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General Law
Public Testimony
Tuesday, February 24th, 2015

TESTIMONY IN SUPPORT OF HOUSE Bill 5780 AN ACT LEGALIZING INDUSTRIAL HEMP.

Good Morning Co-Chairs Senator Leone, Representative Baram; Vice Chairs Senator Larson, Representative Kiner; Ranking Members Senator Witkos and Representative Carter; and esteemed members of the Committee. My name is Melissa Ziobron and I am proud to represent the 34th District, which encompasses the towns of East Hampton, East Haddam and part of Colchester. I am testifying in support of bill that I have proposed— HB 5780.

I appreciate the support from the Department of Consumer Protection, Commissioner of Agriculture, and the Department of Economic and Community Development in issuing their recommendations for legalizing industrial hemp in December 2014. Attached to my testimony is an addendum which provides you with a variety of materials, including the delicate issue of dealing with the DEA as it relates to distributing hemp seeds. Although, there is a hemp amendment in the current federal omnibus budget bill and it is expected to be signed into law. I have also included many backup materials, including the Connecticut study produced in 2014, a congressional study from 2013 and a number of links to other state laws.

The process of reintroducing industrial hemp will not happen overnight. There are a variety of factors that have to be worked on, as would be expected when you are potentially developing a whole new product and the processing chain that is required. As the 2014 Connecticut study indicated in their final assessment it is recommended that Connecticut mirror their legalization of industrial hemp efforts to align with the 2014 Federal Farm Bill. This mandates a higher education facility be involved in the pilot program or a state department of agriculture be involved. Luckily for us, we have a premier facility at our flagship university, UCONN. The College of Agriculture, Health and Natural Resources (CAHNR) which states their purpose is committed to research that solves problems and investigates new areas relevant to agriculture, food, forestry and the environment. Our own Connecticut Agriculture Center is another high level program that could be involved in the development of this program. They have two different properties that could host such a study program.

In Kentucky, they developed a process which I believe may be the best overall framework. It included an Industrial Hemp Commission which then helped to develop the framework, with the input of various stakeholders, to achieve the final outcome. As I stated at the beginning of my testimony, this will be a process and to do it right will require thoughtful and deliberative choices. To assist with your deliberation, I have also included a copy of a very informative slide show from the Kentucky Department of Agriculture.

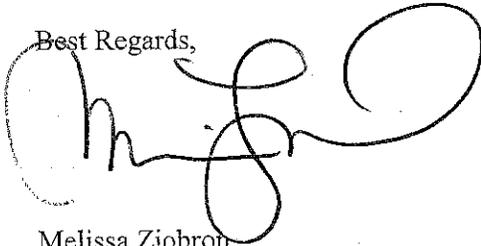
As I testified to in support of the feasibility study, hemp is one of the most versatile and sustainable products. The United States is the only industrialized who does not allow for the cultivation of industrial hemp. As a reminder it can be used for:

- yarns and raw or processed spun fibers
- fabrics and textiles
- paper
- carpeting
- home furnishings
- construction and insulation materials
- auto parts
- composites
- animal bedding
- foods and beverages
- body care products
- nutritional supplements
- industrial oils
- cosmetics
- personal care

An estimated 55,700 metric tons of industrial hemp are produced around the world each year. China, Russia, and South Korea are the leading hemp-producing nations. They account for 70 percent of the world's industrial hemp supply. * I look forward to the day when our country can reclaim our history in this area.

It is my hope that Connecticut is ready to take the next step in developing a new crop for farmers, ingredient for potential products, and a choice to support sustainable alternatives.

Best Regards,

A handwritten signature in black ink, appearing to read 'Melissa Ziobron', written in a cursive style.

Melissa Ziobron
State Representative
34th District

*taken from the Industrial Hemp Facts, Kentucky

Addendum:

Latest Info on Federal Law:

<http://www.votehemp.com/PR/PDF/2014-12-16-omnibus-hemp-amendment.pdf>

UConn College of Agriculture, Health and Natural Resources:

<http://www.cag.uconn.edu/CANR/deansmessage.html>

Connecticut Ag Stations description:

"Under the direction of its Board of Control, Station scientists today investigate insects and diseases that damage trees and crops; analyze for food safety, water quality, and soil properties; study the genetics and biochemistry of plants; and experiment with new crops and changing forests. They also investigate mosquitoes and ticks that spread disease organisms that cause encephalitis and Lyme disease in humans."

<http://www.ct.gov/caes/cwp/view.asp?a=2812&q=345002>

American Farm Bureau Support:

<http://naihc.org/home/343-farm-bureau-reaffirms-support-for-industrial-hemp>

Kentucky:

Hemp Commission: <http://www.kyagr.com/marketing/Kentucky-Industrial-Hemp-Commission.html>

Tennessee:

AN ACT to amend Tennessee Code Annotated, Title 39; Title 43; Title 53 and Title 67, relative to industrial hemp. <http://www.capitol.tn.gov/Bills/108/Bill/HB2445.pdf>

Hemp Seeds:

http://naihc.org/images/stories/ky_dea.pdf

North American Industrial Hemp Council:

<http://naihc.org/home/338-kentucky-a-colorado-race-to-plant-industrial-hemp>

Compilation of Federal and State Legislation

This brief supporting document showcases the state-level legislation supporting hemp around the United States. Nineteen states, including Connecticut, currently have legislation in place to provide for hemp production as stipulated in the Farm Bill. This document will provide the Act Name and Number for each state and brief quotes detailing the exact wording surrounding hemp.

Farm Bill 2014

Agricultural Act of 2014 (H.R. 2642; Pub.L. 11379), SEC. 7606

“[...] an institution of higher education (as defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)) or a State department of agriculture may grow or cultivate industrial hemp if:

- (1) the industrial hemp is grown or cultivated for purposes of research conducted under an agricultural pilot program or other agricultural or academic research; and
- (2) the growing or cultivating of 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.”

“INDUSTRIAL HEMP – The term ‘industrial hemp’ means 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.”

California

CA FOOD & AG 81000-81010

“This bill, the California Industrial Hemp Farming Act, would revise the definition of marijuana so that the term would exclude industrial hemp, as defined, except where the plant is cultivated or processed for purposes not expressly allowed. The bill would define industrial hemp as a fiber or oilseed crop, or both, that is limited to the nonpsychoactive types of the plant *Cannabis sativa* L. and the seed produced therefrom, having no more than 3/10 of 1% tetrahydrocannabinol (THC) contained in the dried flowering tops, and that is cultivated and processed exclusively for the purpose of producing the mature stalks of the plant, fiber produced from the stalks, oil or cake made from the seeds of the plant, any other compound, manufacture, salt, derivative, mixture, or preparation of the mature stalks, except the resin or flowering tops extracted therefrom, fiber, oil, or cake, or the sterilized seed, or any component of the seed, of the plant that is incapable of germination.”

“The bill would enact provisions relating to growing industrial hemp that would impose specified procedures and requirements on a person who grows industrial hemp, except as specified, that would become operative when authorized under federal law. ”

Colorado

CRS §25-18.7-101 to -105

Establishes industrial hemp remediation pilot program “to determine how soils and water may be made more pristine and healthy by phytoremediation, removal of contaminants, and rejuvenation through the growth of industrial hemp.”

Connecticut

Public Act No.14-191

“Commissioners of Agriculture, Consumer Protection and Economic and Community Development shall study the feasibility of legalizing the production, possession, and sale of industrial hemp, respectively.

By Jan. 1, 2015, a report will be made to the legislature regarding “[s]aid commissioners’ recommendations on (1) establishing a statutory definition of “industrial hemp”, based on the percentage of proposed tetrahydrocannabinol in such industrial hemp, as distinguished from marijuana, (2) amending the general statutes to exclude industrial hemp from the definition of “controlled substance” in section 21a-240 of the general statutes, and (3) establishing a licensing system for industrial hemp growers and sellers.”

Delaware

Del. Code Ann. tit. 3, ch. 28, §2800-2803

““Industrial hemp” means 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.”

“Notwithstanding any law or regulation to the contrary, the Department may grow or cultivate industrial hemp for the purpose of agricultural or academic research. The Department is authorized to certify any higher education institution in Delaware to grow or cultivate industrial hemp for the purpose of agricultural or academic research [...]”

Hawaii

S.B. 2175

“Authorizes the dean of the College of Tropical Agriculture and Human Resources at the University of Hawaii at Manoa to establish an industrial hemp remediation and biofuel crop research program; requires a report on the rate of contamination uptake and efficient uptake from soil and water, the rate of carbon fixation in the Calvin cycle and the viability of industrial hemp as a biofuel feedstock; clarifies that the term industrial hemp means the plant *Cannabis Sativa L.*; provides criminal and civil immunity.”

Illinois

720 ILCS 550 §15.2

“Establishes the “Industrial Hemp Pilot Program” and allows Higher Education institutions or the Department of Agriculture to grow or cultivate industrial hemp if used for research purposes that specifically studies the growth, cultivation, or marketing of industrial hemp. “Industrial Hemp” means *cannabis sativa L.*, having no more than 0.3% total THC content.”

Indiana

IC 15-15-13-7

“Industrial hemp is an agricultural product that is subject to regulation by the state seed commissioner.”

Kentucky

KRS §260.850-.869

“Industrial hemp means all parts and varieties of the plant *cannabis sativa*, cultivated or possessed by a licensed grower, whether growing or not, that contain a tetrahydrocannabinol concentration of one percent (1%) or less by weight, except that the THC concentration limit of one percent (1%) may be exceeded for licensed industrial hemp seed research.”

“The Department of Agriculture shall promote the research and development of markets for Kentucky industrial hemp and hemp products after the selection and establishment of the industrial hemp research program and the Industrial Hemp Commission.”

Maine

7 M.R.S.A. §2231

“Notwithstanding any other provision of law, a person may plant, grow, harvest, possess, process, sell and buy industrial hemp if that person holds a license [...]”

17-A M.R.S. 1101-1117

“Industrial hemp means any variety of *Cannabis sativa* L. with a delta-9- tetrahydrocannabinol concentration that does not exceed 0.3% on a dry weight basis and that is grown under a federal permit in compliance with the conditions of that permit.”

Montana

Mont. Code Anno., §80-18-101 to 80-18-111

“[...] an individual in this state may plant, grow, harvest, possess, process, sell, or buy industrial hemp if the industrial hemp does not contain more than 0.3% tetrahydrocannabinol.”

Nebraska

NE L 101

“A postsecondary institution in this state or the Department of Agriculture may grow or cultivate industrial hemp if the industrial hemp is grown or cultivated for purposes of research conducted under an agricultural pilot program or other agricultural or academic research.”

“Industrial hemp means 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 three-tenths percent on a dry weight basis.”

New Hampshire

2014 HB 153

“There is established a committee to study the growth and sale of industrial hemp in New Hampshire. [...] “industrial hemp” means all parts and varieties of the plant *Cannabis sativa* L., whether growing or not, that contain a tetrahydrocannabinol (THC) concentration of 0.3 percent or less by weight.”

North Dakota

N.D. Cent. Code, §4-41-01 to 4-41-03 (2009)

“[...] any person in this state may plant, grow, harvest, possess, process, sell, and buy industrial hemp (*cannabis sativa* L.) having no more than .03 percent tetrahydrocannabinol.”

“North Dakota State University and any other person licensed under this chapter may import and resell industrial hemp seed that has been certified as having no more than .03 percent tetrahydrocannabinol.”

Oregon

O.R.S. §475.005

“Marijuana [...] [d]oes not mean industrial hemp, [...] or industrial hemp commodities or products.”

O.R.S. §571.300 to .315

“Industrial hemp [...] [m]eans all nonseed parts and varieties of the *Cannabis sativa* plant, whether growing or not, that contain a cropwide average tetrahydrocannabinol concentration that does not exceed 0.3 percent on a dry weight basis.”

Authorizes “industrial hemp production and possession, and commerce in industrial hemp commodities and products.”

South Carolina

S. 839

“Adds chapter 55 concerning industrial hemp; provides that it is lawful to grow industrial hemp in this state; clarifies that industrial hemp is excluded from the definition of marijuana; prohibits growing industrial hemp and marijuana on the same property or otherwise growing marijuana in close proximity to industrial hemp to disguise the marijuana growth.”

Tennessee

TN AG Code 916

“Authorizes growing of industrial hemp subject to regulation by the Department of Agriculture; provides for license fees; provides that industrial hemp is not marijuana but can be categorized as a controlled substance under specified

circumstances; provides that the department has the right to inspect the hemp crop for compliance.”

Utah

UT H 105

“This bill permits the Department of Agriculture and a department-certified higher education institution to grow industrial hemp for the purpose of agricultural or academic research [...]”

Vermont

6 V.S.A. §561 to 566

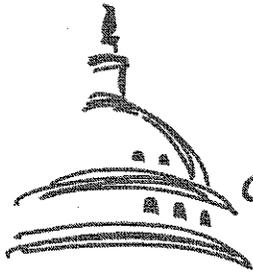
“Industrial hemp means varieties of the plant *cannabis sativa* having no more than 0.3 percent tetrahydrocannabinol, whether growing or not, that are cultivated or possessed by a licensed grower in compliance with this chapter.”

“Industrial hemp is an agricultural product which may be grown, produced, possessed, and commercially traded in Vermont.”

West Virginia

W. Va. Code §19-12E-1 to 19-12E-9

“Industrial hemp that has not more than 1 percent tetrahydrocannabinol is considered an agricultural crop in this state if grown for [...] purposes authorized.”



Congressional
Research
Service

Hemp as an Agricultural Commodity

Renée Johnson
Specialist in Agricultural Policy

July 24, 2013

Congressional Research Service

7-5700

www.crs.gov

RL32725

CRS Report for Congress

Prepared for Members and Committees of Congress

Summary

Industrial hemp is a variety of *Cannabis sativa* and is of the same plant species as marijuana. However, hemp is genetically different and distinguished by its use and chemical makeup. Hemp has long been cultivated for non-drug use in the production of industrial and other goods. Some estimate that the global market for hemp consists of more than 25,000 products. It can be grown as a fiber, seed, or other dual-purpose crop. Hemp fibers are used in a wide range of products, including fabrics and textiles, yarns and raw or processed spun fibers, paper, carpeting, home furnishings, construction and insulation materials, auto parts, and composites. The interior stalk (hurd) is used in various applications such as animal bedding, raw material inputs, low-quality papers, and composites. Hemp seed and oilcake are used in a range of foods and beverages, and can be an alternative food protein source. Oil from the crushed hemp seed is an ingredient in a range of body-care products and also nutritional supplements. Hemp seed is also used for industrial oils, cosmetics and personal care, and pharmaceuticals, among other composites.

Precise data are not available on the size of the U.S. market for hemp-based products. Current industry estimates report that U.S. retail sales of all hemp-based products may be nearly \$500 million per year. Because there is no commercial industrial hemp production in the United States, the U.S. market is largely dependent on imports, both as finished hemp-containing products and as ingredients for use in further processing. Under the current U.S. drug policy, all cannabis varieties, including hemp, are considered Schedule I controlled substances under the Controlled Substances Act (CSA, 21 U.S.C. §§801 *et seq.*; Title 21 CFR Part 1308.11). As such, while there are legitimate industrial uses, these are controlled and regulated by the U.S. Drug Enforcement Administration (DEA). Strictly speaking, the CSA does not make growing hemp illegal; rather, it places strict controls on its production and enforces standards governing the security conditions under which the crop must be grown, making it illegal to grow without a DEA permit. Currently, cannabis varieties may be legitimately grown for research purposes only. Among the concerns over changing current policies is how to allow for hemp production without undermining the agency's drug enforcement efforts and regulation of the production and distribution of marijuana.

In the early 1990s a sustained resurgence of interest in allowing commercial cultivation of industrial hemp began in the United States. Several states have conducted economic or market studies, and have initiated or passed legislation to expand state-level resources and production. Several states have legalized the cultivation and research of industrial hemp, including Colorado, Hawaii, Kentucky, Maine, Maryland, Montana, North Dakota, Oregon, Vermont, Washington, and West Virginia. However, because federal law still prohibits cultivation, a grower still must get permission from the DEA in order to grow hemp, or face the possibility of federal charges or property confiscation, despite having a state-issued permit.

The 113th Congress considered certain changes to U.S. policies regarding industrial hemp during the 2013 farm bill debate. The House-passed version of the farm bill (H.R. 2642, Section 6605) would allow certain research institutions to grow industrial hemp, if allowed under state laws where the institution is located. Similar provisions were not included in the Senate-passed farm bill (S. 947). Other introduced legislation, such as the Industrial Hemp Farming Act of 2013 (H.R. 525; S. 359), could allow for possible commercial cultivation of industrial hemp in the United States. Those bills would amend the CSA to specify that the term "marijuana" does not include industrial hemp, which the bill would define based on its content of delta-9 tetrahydrocannabinol (THC), marijuana's primary psychoactive chemical. Such a change could remove low-THC hemp from being covered by the CSA as a controlled substance and subject to DEA regulation.

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Introduction

For centuries, industrial hemp (plant species *Cannabis sativa*) has been a source of fiber and oilseed used worldwide to produce a variety of industrial and consumer products. Currently, more than 30 nations grow industrial hemp as an agricultural commodity, which is sold on the world market. In the United States, however, production is strictly controlled under existing drug enforcement laws. There is no known commercial domestic production and the U.S. market depends on imports.

The 113th Congress considered certain changes to U.S. policies regarding industrial hemp during the 2013 farm bill debate. The House-passed version of the farm bill (H.R. 2642, Section 6605) includes a provision that would allow certain research institutions to grow industrial hemp, if allowed under state laws where the institution is located. Similar provisions were not included in the Senate-passed version of the bill, however. Other introduced legislation in the Industrial Hemp Farming Act of 2013 (H.R. 525; S. 359) could provide for even greater opportunities for commercial cultivation of industrial hemp in the United States.

Overview of *Cannabis* Varieties

Although marijuana is also a variety of cannabis, it is genetically distinct from industrial hemp and is further distinguished by its use and chemical makeup.

In this report, “hemp” refers to industrial hemp, “marijuana” (or “marihuana” as it is spelled in the older statutes) refers to the psychotropic drug (whether used for medicinal or recreational purposes), and “cannabis” refers to the plant species that has industrial, medicinal, and recreational varieties.¹

Comparison of Hemp and Marijuana

There are many different varieties of cannabis plants. Marijuana and hemp come from the same species of plant, *Cannabis sativa*, but from different varieties or cultivars. However, hemp is genetically different and is distinguished by its use and chemical makeup, as well as by differing cultivation practices in its production.²

Hemp, also called “industrial hemp,”³ refers to cannabis varieties that are primarily grown as an agricultural crop (such as seeds and fiber, and byproducts such as oil, seed cake, hurds) and is characterized by plants that are low in THC (delta-9 tetrahydrocannabinol, marijuana’s primary psychoactive chemical). THC levels for hemp are generally less than 1%.

¹ This report does not cover issues pertaining to medical marijuana. For information on that subject, see CRS Report RL33211, *Medical Marijuana: Review and Analysis of Federal and State Policies*, or related CRS reports.

² See, for example, S. L. Datwyler and G. D. Weiblen, “Genetic variation in hemp and marijuana (*Cannabis sativa* L.) according to amplified fragment length polymorphisms,” *Journal of Forensic Sciences*, Vol. 51, No. 2 (2006).

³ Use of this term dates back to the 1960s; see L. Grlie, “A combined spectrophotometric differentiation of samples of cannabis,” United Nations Office On Drugs and Crime (UNODC), January 1968, http://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1968-01-01_3_page005.html.

Marijuana refers to the flowering tops and leaves of psychoactive cannabis varieties, which are grown for their high content of THC. Marijuana's high THC content is primarily in the flowering tops and to a lesser extent in the leaves. THC levels for marijuana are much higher than for hemp, and are reported to average about 10%; some sample tests indicate THC levels reaching 20%-30%, or greater.⁴

A level of about 1% THC is considered the threshold for cannabis to have a psychotropic effect or an intoxicating potential.⁵ Current laws regulating hemp cultivation in the European Union (EU) and Canada use 0.3% THC as the dividing line between industrial and potentially drug-producing cannabis. Cultivars having less than 0.3% THC can be cultivated under license, while cultivars having more than that amount are considered to have too high a drug potential.⁶

Some also claim that industrial hemp has higher levels of cannabidiol (CBD), the non-psychoactive part of marijuana, which might mitigate some of the effects of THC.⁷ A high ratio of CBD to THC might also classify hemp as a fiber-type plant rather than a drug-type plant. However, opinions are still mixed about how CBD levels might influence the psychoactive effects of THC.

