

STATUS OF INDUSTRIAL HEMP IN TENNESSEE

Eric Walker, Assistant Professor
Department of Plant Sciences

Introduction

Since 2015, Tennessee participants of the Industrial Hemp Agricultural Pilot Program have produced industrial hemp (*Cannabis sativa* L.) for fiber, grain and phytocannabinoids, or cannabinoids that occur naturally in the *Cannabis* spp. Production has been of relatively small scale compared to other crops, and there have been successes and failures in the pilot program. Participants, Tennessee Department of Agriculture (TDA), Tennessee Crop Improvement Association, Tennessee Hemp Industries Association (TN HIA), lawmakers, and university scientists have collaborated on the pilot project to:

- Develop, improve, and abide by federal and state laws, regulations, and guidelines.
- Identify suitable varieties, production practices, and pest management strategies to consistently produce high-quality industrial hemp.
- Identify existing markets, develop new markets, and improve crop profitability.

While there remain challenges related to laws, production, and marketing, the outlook is currently positive. Profitable industrial hemp production is not a “get-rich-overnight” venture, and it will take time for research on management and marketing. Currently in Tennessee, it is not even a “get-rich” or “guaranteed-to-make-a-profit” venture. However, many of Tennessee’s industrial hemp pilot program



participants have entrepreneurial spirits and are determined to make industrial hemp a viable enterprise. While acknowledging the risks and the fact that industrial hemp is not suitable for every producer, it should be noted that some participants in Tennessee are succeeding and investing their knowledge in future growers.

History of Industrial Hemp Production in the United States

Industrial hemp was produced in the United States from 1645 until 1958. However, hemp production markedly declined following the Civil War as cheaper imported jute and abaca displaced most domestic hemp. Producers were later required to register with the federal government following the Marijuana Tax Act of 1937, which was legislated to restrict US marijuana production. During World War II, jute and abaca imports were disrupted, and hemp production in the United States briefly increased due to the implementation of an emergency program where the US Department of Agriculture Commodity Credit Corporation contracted with War Hemp Industries Inc. to produce hemp as a domestic substitute. After the war, industrial hemp production significantly decreased with the last reported commercial industrial hemp crop in the United States being produced in Wisconsin in 1958. The Controlled Substance Act of 1970 categorized any product containing delta-9 tetrahydrocannabinol (THC) as a Schedule I drug. Thereafter, the cultivation of all *Cannabis sativa*, including industrial hemp, became strictly regulated at the federal level.

Industrial Hemp vs. Marijuana

Industrial hemp is the same genus and species as marijuana, but industrial hemp has no psychoactive effects.

Marijuana

Marijuana is federally defined as “all parts of the plant *Cannabis sativa* L., whether growing or not; the seeds thereof; the resin extracted from any part of such plant; and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin. Such term does not include the mature stalks of such plant, fiber produced from such stalks, oil, or cake made from the seeds of such plant, any other compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil, or cake, or the sterilized seed of such plant which is incapable of germination.” 21 USC 802(d) (16)

THC is the primary psychoactive cannabinoid, or chemical constituent, in marijuana, and 3-20 percent THC is reportedly found in the plant (on a dry weight basis). Marijuana plant parts — usually the flowers, buds, and leaves — are prepared or processed in such a way as to allow the user of marijuana to inhale or absorb THC to achieve a psychoactive state of

mind, or “high.” Some information suggests that similar methods of intake of cannabinoids, namely cannabidiol (CBD) and THC, taken individually or in combination, may treat certain medical conditions. Because CBD is not psychoactive — and therefore does not produce a high — yet is believed to impart therapeutic benefits, there is particular interest in this cannabinoid for medicinal use. However, more data is needed to fully understand the short- and long-term effects of CBD, THC, and other cannabinoids on the patient or the disease or disorder when these cannabinoids are administered alone or in combination.

Presently in Tennessee, the cultivation and possession of marijuana is prohibited, and both the recreational and medicinal uses of marijuana are illegal.

