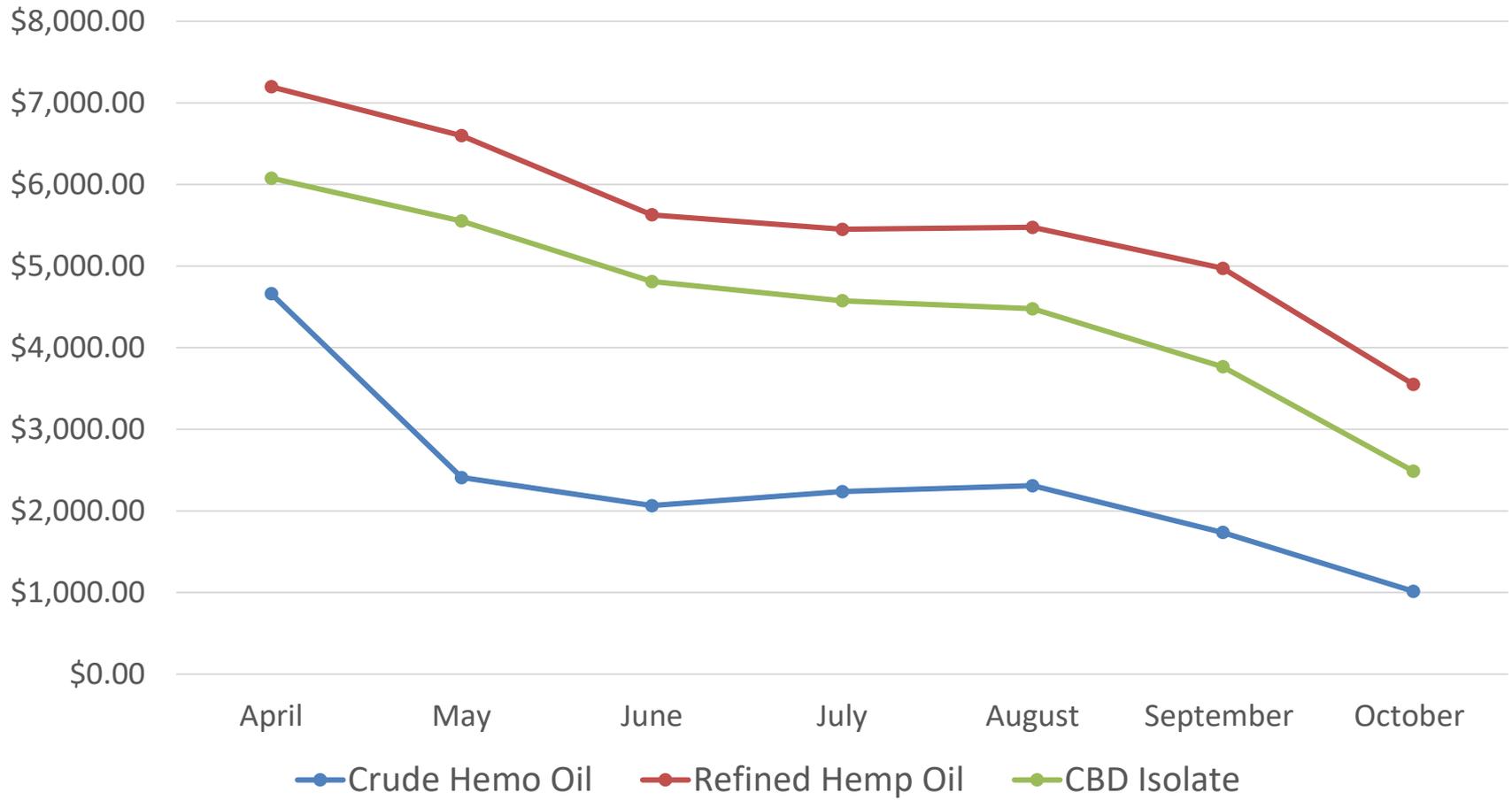
Seven-month summary (\$ per %CBD per pound)



Source: Hempbenchmarks. October, 2019.

Wholesale Prices for CBD Hemp Oil

Seven-month summary (\$ per kilo)



Source: Hempbenchmarks. October, 2019.