Production Differences

Production differences depend on whether the cannabis plant is grown for fiber/oilseed or for medicinal/recreational uses. These differences involve the varieties being grown, the methods used to grow them, and the timing of their harvest (see discussion in "Hemp" and "Marijuana," below). Concerns about cross-pollination among the different varieties are critical. All cannabis plants are open, wind and/or insect pollinated, and thus cross-pollination is possible.

Because of the compositional differences between the drug and fiber varieties of cannabis, farmers growing either crop would necessarily want to separate production of the different varieties or cultivars. This is particularly true for growers of medicinal or recreational marijuana in an effort to avoid cross-pollination with industrial hemp, which would significantly lower the THC content and thus degrade the value of the marijuana crop. Likewise, growers of industrial hemp would seek to avoid cross-pollination with marijuana plants, especially given the illegal

⁴ National Institute of Drug Abuse, "Quarterly Report, Potency Monitoring project," Report 100, University of Mississippi, 2008. Based on sample tests of illegal cannabis seizures (December 16, 2007, through March 15, 2008).

⁵ E. Small and D. Marcus, "Hemp: A new crop with new uses for North America," In: *Trends in New Crops and New Uses*, J. Janick and A. Whipkey (eds.), American Society for Horticultural Science (ASHS) Press, 2002, <http://www.hort.purdue.edu/newcrop/nenu02/v5-284.html>.

⁶ E. Small and D. Marcus, "Tetrahydrocannabinol levels in hemp (*Cannabis sativa*) germplasm resources," *Economic Botany*, vol. 57, no. 4 (October 2003); and G. Leson, "Evaluating Interference of THC Levels in Hemp Food Products with Employee Drug Testing" (prepared for the Province of Manitoba, Canada), July, 2000,.

⁷ U. R. Avico, R. Pacifici, and P. Zuccaro, "Variations of tetrahydrocannabinol content in cannabis plants to distinguish the fibre-type from drug-type plants," *UNODC Bulletin on Narcotics*, January 1985, http://www.unodc.org/unodc/en/data-and-analysis/bulletin/bulletin_1985-01-01_4_page008.html; C. W. Waller, "Chemistry Of Marihuana," *Pharmacological Reviews*, vol. 23 (December 1971); K.W. Hillig and P. G. Mahlberg, "A chemotaxonomic analysis of cannabinoid variation in *Cannabis* (Cannabaceae)," *American Journal of Botany*, vol. 91, no. 6 (June 2004); and A. W. Zuardi et al., "Cannabidiol, a *Cannabis sativa* constituent, as an antipsychotic drug," *Brazilian Journal of Medical and Biological Research*, vol. 39 (2006).

status of marijuana. Plants grown of oilseed are also marketed according to the purity of the product, and the mixing of off-type genotypes would degrade the value of the crop.⁸

The different cannabis varieties are also harvested at different times (depending on the growing area), increasing the chance of detection of illegal marijuana, if production is commingled. Because of these differences, many claim that drug varieties of cannabis cannot easily be grown with oilseed or fiber varieties without being easily detected.⁹ As discussed below, among the visual plant differences are **plant height** (hemp is encouraged to grow tall, whereas marijuana is selected to grow short and tightly clustered); **cultivation** (hemp is grown as a single main stalk with few leaves and branches, whereas marijuana is encouraged to become bushy with many leaves and branches to promote flowers and buds); and **planting density** (hemp is densely planted to discourage branching and flowering, whereas marijuana plants are well-spaced).

Hemp

To maximize production of hemp fiber and/or seed, plants are encouraged to grow taller in height. Cultivated plants become a tall stalky crop that usually reaches between 6 and 15 feet, and generally consist of a single main stalk with few leaves and branches. Hemp plants grown for fiber or oilseed are planted densely (about 35-50 plants per square foot)¹⁰ to discourage branching and flowering. The period of seeding to harvest ranges from 70 to 140 days, depending on the purpose, cultivar or variety, and climatic conditions. The stalk and seed is the harvested product. The stalk of the plant provides two types of fibers: the outer portion of the stem contains the bast fibers, and the interior or core fiber (or hurds).

Industrial hemp production statistics for Canada indicate that one acre of hemp yields an average of about 700 pounds of grain, which can be pressed into about 50 gallons of oil and 530 pounds of meal.¹¹ That same acre will also produce an average of 5,300 pounds of straw, which can be transformed into about 1,300 pounds of fiber.¹²

Marijuana

When cannabis is grown to produce marijuana, it is cultivated from varieties where the female flowers of dioecious drug strains are selected to prevent the return of separate male and female plants.¹³ The female flowers are short and tightly clustered. In marijuana cultivation, growers remove all the male plants to prevent pollination and seed set. Some growers will hand-pollinate a female plant to get seed; this is done in isolation of the rest of the female plants. The

⁸ CRS communication with Anndrea Hermann, Hemp Oil Canada Inc., December 2009. Pollen is present at a very early plant development stage.

⁹ D. P. West, "Hemp and Marijuana: Myths & Realities," February 1998, <http://www.gametec.com/hemp/hempandmj.html>. Also see information posted by Vote Hemp Inc., "Different Varieties of Cannabis" (no date), http://www.votehemp.com/different_varieties.html.

¹⁰ Innvista, "Hemp Biology" (no date), <http://www.innvista.com/health/foods/hemp/hempbiol.htm>.

¹¹ Agriculture and Agri-Food Canada, "Industrial Hemp" (no date), <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1174595656066&lang=eng>.

¹² Ibid.

¹³ H. van Bakel et al., "The draft genome and transcriptome of *Cannabis sativa*," *Genome Biology*, Vol. 12, Issue 10, 2011, <http://genomebiology.com/2011/12/10/R102>. In botany, dioecious is a term describing plant varieties that possess male and female flowers or other reproductive organs on separate, individual plants.

incorporation and stabilization of monoecism in cannabis cultivation requires the skill of a competent plant breeder, and rarely occurs under non-cultivated conditions.

If marijuana is grown in or around industrial hemp varieties, the hemp would pollinate the female marijuana plant. Marijuana growers would not want to plant near a hemp field, since this would result in a harvest that is seedy and lower in THC, and degrade the value of their marijuana crop.

Marijuana is cultivated to encourage the plant to become bushy with many leaves, with wide branching to promote flowers and buds. This requires that plants be well-spaced, by as much as about 1-2 plants per square yard.¹⁴ The flower and leaves are the harvested products.

Hemp Production and Use

Commercial Uses of Hemp

Industrial hemp can be grown as a fiber, seed, or dual-purpose crop.¹⁵ The interior of the stalk has short woody fibers called hurds; the outer portion has long bast fibers. Hemp seed/grains are smooth and about one-eighth to one-fourth of an inch long.¹⁶

Although hemp is not grown in the United States, both finished hemp products and raw material inputs are imported and sold for use in manufacturing for a wide range of product categories (**Figure 1**). Hemp fibers are used in a wide range of products, including fabrics and textiles, yarns and spun fibers, paper, carpeting, home furnishings, construction and insulation materials, auto parts, and composites. Hurds are used in various applications such as animal bedding, material inputs, papermaking, and composites. Hemp seed and oilcake are used in a range of foods and beverages, and can be an alternative food protein source. Oil from the crushed hemp seed is used as an ingredient in a range of body-care products and nutritional supplements.¹⁷ Hemp seed is also used for industrial oils, cosmetics and personal care products, and pharmaceuticals, among other composites.

Some estimate that the global market for hemp consists of more than 25,000 products in nine submarkets: agriculture; textiles; recycling; automotive; furniture; food/nutrition/beverages; paper; construction materials; and personal care. For construction materials, such as hempcrete (a mixture of hemp hurds and lime products), hemp is used as a lightweight insulating material.¹⁸

¹⁴ Innvista, "Hemp Biology" (no date), <http://www.innvista.com/health/foods/hemp/hempbiol.htm>.

¹⁵ Different varieties have been developed may be better suited for one use or the other. Cultivation practices also differ depending upon the variety planted.

¹⁶ For additional information, see U.S. Department of Agriculture, Economic Research Service, *Industrial Hemp in the United States: Status and Market Potential*, ERS Report AGES001E, January 2000.

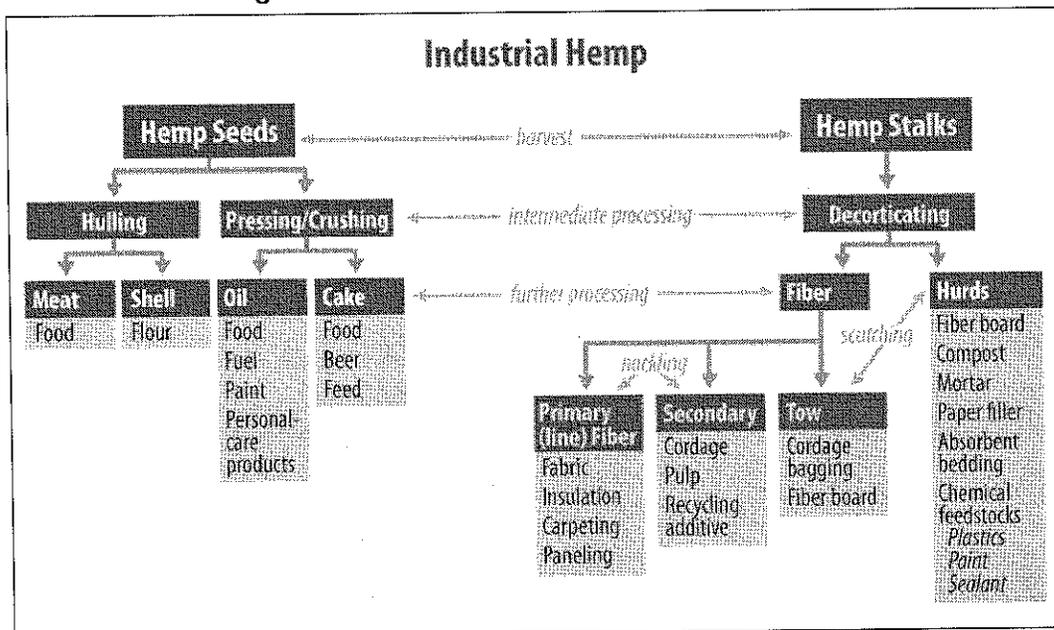
¹⁷ Some have suggested similarities between hempseed oil and hash oil. However, there is evidence suggesting differences regarding initial feedstock or input ingredients (hash oil requires high THC marijuana whereas hempseed oil uses low THC industrial hemp); how they are produced (hash oil is extracted often using a flammable solvent whereas hempseed oil is expeller-pressed or extracted mechanically, generally without chemicals or additives); and how they are used (hash oil is used as a psychoactive drug whereas hempseed oil is used as an ingredient in hemp-based foods, supplements, and body care products). For more background information, contact the author of this report.

¹⁸ "Hemp Homes are Cutting Edge of Green Building," *USA Today*, September 12, 2010; and "Construction Plant," *Financial Times*, January 22, 2010.

Hemp has also been promoted as a potential biodiesel feedstock,¹⁹ although some analysts suggest that competing demands for other products might make it too costly to use as a feedstock.²⁰

These types of commercial uses are widely documented in a range of feasibility and marketing studies conducted by researchers at the U.S. Department of Agriculture (USDA) and various land grant universities and state agencies. (A listing of these studies is in the **Appendix**.)

Figure 1. Flowchart of Potential Hemp Products



Source: CRS, adapted from D. G. Kraenzel et al., "Industrial Hemp as an Alternative Crop in North Dakota," AER-402, North Dakota State University, July 23, 1998, <http://purl.umn.edu/23264>.

Estimated Retail Market

There is no official estimate of the value of U.S. sales of hemp-based products. The Hemp Industries Association (HIA) estimates that the total U.S. retail value of hemp products in 2012 was nearly \$500 million, which includes food and body products, clothing, auto parts, building materials and other products.²¹ Of this, HIA reports that the value of hemp-based food, supplements, and body care sales in the United States is about \$156 million to \$171 million

¹⁹ Manitoba Agriculture, *National Industrial Hemp Strategy*, March 2008, p. 293; J. Lane, "Hemp Makes Comeback as Biofuels Feedstock in 43-acre California Trial," *Biofuels Digest*, August 24, 2009; and H. Jessen, "Hemp Biodiesel: When the Smoke Clears," *Biodiesel Magazine*, February 2007.

²⁰ North Dakota State University (NSDU), "Biofuel Economics: Biocomposites—New Uses for North Dakota Agricultural Fibers and Oils" (no date).

²¹ R. Fletcher, "As Momentum Builds for Policy Change, U.S. Market for Products Made from Industrial Hemp Continues to Thrive: 2012 Annual Retail Sales for Hemp Products Hit \$500 Million," February 25, 2013, [http://www.votehemp.com/PR/2013-02-25-hia_\\$500_million_annual_sales.html](http://www.votehemp.com/PR/2013-02-25-hia_$500_million_annual_sales.html).

annually. Previous reports about the size of the U.S. market for hemp clothing and textiles is estimated at about \$100 million annually.²²

The reported retail value of the U.S. hemp market is an estimate and is difficult to verify. Underlying data for this estimate are from SPINS survey data;²³ however, because the data reportedly do not track retail sales for The Body Shop and Whole Foods Market—two major markets for hemp-based products—as well as for restaurants, hemp industry analysts have adjusted these upward to account for this gap in the reported survey data.²⁴

Available industry information indicates that sales of some hemp-based products, such as foods and body care products, is growing.²⁵ Growth in hemp specialty food products is driven, in part, by sales of hemp milk and related dairy alternatives, among other hemp-based foods.²⁶

Information is not available on other potential U.S. hemp-based sectors, such as for use in construction materials or biofuels, paper, and other manufacturing uses. Data are not available on existing businesses or processing facilities that may presently be engaged in such activities within the United States.

U.S. Hemp Imports

The import value of hemp-based products imported and sold in the United States is difficult to estimate accurately. For some traded products, available statistics have only limited breakouts or have been expanded only recently to capture hemp subcategories within the broader trade categories for oilseeds and fibers. Reporting errors are evident in some of the trade data, since reported export data for hemp from Canada do not consistently match reported U.S. import data for the same products (especially for hemp seeds).

Given these data limitations, available trade statistics indicate that the value of U.S. imports under categories actually labeled “hemp,” such as hemp seeds and fibers, which are more often used as inputs for use in further manufacturing, was nearly \$11.5 million in 2011. Compared to available data for 2007, the value of imported hemp products for use as inputs and ingredients has more than doubled. However, import volumes for other products such as hemp oil and fabrics are lower (**Table 1**). Trade data are not available for finished products, such as hemp-based clothing or other products including construction materials, carpets, or hemp-based paper products.

The single largest supplier of U.S. imports of raw and processed hemp fiber is China. Other leading country suppliers include Romania, Hungary, India, and other European countries. The single largest source of U.S. imports of hemp seed and oilcake is Canada. The total value of Canada’s exports of hemp seed to the United States has grown significantly in recent years

²² HIA, “Hemp Fabric goes High Fashion,” February 11, 2008. Estimate reflects best available current information based on personal communication between CRS and HIA.

²³ SPINS tracks data and market trends on the Natural Product Industry sales (<http://www.spins.com/>).

²⁴ CRS communication with representatives of Vote Hemp, Inc., May 2010. See also HIA’s press release, “Growing Hemp Food and Body Care Sales is Good News for Canadian Hemp Seed and Oil Producers,” April 29, 2009.

²⁵ H. Fastré, CEO of Living Harvest Foods, based on his comments and presentation, “The Future of Hemp,” HIA Convention, Washington DC, October 2009; and HIA, “Growing Hemp Food and Body Care Sales is Good News for Canadian Hemp Seed and Oil Producers,” April 29, 2009.

²⁶ HIA, “Hemp Milk Products Boosted Growth of Hemp Food Market in 2007,” March 14, 2008.

following resolution of a long-standing legal dispute over U.S. imports of hemp foods in late 2004 (see “Dispute over Hemp Food Imports (1999-2004)”). European countries such as the United Kingdom and Switzerland also have supplied hemp seed and oilcake to the United States.

U.S. Market Potential

In the past two decades, several feasibility and marketing studies have been conducted by researchers at the USDA and various land grant universities and state agencies (for example, Arkansas, Kentucky, Maine, Minnesota, North Dakota, Oregon, and Vermont; see **Appendix**).

Studies by researchers in Canada and various state agencies provide a mostly positive market outlook for growing hemp, citing rising consumer demand and the potential range of product uses for hemp. Some state reports claim that if current restrictions on growing hemp in the United States were removed, agricultural producers in their states could benefit. A 2008 study reported that acreage under cultivation in Canada, “while still showing significant annual fluctuations, is now regarded as being on a strong upward trend.”²⁷ Most studies generally note that “hemp ... has such a diversity of possible uses, [and] is being promoted by extremely enthusiastic market developers.”²⁸ Other studies highlight certain production advantages associated with hemp or acknowledge hemp’s benefits as a rotational crop²⁹ or further claim that hemp may be less environmentally degrading than other agricultural crops.³⁰ Some studies also claim certain production advantages to hemp growers, such as relatively low input and management requirements for the crop.³¹

Other studies focused on the total U.S. market differ from the various state reports and provide a less favorable aggregate view of the potential market for hemp growers in the United States. Two studies, conducted by researchers at USDA and University of Wisconsin-Madison (UW-M), highlight some of the continued challenges facing U.S. hemp producers.

For example, USDA’s study projected that U.S. hemp markets “are, and will likely remain, small, thin markets” and also cited “uncertainty about long-run demand for hemp products and the potential for oversupply” among possible downsides of potential future hemp production.³²

²⁷ Manitoba Agriculture, *National Industrial Hemp Strategy*, March 2008. A study prepared for Food and Rural Initiative Agriculture and Agri-Food Canada.

²⁸ E. Small and D. Marcus, “Hemp: A New Crop with New Uses for North America,” In: *Trends in New Crops and New Uses*, 2002, p. 321.

²⁹ See, for example, D. G. Kraenzel et al. “Industrial Hemp as an Alternative Crop in North Dakota,” AER 402, North Dakota State University, Fargo, July 1998; J. B. Kahn, “Hemp ... Why Not?” Berkeley Electronic Press (bepress) Legal Series, Paper 1930, 2007.

³⁰ See, for example, N. Cherrett et al., “Ecological Footprint and Water Analysis of Cotton, Hemp and Polyester,” Stockholm Environment Institute, 2005; and Reason Foundation, “Illegally Green: Environmental Costs of Hemp Prohibition,” Policy Study 367, March 2008.

³¹ See, for example, D. T. Ehrensing, *Feasibility of Industrial Hemp Production in the United States Pacific Northwest*, SB 681, Oregon State University, May 1998.

³² U.S. Department of Agriculture, Economic Research Service, *Industrial Hemp in the United States: Status and Market Potential*, ERS Report AGES001E, January 2000.

