



Comparative Analysis of the Industrial Hemp Industry

*Guide to the evolution of the U.S. industrial
hemp industry in the global economy*

Commissioned by the Missouri Hemp Producers Association with funding
from the Missouri Agricultural and Small Business Development Authority

December 2019



Extension
University of Missouri



The following report was commissioned by the Missouri Industrial Hemp Steering Committee to prepare Missouri producers for the 2020 rollout of industrial hemp in the state. Funding was provided by Missouri Agricultural and Small Business Development Authority through its Missouri Value-Added Grant Program.

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Table of Contents

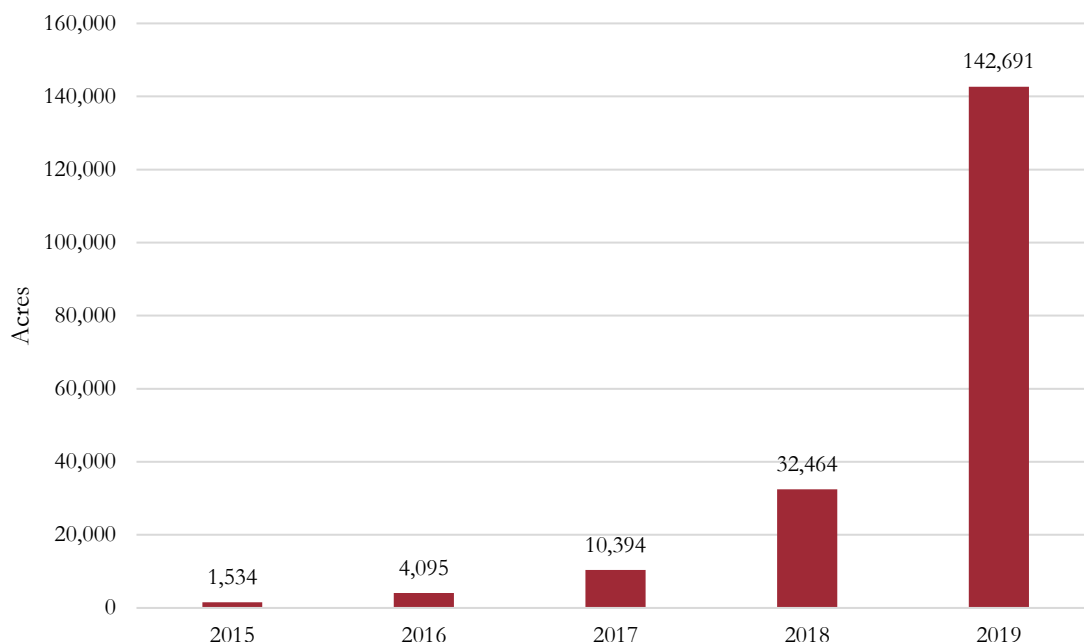
- 1. GLOBAL INDUSTRIAL HEMP INDUSTRY..... 1
 - 1.1 United States..... 1
 - 1.2 Canada 3
 - 1.3 Rest of the World 4
- 2. EXAMINATION OF SELECTED U.S. STATES..... 6
 - 2.1 Kentucky 6
 - 2.2 Colorado..... 8
 - 2.3 Oregon 10
 - 2.4 Tennessee..... 11
 - 2.5 Arkansas 12
 - 2.6 Illinois 13
 - 2.7 Iowa 13
 - 2.8 Nebraska 14
 - 2.9 Kansas 14
 - 2.10 Oklahoma 15
 - 2.11 Minnesota..... 16
 - 2.12 North Carolina 17
 - 2.13 New York..... 18
 - 2.14 Montana 19
- REFERENCES 20

1. Global Industrial Hemp Industry

1.1 United States

The U.S. has seen major growth in industrial hemp production through the state-level pilot programs in recent years. Some question has arisen about the reliability of acreage estimates for the U.S. industrial hemp industry. USDA does not currently publish official acreage estimates for industrial hemp. Some industrial hemp acreage data are available in the USDA Farm Service Agency planted crop acreage data (see Exhibit 1.1.1). But typically, this USDA-reported acreage only captures acreage of those producers who participate in government financial programs and are required to submit an annual report about their cropping and land use. From 2015 to 2019, reported acreage grew from 1,534 acres to 142,691 acres.

Exhibit 1.1.1 – U.S. Hemp Crop Planted Acreage, 2015 to 2019



Source: USDA Farm Service Agency, Crop Acreage Report

Exhibit 1.1.2 details U.S. industrial hemp licensed acreage in select states for 2017, 2018 and 2019. States with major industrial hemp acreage have included Colorado, Kentucky, Oregon and Montana. Vote Hemp (2019) estimated the 2019 total U.S. licensed acreage at 511,442 acres. Many states have shown significant increases in licensed acres.

Exhibit 1.1.2 – State-Level Licensed Industrial Hemp Acreage, 2017 to 2019

State	2017	2018	2019
Colorado	12,042	21,578	80,000
Kentucky	12,800	16,100	58,000
Oregon	3,500	7,808	51,313
Montana	542	22,000	40,000
Tennessee	718	3,338	37,416
Wisconsin	0	1,850	16,100
North Carolina	1,930	3,184	11,572
Nevada	490	1,881	9,145
New York	2,000	2,240	5,000
North Dakota	3,100	2,778	2,175
Total of selected states	37,122	82,757	310,721

Source: Sterns (2019)

Not all licensed acreage is planted and successfully harvested. Independent observers and market analysts publish a variety of estimates. Based on these private assessments, we estimate that approximately 50 percent of the licensed acres in the U.S. were planted in 2019. Of the planted acreage, we further estimate that approximately 50 percent will be successfully harvested in fall 2019. If one applies Vote Hemp licensed acreage to this estimation, then it would result in 255,721 acres being planted in the U.S. and 127,860 acres being harvested in 2019. A large majority (roughly 80 percent) of the U.S. acreage is estimated to be industrial hemp for cannabidiol (CBD).