Industrial Hemp

Industrial hemp is federally defined in the Agricultural Act of 2014 as “the plant *Cannabis sativa* L. and any part of such plant, whether growing or not, with a delta-9 tetrahydrocannabinol (THC) concentration of not more than 0.3% on a dry weight basis.” However, industrial hemp also produces CBD, and there is no restriction on CBD concentration.

Historically, industrial hemp has been regarded primarily as an agricultural crop valued for fiber and grain. Hemp fiber is used to make textiles, building materials, animal bedding, mulch, paper, industrial products, and biofuels. Hemp grain, or seed, is used in food and feed products, and oil from the seed is used to make personal care products and industrial products, including paints, solvents, and lubricants.

Selection and breeding efforts have produced varieties of industrial hemp with comparatively high fiber and grain yields. When these varieties are coupled with production practices from hemp-producing countries, optimum fiber and grain yields and quality are possible. Ideally, industrial hemp is planted at high density to produce tall plants with a singular main stalk, minimal branching, and flowers positioned at the top of the plant. However, it is impossible to differentiate industrial hemp and marijuana by visual inspection alone. Instead, industrial hemp and marijuana can only be separated by chemical analysis to determine THC concentration.

Currently, interest in industrial hemp production in Tennessee is high, as is interest in industrial hemp-based CBD and other phytocannabinoid

production. In fact, most of the industrial hemp currently produced in the state is produced for phytocannabinoids due to the potential for higher revenue per acre. CBD is a non-psychoactive cannabinoid with reported health benefits in some people, including the treatment of seizures; Alzheimer's, Parkinson's, and Huntington's diseases; amyotrophic lateral sclerosis (ALS); multiple sclerosis (MS); inflammation; and other conditions.

While industrial hemp-based CBD is currently promising, CBD prices continue to decrease as more states legalize industrial hemp production and more producers plant the crop for CBD. Proponents believe that because CBD is relatively unknown to most of the United States population, the market for CBD products will significantly expand as more people learn of CBD. Speculation abounds, and different standpoints exist regarding the current legal status of industrial hemp-based CBD.

Regardless of legal interpretation, it is imperative that the citizens of Tennessee know that while industrial hemp is *Cannabis sativa* L., it is distinct from marijuana. To be classified as industrial hemp, *Cannabis sativa* L. cannot have THC content exceeding 0.3 percent on a dry mass basis. Therefore, industrial hemp, by law, is not psychoactive, and topical or ingestible industrial hemp-derived CBD products with less than 0.3 percent on a dry mass basis will not produce an intoxicating effect. Education of Tennessee citizens and civil communications, even between those with opposing viewpoints on *Cannabis*, are essential for an accurate, meaningful, and productive understanding of industrial hemp that will enable this federally and state-authorized program to properly evaluate industrial hemp as an economically viable agricultural crop in Tennessee as intended from its inception.

Tennessee Industrial Hemp Pilot Program

The Industrial Hemp Agricultural Pilot Program in Tennessee, supervised by TDA, is a legitimate program with widespread state and national government support, as well as the support of a growing industrial hemp industry in this state and country.

Because of its close association with marijuana, industrial hemp production is highly regulated. Individuals who want to produce or process industrial hemp in Tennessee must do so as participants of the Tennessee Industrial Hemp Agricultural Pilot Program.

This program is administered by the TDA under the authority of Section 7606 of the Agricultural Act of 2014 and Tennessee Public Chapter No. 916. Interested individuals must first register with the TDA, and upon approval, must produce or process the crop under the guidance of the TDA. Violation of rules and regulations could result in criminal charges. Similarly, production or processing of industrial hemp outside of the Tennessee Industrial Hemp Pilot Program, and therefore without the respective license, is prohibited and could result in criminal charges. Therefore, it is imperative that those interested in producing industrial hemp thoroughly educate themselves in all related regulatory and agricultural issues.

The application deadline for participation in the Tennessee Industrial Hemp Agricultural Pilot Program for 2018 has passed. For those who are interested in producing or processing industrial hemp in Tennessee but did not obtain a license for 2018, they are encouraged to monitor industrial hemp efforts in the state by contacting their local University of Tennessee or Tennessee State University Extension Office, the TDA, and the TN HIA to remain updated on industrial hemp efforts, opportunities, field days and meetings in Tennessee throughout the year. The application period for participation in the Tennessee Industrial Hemp Agricultural Pilot Program for 2019 is November 15, 2018, through February 15, 2019.