Table I. Value and Quantity of U.S. Imports of Selected Hemp Products, 1996-2011

	units	1996	2000	2005	2007	2008	2009	2010	2011
Hemp Seeds (HS 1207990220) ^a	\$1000	—	—	271	2,350	3,111	3,320	5,154	6,054
Hemp Oil and Fractions (HS 1515908010)	\$1000	—	—	711	693	835	726	1,129	839
Hemp Seed Oilcake and Other Solids (HS 2306900130)	\$1000	—	—	—	—	460	1,811	2,369	2,947
True Hemp, raw/processed not spun (HS 5302)	\$1000	100	525	101	88	57	52	33	41
True Hemp Yarn (HS 5308200000)	\$1000	25	396	68	82	202	212	115	425
True Hemp Woven Fabrics (HS 5311004010)	\$1000	1,291	1,617	923	1,579	1,924	751	1,024	1,188
Total		1,416	2,538	2,074	4,789	6,589	6,872	9,822	11,494
Hemp Seeds (HS 1207990220) ^a	metric ton	—	—	92	355	523	602	711	623
Hemp Oil and Fractions (HS 1515908010)	metric ton	—	—	114	99	98	92	134	137
Hemp Seed Oilcake and Other Solids (HS 2306900130)	metric ton	—	—	—	—	56	201	2239	298
True Hemp, raw/processed not spun (HS 5302)	metric ton	53	620	121	102	44	36	28	16
True Hemp Yarn (HS 5308200000)	metric ton	6	60	8	9	51	45	22	64
Subtotal		59	680	335	565	772	976	1,134	1,138
True Hemp Woven Fabrics (HS 5311004010)	m2 (1000)	435	654	248	411	479	167	268	251

Source: Compiled by CRS using data from the U.S. International Trade Commission (USITC), <http://dataweb.usitc.gov>. Data are by Harmonized System (HS) code. Data shown as "—" indicate data are not available as breakout categories for some product subcategories were established only recently.

a. Data for 2007-2011 were supplemented by reported Canadian export data for hemp seeds (HS 12079910), Hemp seeds, whether or not broken) as reported by Global Trade Atlas, <http://www.gtis.com/gta/>. Official U.S. trade data reported no imports during these years for these HS subcategories. The Canadian export data as reported by Global Trade Atlas also differ for hemp seed oilcake (15159020), Hemp oil and its fractions, whether or not refined but not chemically modified) but were not similarly substituted since other countries exported product to the United States.

Similarly, the UW-M study concluded that hemp production “is not likely to generate sizeable profits” and although hemp may be “slightly more profitable than traditional row crops” it is likely “less profitable than other specialty crops” due to the “current state of harvesting and processing technologies, which are quite labor intensive, and result in relatively high per unit costs.”³³ The study highlights that U.S. hemp growers could be affected by competition from other world producers as well as by certain production limitations in the United States, including yield variability and lack of harvesting innovations and processing facilities in the United States, as well as difficulty transporting bulk hemp. The study further claims that most estimates of profitability from hemp production are highly speculative, and often do not include additional costs of growing hemp in a regulated market, such as the cost associated with “licensing, monitoring, and verification of commercial hemp.”³⁴

Given the absence since the 1950s of any commercial and unrestricted hemp production in the United States, it is not possible to predict the potential market and employment effects of relaxing current restrictions on U.S. hemp production. While expanded market opportunities might exist in some states or localities if current restrictions on production are lifted, it is not possible to predict the potential for future retail sales or employment gains in the United States, either nationally or within certain states or regions. Limited information is available from previous market analyses that have been conducted by researchers at USDA and land grant universities and state agencies.³⁵

Global Production

Reported International Production

Approximately 30 countries in Europe, Asia, and North and South America currently permit farmers to grow hemp. Some of these countries never outlawed production, while some countries banned production for certain periods in the past. China is among the largest producing and exporting countries of hemp textiles and related products, as well as a major supplier of these products to the United States. The European Union (EU) has an active hemp market, with production in most member nations. Production is centered in France, the United Kingdom, Romania, and Hungary.³⁶

Acreage in hemp cultivation worldwide has been mostly flat to decreasing, reported at about 200,000 acres globally in 2011.³⁷ Although variable year-to-year, global production has increased overall from about 250 million pounds in 1999 to more than 380 million pounds in 2011, mostly due to increasing production of hemp seed (**Figure 2**). Upward trends in global hemp seed

³³ T. R. Fortenbery and M. Bennett, “Opportunities for Commercial Hemp Production,” *Review of Agricultural Economics*, 26(1): 97-117, 2004.

³⁴ *Ibid.*

³⁵ For more information, see CRS Congressional Distribution Memorandum, “Potential U.S. Market Effects of Removing Restrictions on Growing Industrial Hemp,” March 4, 2013, available from Renée Johnson (7-9588).

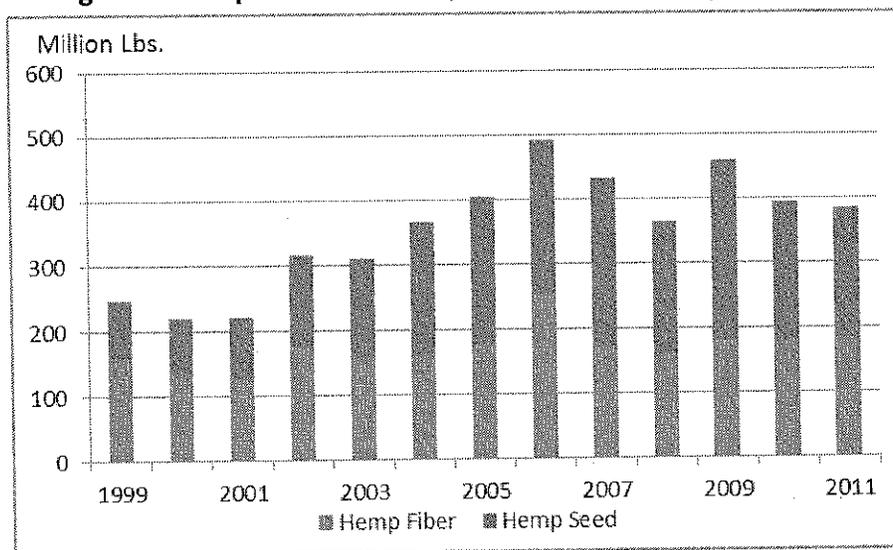
³⁶ Other EU producing countries include Austria, Denmark, Finland, Germany, Italy, Netherlands, Poland, Portugal, Slovenia, and Spain.

³⁷ Food and Agriculture Organization (FAO) of the United Nations, FAOSTAT crop production data, <http://faostat.fao.org/site/567/default.aspx#ancor>.

production roughly track similar upward trends in U.S. imports of hemp seed and oil, mostly for use in hemp-based foods, supplements, and body care products (Table 1).

Many EU countries lifted their bans on hemp production in the 1990s and, until recently, also subsidized the production of “flax and hemp” under the EU’s Common Agricultural Policy.³⁸ EU hemp acreage was reported at about 26,000 acres in 2010, which was below previous years, when more than 50,000 acres of hemp were under production.³⁹ Most EU production is of hurds, seeds, and fibers. Other non-EU European countries with reported hemp production include Russia, Ukraine, and Switzerland. Other countries with active hemp grower and/or consumer markets are Australia, New Zealand, India, Japan, Korea, Turkey, Egypt, Chile, and Thailand.⁴⁰

Figure 2. Hemp Fiber and Seed, Global Production (1999-2011)



Source: FAOSTAT, <http://faostat.fao.org/site/567/default.aspx#ancor>.

Canada is another major supplier of U.S. imports, particularly of hemp-based foods and related imported products. Canada’s commercial hemp industry is fairly new: Canada began to issue licenses for research crops in 1994, followed by commercial licenses starting in 1998.

The development of Canada’s hemp market followed a 60-year prohibition and is strictly regulated.⁴¹ Its program is administered by the Office of Controlled Substances of Health Canada, which issues licenses for all activities involving hemp. Under the regulation, all industrial hemp grown, processed, and sold in Canada may contain THC levels no more than 0.3% of the weight of leaves and flowering parts. Canada also has set a maximum level of 10 parts per million (ppm)

³⁸ For information regarding the EU’s prior agricultural support for industrial hemp, see the EU’s notification to the World Trade Organization regarding its domestic support for agricultural producers (G/AG/N/EEC/68; January 24, 2011); also see “Health Check of the CAP,” May 2008, http://ec.europa.eu/agriculture/healthcheck/guide_en.pdf.

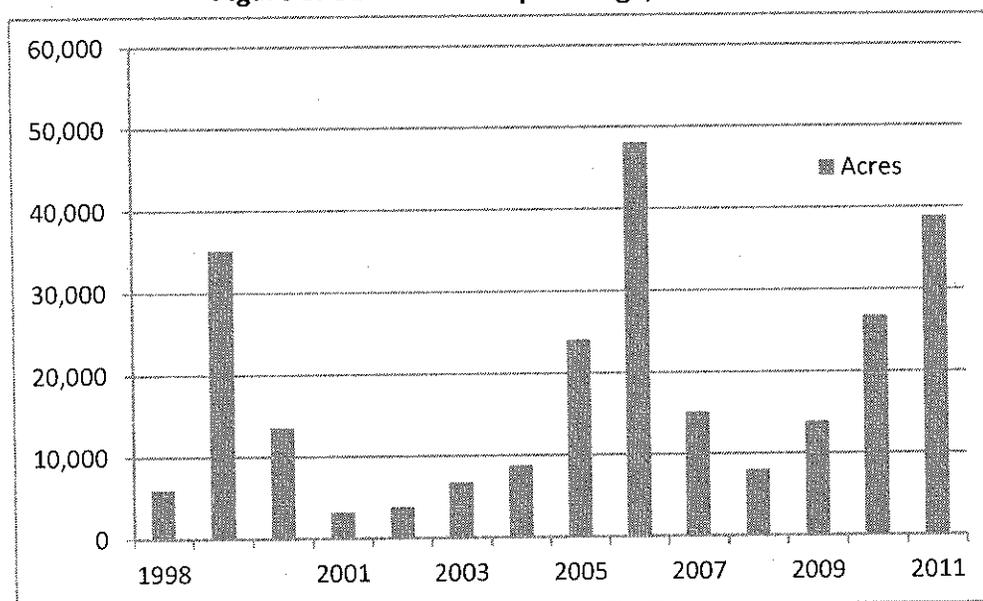
³⁹ M. Carus et al., “The European Hemp Industry,” May 2013. Also see European Industrial Hemp Association, “European Commission: Hemp and Flax, AGRI C5, 2009,” February 2009.

⁴⁰ Additional country information is available at Hemp Industries Association, <http://www.thehia.org/facts.html>.

⁴¹ Industrial Hemp Regulations (SOR/98-156), as part of the Controlled Drugs and Substances Act (<http://laws.justice.gc.ca/en/C-38.8/SOR-98-156/index.html>).

for THC residues in products derived from hemp grain, such as flour and oil.⁴² To obtain a license to grow hemp, Canadian farmers must submit extensive documentation, including background criminal record checks, the Global Positioning System (GPS) coordinates of their fields, and supporting documents (from the Canadian Seed Growers' Association or the Canadian Food Inspection Agency) regarding their use of low-THC hemp seeds and approved cultivars; and they must allow government testing of their crop for THC levels.⁴³ Since hemp cultivation was legalized in Canada, production has been variable year-to-year (Figure 3), ranging from a high of 48,000 acres planted in 2006, to about 4,000 acres in 2001-2002, to a reported nearly 39,000 acres in 2011. Canada's hemp cultivation still accounts for less than 1% of the country's available farmland. The number of cultivation licenses has also varied from year to year, reaching a high of 560 licenses in 2006, followed by a low of 77 licenses in 2008 (with 340 licenses in 2011).⁴⁴

Figure 3. Canadian Hemp Acreage, 1998-2011



Source: Agriculture and Agri-Food Canada, "Industrial Hemp Statistics," <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1174420265572&lang=eng>.

Note: The downturn in 2007 is viewed as a correction of overproduction in 2006, following the "success of the court case against the DEA in 2004, and continued improvements in breeding, production, and processing," which resulted in part in a "dramatic reduction in hemp acreage planted" in 2007. The 2007 downturn is also attributed to "increasingly positive economics of growing other crops" (Manitoba Agriculture, National Industrial Hemp Strategy, March 2008, prepared for Food and Rural Initiative Agriculture and Agri-Food Canada).

⁴² Agriculture Canada, "Canada's Industrial Hemp Industry," March 2007, <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1174595656066&lang=eng>.

⁴³ See Health Canada's FAQs on its hemp regulations (<http://www.hc-sc.gc.ca/hc-ps/substancontrol/hemp-chanvre/about-apropos/faq/index-eng.php#a3>) and its application for obtaining permits (http://www.hc-sc.gc.ca/hc-ps/pubs/precurs/hemp-indus-chanvre/guide/app-demande/hemp-chanvre/guid_append_1-annexe-eng.php). Other information is at the Canadian Food Inspection Agency website (<http://www.inspection.gc.ca/english/plaveg/seesem/indust/hemchae.shtml>).

⁴⁴ Health Canada, Industrial Hemp Section, "Cultivation Licenses," October 25, 2011.

Historical U.S. Production

Hemp was widely grown in the United States from the colonial period into the mid-1800s; fine and coarse fabrics, twine, and paper from hemp were in common use. By the 1890s, labor-saving machinery for harvesting cotton made the latter more competitive as a source of fabric for clothing, and the demand for coarse natural fibers was met increasingly by imports. Industrial hemp was handled in the same way as any other farm commodity, in that USDA compiled statistics and published crop reports,⁴⁵ and provided assistance to farmers promoting production and distribution.⁴⁶ In the early 1900s, hemp continued to be grown and researchers at USDA continued to publish information related to hemp production and also reported on hemp's potential for use in textiles and in paper manufacturing.⁴⁷ Several hemp advocacy groups, including the Hemp Industries Association (HIA) and Vote Hemp Inc., have compiled other historical information and have copies of original source documents.⁴⁸

Between 1914 and 1933, in an effort to stem the use of *Cannabis* flowers and leaves for their psychotropic effects, 33 states passed laws restricting legal production to medicinal and industrial purposes only.⁴⁹ The 1937 Marihuana Tax Act defined hemp as a narcotic drug, requiring that farmers growing hemp hold a federal registration and special tax stamp, effectively limiting further production expansion.

Hemp was briefly brought back into large-scale production during World War II, at the urging of USDA, to provide for "products spun from American-grown hemp" including "twine of various kinds for tying and upholsters work; rope for marine rigging and towing; for hay forks, derricks, and heavy duty tackle; light duty fire hose; thread for shoes for millions of American soldiers; and parachute webbing for our paratroopers," as well as "hemp for mooring ships; hemp for tow lines; hemp for tackle and gear; hemp for countless naval uses both on ship and shore."⁵⁰

In 1943, U.S. hemp production reached more than 150 million pounds (140.7 million pounds hemp fiber; 10.7 million pound hemp seed) on 146,200 harvested acres. This compared to pre-war production levels of about 1 million pounds. After reaching a peak in 1943, production started to decline. By 1948, production had dropped back to 3 million pounds on 2,800 harvested acres, with no recorded production after the late 1950s.⁵¹

⁴⁵ See, for example, editions of USDA *Agricultural Statistics*. A compilation of U.S. government publications is available from the Hemp Industries Association (HIA) at <http://www.hempology.org/ALLARTICLES.html>.

⁴⁶ See, for example, USDA's 1942 short film "Hemp for Victory," and University of Wisconsin's Extension Service Special Circular, "What about Growing Hemp," November 1942.

⁴⁷ Regarding papermaking, see L. H. Dewey and J. L. Merrill, "Hemp Hurds as Paper-Making Material," USDA Bulletin No. 404, October 14, 1916. A copy of this document is available, as posted by Vote Hemp Inc., at <http://www.votehemp.com/17855-h/17855-h.htm>. Other USDA and state documents from this period are available at <http://www.hempology.org/ALLARTICLES.html>.

⁴⁸ See links at <http://www.thehia.org/history.html> and <http://www.hemphistoryweek.com/timeline.html>.

⁴⁹ R. J. Bonnie and C. H. Whitebread, *The Marihuana Conviction: A History of Marihuana Prohibition in the United States* (Charlottesville: University Press of Virginia, 1974), p. 51.

⁵⁰ Text from a short film produced by USDA in 1942, "Hemp for Victory," to promote the cultivation of hemp during WWII. Text from this film, as reported by HIA, is available at <http://www.hempology.org/ALLARTICLES.html>.

⁵¹ USDA *Agricultural Statistics*, various years through 1949. A summary of data spanning 1931-1945 is available in the 1946 edition. See "Table 391—Hemp Fiber and hempseed: Acreage, Yield, and Production, United States."

Currently, industrial hemp is not grown commercially in the United States. No active federal licenses allow U.S. commercial cultivation at this time.

Legal Status in the United States

Federal Law

In 1937, Congress passed the first federal law to discourage Cannabis production for marijuana while still permitting industrial uses of the crop (the Marihuana Tax Act; 50 Stat. 551). Under this statute, the government actively encouraged farmers to grow hemp for fiber and oil during World War II. After the war, competition from synthetic fibers, the Marihuana Tax Act, and increasing public anti-drug sentiment resulted in fewer and fewer acres of hemp being planted, and none at all after 1958.

Strictly speaking, the Controlled Substances Act of 1970 (CSA, 21 U.S.C. §801 et. seq.) does not make growing hemp illegal; rather, it places strict controls on the production of hemp, making it illegal to grow the crop without a DEA permit.

The CSA adopted the same definition of *Cannabis sativa* that appeared in the 1937 Marihuana Tax Act. The definition of “marihuana” (21 U.S.C. §802(16)) reads:

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 ... 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.

The statute thus retains control over all varieties of the cannabis plant by virtue of including them under the term “marijuana” and does not distinguish between low- and high-THC varieties. The language exempts from control the parts of mature plants—stalks, fiber, oil, cake, etc.—intended for industrial uses. Some have argued that the CSA definition exempts industrial hemp under its term exclusions for stalks, fiber, oil and cake, and seeds.⁵² DEA refutes this interpretation.⁵³

Since federal law prohibits cultivation without a permit, DEA determines whether any industrial hemp production authorized under a state statute is permitted, and it enforces standards governing the security conditions under which the crop must be grown. In other words, a grower needs to get permission from the DEA to grow hemp or faces the possibility of federal charges or property confiscation, regardless of whether the grower has a state-issued permit.⁵⁴

⁵² See, for example, *Hemp Industries Association v. Drug Enforcement Administration*, 357 F.2d (9th Circuit 2004).

⁵³ 66 *Federal Register* 51530.

⁵⁴ Registration requirements are at 21 CFR 823. See also DEA’s registration procedures and applications at <http://www.deadiversion.usdoj.gov/drugreg/process.htm> and http://www.deadiversion.usdoj.gov/drugreg/reg_apps/onlineforms_new.htm.

DEA issued a permit for an experimental quarter-acre plot at the Hawaii Industrial Hemp Research Program during the period from 1999 to 2003 (now expired).⁵⁵ Most reports indicate that the DEA has not granted any current licenses to grow hemp, even for research purposes. To date, all commercial hemp products sold in the United States are imported or manufactured from imported hemp materials. In May 2013, it was reported that hemp is being cultivated in Colorado, following changes to that state's laws in November 2012.⁵⁶

Even if DEA were to approve a permit, it could be argued that production might be limited or discouraged because of the perceived difficulties of working through DEA licensing requirements and installing the types of structures necessary to obtain a permit. Obtaining a DEA permit to produce hemp requires that the applicant demonstrate that an effective security protocol will be in place at the production site, such as security fencing around the planting area, a 24-hour monitoring system, controlled access, and possibly armed guard(s) to prevent public access.⁵⁷ DEA application requirements also include a nonrefundable fee, FBI background checks, and extensive documentation. It could also be argued that, because of the necessary time-consuming steps involved in obtaining and operating under a DEA permit, the additional management and production costs from installing structures, as well as other business and regulatory requirements, could ultimately limit the operation's profitability.

The United States is a signatory of the United Nations Single Convention on Narcotic Drugs, 1961 (as amended by the 1972 Protocol Amending the Single Convention on Narcotic Drugs, 1961).⁵⁸ The principal objectives of the convention are to "limit the possession, use, trade in, distribution, import, export, manufacture and production of drugs exclusively to medical and scientific purposes and to address drug trafficking through international cooperation to deter and discourage drug traffickers."⁵⁹ The convention requires that each party control cannabis cultivation within its borders; however, Article 28.2 of the convention states: "This Convention shall not apply to the cultivation of the cannabis plant exclusively for industrial purposes (fibre and seed) or horticultural purposes."⁶⁰ Thus the convention need not present an impediment to the development of a regulated hemp farming sector in the United States.

Previous DEA Actions

DEA's 2003 Rules

In March 2003, DEA issued two final rules addressing the legal status of hemp products derived from the cannabis plant. The DEA found that hemp products "often contain the hallucinogenic substance tetrahydrocannabinols (THC) ... the primary psychoactive chemical found in the

⁵⁵ See, for example, DEA, "Statement from the Drug Enforcement Administration on the Industrial Use of Hemp," March 12, 1998, <http://www.justice.gov/dea/pubs/pressrel/pr980312.htm>.