Historically, hemp seeds, fiber and other hemp-derived products have been imported into the U.S. Exhibit 1.1.3 shows the quantity of various U.S. hemp imports from 2014 to 2018 along with major trade partners by category. The total value of 2018 U.S. imports was \$79.8 million (USDA Foreign Agricultural Service, 2019). Almost 60 percent of this value was from hemp seed imports. Canada has been a major supplier of hemp seeds, hemp oil and fractions and hemp seed oilcake to U.S. manufacturers and seed suppliers. Note that these trade categories do not capture finished hemp products such as paper products, carpets and clothing (Johnson, 2018).

Exhibit 1.1.3 – U.S. Hemp Imports, Metric Tons, 2014 to 2018

Category	2014	2015	2016	2017	2018	Major U.S. Trade Partners (% of 2018 metric tons)
Hemp seeds (HS 1207990320)	2,783	15,977	17,820	7,606	4,539	Canada (86%), China (9%)
Hemp oil and fractions (HS 1515908010)	1,155	538	767	767	1,215	Canada (89%), Poland (5%)
Hemp seed oilcake and solids (HS 2306900130)	938	1,826	1,163	1,475	1,147	Canada (9%), China (3%)
Hemp, raw/processed (HS 5302)	161	279	494	621	567	Netherlands (51%), Denmark (17%)
Hemp, yarn (HS 5308200000)	102	166	213	312	118	Romania (66%), China (33%)
Hemp, woven fabrics (HS 5311004010)	55	60	44	190	306	Dominican Republic (61%), Spain (25%)

Source: USDA Foreign Agricultural Service (2019)

1.2 Canada

Canada represents a significant industrial hemp producer. Industrial hemp has been cultivated in Canada since 1998. Canada reported that 77,929 acres were registered for industrial hemp cultivation in 2018 (Health Canada, 2019). Alberta (30,003 acres), Saskatchewan (27,121 acres) and Manitoba (11,549 acres) represented the provinces with 88 percent of Canada's industrial hemp acreage in 2018.

Reports typically show that hempseed yield averages about 1,000 pounds per acre on dryland and reaches up to 3,000 pounds per acre on irrigated fields. Hempseed processors tend to contract directly with growers (Lupescu, 2019). Hemp varieties used must be from an approved cultivar list strictly regulated by the federal government. There were 52 registered cultivars for the 2019 Canadian growing season (Health Canada, 2019). Most of Canada's industrial hemp is grown for seed purposes such as hulled hemp seeds, hemp oils and protein powders (Halsall, 2018). Only a small fraction of Canadian industrial hemp acreage is raised for fiber. Cannabinoids such as CBD and THC are regulated similarly in Canada and can be only found in three channels: retail or online, medical use or prescription drugs. In October 2019, edible cannabis, cannabis extracts and cannabis topicals that include CBD were to become available in the recreational market (Lupescu, 2019).

Based on available data, trade value of Canadian hemp only captures hempseed, not processed hemp products. In 2018, Canada exported 5,400 metric tons of hempseed at about a \$50 million value in U.S. dollars (USD). More than 70 percent of this volume went to the U.S., and the rest traveled to the European Union and South Korea. Canadian hempseed imports are historically insignificant with 726 metric tons (\$1 million USD) — about 45 percent of which came from the U.S. in 2017 (Lupescu, 2019).

Manitoba Harvest (manitobaharvest.com) is an example of a Canadian company well-versed in the hemp food industry. The company markets hemp hearts, protein powder, granola, bars and hemp extract; see Exhibit 1.2.1. Products from the company can be found across the globe in 22 countries, including 16,000 retail stores in Canada and the U.S. Manitoba Harvest is the branded consumer products division of Fresh Hemp Foods and wholly owned subsidiary of Tilray Inc. Fresh Hemp Foods also has an ingredients division doing business as Hemp Oil Canada Inc.

Exhibit 1.2.1 – Examples of Manitoba Harvest's Hemp-Based Products

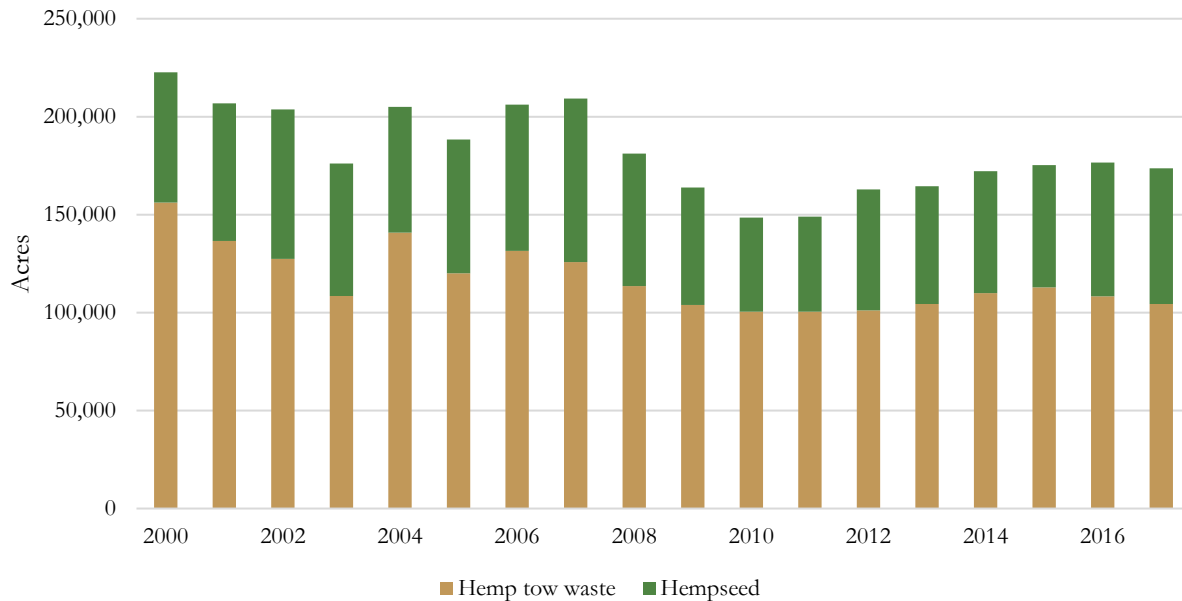


Source: Manitoba Harvest (manitobaharvest.com)

1.3 Rest of the World

Other areas beyond the U.S. and Canada — China and the European Union are examples — have significant hemp industries. Exhibit 1.3.1 shows the number of global harvested hemp acres from 2000 to 2017. In the most recent year reported (2017), a total of 104,325 acres with hemp fiber and 69,340 acres with hemp seed were harvested. Please note that this data source does not include all hemp-producing countries such as Canada and the U.S.