Production Considerations

It is imperative for each state industrial hemp pilot program applicant and licensee to understand that industrial hemp is a specialized agricultural crop requiring agronomic knowledge; agricultural equipment; and significant time, labor, and fertilizer inputs. Like other crops in Tennessee, industrial hemp requires the application of sound agronomic principles and timely crop management practices. These practices include planting seed at the proper time, seeding depth, and density in a prepared seedbed consisting of fertile, well-drained productive soils with abundant organic matter, and amending these soils with lime and fertilizer to optimize yield and quality. Failure to implement sound crop management practices by planting industrial hemp too shallow or deep, in improperly prepared seedbeds or poor soils, or failing to amend the soil with appropriate amounts of lime or fertilizer will result in reduced yield and quality.

Unlike most established crops in Tennessee, there are no labeled pesticides to control weeds, insects, and diseases in industrial hemp. Therefore, weeds must be suppressed either by cultural management used in industrial hemp seed/grain or fiber production or by mechanical methods such as cultivation, hand-hoeing, or hand-removal in industrial hemp grown for CBD or phytocannabinoid production. If a historically clean site (with few to no weeds) is selected for seed/grain or fiber production in which a high population of industrial hemp plants are established from seed into a clean site prior to weed emergence, a high number of industrial hemp plants may suppress weeds by outcompeting them for light, water, and nutrients. The level of weed suppression or control depends on the weeds present and the growing conditions. If industrial hemp seed or female propagules are planted in the field for CBD or phytocannabinoid production, the resulting plants will likely be spaced further apart to maximize flower production; therefore, weeds can be controlled by cultivation, hand-hoeing, or hand removal. Industrial hemp for CBD or phytocannabinoid production may also be produced in a greenhouse.

It is imperative that potential industrial hemp producers understand that in addition to licensing fees, seed costs, and THC testing fees, production costs may be significant. In the absence of a strong market for selling industrial hemp grain, fiber, CBD/phytocannabinoids, or other products, significant financial losses of thousands of dollars per acre can result. Therefore, it is advisable that each applicant and licensee know and understand the related fees and costs of producing industrial hemp in the Tennessee pilot program and the risks associated with the production of this crop. Each producer will need to develop a plan to produce and either market industrial hemp or secure a market with a known price per unit by seeking out either buyer or contracted opportunities. Some producers sell to industrial hemp processors in Tennessee or other bordering states that have industrial hemp pilot programs. This requires one to know the purpose for the industrial hemp (seed/grain, fiber, CBD/phytocannabinoids or some combination thereof) and plan accordingly when calculating costs and choosing varieties, production systems, and processors.

Licensees are responsible for choosing and sourcing industrial hemp varieties for planting. However, the seed, propagules, or plants must be reviewed and

approved by the TDA and shipped directly to the TDA, from which the pilot program licensees pick up the seed, propagules, or plants pending TDA approval. A list of seed, propagule, and plant providers can be accessed at the TN HIA web link at the end of this publication. Seed, propagule, and plant import requirements and a list of state industrial hemp processors can be accessed at the TDA Industrial Hemp website listed at the end of this publication.

Due to conflicting federal laws regarding the legal status of industrial hemp, no federal crop insurance is available for the crop. According to TDA, federal farm programs managed by the USDA — such as crop insurance, farm loans, and conservation reserve — could be jeopardized if industrial hemp is planted. Some banks may be reluctant to provide services to industrial hemp producers for fear of prosecution due to federal laws and regulations violations. Therefore, thoroughly read and understand federal and state laws and regulations regarding industrial hemp and *Cannabis*, as there is some overlap, and consult legal counsel to address concerns and ensure compliance.