⁵⁶ S. Raabe, "First major Hemp Crop in 60 Years is Planted in Southeast Colorado," *Denverpost.com*, May 13, 2013.

⁵⁷ University of Kentucky Cooperative Extension Service, "Industrial Hemp—Legal Issues, September 2012," <http://www.uky.edu/Ag/NewCrops/introsheets/hemp.pdf>.

⁵⁸ United Nations Single Convention on Narcotic Drugs, 1961 (as amended by the 1972 Protocol Amending the Single Convention on Narcotic Drugs, 1961), Article 28.

⁵⁹ Information posted on International Narcotics Control Board (INCB) website.

⁶⁰ *Ibid.*

cannabis (marijuana) plant.”⁶¹ Although the DEA acknowledged that “in some cases, a Schedule I controlled substance may have a legitimate industrial use,” such use would only be allowed under highly controlled circumstances. These rules set forth what products may contain “hemp” and also prohibit “cannabis products containing THC that are intended or used for human consumption (foods and beverages).”⁶² Development of the 2003 rule sparked a fierce battle over the permissibility of imported hemp-based food products that lasted from 1999 until 2004.

Dispute over Hemp Food Imports (1999-2004)

In late 1999, during the development of the 2003 rules (described in the previous section), the DEA acted administratively to demand that the U.S. Customs Service enforce a zero-tolerance standard for the THC content of all forms of imported hemp, and hemp foods in particular.

The DEA followed up, in October 2001, with publication of an interpretive rule in the *Federal Register* explaining the basis of its zero-tolerance standard.⁶³ It held that when Congress wrote the statutory definition of marijuana in 1937, it “exempted certain portions of the *Cannabis* plant from the definition of marijuana based on the assumption (now refuted) that such portions of the plant contain none of the psychoactive component now known as THC.” Both the proposed rule (which was published concurrently with the interpretive rule) and the final 2003 rule gave retailers of hemp foods a date after which the DEA could seize all such products remaining on shelves. On both rules, hemp trade associations requested and received court-ordered stays blocking enforcement of that provision. The DEA’s interpretation made hemp with any THC content subject to enforcement as a controlled substance.

Hemp industry trade groups, retailers, and a major Canadian exporter filed suit against the DEA, arguing that congressional intent was to exempt plant parts containing naturally occurring THC at non-psychoactive levels, the same way it exempts poppy seeds containing trace amounts of naturally occurring opiates.⁶⁴ Industry groups maintain that (1) naturally occurring THC in the leaves and flowers of cannabis varieties grown for fiber and food is already at below-psychoactive levels (compared with drug varieties); (2) the parts used for food purposes (seeds and oil) contain even less; and (3) after processing, the THC content is at or close to zero. U.S. and Canadian hemp seed and food manufacturers have in place a voluntary program for certifying low, industry-determined standards in hemp-containing foods. Background information on the TestPledge Program is available at <http://www.TestPledge.com>. The intent of the program is to assure that consumption of hemp foods will not interfere with workplace drug testing programs or produce undesirable mental or physical health effects.

On February 6, 2004, the U.S. Court of Appeals for the Ninth Circuit permanently enjoined the enforcement of the final rule.⁶⁵ The court stated that “the DEA’s definition of ‘THC’ contravenes the unambiguously expressed intent of Congress in the CSA and cannot be upheld.”⁶⁶ In late September 2004 the Bush Administration let the final deadline pass without filing an appeal.

⁶¹ DEA, “DEA History in Depth,” 1999-2003, and other DEA published resources.

⁶² *Ibid.*

⁶³ 66 *Federal Register* 51530.

⁶⁴ 21 U.S.C. §802 (19) and (20).

⁶⁵ 68 *Federal Register* 14113.

⁶⁶ *Hemp Industries Association v. Drug Enforcement Administration*, 357 F.2d (9th Circuit 2004).

Other Policy Statements

In a recent DEA report, the agency acknowledged that it has been reviewing inquiries about the legal status of hemp-based products (such as those shown in **Figure 1**), including inquiries from U.S. Customs inspectors regarding the need for guidance regarding imported hemp products.⁶⁷

DEA took the position that it would follow the plain language of the Controlled Substances Act (CSA), which expressly states that anything that contains “any quantity” of marijuana or THC is a schedule I controlled substance. However, as a reasonable accommodation, DEA exempted from control legitimate industrial products that contained THC but were not intended for human consumption (such as clothing, paper, and animal feed).

DEA’s position that “anything that contains ‘any quantity’ of marijuana or THC” should be regarded as a controlled substance is further supported by reports published by the National Institute on Drug Abuse (NIDA), which is part of the National Institutes of Health. Although NIDA does not have a formal position about industrial hemp, NIDA’s research tends to conflate all cannabis varieties, including marijuana and hemp. For example, NIDA reports: “All forms of marijuana are mind-altering (psychoactive)” and “they all contain THC (delta-9-tetrahydrocannabinol), the main active chemical in marijuana.”⁶⁸ The DEA further maintains that the CSA does not differentiate between different varieties of cannabis based on THC content.⁶⁹

Regarding DEA’s issuance of its 2003 rules and the import dispute that followed (discussed in the previous report sections), the agency continues to maintain that the courts have expressed conflicting opinions on these issues:⁷⁰

Despite the plain language of the statute supporting DEA’s position, the ninth circuit ruled in 2004 that the DEA rules were impermissible under the statute and therefore ordered DEA to refrain from enforcing them. Subsequently, in 2006, another federal court of appeals (the eight circuit) took a different view, stating, as DEA had said in its rules: “The plain language of the CSA states that schedule I(c) includes ‘any material ... which contains any quantity of THC’ and thus such material is regulated.”...⁷¹ Thus, the federal courts have expressed conflicting views regarding the legal status of cannabis derivatives.

Regarding interest among growers in some states to cultivate hemp for industrial use, DEA claims that the courts have supported the agency’s current policy that all hemp growers—regardless of whether a state permit has been issued and of the THC content—are subject to the CSA and must obtain a federal permit.⁷²

Under the CSA, anyone who seeks to grow marijuana for any purpose must first obtain a DEA registration authorizing such activity. However, several persons have claimed that growing marijuana to produce so-called “hemp” (which purportedly contains a relatively low percentage of THC) is not subject to CSA control and requires no DEA registration. All such claims have

⁶⁷ DEA, “DEA History in Depth,” 1999-2003, and other DEA published resources.

⁶⁸ NIDA, “Marijuana: Facts for Teens” (no date), <http://www.drugabuse.gov/MarijBroch/teenpg1-2.html>.

⁶⁹ DEA, “DEA History in Depth,” 1999-2003, and other DEA published resources.

⁷⁰ *Ibid.*

⁷¹ DEA-cited court case: *United States v. White Plume*, 447 F.3d 1067, 1073 (8th Cir. 2006).

⁷² DEA, “DEA History in Depth,” 1999-2003, and other DEA published resources. DEA-cited court cases: *New Hampshire Hemp Council, Inc. v. Marshall*, 203 F.3d 1 (1st Cir 2000); *United States v. White Plume*, *supra*; *Monson v. DEA*, 522 F.Supp.2d 1188 (D. N.D. 2007), No. 07-3837 (8th Cir. 2007).

thus far failed, as every federal court that has addressed the issue has ruled that any person who seeks to grow any form of marijuana (no matter the THC content or the purpose for which it is grown) must obtain a DEA registration.

Regarding states that have enacted laws legalizing cannabis grown for industrial purposes, “these laws conflict with the CSA, which does not differentiate, for control purposes, between marijuana of relatively low THC content and marijuana of greater THC content.”⁷³

Other Federal Actions

In 1994, President Clinton issued Executive Order 12919, entitled “National Defense Industrial Resources Preparedness,” which was intended to strengthen the U.S. industrial and technology base for meeting national defense requirements. The order included hemp among the essential agricultural products that should be stocked for defense preparedness purposes.⁷⁴ Some hemp supporters have argued that the executive order gives hemp a renewed value as a strategic crop for national security purposes, in line with its role in World War II.⁷⁵

USDA has supported research on alternative crops and industrial uses of common commodities since the late 1930s. Some alternative crops have become established in certain parts of the United States—kenaf (for fiber) in Texas, jojoba (for oil) in Arizona and California, and amaranth (for nutritious grain) in the Great Plains states. Many have benefits similar to those ascribed to hemp, but are not complicated by having a psychotropic variety within the same species.

The Critical Agricultural Materials Act of 1984 (P.L. 98-284, 7 U.S.C. §178) supports the supplemental and alternative crops provisions of the 1985 and 1990 omnibus farm acts and other authorities, and funds research and development on alternative crops at USDA and state laboratories. In 2010, USDA recommended \$1.083 million for programs under the act.⁷⁶ In addition, Section 1473D of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (NARETPA, 7 U.S.C. §3319d(c)) authorizes USDA to make competitive grants toward the development of new commercial products derived from natural plant material for industrial, medical, and agricultural applications.⁷⁷ In 2010, USDA recommended \$835,000 for the program.⁷⁸ To date, these authorities have not been used to develop hemp cultivation and use.

State Laws

The past decade has witnessed a resurgence of interest in the United States in producing industrial hemp. Farmers in regions of the country that are highly dependent upon a single crop, such as tobacco or wheat, have shown interest in hemp’s potential as a high-value alternative crop, although the economic studies conducted so far paint a mixed profitability picture.

⁷³ DEA, “DEA History in Depth,” 1999-2003, and other DEA published resources.

⁷⁴ Hemp is included under the category of “food resources,” which it defined to mean, in part, “all starches, sugars, vegetable and animal or marine fats and oils, cotton, tobacco, wool, mohair, hemp, flax, fiber and other materials, but not any such material after it loses its identity as an agricultural commodity or product.”

⁷⁵ J. B. Kahn, “Hemp ... Why Not?” Berkeley Electronic Press (bepress) Legal Series, Paper 1930, 2007.

⁷⁶ USDA’s 2011 Explanatory Notes, <http://www.obpa.usda.gov/17nifa2011notes.pdf>.

⁷⁷ For information, see USDA, http://www.csrees.usda.gov/funding/rfas/pdfs/10_alt_crops.pdf.

⁷⁸ See USDA’s 2011 Explanatory Notes NIFA, <http://www.obpa.usda.gov/17nifa2011notes.pdf>.

Beginning around 1995, an increasing number of state legislatures began to consider a variety of initiatives related to industrial hemp. Most of these have been resolutions calling for scientific, economic, or environmental studies, and some are laws authorizing planting experimental plots under state statutes. Nonetheless, the actual planting of hemp, even for state-authorized experimental purposes, remains regulated by the DEA under the Controlled Substances Act.

A summary of current state legislative actions regarding industrial hemp, according to the advocacy organization Vote Hemp, is as follows (also see text box):⁷⁹

- Nine states have defined industrial hemp as distinct and removed barriers to its production (Colorado, Kentucky, Maine, Montana, North Dakota, Oregon, Vermont, Washington, and West Virginia).
- Three states have passed bills creating commissions or authorizing research (Hawaii, Kentucky, and Maryland).
- Nine states have passed hemp resolutions (California, Colorado, Illinois, Montana, New Hampshire, New Mexico, North Dakota, Vermont, and Virginia).
- Eight states have passed hemp study bills (Arkansas, Illinois, Maine, Minnesota, New Mexico, North Carolina, North Dakota, and Vermont). (Some states have done studies without legislative directive.)

Although several states have established programs under which a farmer may be able to grow industrial hemp under certain circumstances, a grower would still need to obtain a DEA permit and abide by the DEA's strict production controls. This relationship has resulted in some high-profile cases, wherein growers have applied for a permit but DEA has not approved (or denied) a permit to grow hemp, even in states that authorize cultivation under state laws. Ongoing cases involve attempts to grow hemp under state law in North Dakota, Montana, Vermont, and other states. DEA permits to grow hemp have been issued to some university researchers and to the Hawaii Industrial Hemp Research Program.⁸⁰

Changes to Colorado's state laws in November 2012 now allow for industrial hemp cultivation in small test plots, and industrial hemp is now reported as being grown in Colorado.⁸¹ Changes to Kentucky's state laws in April 2013 might also soon allow for hemp to be grown in that state.

North Dakota passed its state law authorizing industrial hemp production in 1999.⁸² In 2007, researchers at North Dakota State University applied for, but did not receive, a DEA permit to cultivate hemp for research purposes in the state.⁸³

⁷⁹ Vote Hemp, "U.S. Federal Industrial Hemp Legislation," <http://www.votehemp.com/legislation.html>.

⁸⁰ CRS communication with Vote Hemp representatives, July 24, 2013.

⁸¹ S. Raabe, "First major Hemp Crop in 60 Years is Planted in Southeast Colorado," *Denverpost.com*, May 13, 2013.

⁸² The North Dakota Department of Agriculture issued final regulations in 2007 on licensing hemp production. For information on the state's requirements, see <http://www.agdepartment.com/Programs/Plant/HempFarming.htm>.

⁸³ See, for example, letter from North Dakota State University to the DEA, July 27, 2007.

Selected State Laws Providing for Hemp Cultivation and Research

Several states have taken steps to legalize the cultivation and research of industrial hemp, including Colorado, Hawaii, Kentucky, Maine, Maryland, Montana, North Dakota, Oregon, Vermont, Washington, and West Virginia.

Colorado (2012): Defined "Industrial Hemp" as the plant of the genus *Cannabis* and any part of such plant, whether growing or not, with a delta-9 tetrahydrocannabinol concentration that does not exceed 0.3% on a dry weight basis. Instructed the state legislature to enact legislation governing the cultivation, processing and sale of industrial hemp by July 1, 2014 (Amendment 64; <http://www.leg.state.co.us/>; <http://www.colorado.gov/>).

Hawaii (2002, 2001, 1996): Provided an extension of previous legislation allowing for privately funded industrial hemp research to be conducted in Hawaii under certain conditions (HB57, <http://www.capitol.hawaii.gov/session2002/status/HB57.asp>; HB32, http://www.capitol.hawaii.gov/session1999/bills/hb32_sd2_.htm). Defined industrial hemp as containing "0.3 percent or less of THC." Provides for the cultivation of an initial test plot of industrial hemp. A previous 1996 law provided for "a study on the economic potential, problems, and other related matters of growing nonpsychoactive industrial cannabis hemp as an agricultural product in Hawaii" (completed in 1997).

Kentucky (2001): Provided for an industrial hemp research program to conduct research on industrial hemp as an agricultural product in Kentucky (HB 100, <http://www.lrc.state.ky.us/recarch/01rs/HB100.htm>).

Maine (2009, 2003): Provided for the growing of industrial hemp if a person holds a license issued by the Commissioner of Agriculture, Food and Rural Resources and the hemp is grown under a federal permit in compliance with the conditions of that permit (LD 1159, <http://www.mainelegislature.org/LawMakerWeb/summary.asp?ID=280032156>). A previous 2003 law authorized the Maine Agricultural Experiment Station to study cultivation of industrial hemp and defined industrial hemp as any variety of *Cannabis sativa* L. with a THC concentration that "does not exceed 0.3% on a dry weight basis" and that is "grown under a federal permit in compliance with the conditions of that permit" (LD 53, http://www.mainelegislature.org/legis/bills_121st/LD.asp?LD=53).

Maryland (2000): Established a pilot program to study the growth and marketing of industrial hemp under certain conditions and in consultation with specified state and federal agencies; also established licensing procedures for researchers who wish to grow hemp for research purposes (HB 1250, <http://mlis.state.md.us/2000rs/billfile/HB1250.htm>).

Montana (2001): Authorized the production of industrial hemp as an agricultural crop under certain conditions; recognized hemp with no more than 0.3% THC as an "agricultural crop" (SB 261).

North Dakota (2007, 2005, 1999, 1997): Authorized the production of industrial hemp, and established licensing procedures to allow local farmers to grow hemp commercially (HB 1428, <http://www.legis.nd.gov/assembly/56-1999/bill-actions/ba1428.html>). Other subsequent bills allowed for feral hemp seed collection and breeding at North Dakota State University (2005, HB 1492), and related to the sale of industrial hemp seed (2007, HB 1490), among other actions (including resolution related to federal policies and appropriations). A previous action in 1997 provided for a study of industrial hemp production in the state (completed in 1998).

Oregon (2009): Permitted production and possession of industrial hemp and trade in industrial hemp commodities and products. Authorized the State Department of Agriculture to administer licensing, permitting and inspection program for growers and handlers of industrial hemp. Allowed the department to charge fees to growers and handlers, and to impose civil penalty not exceeding \$2,500 for violation of license or permit requirements (SB 676, <http://www.leg.state.or.us/09reg/asures/sb0600.dir/sb0676.intro.html>).

Vermont (2008, 1996): Provided for the development of an industrial hemp industry in Vermont (H.267, <http://www.leg.state.vt.us/database/status/summary.cfm?Bill=H%2E0267&Session=2008>). A previous action in 1996 provided for a study of industrial hemp production in the state (completed in 1997).

Washington (2012): Provided for the following definition of "marijuana" to mean all parts of the plant *Cannabis*, whether growing or not, with a THC concentration greater than 0.3 percent on a dry weight basis" (Initiative 502; <http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Initiatives/Initiatives/INITIATIVE%20502.pdf>).

West Virginia (2002): Provided for licensing procedures to allow local farmers to plant, grow, harvest, possess, process and sell hemp commercially (SB 447, http://www.legis.state.wv.us/Bill_Text_HTML/2002_SESSIONS/RS/Bills/SB447%20INTR.htm).

Source: Compiled by CRS from legislation information at various state website and summary information posted by Vote Hemp (<http://www.votehemp.com/state.html>) and NORML (http://norml.org/index.cfm?Group_ID=3395).

Also in 2007, two North Dakota farmers were granted state hemp farming licenses and, in June 2007, filed a lawsuit in U.S. District Court (North Dakota) seeking “a declaratory judgment” that the CSA “does not prohibit their cultivation of industrial hemp pursuant to their state licenses.”⁸⁴ The case was dismissed in November 2007.⁸⁵ The case was appealed to the U.S. Court of Appeals (Eighth Circuit), but was again dismissed in December 2009.⁸⁶ They filed an appeal in May 2010.⁸⁷

Montana passed its state law authorizing hemp production in 2001. In October 2009, Montana’s Agriculture Department issued its first state license for an industrial hemp-growing operation in the state. Media reports indicate that the grower does not intend to request a federal permit, which would make the grower’s attempt to grow hemp technically illegal. Some argue that this case could pose a potential challenge to DEA of whether it is willing to override the state’s authority to allow for hemp production in the state, as well as a test of state’s rights.⁸⁸

In California, there are ongoing efforts to revise the definition of marijuana to exclude “industrial hemp.” Previous efforts in 2011 to allow for a hemp pilot program in selected counties in California were vetoed by the state’s governor.⁸⁹

Legislative Activity

The 113th Congress has considered certain changes to U.S. policies regarding industrial hemp during the 2013 farm bill debate. In the Senate, Senators Wyden, McConnell, Paul, and Merkley introduced an amendment to the Senate version of the farm bill (S. 954, the Agriculture Reform, Food and Jobs Act of 2013). The amendment (S.Amdt. 952) would have amended the CSA to exclude industrial hemp from the definition of marijuana. The amendment was not adopted as part of the Senate-passed farm bill.

In the House, Representatives Polis, Massie, and Blumenauer introduced an amendment to the House version of the farm bill (H.R. 1947, the Federal Agriculture Reform and Risk Management Act of 2013) during floor debate on the bill. The amendment (H.Amdt. 208) would allow institutions of higher education to grow or cultivate industrial hemp for the purpose of agricultural or academic research, and would apply to states that already permit industrial hemp growth and cultivation under state law. The amendment was adopted by the House of Representatives. However, the full House ultimately voted to reject H.R. 1947. Similar language was included as part of a subsequent revised version of the House bill (H.R. 2642), which was passed by the full House.

Other introduced legislation would provide for even greater opportunities for commercial cultivation of industrial hemp in the United States.

⁸⁴ *David Monson and Wayne Hauge v. Drug Enforcement Administration and United States Department of Justice*, Complaint for Declaratory Judgment, U.S. District Court for the District of North Dakota, June 18, 2007. For an overview, see Vote Hemp Inc. website: http://www.votehemp.com/legal_cases_ND.html#overview

⁸⁵ *Monson v. DEA*, 522 F. Supp. 2d 1188 (D.N.D. 2007).