*Exhibit 1.3.1 – World Hemp Seed and Fiber Harvested Acres, 2000 to 2017**

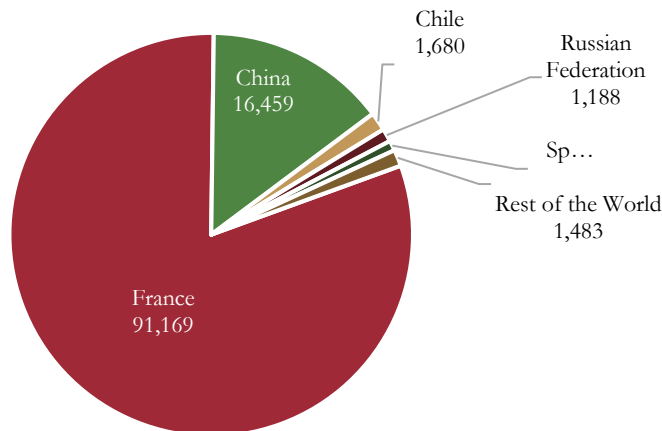


* Note that these statistics do not include all producing countries such as Canada and the U.S.

Source: Food and Agriculture Organization of the United Nations (2019)

Countries that have large hempseed production include France, China, Chile, Russia and Spain. Exhibit 1.3.2 shows global hempseed production in metric tons for 2017. Keep in mind that Canada's large hempseed industry is not included in this data set and would impact the global production reported. Of the countries reported by the Food and Agriculture Organization of the United Nations, France and China grew roughly 95 percent of the 112,893 metric tons of hempseed produced in 2017.

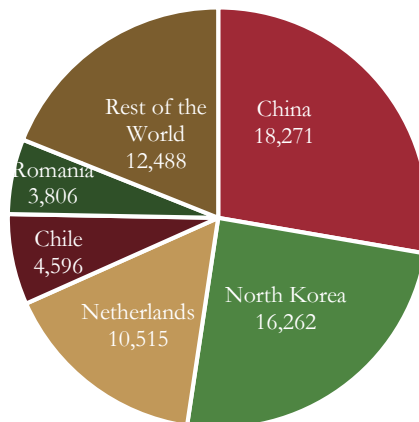
*Exhibit 1.3.2 – World Hempseed Production, Metric Tons, 2017**



* Note that these statistics do not include all hemp-producing countries such as Canada and the U.S.
Source: Food and Agriculture Organization of the United Nations (2019)

Significant global hemp fiber producers include China, North Korea, Netherlands, Chile and Romania. Exhibit 1.3.3 shows world fiber production in metric tons for 2017. Note that hemp tow waste refers to the fiber from plants cultivated for seed or fiber. As previously mentioned, please note that this data source does not include all hemp-producing countries such as Canada and the U.S. A total of 65,938 metric tons of hemp fiber were estimated to be produced in 2017.

*Exhibit 1.3.3 – World Hemp Tow Waste Production, Metric Tons, 2017**



* Note that these statistics do not include all hemp-producing countries such as Canada and the U.S.
Source: Food and Agriculture Organization of the United Nations (2019)

China is known as a world leader in hemp and consumer textile production. It is also considered one of the earliest active hemp cultivation areas (Fike, 2019). Although official estimates about the Chinese hemp industry are not known, media outlets and other sources have noted various aspects of the industry. China was estimated to have at least 113,000 hemp acres in 2017 (Giammona and Einhorn, 2019). It currently allows the sale of hemp seeds and hemp oil and use of CBD in cosmetics, but it hasn't approved CBD in food or medicines (Myers, 2019). Many Chinese companies export CBD hemp products globally. Hanma Investment Group is a major player in the Chinese industrial hemp industry, and many other companies have been investing recently in China for industrial hemp for CBD purposes.

2. Examination of Selected U.S. States

The following section provides snapshots of industrial hemp developments across selected U.S. states. Regulatory programs reflect pilot programs enabled by the 2014 farm bill. Under the interim final rule of the 2018 farm bill, state regulations will shift to new state plans approved by USDA, or producers will be regulated directly by USDA-administered plans.

2.1 Kentucky

Production

Exhibit 2.1.1 shows a snapshot of Kentucky's industrial hemp evolution and growth since its inception after the 2014 farm bill's passage. Over the years, many colleges and universities such as the University of Kentucky, Murray State University and Western Kentucky University have actively performed research projects on a variety of agronomic, technology and industry applications. The number of approved processors in Kentucky grew to 200 in 2019. The Kentucky Department of Agriculture (KDA) permitted 978 growers for the industrial hemp 2019 production year on 60,000 acres, which is a significant jump from the previous year (16,100 acres). Note that harvested acres have been lower than approved acreage. Kentucky had 24,900 harvested acres in 2019. A majority of the growers (92 percent) grew industrial hemp for CBD production. Other end markets or uses such as grain/seed (2 percent), fiber (4 percent) and dual-purpose crops (2 percent) made up the remainder of the hemp raised during the 2019 growing season.

Exhibit 2.1.1 – Kentucky Department of Agriculture Industrial Hemp Production Statistics

Production Year	# University Projects	Approved Processors	Approved Growers	KY Counties with Hemp	Approved Acres	Planted Acres	Harvested Acres	% Grain or Seeds	% Fiber	% CBD	% Grain & CBD	% Seed & Fiber
2014	7	9	20	14	-	33	-	47%	32%	21%		
2015	8	29	99	41	1,742	922	500	47%	6%	47%		
2016	17	45	137	60	4,600	2,300	2,000	34%	6%	60%		
2017	17	49	204	71	12,800	3,200	2,300	36%	5%	27%	32%	
2018	14	72	210	73	16,100	6,700	6,000	18%	4%	61.5%	14%	2.5%
2019	12	200	978	102	60,000	26,500	24,900	2%	4%	92%	0	2%

Source: Kentucky Department of Agriculture (2019)

Program

A license from the KDA is necessary to grow, handle, process or market industrial hemp and participate in the state's industrial hemp program. Exhibit 2.1.2 shows the dates and key components of Kentucky's licensing program in 2019.