Legal Considerations

The following discussion of federal and state legislation that established the program and the parameters within which it operates is detailed below. This discussion is intended to inform those interested in industrial hemp production and processing in Tennessee of existing laws and governmental documents and discrepancies among these laws and governmental documents. There is controversy even among those directly involved in industrial hemp concerning some of the legal aspects, so some will contest the associated information in this publication. Please note that all efforts were made to ensure accuracy of the following information, including discussions with legal counsel and the US Drug Enforcement Agency (DEA), but interpretation of the legal aspects contained in this publication could be incorrect. It is therefore the sole responsibility of each state industrial hemp pilot program applicant and licensee to read all related federal and state laws regarding industrial hemp and *Cannabis* spp., understand all information provided by the TDA about the state industrial hemp pilot program — including guidance and issues — and seek appropriate legal counsel to reach an understanding of the meanings of the related laws and the potential risks of participating in this program.

The Agricultural Act of 2014 established the Industrial Hemp Agricultural Pilot Program. This enabled legal growing of industrial hemp in states with an industrial hemp pilot program operated under the supervision of the state department of agriculture or a university for the purpose of research. Section 7606 of this act, Legitimacy of Industrial Hemp Research, defined industrial hemp as “the plant *Cannabis sativa* L. and any part of such plant, whether growing or not, with a delta-9 tetrahydrocannabinol concentration of not more than 0.3 percent on a dry weight basis” and established general guidelines by which participants of the agricultural pilot program must abide. It also provided some protection for pilot program participants from other federal laws regarding *Cannabis sativa* L., stating that “an institution of higher education...or a State department of agriculture may grow or cultivate hemp” “notwithstanding the Controlled Substances Act (21 U.S.C. 7101 et seq.), chapter 81 of title 41, United States Code, or any other Federal law” as long as “the industrial hemp is grown or cultivated for purposes of research conducted under an agricultural pilot program or other agricultural or academic research; and the growing or cultivating of the industrial hemp is allowed under the laws of the State in which such institution of higher education or State department of agriculture is located and such research occurs.”

Shortly after passing of the bill, Tennessee legislators passed Public Chapter No. 916, legalizing the production of industrial hemp in the state under the provisions of the Section 7606 of the Agricultural Act of 2014 and outlining the state industrial hemp pilot program. In 2015, industrial hemp was legally produced in the state for the first time in more than 60 years, and it has been produced every year since then. In 2018, there were more than 160 industrial hemp producers licensed by TDA.

Within the federal and state definitions of industrial hemp, the phrase, “with a delta-9 tetrahydrocannabinol concentration of not more than 0.3 percent on a dry weight basis,” is critical because this is the only legal differentiation between industrial hemp and marijuana. Both are defined as *Cannabis sativa* L. THC is a phytocannabinoid, and phytocannabinoids are contained in the resin of *Cannabis* spp. This resin is produced in the trichomes, which are glandular, hairlike structures concentrated in high densities on the flowers, or buds, of female plants, and to a much lesser degree on the surfaces of other

aboveground plant parts. There are many different phytocannabinoids. Two of the most popular are THC and CBD. The reason for the emphasis on THC in the federal and state definitions of industrial hemp is because THC is the component of *Cannabis*, specifically marijuana, that, when inhaled or ingested produces the psychoactive effects, including the “high,” with which marijuana is associated. When federal and state laws defined industrial hemp, a THC concentration of not more than 0.3 percent on a dry weight basis was recognized as a standard by which industrial hemp could not be practically produced for THC production (thereby preventing its utilization as an illegal drug in most countries) but could still be effectively and economically produced for the production of traditional hemp products manufactured from seeds, seed oil and fiber in the stalks.

Initially, state law did not allow whole plant extracts for cannabinoid production, and many state pilot program participants focused on seed, oil and fiber production. However, it quickly became evident that industrial hemp for seed/grain, oil, and fiber production faced significant challenges, including lack of adapted varieties and labeled pesticides, lack of processing and marketing infrastructure, limitations of current technology to consistently and cost-effectively harvest and prepare the industrial hemp product for market, and the requirement for row crop-scale equipment. Additionally important would be row crop-scale profit potential because current limited returns per acre require a significant number of acres to meet both fixed and variable costs. While there has been limited progress in some of these areas since 2015, there remain significant challenges that preclude most people in Tennessee who are interested in producing industrial hemp from being financially successful in industrial hemp seed/grain, seed oil, and fiber production efforts.