⁸⁶ *Monson v. DEA*, 589 F.3d 952 (8th Cir. 2009).

⁸⁷ S. Roesler, “ND farmers file another industrial hemp appeal in district court,” *Farm & Ranch Guide*, June 4, 2010.

⁸⁸ M. Brown, “First license issued to Montana hemp grower,” *Missoulian*, October 27, 2009.

⁸⁹ S. Nidever, “Brown Vetoes Bill That Would Have Allowed Industrial Hemp,” *Hanford Sentinel*, October 11, 2011.

The Industrial Hemp Farming Act was first introduced in the 109th Congress by former Representative Ron Paul, and was reintroduced in subsequent legislative sessions (H.R. 1831, 112th Congress; H.R. 1866, 111th Congress; H.R. 1009, 110th Congress; H.R. 3037, 109th Congress). In the 112th Congress, Senator Ron Wyden introduced S. 3501 in the Senate.⁹⁰

In the 113th Congress, the Industrial Hemp Farming Act of 2013 (Massie/H.R. 525; Wyden/S. 359) is intended to facilitate the possible commercial cultivation of industrial hemp in the United States. The bill would amend Section 102 of the Controlled Substances Act (21 U.S.C. 802(16)) to specify that the term “marijuana” does not include industrial hemp, which the bill would define based on its content of delta-9 tetrahydrocannabinol (THC), marijuana’s primary psychoactive chemical. Such a change could remove low-THC hemp from being covered by the CSA as a controlled substance and subject to DEA regulation, thus allowing for industrial hemp to be grown and processed under some state laws. If enacted, these bills could remove low-THC hemp from being covered by the CSA as a controlled substance and subject to DEA regulation. The bill could grant authority to any state permitting industrial hemp production and processing to determine whether any such cannabis plants met the limit on THC concentration as set forth in the CSA. In any criminal or civil action or administrative proceeding, the state’s determination may be conclusive and binding. Some in Congress believe that industrial hemp production could result in economic and employment gains in some states and regions.⁹¹

Groups Supporting/Opposing Legislation

In addition to groups such as HIA and Vote Hemp Inc. that are actively promoting reintroducing hemp as a commodity crop in the United States, some key agricultural groups also support U.S. policy changes regarding industrial hemp. For example:

- The National Farmers Union (NFU) updated its 2013 farm policy regarding hemp to urge the President, Attorney General, and Congress to “direct the U.S. Drug Enforcement Administration (DEA) to reclassify industrial hemp as a non-controlled substance and adopt policy to allow American farmers to grow industrial hemp under state law without affecting eligibility for USDA benefits.”⁹² Previously NFU’s policy advocated that the DEA “differentiate between industrial hemp and marijuana and adopt policy to allow American farmers to grow industrial hemp under state law without requiring DEA licenses.”⁹³

⁹⁰ Previous versions of the bill differ. Section 3 of the 2009 bill would apply when a state has an industrial hemp regulatory scheme, whereas the 2011 bills would apply whenever state law permits “making industrial hemp,” which a state might do by exempting hemp making from its controlled substance regulatory scheme. Section 3 of the 2009 bill would have afforded state officials “exclusive authority” to construe the proposed hemp exclusion from the definition of marijuana (amending 21 U.S.C. §802(16)(B)), whereas the 2011 bills would include within the proposed industrial hemp exclusion (amending 21 U.S.C. §802(57)) any industrial hemp grown or possessed in accordance with state law relating to making industrial hemp. For more information, contact Charles Doyle, CRS attorney, 7-6968.

⁹¹ See, for example, B. Schreiner, “Senate Committee Approves Hemp Legislation,” *Associated Press*, February 11, 2013; also press release of Senate Minority Leader, Mitch McConnell, “Industrialized Hemp Will Help Spur Economic Growth and Create Jobs in Kentucky,” January 31, 2013.

⁹² NFU, “Policy of the National Farmers Union,” March 2-5, 2013.

⁹³ NFU, “National Farmers Union Adopts New Policy on Industrial Hemp,” March 22, 2010. Also see NFU, “Policy of the National Farmers Union,” enacted by delegates to the 108th annual convention, Rapid City, SD, March 14-16, 2010.

- The National Association of State Departments of Agriculture (NASDA) “supports revisions to the federal rules and regulations authorizing commercial production of industrial hemp,” and has urged USDA, DEA, and the Office of National Drug Control Policy to “collaboratively develop and adopt an official definition of industrial hemp that comports with definitions currently used by countries producing hemp.” NASDA also “urges Congress to statutorily distinguish between industrial hemp and marijuana and to direct the DEA to revise its policies to allow USDA to establish a regulatory program that allows the development of domestic industrial hemp production by American farmers and manufacturers.”⁹⁴
- The National Grange voted in 2009 to support “research, production, processing and marketing of industrial hemp as a viable agricultural activity.”⁹⁵
- Regional farmers’ organizations also have policies regarding hemp. For example, the North Dakota Farmers Union (NDFU), as part of its federal agricultural policy recommendations, has urged “Congress to legalize the production of industrial hemp.”⁹⁶ The Rocky Mountain Farmers Union (RMFU) has urged “Congress and the USDA to re-commit and fully fund research into alternative crops and uses for crops” including industrial hemp; also, they “support the decoupling of industrial hemp from the definition of marijuana” under the CSA and “demand the President and the Attorney General direct the U.S. Drug Enforcement Agency (DEA) to differentiate between industrial hemp and marijuana and adopt a policy to allow American farmers to grow industrial hemp under state law without requiring DEA licenses,” to “legalize the production of industrial hemp as an alternative crop for agricultural producers.”⁹⁷
- In California, ongoing efforts to revise the definition of marijuana to exclude “industrial hemp” (SB 566) is supported by the State’s Sheriffs’ Association.⁹⁸ Previous efforts in 2011 to establish a pilot program to grow industrial hemp in selected counties were supported by the county farm bureau and two sheriff’s offices (although the bill, SB 676, was later vetoed by the state’s governor).⁹⁹

Despite support by some, other groups continue to oppose policy changes regarding cannabis. For example, the National Alliance for Health and Safety, as part of Drug Watch International, claims that proposals to reintroduce hemp as an agricultural crop are merely a strategy by “the international pro-drug lobby to legalize cannabis and other illicit substances.”¹⁰⁰ The California Narcotic Officer’s Association claims that allowing for industrial hemp production would undermine state and federal enforcement efforts to regulate marijuana production, since they claim the two crops are not distinguishable through ground or aerial surveillance, but would

⁹⁴ NASDA, “New Uses of Agricultural Products,” 2010, <http://www.nasda.org/cms/7196/9017/9350/7945.aspx>.

⁹⁵ The National Grange, “Legislative Policies,” http://www.nationalgrange.org/legislation/policy/policy_ag.htm; also see The National Grange, “Hemp Policy,” <http://www.grangehemppolicy.info/>.

⁹⁶ NDFU, “2010 Program of Policy & Action,” p. 8; also see <http://www.ndfu.org>.

⁹⁷ RMFU, “Policy 2010,” <http://www.rmfu.org/pdfs/RMFUPolicy10.pdf>, p. 6, pp. 15-16, and p. 24.

⁹⁸ Letter from the California State Sheriff’s Association to Chairwoman Cathleen Galgiani of the State Senate Agriculture Committee, March 21, 2013.

⁹⁹ Letters of support for SB 678 to California State Senator, Mark Leno, from the Imperial County Farm Bureau (June 16, 2011), Office of Sheriff, Kings County (July 19, 2011), and Office of Sheriff, Kern County (July 21, 2011).

¹⁰⁰ See, for example, Drug Watch International, “Position Statement on Hemp (*Cannabis sativa* L.),” November 2002.

require costly and time-consuming lab work to be conducted.¹⁰¹ This group also claims that these similarities would create an incentive to use hemp crops to mask illicit marijuana production, since marijuana is such a lucrative cash crop.¹⁰² Concerns about the potential linkages to the growing and use of illegal drugs are also expressed by some parent and community organizations, such as Drug Free America Foundation, Inc. and PRIDE Inc.¹⁰³

Given the DEA's current policy positions (see section titled "Previous DEA Actions") and perceived DEA opposition to changing its current policies because of concerns over how to allow for hemp production without undermining the agency's drug enforcement efforts and regulation of the production and distribution of marijuana, further policy changes regarding industrial hemp are likely not forthcoming absent congressional legislative action.

Concluding Remarks

Hemp production in the United States faces a number of obstacles in the foreseeable future. The main obstacles facing this potential market are U.S. government drug policies and DEA concerns about the ramifications of U.S. commercial hemp production. These concerns are that commercial cultivation could increase the likelihood of covert production of high-THC marijuana, significantly complicating DEA's surveillance and enforcement activities and sending the wrong message to the American public concerning the government's position on drugs. DEA officials and a variety of other observers also express the concern that efforts to legalize hemp—as well as those to legalize medical marijuana—are a front for individuals and organizations whose real aim is to see marijuana decriminalized.¹⁰⁴

Hemp production in the United States also faces competition from other global suppliers. The world market for hemp products remains relatively small, and China, as the world's largest hemp fiber and seed producer, has had and likely will continue to have major influence on market prices and thus on the year-to-year profits of producers and processors in other countries.¹⁰⁵ Canada's head start in the North American market for hemp seed and oil also would likely affect the profitability of a start-up industry in the United States.

Nevertheless, the U.S. market for hemp-based products has a highly dedicated and growing demand base, as indicated by recent U.S. market and import data for hemp products and ingredients, as well as market trends for some natural foods and body care products. Given the existence of these small-scale, but profitable, niche markets for a wide array of industrial and consumer products, commercial hemp industry in the United States could provide opportunities as an economically viable alternative crop for some U.S. growers.

¹⁰¹ Letter from the California Narcotic Officer's Association to Governor Arnold Schwarznegger, September 18, 2007.

¹⁰² CRS conversation with John Coleman, August 22, 2011.

¹⁰³ Information provided to CRS by Jeanette McDougal, National Alliance for Health and Safety, August 22, 2011.

¹⁰⁴ For more information on legislative and executive branch actions concerning illegal drugs, see CRS Report RL32352, *War on Drugs: Reauthorization and Oversight of the Office of National Drug Control Policy*. For information on issues pertaining to medical marijuana, see CRS Report RL33211, *Medical Marijuana: Review and Analysis of Federal and State Policies*.

¹⁰⁵ T. R. Fortenbery and M. Bennett, "Opportunities for Commercial Hemp Production," *Review of Agricultural Economics*, vol. 26, no. 1, Spring 2004, pp. 97-117. The time period covered in this study ends with the year 2000.

Appendix. Listing of Selected Hemp Studies

Below is a listing of reports and studies, ranked by date (beginning with the most recent).

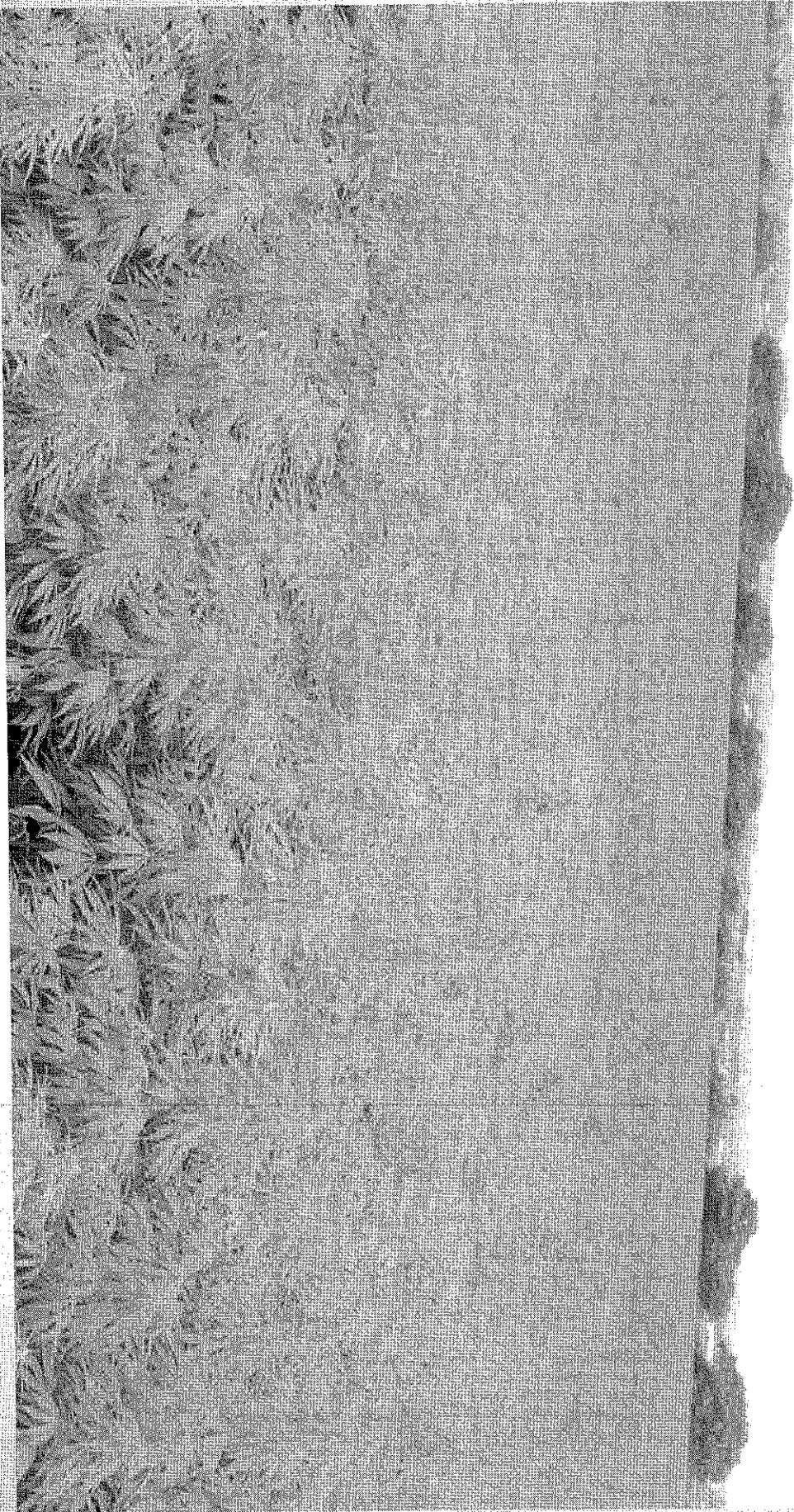
- C. A. Kolosov, "Regulation of Industrial Hemp under the Controlled Substances Act" *UCLA Law Review*, vol. 57, no. 237, October 2009, <http://uclalawreview.org/pdf/57-1-5.pdf>.
- Manitoba Agriculture, *National Industrial Hemp Strategy*, March 2008 (prepared for Food and Rural Initiative Agriculture and Agri-Food Canada).
- Reason Foundation, "Illegally Green: Environmental Costs of Hemp Prohibition," Policy Study 367, March 2008, <http://www.reason.org/ps367.pdf>.
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*Hemp in Kentucky???

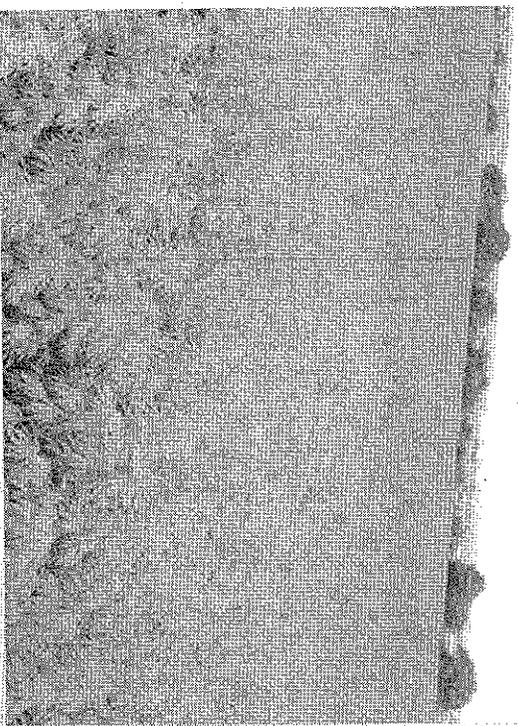


*Industrial Hemp

- *Hemp has been grown for over 12,000 years
- *Hemp was a major crop in Kentucky early 1900's and again during World War II.
- *The United States is the only industrialized nation that does not allow production of industrial hemp.

*Federal Regulation

- *The first federal law restricting hemp production was the Marijuana Tax Act of 1937 *Cannabis sativa*
- *The Controlled Substance Act 1970 - declared all cannabis varieties as a controlled substance and under the regulatory authority of DEA (Drug Enforcement Authority)



*World view

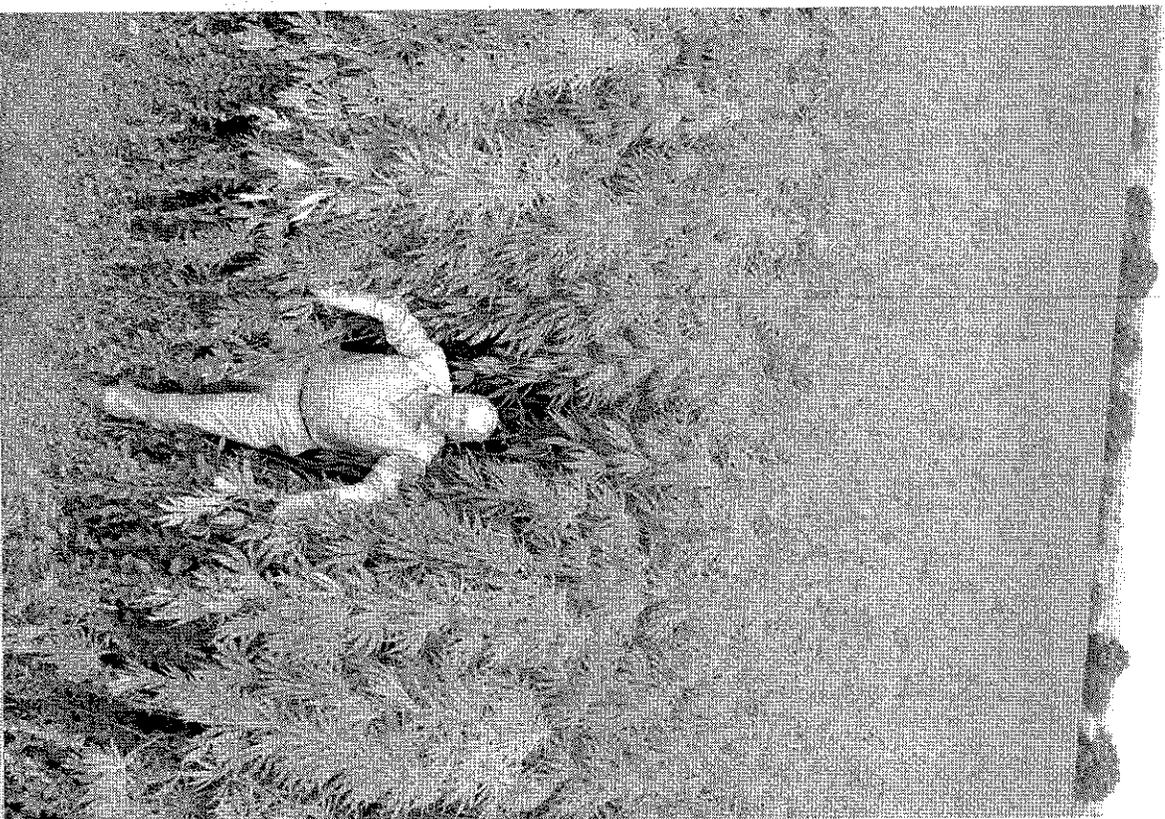
- *55,600 metric tons, with China, South Korea and the Russian Federation as the lead producers (none of these countries has ever made industrial hemp cultivation illegal).
- *70% of total world supply.
- *Hemp is government subsidized in these countries.