Seed can either be purchased from a KDA-licensed participant or from outside of Kentucky. A planting report must be submitted within 15 days of each planting. KDA can inspect plots for compliance at any time. A harvest report must be submitted at least 15 days prior to harvest, and KDA will sample all hemp growing locations before harvest. A final production report is due by Dec. 1. KDA also controls the transferability of certain harvested or processed industrial hemp materials.

2019 Fee Schedule	
Application fee:	\$100
Grower fee:	\$400 per growing address
Processor/handler fee (annual):	
• Floral material processor:	\$3,000
• Grain processor:	\$500
• Fiber processor:	\$500
• Handler:	\$500
Source: Kentucky Department of Agriculture (2019)	

Exhibit 2.1.2 – Kentucky Department of Agriculture Industrial Hemp Program Components and Timeline

Event	Due Date
Orientation and execution of licensing agreement	February-March
Seed requests (required if purchasing seeds/propagules outside Kentucky)	<i>International:</i> Feb. 28 <i>Domestic:</i> Three weeks in advance
Seed and propagule delivery	Seed or propagules approved for purchase from sources outside of Kentucky arrive at and are inventoried by the Kentucky Department of Agriculture. Then, participants are notified for same-day pickup. Seed or propagules from other Kentucky-licensed participants are transferred in Kentucky without delivery to the Kentucky Department of Agriculture.
Hemp planting	Growers plant at the appropriate time.
Planting report forms (required for every growing location ID on all grower licensing agreements)	<i>Field production</i> – Due 15 days or sooner following each planting. July 31 is the deadline to submit “no plant” report for unplanted fields. <i>Greenhouse/ indoor production</i> - Due 15 days or sooner following initial planting into empty structure. Due also on a quarterly basis.
Site inspection	Verification inspection by Kentucky Department of Agriculture can take place at any time.
Harvest/destruction report form	15 days prior to harvest or 15 days prior to destruction of a failed crop. Destruction requests must be accompanied with photos.
Pre-harvest inspection and sampling	Kentucky Department of Agriculture will inspect and collect samples from hemp growing locations and variety/strain prior to harvest.
THC testing	Kentucky Department of Agriculture will report THC test results to participant.
Transfers	All transfers must comply with Kentucky regulations and requirements. If harvesting floral material, then participant must receive written approval from Kentucky Department of Agriculture prior to commingling or processing any materials.
Production report and processor renewals	Due Dec. 1

Source: Kentucky Department of Agriculture (2019)

Selected Examples of Processing/Economic Development

- Licensed hemp processors paid Kentucky farmers \$17.75 million and created 281 new full-time jobs in 2018. Additionally, these processors reported capital investments of \$23.4 million and gross product sales of \$57.75 million for 2018 (Kentucky Department of Agriculture, 2019).
- **GenCanna** (gencanna.com) is investing more than \$40 million in a new hemp processing facility in Mayfield, Kentucky, to be operational in early 2020. The extraction facility will process hemp into CBD oil and employ more than 80 workers. The plant will be able to process approximately 10,000 acres of industrial hemp.
- **Atalo Holdings** (ataloholdings.com) is based in Winchester, Kentucky, and is a vertically integrated firm specializing in research, development and production of industrial hemp. It has a strategic partnership or alliance with GenCanna on the companies' cultivation operations. In 2019, Atalo was permitted for 10,000 acres of industrial hemp. Atalo announced in July 2019 that it would open a new large hemp processing facility (50,000 square feet) in Winchester, which is the company's second plant within the state. Atalo operates processing facilities to sell bulk and white label hemp-derived CBD products and superfoods, such as hemp oil, hemp hearts and hemp protein powder.
- **Zelios** (zelios.com) is a leading cannabinoid extraction company that processes and produces natural, hemp-derived products. The company has a facility near Lexington, Kentucky, with an annual extraction capacity of more than 2.3 million pounds of biomass. It uses carbon dioxide extraction to produce a range of formulated CBD products, and it performs toll and contract processing.
- **Sunstrand LLC** (sunstrands.com) is a fiber processing company headquartered in Louisville, Kentucky. It has processing plants located in Milton, Kentucky, and Alberta, Canada. Sunstrand works with a variety of feedstocks including industrial hemp, bamboo, kenaf, flax and jute. Products developed have applications for a variety of industries including construction, automotive, electrical and electronics, pet and animals and recreation. Sunstrand contracts with local farmers for its feedstock.
- **Victory Hemp** (victoryhempfoods.com) focuses on making products from whole hemp seeds. Examples include hemp protein powders, oils, hearts and roasted hemp seeds. Based in Carrollton, Kentucky, the company has the capacity to produce 8,000 gallons of hemp seed oil and about 50,000 pounds of hemp protein powder monthly.

2.2 Colorado

Production

Industrial hemp farming in Colorado has grown significantly over time. Exhibit 2.2.1 details Colorado's growth in industrial hemp production (outdoors and indoors) and number of registrants since 2014. In 2018, 52 of the 64 Colorado counties had a least one registered land area. A total of 30,950 acres of outdoor production and 4,788,523 square feet of indoor production were registered in 2018.

Exhibit 2.2.1 – Colorado Industrial Hemp Program Production Area and Registrants

Year	Registered Acres	Registered Sq. ft.	Registrants
2014	1,811	253,000	131
2015	3,657	570,980	166
2016	8,988	1,360,000	312
2017	12,024	2,300,000	386
2018	30,950	4,788,523	835

Source: Colorado Department of Agriculture (2019)

Program

The Industrial Hemp Program within the Colorado Department of Agriculture has jurisdiction over industrial hemp growers. Farmers who want to grow industrial hemp must submit an application form with information such as name, location and a map of the location, and they must pay registration fees. It can take up to 30 days for a commercial industrial hemp

registration to be granted after all required information is submitted. Applications can be submitted year-round. Registrations expire 365 days after issuance. Pre-planting, planting and harvest reports are required as a condition of the registration. Registered fields can be sampled and tested for THC levels at any time by the department, and fees must be paid for the inspector and laboratory. A risk and random selection procedure is used to select a percentage of registrants for inspection and sampling. In 2018, the Colorado Department of Agriculture reported that 21 of 138 samples taken (15.2 percent) failed testing on THC content.