As time passed and hemp advocates across the nation searched for ways that industrial hemp production could be successful in the US, they discovered that industrial hemp could be successfully grown to optimize the production of non-psychoactive phytocannabinoids, with a focus on CBD. Currently, there is interest in industrial hemp-based CBD; demand for CBD products; available technology and methodology for extraction, formulation, and packaging; and potential for profit with industrial hemp-based CBD and phytocannabinoid production.

After careful review of these findings, Tennessee state law was amended with Public Chapter No. 369, in which industrial hemp was state-defined as “the plants, plant parts, and whole plant extract, whether in manufacturing process or reconstituted, of the genera cannabis that do not contain a delta-9 tetrahydrocannabinol (THC) concentration more than three-tenths of one percent (0.3%) on a dry mass basis” and “includes any industrial hemp-derived products that do not contain more than three-tenths of one percent (0.3%) of delta-9 tetrahydrocannabinol (THC) in a topical or ingestible consumer product.”

However, there could be potential legal risks due to conflicting federal regulations and state laws. The Controlled Substances Act (21 U.S.C. 7101 et seq.) states that the term “marihuana” means “all parts of the plant *Cannabis sativa* L., whether growing or not; the seeds thereof; the resin extracted from any part of such plant; and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin. Such term does not include the mature stalks of such plant, fiber produced from such stalks, oil or cake made from the seeds of such plant, any other compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil, or cake, or the sterilized seed of such plant which is incapable of germination.”

It is important to note that there is no distinction in this act separating industrial hemp from marijuana based on THC content. Therefore, this definition currently applies simply to *Cannabis sativa* L., which includes industrial hemp. The “resin extracted from any part of such plant” is not excluded from the definition of “marihuana” as is the “mature stalks of such plant, fiber produced from such stalks, oil or cake made from the seeds of such plant, any other compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks..., fiber, oil, or cake, or the sterilized seed of such plant.” This is important because phytocannabinoids are derived from the *Cannabis* resin. CBD and other phytocannabinoids extracted from industrial hemp are derived primarily from resin. DEA 21 CFR Part 1308 states CBD and all other cannabinoids are currently viewed and will be treated as Schedule I controlled substances.

The Agricultural Act of 2014 states that “an institution of higher education...or a State department of agriculture may grow or cultivate hemp”

“notwithstanding the Controlled Substances Act (21 U.S.C. 7101 et seq.), chapter 81 of title 41, United States Code, or any other Federal law.” This should also apply to pilot program participants licensed by the institution of higher education or state department of agriculture overseeing the industrial hemp agricultural pilot program within the state. However, there is currently no federal law that indemnifies individuals who are not agricultural pilot program participants from possessing “the resin extracted from any part of such plant; and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin,” with “such plant” being *Cannabis sativa* L. According to DEA 21 CFR Part 1308, even industrial hemp-based CBD and other cannabinoids are currently viewed by the United States Drug Enforcement Agency as Schedule I controlled substances.

This contrasts with state law TN ADC 0080-06-28-.05, which states that “any person – with or without a license issued under this chapter – may distribute or store nonviable industrial hemp or hemp products if the industrial hemp was grown or processed by a person licensed under this chapter or the industrial hemp was acquired from a person in a foreign jurisdiction where distribution of the material or product was lawful.”

On February 16, 2018, a Circuit Court judge ruled that stores forced to close in Rutherford County, Tennessee, for selling CBD products just days prior could reopen. Furthermore, money and CBD products that were seized during the raid were returned to the stores and charges against those indicted for selling the products were suspended. These events follow similar proceedings in other states with industrial hemp pilot programs in which similar actions were followed by dropped charges as state laws were upheld. Furthermore, the recently passed Consolidated Appropriations Act of 2018 prohibits the Department of Justice and the DEA from using federal funds to (1) infringe Section 7606 of the Agricultural Act of 2017, which authorizes the Industrial Hemp Agricultural Pilot Program and (2) “prohibit the transportation, processing, sale or use of industrial hemp, or seeds of such plant, that is grown or cultivated in accordance with subsection section 7606 of the Agricultural Act of 2017, within or outside the State in which the industrial hemp is grown or cultivated.