*Canada

*Canada had 38,828 licensed acres in 2011. Over 80 percent of this was for seed production

*Canada estimated gross revenue of between \$30.75 million to \$34.17 million

*Canada exports industrial hemp in the form of hemp seeds, fiber, oil and oil-cake. In 2010, exports of hemp seed and hemp products were valued at more than \$10 million, with most exports going to the U.S.



* Questions about Hemp

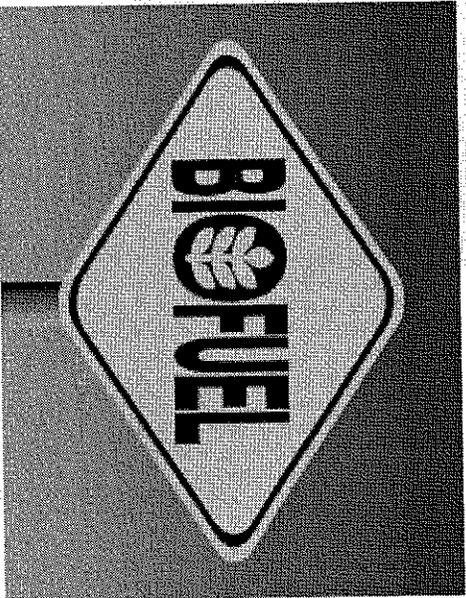
- * Marketing?
- * Uses?
- * Processing?
- * How do you raise?
- * Restrictions?
- * Equipment - planting, harvesting?
- * When? Growing season?
- * Transportation?
- * Profitable?

*Hemp as a fuel

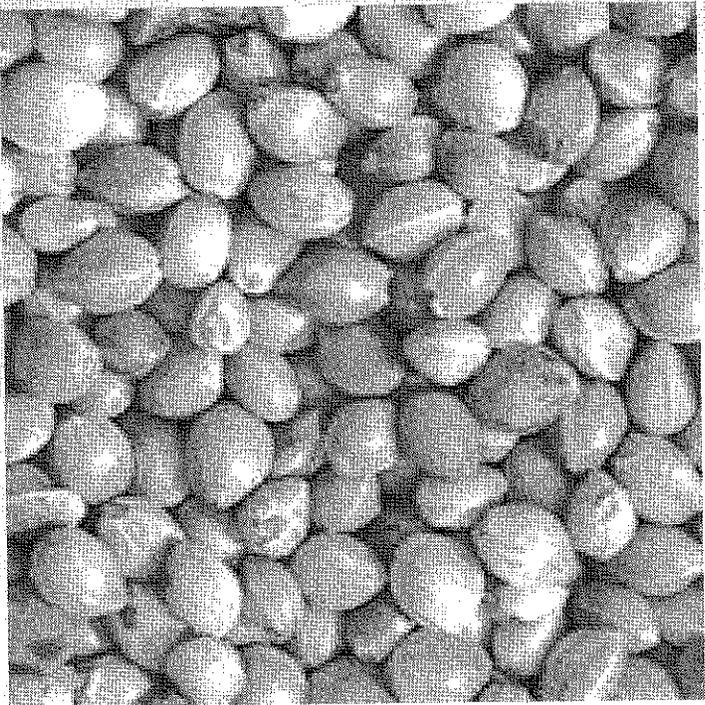
*Hemp can provide two types of fuel.

1. Hemp biodiesel - made from the oil of the (pressed) hemp seed.
2. Hemp ethanol/methanol - made from the fermented stalk

*Hemp fuels - Environmentally friendly fuel sources

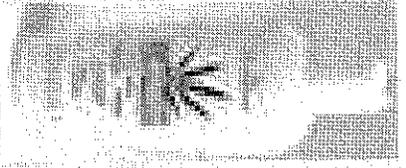


*Hemp as feed or food?



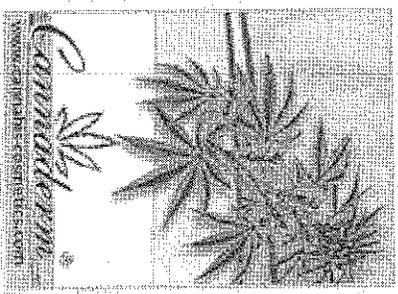
- *Hemp seed added to the diet is great source of polyunsaturated essential fatty acids. Hemp studies indicate a positive effect on cardiovascular function, organ function, immunity levels, inflammation and muscle recovery.
- *30-40% of weight of hemp seed edible oils
- *Contains all 21 amino acids including 9 essentials
- *high in protein and good fatty acids

*Hemp as lotions and cosmetics

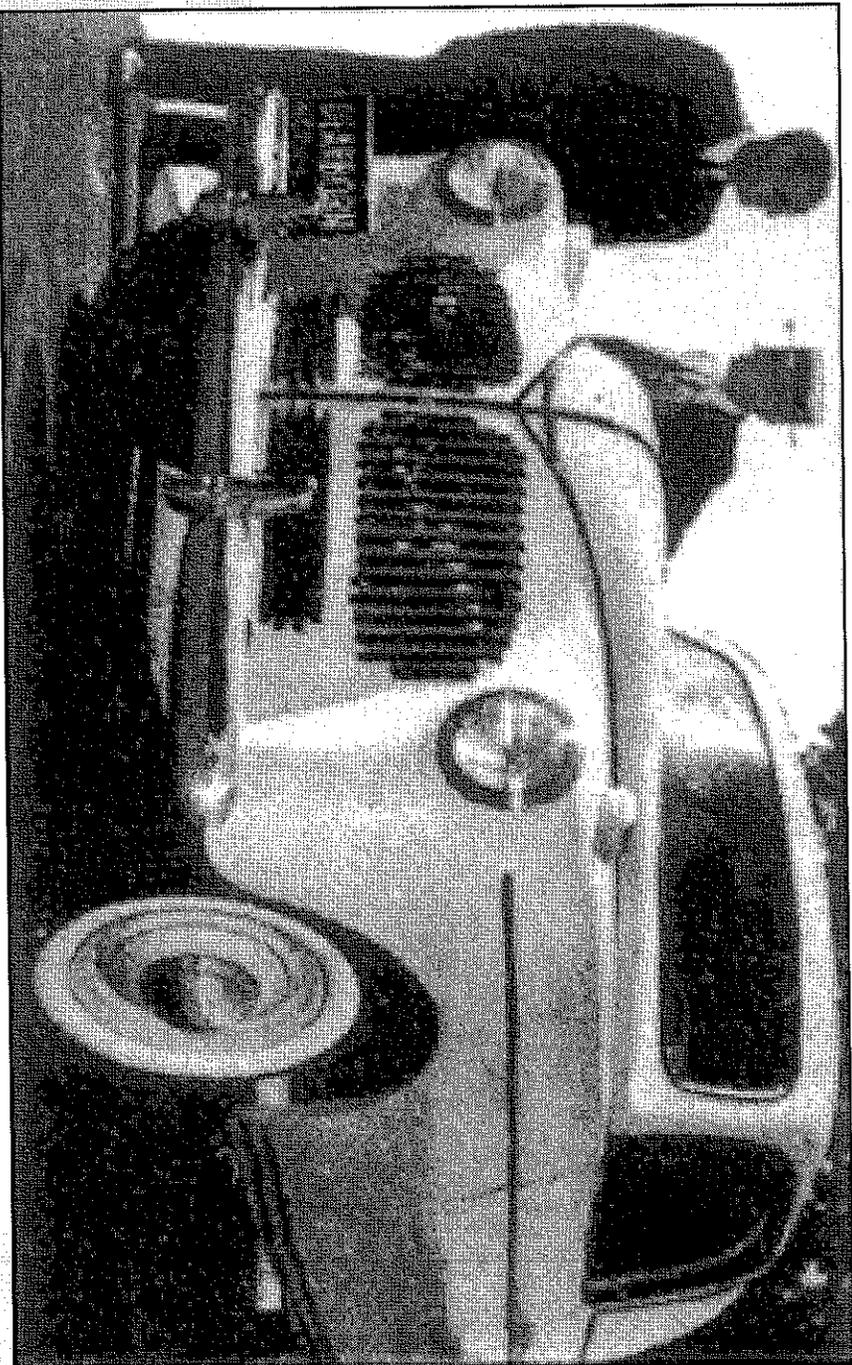


*Hemp cream

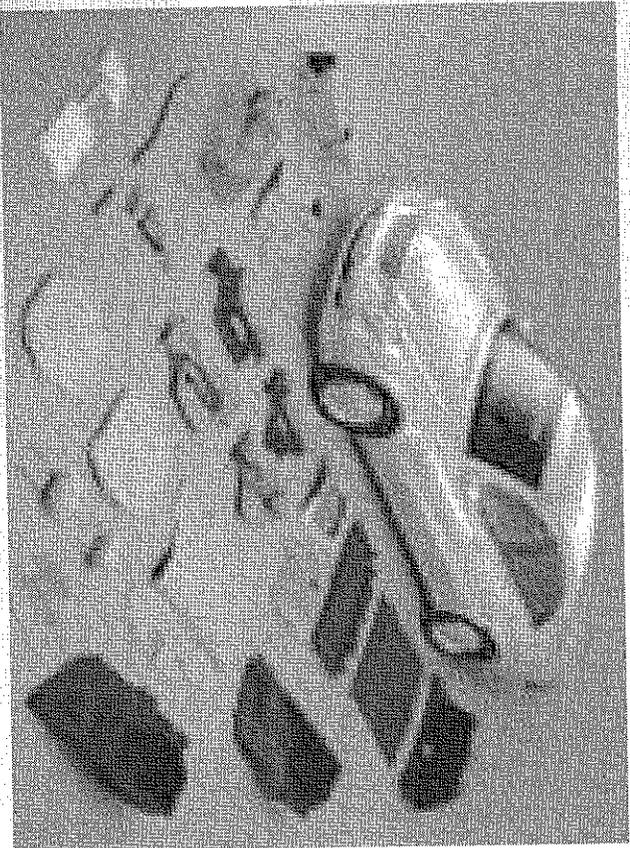
*Hemp oil



*Henry Ford's Hemp car



*Hemp for auto parts

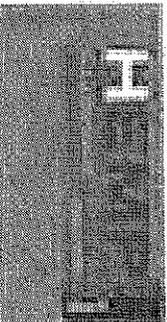


* Scientists say the materials are biodegradable and can increase fuel efficiency since they weigh about 30 percent less than currently used materials.

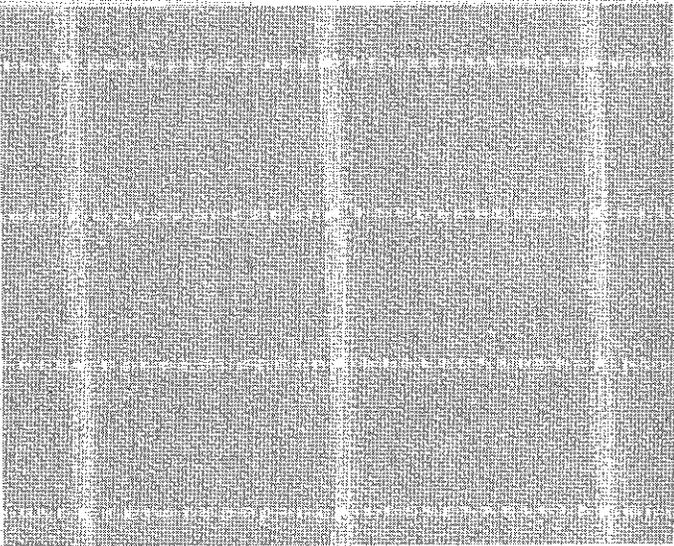
* Hemp fibers have higher strength-to-weight ratios than steel and can also be considerably cheaper to manufacture

*Hemp for paper

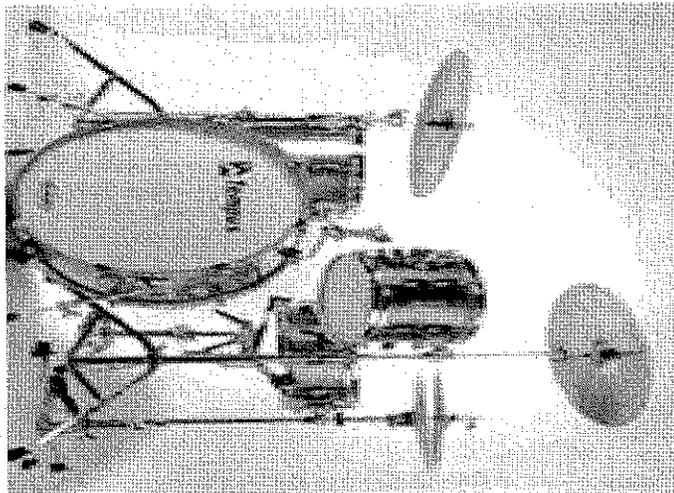
- *75-90% of all paper in the world was made with hemp fiber until 1883.
- *93% of the world's paper is made of wood
- *Trees 30% cellulose, Hemp 85% cellulose
- *Jefferson drafted the Declaration of Independence on hemp paper



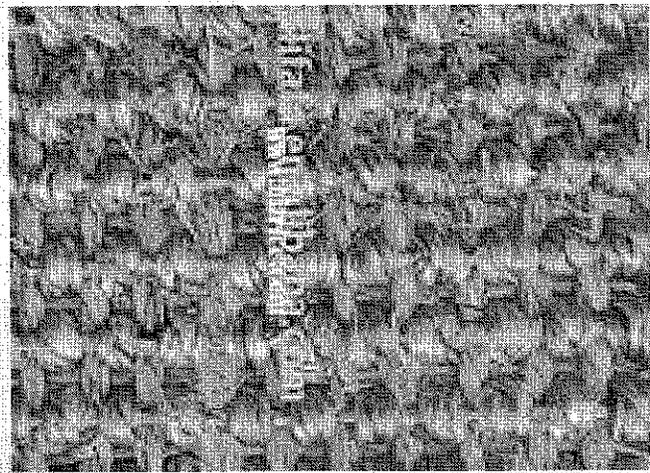
***Hemp for
Upholstery**



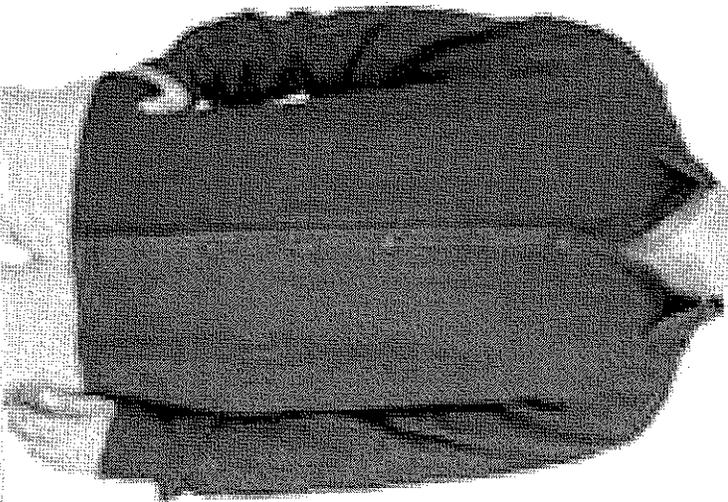
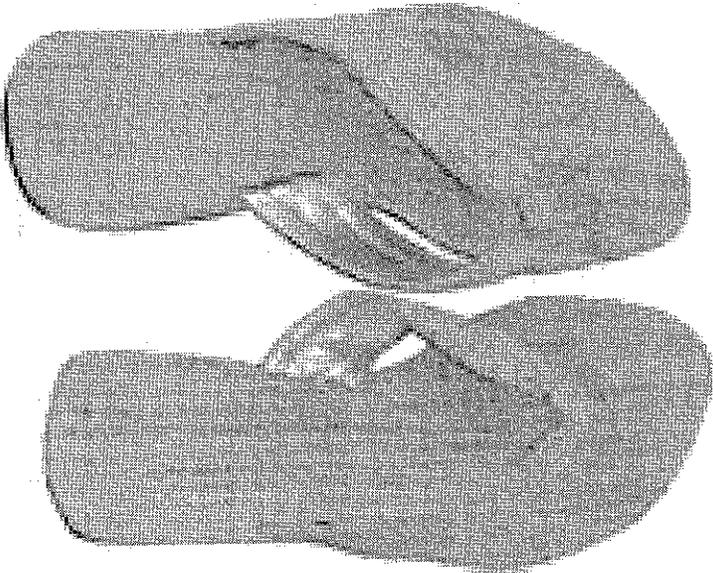
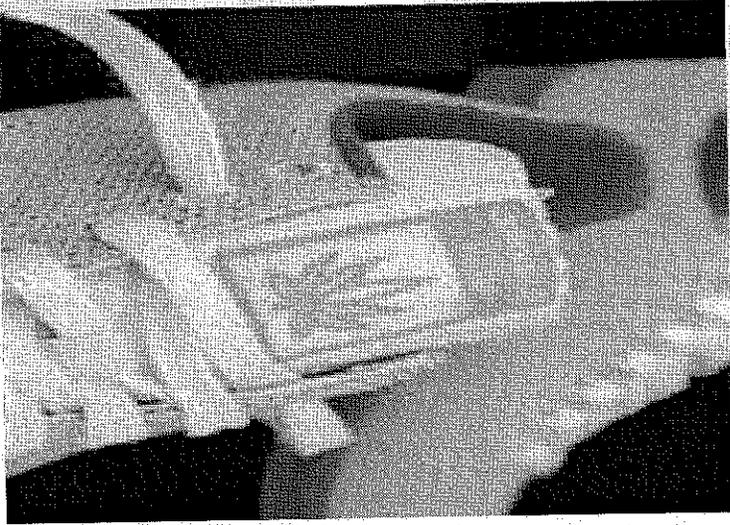
Fiberglass



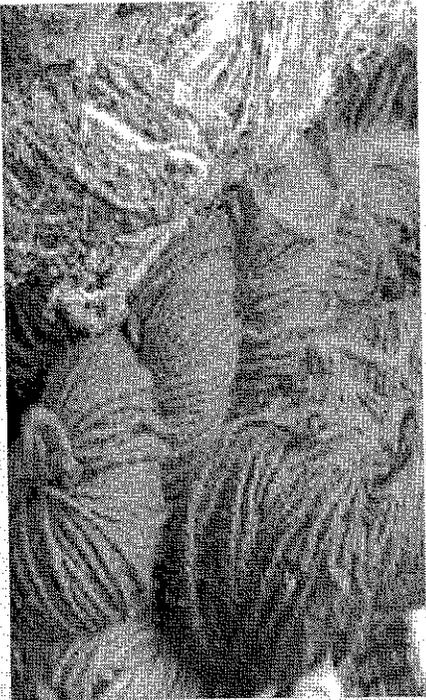
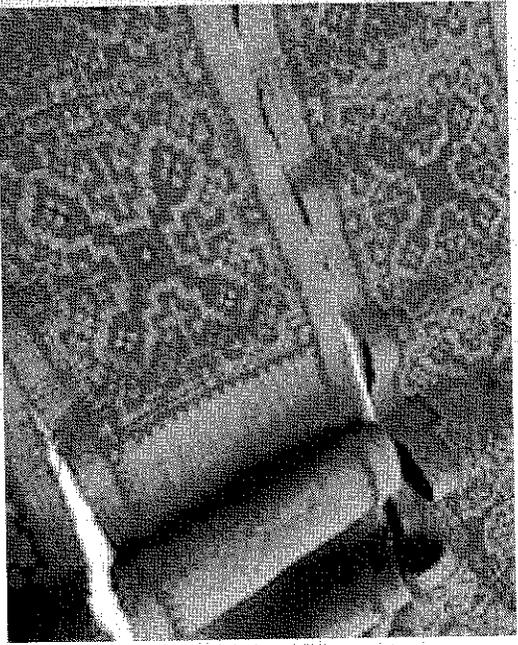
Carpet



*Hemp for clothes



*Hemp for Textiles



* **Hemp v. Marijuana: The Great Misperception**

- * One product that will not be produced from industrial hemp is marijuana.
- * Industrial hemp will cross-pollinate with marijuana greatly lowering the drug content of the Marijuana.
- * Hemp 0.30% (THC drug)
- * Marijuana 10-30% THC

*5 players in Hemp

- * University of Kentucky
- * Kentucky State Police
- * Kentucky Hemp Commission
- * Kentucky Department of Agriculture
- * Growers