2019 Fee Structure

Registration: \$500

Outdoor production: \$5 per acre

Indoor production: \$3 per 1,000 square feet

Source: Colorado Department of Agriculture (2019)

The Colorado Department of Public Health and Environment (CDPHE) regulates the processing, sale or distribution of industrial hemp and its products for human use or consumption. Additionally, the Colorado Department of Agriculture Division of Inspection and Consumer Services regulates farm products and commodity handlers including industrial hemp.

Economic Development

Colorado has been an early leader in the U.S. industrial hemp industry. One approach that has garnered industry support is its work on the Colorado Hemp Advancement and Management Plan known as CHAMP. This initiative consists of 173 stakeholders working in teams to develop a comprehensive plan to strengthen and advance the hemp supply chain in Colorado (Long, 2019). This final product is expected to be released in June 2020.

Selected Examples of Processing

- **Paragon Processing** (paragonprocessors.com) opened a 250,000-square-foot hemp CBD extraction processing facility in Colorado City, Colorado, in August 2019. The facility will produce a variety of hemp extractions through isolation and distillation and had planned to evolve to process 2 million pounds of biomass per month in fall 2019.
- **Colorado Hemp Works** (coloradohempworks.com) has an industrial hemp processing facility in Longmont, Colorado, focused on hemp seed. It sells wholesale hemp hearts, hemp seed oil, seed cake, hemp flour and shell casings and offers hemp grain toll processing services. Throughput for the plant is 6,000 pounds per day.

- **Bluebird Botanicals** (bluebirdbotanicals.com) is a hemp extract and CBD oil manufacturer founded in 2012. Based in Louisville, Colorado, it has Colorado manufacturing facilities in Boulder and Broomfield and is a certified business with U.S. Hemp Authority™. It offers a batch database system and third-party certificates of analysis online for consumers. Products from Bluebird Botanicals also have glyphosate residue-free certification.

2.3 Oregon

Production

Oregon's first licensed industrial hemp production occurred in 2015. Like in other states, Oregon's industrial hemp production and processing grew significantly in the past five years. Exhibit 2.3.1 details Oregon's trends for number of growers, number of handlers and total acreage grown. Growers refer to those who grow and harvest hemp. Handlers refer to businesses that purchase hemp from growers and process it into hemp-derived products. As of Sept. 9, 2019, 1,195 growers in Oregon had a total of 62,000 acres of industrial hemp in production (Moore, 2019).

Exhibit 2.3.1 – Oregon Industrial Hemp Growers, Handlers and Acreage

Year	Number of Growers	Number of Handlers	Total Acres
2015	13	13	105
2016	83	66	1,200
2017	246	189	3,000
2018	584	212	11,754
2019	1,915	475	62,000

Source: Oregon Department of Agriculture (Moore, 2019)

Program

The Oregon Department of Agriculture (ODA) oversees the state's hemp program and requires registration for industrial hemp growers, handlers and seed producers. Hemp seed producers must also have a registration for either growing or handling. There are no limitations on how much hemp can be grown in terms of acres or plants. All registrations are good for the calendar year (Jan. 1 to Dec. 31). Local planning departments must also approve land use compatibility statements with handling registrations to make sure the land use is consistent with local planning.

2019 Fee Structure

Grower registration: \$1,300 annually
 Handler registration: \$1,300 annually
 Hemp seed producer: \$120 annually

Source: Oregon Department of Agriculture (2019)

Hemp grown under an ODA registration must be sampled and tested to ensure the crop contains an average THC concentration not exceeding 0.3 percent on a dry weight basis. Sampling must occur no more than four weeks prior to harvest. Testing may be performed by ODA or other laboratories licensed by the Oregon Liquor Control Commission and accredited by the Oregon Health Authority. Post-harvest test requirements depend on the end use, mostly for certain hemp-derived products used by humans. Hemp seed for food is excluded from post-harvest testing. Testing requirements may include pesticides, water activity and moisture content, THC and CBD levels and/or solvents. Companies using hemp as an ingredient for food must also secure a food safety license from ODA.

Selected Examples of Processing/Economic Development

- **Hemp Inc.** (hempinc.com) has ownership in a CBD processing facility in Medford, Oregon. It currently focuses on processing industrial hemp into pre-rolls and high-CBD flower for its “King of Hemp” product line. Its expected Oregon harvest in 2019 will result in 1 million pounds (wet weight) of cola (flowering site of the hemp plant). Hemp Inc. is publicly traded (OTC: HEMP) and has operations in Arizona and North Carolina.
- The **Global Hemp Innovation Center** (agsci.oregonstate.edu/hemp) is based at Oregon State University. It intends to become the country’s premier hemp research institution. Oregon State has collaborations with 40 faculty across 19 disciplines in the state and globally and 10 experiment stations within the state. The university also provides certified seed services for industrial hemp and will supply seed to growers registered in Oregon.
- **Oregon CBD** (oregoncbdseeds.com) is an industrial hemp seed supplier located southwest of Salem, Oregon. It was founded in 2015 by two brothers, Seth and Eric Crawford. They have been rapidly expanding operations with 90,000 square feet of indoor growing capacity and an additional 217,000 square feet that is under construction. Oregon CBD supplied seed for about 35,000 acres of hemp in 2019 and has plans to grow to 500,000 acres in 2020.

2.4 Tennessee

Production

In 2018, 226 licenses were issued to Tennessee industrial hemp growers. Licensed growers planted 1,034 acres and about 90 percent of those acres were harvested (Tennessee Department of Agriculture, 2019). As of Aug. 2, 2019, the state had 3,099 active licenses for industrial hemp (Tennessee Department of Agriculture, 2019).