Betting the Farm on Hemp?

2019 was an expensive learning experience for first-time hemp producers

- “Struggling farmers who bet everything on hemp this year experiencing bitter harvest”.
- Many traditional row-crop farmers and livestock producers, faced with falling prices and trade tariffs cutting into already thin margins, planted hemp this year with hopes to profit from the rising popularity of hemp-derived CBD.
- In some cases, farmers were told they stood to make upwards of \$50,000 per acre, a dramatic increase over the \$787 that an acre of corn was projected to produce in 2019, according to the University of Illinois at Urbana-Champaign.
- According to *Hemp Industry Daily*, hemp farmers reported median revenue of \$15,000 per acre planted in 2018, a figure they expected would double this year.
- Many farmers were either promised contracts that didn’t work out or didn’t secure contracts before their crops were in the ground, leading them to grow on speculate
- The lack of capital extends to the rest of the supply chain, which will ultimately affect farmers, too, on of the booming industry.
- Most of the large processing facilities themselves are vertically integrated, so they’re already at capacity from their own farms, not needing to buy in additional crops. But most traditional farmers prefer to grow and sell their crops without having to worry about the business end of processing and manufacturing end products

Limitations for Producers

Business risks and regulatory risk of production (THC levels)

- USDA officials were asked about the risks of high-THC tests because of weather variability.
 - That would lead to the crop being destroyed.
 - USDA said that is a risk farmers will have to face.
 - Producers need to learn about hemp seed varieties to plant in their area that will be suitable.
 - Crop insurance will not cover losses that has to be destroyed because of too much THC.
 - EPA closed a public comment period in September on pesticides that could be used on hemp and the agency is working through a pathway for pesticide registration.

Hemp and The Farm Bill

Guidance of agencies on eligibility on additional farm programs in 2020 CY

- Once production plans are approved and licenses are issued, hemp producers may be eligible for many USDA programs in 2020, including:
 - Whole-Farm Revenue Protection (WFRP)
 - Noninsured Crop Disaster Assistance Program (NAP)
 - NRCS-administered conservation programs, including the Environmental Quality Incentives Program, Conservation Stewardship Program, Regional Conservation Partnership Program, and Agricultural Conservation Easement Program
 - Farm loans, including operating, ownership, beginning farmer, and farm storage facility

The Food and Drug Administration (FDA)

FDA is working on to find out more about cannabis-derived compounds

- The FDA is working to learn more about the safety of CBD and CBD products.
- Unapproved CBD drug products have not been subject to FDA review as part of the drug approval process, and there has been no FDA evaluation regarding whether they are safe and effective
- FDA is currently evaluating the regulatory frameworks that apply to certain cannabis-derived products that are intended for non-drug uses, including whether and/or how the FDA might consider updating its regulations, as well as whether potential legislation might be appropriate.

Remaining Limitations for Ag Lenders

Business risks and financing limitations

- What ag lenders should know:
 - Type of hemp being grown
 - USDA and State regulations
 - Crop insurance (must have a processing contract)
- What happen when the THC level is too high?
 - Uninsurable loss incurred by the producer
- What is the producer's liability?

Ag Lending for Hemp Producers

Agricultural lending industry seeking information

- When a new piece of federal regulation is enacted, it takes time for all the clarity and learning curves to be worked out.
- Banks need sound information about the risk and opportunities of financing the industrial hemp industry
- H.R. 1595, the Secure and Fair Enforcement Banking Act (SAFE Banking Act of 2019)
 - Cannabis businesses
 - Passed House, awaits Senate action

Risk and Uncertainty are Apparent in the Market

Rating the regulatory issues and business limitations of hemp production

Type of Risk	Fiber	Grain	CBD
Int'l. Competition	Med	Med	High
Mkt. Demand Risk	Low	Med	High
Proc. Infrastructure	High	Low	Med
Seed	Low	Low	High
THC Limit	Low	Low	High
Market Info	Med	Med	High
Pricing	Med	Med	Med
Crop Insurance Cost	Med	Med	High
Labor Costs	Low	Med	High

Source: CoBank. October, 2019

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<https://www.lsuagcenter.com/topics/crops/industrial-hemp>

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