At present, it appears that policies regarding industrial hemp-derived CBD and phytocannabinoid products will be based and judged based on state laws in Tennessee. However, it is solely the responsibility each Tennessee industrial hemp pilot program participant to read all related federal and state laws concerning industrial hemp and *Cannabis* spp. and seek appropriate counsel to fully understand the meanings of the related laws and the potential risks of participation in this program.

On April 12, 2018, S.2667, the Hemp Farming Act of 2018, was introduced. If passed, this act would remove industrial hemp and all hemp-derived products from

the Controlled Substances Act (21 USC 812 (c)) and federally legalize commercial cultivation of industrial hemp in the US. A vote is expected later in 2018.

Industrial hemp looks to be a viable enterprise for some producers and processors in Tennessee, but not everyone. Those interested in the production and processing of this crop should thoroughly educate themselves about all aspects associated with this crop, including state and federal rules and regulations and production and marketing considerations. Please contact your county UT-TSU Extension Office for additional information.

Sources and Suggested Reading

Tennessee Department of Agriculture Industrial Hemp

This site has excellent information vital to those who want to produce industrial hemp in Tennessee. Examples guidance and issues; state rules and regulations; grower and processor applications; associated fees and costs; Tennessee processor list; answers to frequently asked questions; and seed, propagule or plant information and acquisition forms.

tn.gov/agriculture/farms/hemp-industry

Tennessee Hemp Industries Association

This organization provides valuable information, networking opportunities, and online and monthly meeting opportunities to connect, share and learn from other Tennessee producers, processors and others involved with industrial hemp in Tennessee.

facebook.com/tnhemporg

tnhia.org

Seed, propagule or plant provider list: tnhia.org/seed-acquisition

Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy. L. Robbins, W. Snell, G. Halich, L. Maynard, C.

Dillon, and D. Spalding. 2013.

uky.edu/Ag/AgEcon/pubs/reshempimpfarmer28.pdf

Hemp as an Agricultural Commodity. R. Johnson. 2013. Congressional Research

Service publication RL32725. fas.org/sgp/crs/misc/RL32725.pdf

An Introduction to Industrial Hemp and Hemp Agronomy. D.W. Williams and R. Mundell. hemp.ca.uky.edu/files/hemp_history_and_agronomy_2018.pdf

Some Background on Industrial Hemp in a Western Oregon Context. R. Karow, R. Berry, and D. Hannaway. 2013. Oregon State University. cropandsoil.oregonstate.edu/sites/agscid7/files/crop-soil/Cannabis%20sativa%2011-08-13.pdf

"Hemp: a new crop with new uses for North America." E. Small and D. Marcus. 2002. P. 284-326. In: J. Janick and A. Whipkey (eds.), Trends in new crops and new uses. SHS Press, Alexandria, VA. hort.purdue.edu/newcrop/ncnu02/v5-284.html

State Industrial Hemp Statutes. National Conference of State Legislatures. ncsl.org/research/agriculture-and-rural-development/state-industrial-hemp-statutes.aspx

Industrial hemp in the United States: status and market potential. 2000. United States Department of Agriculture Economic Research Service Publication. Agricultural Economic Report No. AGES-001E.ers. usda.gov/publications/pub-details/?pubid=41757

Feasibility of Industrial Hemp Production in the United States Pacific Northwest. D.T. Ehrensing. 1998. Oregon State University Extension Service Pub. SB 681. ir.library.oregonstate.edu/concern/administrative_report_or_publications/j3860729t



AG.TENNESSEE.EDU

Real. Life. Solutions.™

W 777 09/18 19-0049

Programs in agriculture and natural resources, 4-H youth development, family and consumer sciences, and resource development. University of Tennessee Institute of Agriculture, U.S. Department of Agriculture and county governments cooperating. UT Extension provides equal opportunities in programs and employment.