Fee Structure

Annual hemp license fee:

- <5 acres: \$250
- 5-20 acres: \$300
- >20 acres: \$350
- University: waived

Lab sample: \$150

Source: Tennessee Department of Agriculture (2019)

Program

The Tennessee Department of Agriculture regulates industrial hemp growers. The application period for a license is year-round. Grower licenses will expire on June 30 following their issuance. Growers must obtain a movement permit when moving rooted plants or harvested hemp from their operations. Any person can possess, distribute or store non-rooted hemp. Licensees pay for any laboratory analysis fees associated with sampling. Growers should contact the department 30 days prior to harvest for an inspection, and they must submit an agronomic report for each crop grown.

Selected Examples of Processing/Economic Development

- The **Tennessee Hemp Industries Association** (tnhia.org) was founded in 2013 with the goal to provide support to hemp farmers and businesses in order to develop a successful hemp industry. The organization allows farmers to network and provides resources on current issues. It also advocates for the hemp industry.
- **LabCanna** (labcanna.com) has a processing facility located in Centerville, Tennessee, and has its headquarters in Nashville, Tennessee. It manufactures TenneCBD, which is a line of CBD products sold in about 300 stores nationwide. LabCanna has its own grow operations and has also evolved into operating its own storefronts and restaurants (Kelman, 2019).

- **Buffalo River Hemp Company** (buffaloriverhemp.com) is a family-owned and -operated industrial hemp growing and processing business in Lawrence County, Tennessee. Products offered include CBD- and hemp oil-related products.

2.5 Arkansas

Production

Arkansas had its first growing season for industrial hemp in 2019. As of June 12, 2019, the state reported 101 grower licenses and approximately 3,200 permitted acres (Turner, 2019).

Program

The Arkansas Department of Agriculture's State Plant Board is administering the state's industrial hemp research pilot program. Regulations about this pilot permitting program became effective Aug. 31, 2018. Licenses are based on a fiscal year from July 1 to June 30. Growers, processors and handlers need to secure licenses with the department. The license holder is responsible for laboratory fees. All hemp seed dealers (in-state and out-of-state) must be registered with the Arkansas Department of Agriculture. Reporting requirements for a grower license include the following:

- Seed/propagule form (due three weeks before seed purchase)
- Field planting form (due 10 days after planting)
- Greenhouse form (due 10 days after planting and quarterly if planting continues)
- Harvest/destruction notification form (two weeks prior to harvest)
- Production report form (due Dec. 31)

2020 Fee Structure

Application fee: \$50
Hemp grower/processor/handler license fee: \$200
Industrial hemp seed license: \$250

Note: Licenses cover fiscal year of July 1 to June 30.
Additional fees and service charges are forthcoming to cover cost of the program.

Source: Arkansas Department of Agriculture (2019)

Selected Examples of Processing/Economic Development

- **New Age Hemp** (newagehemp.us) is based in Hot Springs, Arkansas. It is a licensed processor/wholesale supplier that sources industrial hemp floral material from local Arkansas growers.
- **Natvana** (natvana.com) was a licensed Arkansas extraction facility founded in 2019. Services include toll processing, white labeling, crop consulting services and custom formulation creation.
- **Ozark Botanical Farms** (ozarkbotanicalfarms.com) can be found in Redfield, Arkansas. It has a licensed industrial hemp extract and processing plant. Other services offered include hemp cultivation, harvesting, transportation and genetics/seed research.

2.6 Illinois

Production

As of June 10, 2019, Illinois had issued licenses to 474 growers covering 12,103 production acres (Hancock, 2019).

Program

The Illinois Department of Agriculture approved hemp production rules in April 2019. Under its rules, industrial hemp growers must receive a hemp cultivation license, and industrial hemp processors/handlers must be registered with the department. A license or registration may be good for up to three years. Thirty days prior to harvest is when growers must file a harvest report. A final report is to be filed as of Feb. 1 that details final planted and harvested acreage, varieties and yields. Testing costs are the responsibility of the licensee, and testing is to be conducted in approved laboratories by the Illinois Department of Agriculture.

Fee Structure

Application fee: \$100 per site

Hemp grower license fee:

- One year: \$375
- Two year: \$700
- Three year: \$1,000

Hemp processor license fee:

- One year: \$375
- Two year: \$700
- Three year: \$1,000

Source: Illinois Department of Agriculture (2019)

Selected Examples of Processing/Economic Development

- **Red White & Bloom (RWB)** is a Michigan-based company that has signed a letter of intent to acquire a 3.6 million square foot of indoor greenhouse space in Granville, Illinois. The facility sits on more than 231 acres and has 175 full-time employees. This greenhouse has been in operation since 1978 and has secured an industrial hemp grower and processor license by the Illinois Department of Agriculture. Its intentions are to establish large-scale hemp extraction and product manufacturing focusing on premium hemp CBD and CBD-derived medicines and products (Red White & Bloom, 2019).

2.7 Iowa

Production

In Iowa, industrial hemp was not legal to grow in 2019.

Program

Legislation was signed into law in May 2019 that will allow the Iowa Department of Agriculture and Land Stewardship to develop a state plan for licensing and regulation of industrial hemp production. Farmers are not allowed to grow industrial hemp in Iowa until the USDA approves its state plan. Farmers are restricted to 40 or fewer acres after the state plan is approved (Iowa Department of Agriculture, 2019).

Fee Structure

License fee per crop site:

- 5 acres or less: \$500 plus \$5 per acre
- 5 acres to 10 acres: \$750 plus \$5 per acre
- 10 or more acres: \$1,000 plus \$5 per acre

Inspection/testing base fee: \$1,000

Source: Iowa Department of Agriculture (2019)

2.8 Nebraska

Production

The 2019 growing season was the first production year for Nebraska. The Nebraska Department of Agriculture received 176 applications for the 2019 growing season. Of those applications received, the department approved 10 grower licenses by random selection (Nebraska Department of Agriculture, 2019).

Program

Legislative Bill 657 that was approved by the Nebraska governor on May 30, 2019, set in motion the state hemp program (Nebraska Department of Agriculture, 2019). The permitting program for Nebraska had a short timetable to solicit applications (one week), and licenses were given to a limited number of applicants. The Nebraska Department of Agriculture is in charge of issuing permits for hemp cultivation, handling, processing and brokering and will be adapting the program to USDA guidelines for the 2020 growing season.