*University of Kentucky - Research

- * Electricity
- * Bio fuel
- * Seed varieties
- * Adaptability to reclaimed ground
- * Seed oil for fuels
- * Assessment production cost
- * Soil types
- * Growing conditions
- * Harvesting methods

*Kentucky Hemp Commission

- * Establish a license system (research and commercial)
- * Establish license fees
- * Notify state police and local county sheriff (size, location and duration of hemp site)
- * Forward applications for background checks
- * Shall seek private funding for commission and research
- * Annual report to Governor and LRC
- * Assist growers in compliance

* Kentucky State Police

- * Perform background checks
- * Approve applications
- * Inspect growing sites

*Kentucky Department of Agriculture

- * Serve as administrative support to Hemp commission and research universities
- * Testing of Hemp
- * Financial accounting and record keeping of licenses
- * Hemp commission meeting coordination and staffing

*GROWERS

- * Licenses
- * Report seed type and variety
- * Provide legal description and GPS location
- * Allow inspection and testing
- * Notify upon sale
- * Be only individual to transport
- * Records for 3 years
- * Provide copies of contracts once sold

* 3 choices

* Seed - 75%

* Fiber - 25%

* Both

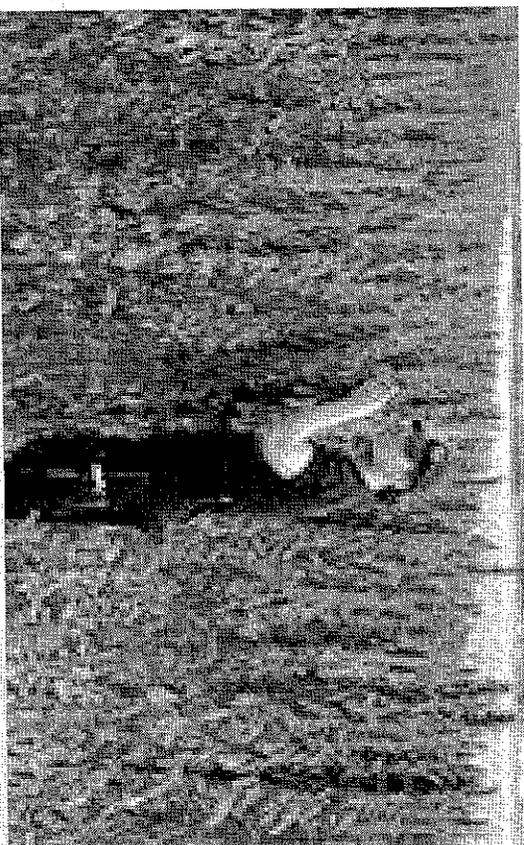
*Hemp Production

- * Seed bed - well drained soils
- * Sandy-loam soil type (firm, level, and fine)
- * Compaction is a problem (accommodate tap root)
- * (Clay type soils negative)
- * Soil PH 6.0 up to 7.2
- * 27 seed varieties in Canada - Seed and oil production or Fiber
- * 41 varieties in European Union



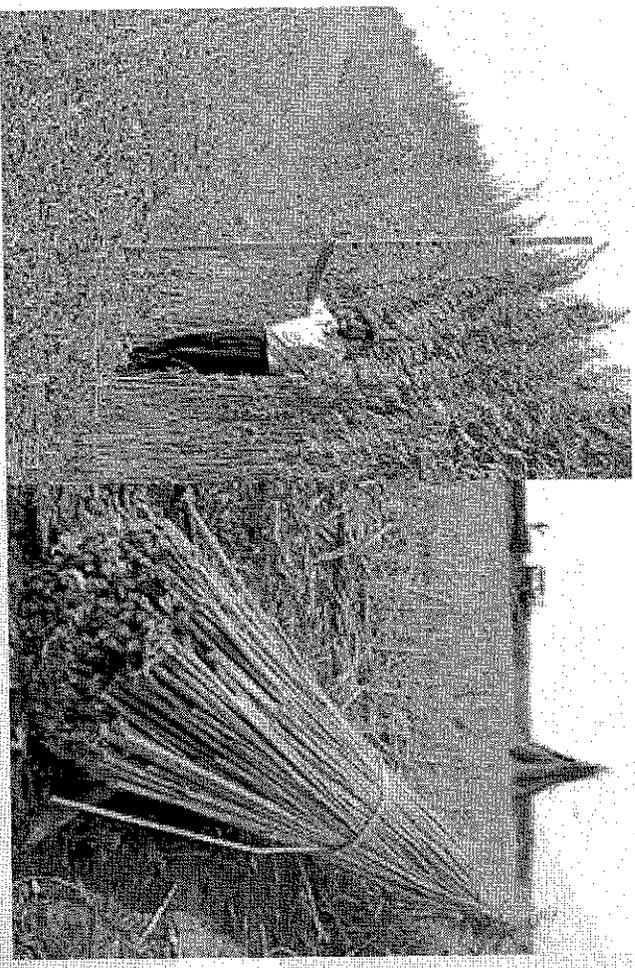
*Hemp Production

- * Plant rows 6-7 inches
- * Plant April to May in Canada
- * 3-4 weeks 12-15 inches tall with 90% ground cover for weed control
- * No pesticides or herbicides approved for Hemp
- * Same fertility as wheat (\$100-125 acre)
- * Mature to fiber in 60-90 days
- * Seed production 110-150 days



*Hemp Harvesting

- *Plants get 10-15 feet tall
- *Yields 1-5.5 tons per acre of fiber
- *Combine for seed
- *Cut with disk mower - fiber
- *Grain and fiber: combine then recut for fiber
- *For textiles cut in early flowering stage
- *Retting: process of separating fiber from other plant material (14-28 days) windrow and turn



*Hemp environmentally

- *Mop crop - Cleans impurities from the soil
 - using around Chernobyl to clean up contaminants
- *Soil texture - tap root loosens soil for next crop

*Economic Impact

*Studies have shown that hemp could be at least the third most profitable crop in Kentucky.

*Seed - Caudill Seed Co

*Processing and Manufacturing

- Tobacco company

*Companies interested

- Health food company
- Snack food company
- Cosmetic and body lotion company
- Auto manufacturer - dashboards, side panels

*Seed/Oil/Meal



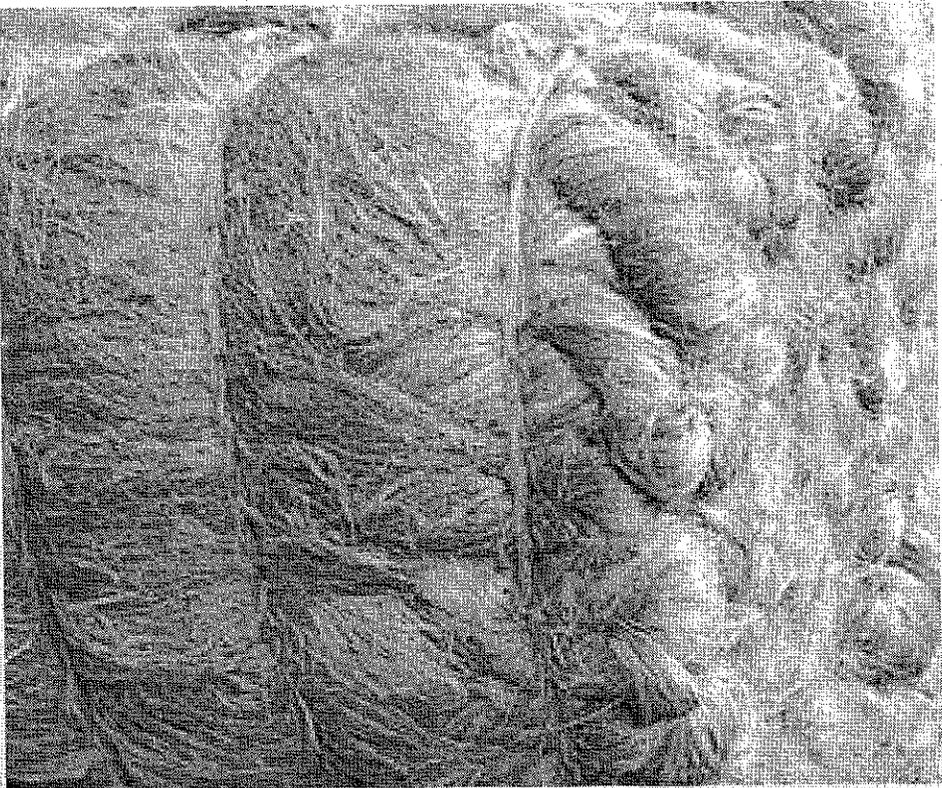
* Seed Yield-300-800
lbs. per acre

* \$.40-1.00 per pound

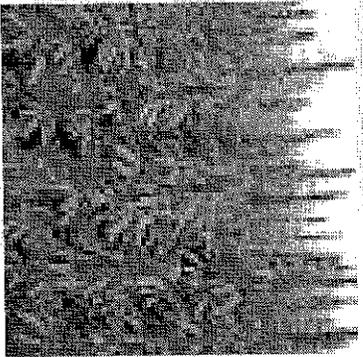
* Seed - \$300- \$800

*Fiber

- *Yields 1-5.5 tons per acre of fiber
- *12,000 lbs. straw per hectare = 5,000 pound acre
- *25% of straw = fiber 1215 pounds
- *Fiber price \$70-\$180 per ton
- *Fiber \$100-\$900
- *Total estimates \$400-\$1400
- *Best guess \$900-\$1100



*Why would we not grow hemp?



Constraints

- * Profitability (yield, price)
- * Government restriction, red tape
- * Risk? (crop insurance)
- * Market place - take place of something (cotton, plastic, etc.)
- * What will it take place of on farm? Corn, soybeans, tobacco, pasture, hay, trees?
- * Market location - Transport to market

*Summary

- *Hemp is presently a niche market
- *Marketing determines demand
- *We can grow it in Kentucky
- *Industrial hemp as a product has nearly unlimited potential.
- *Presently in Canada seed generate 75% and fiber 25% of income from hemp.
- *Hemp genetics dormant since early 1900's needs upgrade
- *Harvesting equipment needs upgrade
- *Processing and manufacturing need to be modernized to use everything
- *Plants should be located close to where product is grown - Bulky to transport.

*Where are we?

*Legislation passed puts a framework in place to grow industrial hemp in Kentucky

*Federal law prohibits growing at this time

- (Commissioner Comer trip gives hope) Speaker Boehner, Sen. McConnell looking to attach either Rep Massey or Sen. Paul bill.

*We believe the potential is great!

*Kentucky first?

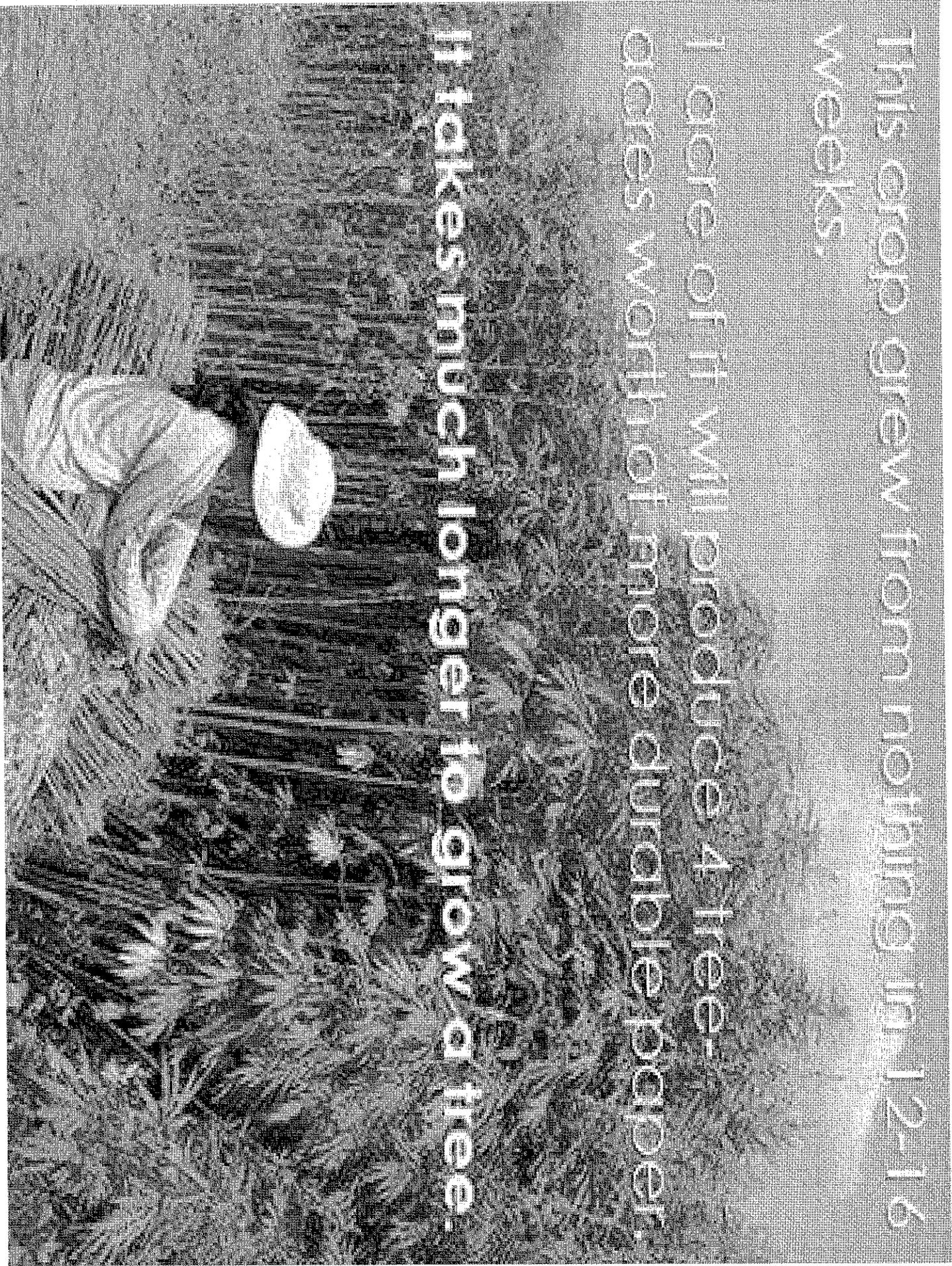
*We want to be first!

- create an infrastructure of Kentucky growers, processors, manufacturers, and marketers.
- create profitable economic activity from small farm through agri-business and retail.
- agriculture as economic development (jobs)

This crop grew from nothing in 12-16 weeks.

1 acre of it will produce 4 tree-
acres worth of more durable paper.

It takes much longer to grow a tree.



* Warren Beeler

* warren.beeler@ky.gov

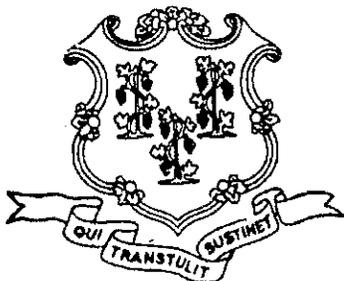
* www.kyagr.com

* Cell 270-991-3438

* Office 502-564-4983

* **Questions**

Department of Consumer Protection



**Report to the General Assembly's Environment, General Law and
Commerce Committees pursuant to Public Act 14-191,
"AN ACT CONCERNING A STUDY OF THE FEASIBILITY OF
LEGALIZING INDUSTRIAL HEMP"**

December 31, 2014

**William M. Rubenstein, Commissioner
Department of Consumer Protection
165 Capitol Avenue
Hartford, CT 06106**

REPORT PURSUANT TO SECTION 2 OF PUBLIC ACT 14-191:
“AN ACT CONCERNING A STUDY OF THE FEASIBILITY OF LEGALIZING
INDUSTRIAL HEMP”

Background & Legislative Mandate

On June 12, 2014, Gov. Malloy signed into law Public Act No. 14-191, which provides in Section 2 of the Act that the “Commissioners of Agriculture, Consumer Protection and Economic and Community Development, after consulting with the Attorney General, shall study the feasibility of legalizing industrial hemp for the purpose of encouraging economic development and increasing the number of new businesses in this state.”

With regard to assessing the feasibility of legalizing industrial hemp, the Act set out three areas of inquiry:

- The Commissioner of Agriculture “shall study the feasibility of legalizing the production of industrial hemp;”
- The Commissioner of Consumer Protection “shall study the feasibility of legalizing the possession of industrial hemp;” and
- The Commissioner of Economic and Community Development “shall study the feasibility of legalizing the sale of industrial hemp.”

The Public Act further provides that the study should include the commissioners’ recommendations on: “(1) establishing a statutory definition of industrial hemp”, based on the percentage of proposed tetrahydrocannabinol in such industrial hemp, as distinguished from marijuana, (2) amending the general statutes to exclude industrial hemp from the definition of “controlled substance” in section 21a-240 of the general statutes, and (3) establishing a licensing system for industrial hemp growers and sellers.” Connecticut Public Act No. 14-191, § 2 (2014).

In accordance with the Act, this study consists of four sections corresponding to the areas of inquiry set out for each Commissioner and concluding with the Commissioners’ recommendations, as follows:

Section 1. Commissioner of Agriculture: “The feasibility of production of industrial hemp”

Section 2. Commissioner of Consumer Protection: “The feasibility of legalizing the possession of industrial hemp”

Section 3. Commissioner of Economic and Community Development: “The feasibility of legalizing the sale of industrial hemp”

Section 4. Recommendations

I. Commissioner of Agriculture's study: the feasibility of the production of industrial hemp

PRODUCTION OF INDUSTRIAL HEMP IN CONNECTICUT Connecticut Department of Agriculture

INTRODUCTION

Much has been written on industrial hemp in the past 20 years as interest in its production domestically has increased. Reports have been published by the Congressional Research Service, United States Department of Agriculture (USDA), University of Kentucky, Oregon State University, and Iowa State University, among others, all of which were used to develop this brief summary and which should be consulted for additional information on this topic.

BOTANY

Cannabis sativa L. is an herbaceous annual, meaning it completes its life cycle in one year. It is a member of the Cannabaceae family, which contains the genera *Cannabis* (hemp and marijuana) and *Humulus* (hops). It is naturally dioecious, having male and female flowers with differing forms on separate plants with distinct habits, although monoecious cultivars have been developed and produce both male and female flowers on the same plant.

Cannabis sativa L. may grow 15 to 20 feet high and produces rough stems with tough inner bark containing both long, coarse, and short, fine fibers surrounding a woody, usually hollow core. It has alternate leaves palmately divided into 3 to 9 narrowly lanceolate, toothed segments 3 to 6 inches long. Male flowers, which produce pollen, appear in panicles 9 to 15 inches long, while female flowers, which produce seeds between 1/10 and 3/16 inches in diameter, appear in much shorter leafy-bracted spikes of about 3/4 inches long.

Industrial hemp is generally differentiated from marijuana by its level of the psychoactive chemical THC (delta-9 tetrahydrocannabinol), with 1% THC considered the threshold for inducing intoxication or psychotropic effect. Some U.S. states, including Colorado, Maine, Montana, and Vermont, define industrial hemp as those varieties of *Cannabis sativa* containing 0.3 percent or less THC. Plants with lower THC levels cannot be distinguished by appearance from those with higher levels.

Cannabis sativa L. is sometimes called true hemp to distinguish it from other species with common names or fibers known as hemp, including *Agave sisalana* (sisal hemp), *Crotalaria juncea* (sunn hemp), *Hibiscus cannabinus* (ambari hemp), and *Musa textilis* (Manila hemp).

CULTURE

Although it can survive in a variety of environments, *Cannabis sativa* L. requires fertile, well-drained soils, such as silty or sandy loams high in organic matter, for optimum growth. It also needs adequate moisture, especially in the first several weeks after germination, but does not tolerate flooding. Its growing season ranges 4 to 5-1/2 months (120 to 165 days), depending on the end product sought, which determines when it is harvested.

Plants grown for fiber are planted densely to grow tall and straight with few branches, crowding out most weeds, and are harvested shortly after male flowers produce pollen. Plants grown for seed are spaced farther apart to encourage branching, and are harvested later in the season after the female flowers have matured and formed seeds.