2019 Fee Structure

Application fee: \$100
Cultivator site registration fee: \$400 per site
Processor/handler site registration fee: \$800 per site
Hemp seed sold: \$0.01 per pound
Hemp fiber sold: \$1 per ton

Note: Department has ability to increase/decrease application and registration fees yearly, but it does have statutory ceilings on fee increases.

Source: Nebraska Department of Agriculture (2019)

2.9 Kansas

Production

Kansas began its first cultivation year for industrial hemp in 2019. The state passed the Alternative Crop Research Act in April 2018 that allowed the development of an industrial hemp research program. Regulations became effective in February 2019. There were 207 grower licenses issued on 1,563 acres along with licenses for 20 distributors, 34 processors and nine educational institutions in 2019 (Geiszler-Jones and Hardy, 2019). Growers were restricted to 80 acres on each license, though producers could obtain multiple licenses.

Program

Kansas is in the process of evolving its industrial hemp research program into a commercial industrial hemp program (in accordance with USDA) in 2020. The Kansas Department of Agriculture will operate under its existing research program for 2020 until the commercial program is finalized. Applications should have been available in September 2019 with a Nov. 30, 2019, deadline for growers, distributors, processors and state educational institutions. Exhibit 2.9.1 details a summary of reporting required for 2019 license holders.

2019/2020 Fee Structure

Application fee: \$200
Background check: \$47
License fee:

- Grower: \$1,000
- Distributor: \$2,000
- Fiber or grain processor: \$3,000
- Floral material processor: \$6,000

Note: Each license fee includes cost of initial sample collection and laboratory test.

Source: Kansas Department of Agriculture (2019)

Exhibit 2.9.1 – Kansas Industrial Hemp Research Program 2019 Reporting

Report Due	License Type	When Due
Field planting report	Grower	Within 15 days after every planting, including replanting seeds or propagules or establishing plants
Voluntary partial destruction report	Grower	15 days' notice (date and time) before destruction and within 15 days after the destruction
Voluntary withdrawal report	Grower, distributor, processor and state educational institution	30 days before the intended withdrawal date, except with prior written approval from the department
Pre-harvest report	Grower	30 days before each intended harvest date
Harvest report	Grower	No more than five days after each harvest
Production, distribution, processing reports	Grower, distributor, processor and state educational institution	No later than 30 days after the harvest date for each harvest for growers; Nov. 30 for other license types
Research report	Grower, distributor, processor and state educational institution	No later than Nov. 30 of license year

Source: Kansas Department of Agriculture (2019)

2.10 Oklahoma

Production

Oklahoma producers grew industrial hemp under the state's pilot program in 2018 and 2019. There were an estimated 328 licenses given in Oklahoma to grow industrial hemp in 2019 (Howard and Ray, 2019). In 2018, Oklahoma had 445 acres in production (Vote Hemp, 2019).

Program

The Oklahoma Industrial Hemp Program began as a pilot program in 2018. The pilot program has operated in Oklahoma with a requirement that producers must contract with a qualified higher education institute (college or university) that can have an institutional licensee. The state laws were changed in April 2019 to authorize a commercial program implemented by the Oklahoma Department of Agriculture, Food and Forestry (2019). Pending the new rules set by the department, this program will morph the pilot program into a commercial program that will offer licenses to people who engage in growing, cultivating, handling or processing industrial hemp in Oklahoma.

Fee Structure

License fee per contiguous field: \$500
 License fee per acre: \$5
 License fee per greenhouse space: \$0.33/sq. ft.

Source: Oklahoma Department of Agriculture, Food and Forestry (2019)

2.11 Minnesota

Production

Minnesota passed a law in 2015 to allow a hemp pilot program to begin. In 2016, there were six pilot participants on 40 acres in Minnesota. In 2017, there were 38 registered growers on 1,205 acres. In 2018, there were 51 registered growers on 710 acres. In the most recent year (2019), the state had a total of 8,000 acres and 400,000 indoor square feet of growing space under production for 540 license holders (Minnesota Department of Agriculture, 2019)

Program

The Minnesota Department of Agriculture operates the state's industrial hemp program. Growers and processors must secure hemp licenses. An applicant must submit an application, detailed field map and program fees. First-time applicants must also submit fingerprints and pass a criminal background check. Licenses will expire on Dec. 31 annually.

Through the growing season, license holders must submit two reporting forms — a planting/harvest report and a financial report — by the end of November each year.

2020 Fee Structure (Annual)

Grower license at one grow location: \$400
Each additional grow location: \$250
Each additional inspection for THC testing beyond first harvest: \$250
Each additional sample for THC testing beyond first sample: \$175
Processor license: \$250

Source: Minnesota Department of Agriculture (2019)

An inspector from the Minnesota Department of Agriculture will sample each field grown within 30 days of harvest. If the plants test above the acceptable THC range, then a second test may be requested at an additional charge, or the crop will be destroyed. If the second test fails, then the crop will be destroyed. If the crop passes its THC test, then a fit for commerce certification is issued for transferring ownership of the crop.

Selected Examples of Processing/Economic Development

- The **Minnesota Hemp Association** (mnhempassociation.org) is a group of farmers, processors, manufacturers, retailers and service providers with the goal of creating economic growth and educating the hemp industry in Minnesota. The group hosts events and lobbies on behalf of Minnesota hemp growers to promote growth of the industry.
- **Minnesota Hemp Farms** (mnhempfarms.com) was founded in 2016 and is a food, fiber and CBD extract company based in Hastings, Minnesota. It sells processed hemp products in bulk and offers private-label packaging services.

2.12 North Carolina

Production

The number of North Carolina industrial hemp growers in 2019 was approximately 1,350 with a total of 16,700 acres (Joyce, 2019). North Carolina also has 885 registered industrial hemp processors (North Carolina Department of Agriculture & Consumer Services, 2019)

Program

The current pilot program consists of 11 possible research purposes, and one of these must be designated at the time of application. Growers and processors are to be licensed and registered with the North Carolina Industrial Hemp Commission. Processing and grower applications may be submitted at any time during the year. Licensed growers have data reporting requirements as well as research progress and results reporting requirements. Additionally, the application requires information regarding the specific variety of hemp to be grown, the origin of the seed and the GPS coordinates for intended plantings and storage. Applicants must also designate which plant parts they intend to sell and where they intend to sell them. THC sampling will be billed to the licensee. Requirements for processors include reporting total weight and type of industrial hemp processed each calendar year.

Fee Structure

Initial fee: \$250

Annual grower fee for 50+ acres: \$500

Annual grower fee for 0-49 acres: \$250

Annual license fee per unit:

- Per acre: \$2
- Per 1,000 square feet: \$2

Source: North Carolina Department of Agriculture & Consumer Services (2019)

Selected Examples of Processing/Economic Development

- **Carolina Botanicals** (carolinabotanicals.com) is an industrial hemp processor developing a new facility in Tabor City, North Carolina. It is investing \$3.46 million in capital, and the plant will support 30 new jobs. Carolina Botanicals also received a \$100,000 performance-based (job creation and capital investment) grant from the One North Carolina Fund.
- The **North Carolina Industrial Hemp Association** (ncindhemp.org) is a trade organization representing the hemp industry in North Carolina. It has an aim to help build a thriving hemp industry. Members receive resources from the organization, and the organization supports bills to grow the industry.
- **Broadway Hemp Company** (broadwayhemp.com) is a hemp growing operation located in Broadway, North Carolina. Its corporate office is in Sanford, North Carolina. The business has more than 40 acres outdoors and 50,000 square feet of indoor production for their hemp growing operation. Hemp is processed under supercritical carbon dioxide extraction, and the company's hemp-derived products are marketed under the "CannaBiDine" label.
- In 2019, **Criticality LLC** (criticalitync.com) opened an industrial hemp extraction and purification facility in Wilson, North Carolina. Its 55,000-square-foot facility is expected to generate 90 jobs within the first five years of operation. Oil extracted from the plant will be incorporated into the company's "Korent" CBD products.

2.13 New York

Production

New York had 459 industrial hemp growers, 96 industrial hemp processors and 18 combined grower/processors as of Oct. 7, 2019 (New York State Department of Agriculture and Markets, 2019). Industrial hemp growers had an estimated 18,000 acres in production in 2019 (Platsky, 2019).

Program

The industrial hemp pilot program is administered by the New York State Department of Agriculture and Markets, Division of Plant Industry. By state law, anyone growing and processing industrial hemp within the state must be registered with this department.

Fee Structure

Grower application: \$500
Processor application: \$500

Source: New York State Department of Agriculture and Markets (2019)

In order to receive a permit to grow industrial hemp in New York, an application must be submitted and approved. This application requires applicant/grower information and growing locations. The application also requires a description of any relevant experience of the applicant or others who are responsible for organizational management. Other application requirements include the research focus and end product distribution goals, the detailed research plan, the seed acquisition plan with denoted varieties, the security measures that will be taken and the felony history of the applicant/management. Harvest reports must be submitted within 20 days of harvest, and an annual report must be completed for all licensed growers and processors.

Selected Examples of Processing/Economic Development

- **Canopy Growth** (canopygrowth.com) is a Canadian company that announced in 2019 that it would open a CBD extraction facility and industrial hemp park in Kirkwood, New York. Investment is estimated to total up to \$150 million, and the facility will start up with 200 jobs. Canopy Growth is publicly traded on the New York Stock Exchange.
- **Hudson Hemp** (hudsonhemp.com) is a group of organic hemp farmers in New York's Hudson Valley. Participating producers focus on regenerative agriculture and growing hemp as a way to sequester carbon and improve the ecosystem. They sell CBD distillate, CBD isolate and customized formulas.
- The **state of New York** has developed grant opportunities (esd.ny.gov/industrial-hemp) targeted to the industrial hemp industry. Up to \$10 million in grant funds will be provided in New York for advanced research and processing capital (machinery/equipment) to stimulate the industry.

2.14 Montana

Production

There were 21,600 acres of commercial hemp grown in Montana in 2018 on 200 field locations and six indoor locations. In 2019, Montana had 197 growers with hemp production licenses (Montana Department of Agriculture, 2019).

Program

The Montana Department of Agriculture issues hemp licenses in two stages. A conditional grower license will be issued to eligible applicants so they can purchase seed and plant their hemp crop. A production license is issued to eligible applicants for them to verify location and variety during growing, transporting and sale. The production certificate will be issued after planting is complete and the licensing requirements are completed. If requested by the department, then license holders must submit an agricultural or agronomic report about their production yield and sales of their hemp crop.

Fee Structure

State hemp license fee: \$450
Planting fee: \$400
Category C seed planting/testing fee: \$250
Hemp processor license for hemp floral/root extracts: \$2,500
Hemp processor license for hemp grain, seed, seed oil and fiber: \$1,000

Source: Montana Department of Agriculture (2019)

Hemp processing licenses are needed in certain situations, and annual costs vary by what hemp-derived material is processed. Industrial hemp growers with current production licenses do not need a processing license to process hemp they produce.

Varieties of industrial hemp must be approved by the Montana Department of Agriculture. The department has risk-based ratings of hemp seed varieties. Category A refers to varieties previously grown in Montana and approved for planting. Category B refers to seed certified by the Association of Official Seed Certifying Agencies or the Organization for Economic Cooperation and Development standards and can be approved upon review. Category C refers to seed not certified that can be approved upon review but will require additional sampling and testing at a grower's expense. For fall 2019, the Montana Department of Agriculture's goal was to sample 100 percent of Category C, 20 percent of Category B and 10 percent of Category A varieties.

Selected Examples of Processing/Economic Development

- **Eureka93** (eureka93.com) has a large-scale extraction processing facility in Eureka, Montana. It has the capacity to produce up to 8,000 liters of full plant extract per month or further refine it into CBD isolate (800 kilograms of CBD isolate per month). As of Sept. 6, 2019, the company was going through restructuring and reviewing strategic alternatives.
- In 2019, Montana lawmakers passed three bills targeted to the industrial hemp industry. They exempted hemp processing equipment from taxation, allowed the Montana Department of Agriculture to develop a "Montana-certified" hemp program and modified hemp laws to be consistent with the 2018 farm bill (Manning, 2019).
- A new CBD processing facility is in progress for Conrad, Montana, and will contract with local Montana growers. CBD oil will be extracted and marketed through **Evolution CBD** (thecbdstores.com) with wholesalers throughout the U.S. (Puckett, 2019).

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