Industrial hemp currently is commercially grown for its fiber and/or seed by approximately 30 countries in Asia, Europe, and North and South America, including China and Canada. Cultivars have been developed specifically for improved fiber, for improved seed production, and as dual-purpose plants grown for both fiber and seed.

Generally, plants better suited to northern climates are those with better seed production, while those that produce the best fiber grow better in warmer climates. With its soil and fertility needs similar to that of corn, *Cannabis sativa* L. has been most productive domestically in the Midwest and Kentucky.

HISTORY IN CONNECTICUT

The species is native to Asia but is widely naturalized in other regions of the world, including parts of North America. It is believed to have been introduced to the U.S. by Puritans who brought it to New England for its strong and useful fiber, and from there its cultivation spread to other parts of the country, with Kentucky becoming the greatest producer.

USDA's Natural Resources Conservation Service shows it has been grown in at least in six of Connecticut's eight counties (Fairfield, Hartford, Litchfield, New Haven, New London, and Tolland), and its production in East Windsor was documented in 1819 by John C. Pease and John M. Niles in their *A Gazetteer of the States of Connecticut and Rhode Island*. Anecdotal oral reports exist of its cultivation in Simsbury during WWII to support production of wicks for Ensign Bickford's explosives.

POTENTIAL IN CONNECTICUT

Cultivation of industrial hemp in Connecticut is limited by legal restrictions. Additional challenges include the plant's long growing season and high fertility and moisture needs, and the significant processing infrastructure needed to harvest and process its fiber and seed. It has virtually no potential as a direct-market crop, upon which many Connecticut farmers depend for a sustainable profit margin.

A wholesale market and processing infrastructure sufficient to produce a significant return on investment would be needed to justify its replacement of high-value crops on Connecticut's prime and important farmland soils, such as direct-market vegetables and/or the feed corn that directly supports the state's dairy cattle and other livestock.

To make the crop economically viable, a market for the plant's byproducts also would need to be developed. Because the inner core is highly absorbent, the hurds remaining after the fiber is harvested can be used as animal bedding, including that for horses. Connecticut's high equine population may provide opportunity in this area.

The plant may have potential as a rotational crop due to its ability to crowd out annual and biennial weeds, loosen/stabilize soils with its substantial root system, and return nutrients to the soil if left in the field.

Research and breeding programs, which exist in other countries, could be pursued domestically if legislation allows. This work might identify and/or develop cultivars well suited to Connecticut's environmental conditions. Potential exists for genetic engineering to increase quality and yields in Connecticut's relatively short growing season.

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Staff of the L.H. Bailey Hortorium at Cornell University. *Hortus Third, A Concise Dictionary of the Plants Cultivated in the United States and Canada*. New York: MacMillan Publishing Company, and London: Collier MacMillan Publishers, 1976.

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<http://plants.usda.gov/core/profile?symbol=CANNA>

II. Commissioner of Consumer Protection's study: the feasibility of legalizing the possession of industrial hemp

With regard to the feasibility of legalizing industrial hemp, the State may decriminalize the possession and sale of industrial hemp under State law. *See New York v. United States*, 505 U.S. 144, 161-62 (1992). This will not, however, create an immunity or defense for growers under federal law. *Monson v. DEA*, 589 F.3d 952, 962 (8th Cir. 2009). The federal Controlled Substances Act defines marijuana to include all parts of the *Cannabis sativa L* plant regardless of the tetrahydrocannabinol ("THC") level. 21 U.S.C. § 802(16). Under federal law, therefore, industrial hemp would be considered a Schedule I controlled substance regardless of how it is defined by the State. 21 U.S.C. § 812. As a result, the cultivation, distribution or possession of marijuana, regardless of the THC level, intended use or lawfulness under State law, is a federal crime.

If the State goes beyond decriminalizing industrial hemp by, for example, licensing and promoting the possession and sale of hemp, there is a possibility that a court will conclude that the State's law is preempted by federal law. Preemption occurs where there is a "positive conflict between [the federal] and . . . State law so that the two cannot consistently stand together." 21 U.S.C. § 903.

Of relevance in considering the likelihood of federal preemption, is an Act passed by Congress last year that permits certain industrial hemp research programs. Specifically, Congress passed the Agricultural Act of 2014, which includes a provision permitting an institution of higher education or a state department of agriculture to grow or cultivate industrial hemp for purposes of "research conducted under an agricultural pilot program or other agricultural or academic research" program if allowed under State law. P.L. No. 113-79, § 7606(a). The Agricultural Act of 2014 defines 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." *Id.* at 7606(b)(2).

To qualify as an agricultural pilot program under the Agricultural Act, the State program must be intended to "study the growth, cultivation, or marketing of industrial hemp." *Id.* at 7606(b)(1). In addition, only an institution of higher education or Department of Agriculture can grow the industrial hemp and the grow sites must be certified, registered and regulated by the Department of Agriculture. *Id.*

The Agricultural Act of 2014 is attached as appendix A.

III. Commissioner of Economic and Community Development's study: the feasibility of legalizing the sale of industrial hemp

PA 14-191 Report Section: Department of Economic and Community Development

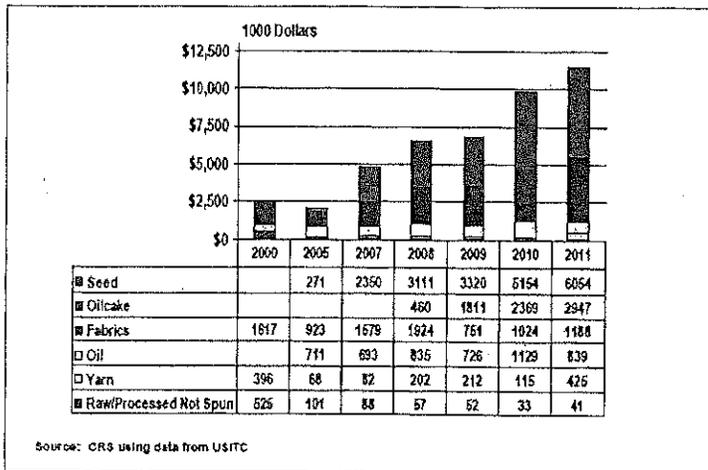
I. Review of Public Act 14-191

Public Act 14-191 charges the Connecticut Commissioner of the Department of Economic and Community Development, along with the Commissioners of the Departments of Agriculture and Consumer Protection to “study the feasibility of legalizing industrial hemp for the purpose of encouraging economic development and increasing the number of new businesses in this state.”ⁱ The Commissioner of the Department of Economic and Community Development, specifically, is also charged with studying the “feasibility of legalizing the sale” of industrial hemp.ⁱⁱ Finally, all Commissioners listed above are tasked by the legislation with crafting recommendations on:

- “(1) establishing a statutory definition of ‘industrial hemp’, based on the percentage of proposed tetrahydrocannabinol in such industrial hemp, as distinguished from marijuana,
- (2) amending the general statutes to exclude industrial hemp from the definition of ‘controlled substance’ in section 21a-240 of the general statutes, and
- (3) establishing a licensing system for industrial hemp growers and sellers.”ⁱⁱⁱ

II. Feasibility of the Sale of Industrial Hemp

Industrial hemp is currently grown and sold in many countries around the world. There are myriad uses for hemp, ranging from manufacturing applications to clothing to food stuffs.^{iv}



Although it is not currently cultivated commercially in the United States due to federal prohibition, many states have legalized the growing of industrial hemp.^{1,v} Despite the federal prohibition against commercial hemp cultivation, the United States imports millions of dollars of hemp products each year to be used in a wide variety of applications.^{vi} At present, hemp products are sold as food in many grocery stores in Connecticut.

Value of U.S. Imports of Selected Hemp Products

Source: Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy Department of Agricultural Economics, University of Kentucky, July 2013

Similarly, products containing hemp or derived from hemp are sold as personal care items, clothing, household items, and manufacturing components and are all available for purchase in Connecticut, currently.

¹ As of July 2013, states that had legalized the general cultivation of hemp included: Colorado, Hawaii, Kentucky, Maine, Maryland, Montana, North Dakota, Oregon, Vermont, Washington, and West Virginia. Other states have since passed legislation regarding hemp cultivation in a variety of capacities.

While the market for industrial hemp varies widely among different parts of the world, some countries that produce hemp and hemp products have millions of dollars in economic activity added to their economies. Recently, Canada has been strategic in their hemp production, supplying about 90% of their international product to the United States.^{vii} Hemp seed production, much of which is consumed or purchased by the United States, has contributed an estimated \$30-35 million in direct contribution to Canada's economy.^{viii}

Commercial hemp production requires careful planning to be profitable and sustainable. Each acre of industrial hemp is estimated to provide only approximately \$412 in maximum net profit.^{ix} Given Connecticut's small size, it is unlikely that hemp would become a major industry in the state.

Net Hemp Returns/Acre (does not include land cost) \$75/ton Fiber and \$ 70/lb Seed				
Production System	Low Productivity	Medium-Low Productivity	Medium-High Productivity	High Productivity
Fiber Only	-\$167	-\$149	-\$130	-\$112
Dual System (fiber plus seed)	\$42	\$125	\$208	\$290
Seed Only	\$119	\$217	\$315	\$412
<i>Notes: Costs include labor and depreciation/overhead but not land costs. \$3.50/gal fuel; N, P, and K at \$.50/unit; 50 miles one-way trucking to market.</i>				

Source: Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy Department of Agricultural Economics, University of Kentucky , July 2013

As mentioned, the United States government currently prohibits cultivation of hemp on a commercial scale. Thusly, it would appear infeasible at this time to sell Connecticut grown hemp seed or fibers. Tennessee recently decriminalized hemp and will allow cultivation starting in 2015. However, the Tennessee state government openly acknowledges that the interplay of state and federal law could pose a threat to Tennessee residents attempting to commercially cultivate and sell industrial hemp.^x Should the federal government allow the commercial cultivation of hemp in the United States, the sale of industrial hemp and value-added hemp products in Connecticut would allow for modest new economic opportunities for Connecticut farmers and producers of value-added products.

ⁱ Public Act No. 14-191 "AN ACT CONCERNING A STUDY OF THE FEASIBILITY OF LEGALIZING INDUSTRIAL HEMP." Sec. 2.

ⁱⁱ Ibid.

ⁱⁱⁱ Ibid.

^{iv} Johnson, Renee. "Hemp as an Agricultural Commodity." Congressional Research Service. July 24, 2013. Page 4.

^v Ibid, Summary.

^{vi} Ibid, Page 6.

^{vii} "Economic Considerations for Growing Industrial Hemp: Implications for Kentucky's Farmers and Agricultural Economy." University of Kentucky, Department of Agricultural Economics. July 2013. Page 5.

^{viii} Ibid.

^{ix} Ibid, Page 10.

^x State of Tennessee. Department of Agriculture. Industrial Hemp.
<http://www.tn.gov/agriculture/regulatory/industrialhemp.shtml>

IV. Recommendations

Should the legislature, following its review of the above feasibility studies, conclude that industrial hemp should be legalized in the State of Connecticut, it is recommended that the legislature take steps to minimize the risk of federal interference in Connecticut's program. In particular, it is recommended that any industrial hemp program be designed to align with the requirements of the Agricultural Act of 2014.

Specifically, it is recommended that the definition of "industrial hemp" under State law parallel the definition of industrial hemp under the federal Agricultural Act of 2014. As discussed above, the federal Act defines 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." Agricultural Act of 2014, at 7606(b)(2). Likewise, it is recommended that industrial hemp, as defined above, be excluded from the definition of "controlled substance" in section 21a-240 of the general statutes so as to make clear that industrial hemp is not considered a controlled substance in the State. Finally, it is recommended that a licensing and regulatory oversight system be created that conforms to the requirements of the Agricultural Act of 2014.

To the extent the legislature creates an industrial hemp program that deviates from what is permitted under the Agricultural Act of 2014, it is recommended that the program be designed and implemented in a manner that effectively regulates industrial hemp cultivation, possession and sale as to not obstruct federal criminal law enforcement priorities. Such steps will reduce, although not eliminate, the potential for federal interference with Connecticut's program. Current federal priorities with regard to the exercise of prosecutorial discretion in connection with State medical marijuana programs is set forth in an Aug. 29, 2013 Memorandum of Deputy U.S. Attorney General James Cole (attached hereto as appendix B). It is reasonable to expect that similar concerns would be at issue with a State industrial hemp program.

The Commissioners and staff of the Departments of Consumer Protection, Agriculture and Economic and Community Development thank the legislature for the opportunity to research this issue and to submit this report. It is hoped that the members of Environment, General Law and Commerce committees as well as to the public and other interested parties find this information useful. Questions may be directed to the specific agencies, or to Gary Berner, Legislative Program Manager, Department of Consumer Protection.

Appendix A

Agricultural Act of 2014, P.L. No. 113-79, 128 Stat. 912 (Feb. 7, 2014)

§ 7606 Legitimacy of Industrial Hemp Research.

(a) In General- Notwithstanding the Controlled Substances Act (21 U.S.C. 801 et seq.), the Safe and Drug-Free Schools and Communities Act (20 U.S.C. 7101 et seq.), chapter 81 of title 41, United States Code, or any other Federal law, an institution of higher education (as defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)) or a State department of agriculture may grow or cultivate industrial hemp if—

- (1) the industrial hemp is grown or cultivated for purposes of research conducted under an agricultural pilot program or other agricultural or academic research; and
- (2) the growing or cultivating of 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.

(b) Definitions- In this section:

(1) AGRICULTURAL PILOT PROGRAM- The term 'agricultural pilot program' means a pilot program to study the growth, cultivation, or marketing of industrial hemp—

(A) in States that permit the growth or cultivation of industrial hemp under the laws of the State; and

(B) in a manner that—

(i) ensures that only institutions of higher education and State departments of agriculture are used to grow or cultivate industrial hemp;

(ii) requires that sites used for growing or cultivating industrial hemp in a State be certified by, and registered with, the State department of agriculture; and

(iii) authorizes State departments of agriculture to promulgate regulations to carry out the pilot program in the States in accordance with the purposes of this section.

(2) INDUSTRIAL HEMP- The term 'industrial hemp' means 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.

(3) STATE DEPARTMENT OF AGRICULTURE- The term 'State department of agriculture' means the agency, commission, or department of a State government responsible for agriculture within the State.

Appendix B



U.S. Department of Justice

Office of the Deputy Attorney General

The Deputy Attorney General

Washington, D.C. 20530

August 29, 2013

MEMORANDUM FOR ALL UNITED STATES ATTORNEYS

FROM: James M. Cole 
Deputy Attorney General

SUBJECT: Guidance Regarding Marijuana Enforcement

In October 2009 and June 2011, the Department issued guidance to federal prosecutors concerning marijuana enforcement under the Controlled Substances Act (CSA). This memorandum updates that guidance in light of state ballot initiatives that legalize under state law the possession of small amounts of marijuana and provide for the regulation of marijuana production, processing, and sale. The guidance set forth herein applies to all federal enforcement activity, including civil enforcement and criminal investigations and prosecutions, concerning marijuana in all states.

As the Department noted in its previous guidance, Congress has determined that marijuana is a dangerous drug and that the illegal distribution and sale of marijuana is a serious crime that provides a significant source of revenue to large-scale criminal enterprises, gangs, and cartels. The Department of Justice is committed to enforcement of the CSA consistent with those determinations. The Department is also committed to using its limited investigative and prosecutorial resources to address the most significant threats in the most effective, consistent, and rational way. In furtherance of those objectives, as several states enacted laws relating to the use of marijuana for medical purposes, the Department in recent years has focused its efforts on certain enforcement priorities that are particularly important to the federal government:

- Preventing the distribution of marijuana to minors;
- Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels;
- Preventing the diversion of marijuana from states where it is legal under state law in some form to other states;
- Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;

- Preventing violence and the use of firearms in the cultivation and distribution of marijuana;
- Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use;
- Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands; and
- Preventing marijuana possession or use on federal property.

These priorities will continue to guide the Department's enforcement of the CSA against marijuana-related conduct. Thus, this memorandum serves as guidance to Department attorneys and law enforcement to focus their enforcement resources and efforts, including prosecution, on persons or organizations whose conduct interferes with any one or more of these priorities, regardless of state law.¹

Outside of these enforcement priorities, the federal government has traditionally relied on states and local law enforcement agencies to address marijuana activity through enforcement of their own narcotics laws. For example, the Department of Justice has not historically devoted resources to prosecuting individuals whose conduct is limited to possession of small amounts of marijuana for personal use on private property. Instead, the Department has left such lower-level or localized activity to state and local authorities and has stepped in to enforce the CSA only when the use, possession, cultivation, or distribution of marijuana has threatened to cause one of the harms identified above.

The enactment of state laws that endeavor to authorize marijuana production, distribution, and possession by establishing a regulatory scheme for these purposes affects this traditional joint federal-state approach to narcotics enforcement. The Department's guidance in this memorandum rests on its expectation that states and local governments that have enacted laws authorizing marijuana-related conduct will implement strong and effective regulatory and enforcement systems that will address the threat those state laws could pose to public safety, public health, and other law enforcement interests. A system adequate to that task must not only contain robust controls and procedures on paper; it must also be effective in practice. Jurisdictions that have implemented systems that provide for regulation of marijuana activity

¹ These enforcement priorities are listed in general terms; each encompasses a variety of conduct that may merit civil or criminal enforcement of the CSA. By way of example only, the Department's interest in preventing the distribution of marijuana to minors would call for enforcement not just when an individual or entity sells or transfers marijuana to a minor, but also when marijuana trafficking takes place near an area associated with minors; when marijuana or marijuana-infused products are marketed in a manner to appeal to minors; or when marijuana is being diverted, directly or indirectly, and purposefully or otherwise, to minors.

must provide the necessary resources and demonstrate the willingness to enforce their laws and regulations in a manner that ensures they do not undermine federal enforcement priorities.

In jurisdictions that have enacted laws legalizing marijuana in some form and that have also implemented strong and effective regulatory and enforcement systems to control the cultivation, distribution, sale, and possession of marijuana, conduct in compliance with those laws and regulations is less likely to threaten the federal priorities set forth above. Indeed, a robust system may affirmatively address those priorities by, for example, implementing effective measures to prevent diversion of marijuana outside of the regulated system and to other states, prohibiting access to marijuana by minors, and replacing an illicit marijuana trade that funds criminal enterprises with a tightly regulated market in which revenues are tracked and accounted for. In those circumstances, consistent with the traditional allocation of federal-state efforts in this area, enforcement of state law by state and local law enforcement and regulatory bodies should remain the primary means of addressing marijuana-related activity. If state enforcement efforts are not sufficiently robust to protect against the harms set forth above, the federal government may seek to challenge the regulatory structure itself in addition to continuing to bring individual enforcement actions, including criminal prosecutions, focused on those harms.

The Department's previous memoranda specifically addressed the exercise of prosecutorial discretion in states with laws authorizing marijuana cultivation and distribution for medical use. In those contexts, the Department advised that it likely was not an efficient use of federal resources to focus enforcement efforts on seriously ill individuals, or on their individual caregivers. In doing so, the previous guidance drew a distinction between the seriously ill and their caregivers, on the one hand, and large-scale, for-profit commercial enterprises, on the other, and advised that the latter continued to be appropriate targets for federal enforcement and prosecution. In drawing this distinction, the Department relied on the common-sense judgment that the size of a marijuana operation was a reasonable proxy for assessing whether marijuana trafficking implicates the federal enforcement priorities set forth above.

As explained above, however, both the existence of a strong and effective state regulatory system, and an operation's compliance with such a system, may allay the threat that an operation's size poses to federal enforcement interests. Accordingly, in exercising prosecutorial discretion, prosecutors should not consider the size or commercial nature of a marijuana operation alone as a proxy for assessing whether marijuana trafficking implicates the Department's enforcement priorities listed above. Rather, prosecutors should continue to review marijuana cases on a case-by-case basis and weigh all available information and evidence, including, but not limited to, whether the operation is demonstrably in compliance with a strong and effective state regulatory system. A marijuana operation's large scale or for-profit nature may be a relevant consideration for assessing the extent to which it undermines a particular federal enforcement priority. The primary question in all cases – and in all jurisdictions – should be whether the conduct at issue implicates one or more of the enforcement priorities listed above.

Memorandum for All United States Attorneys
Subject: Guidance Regarding Marijuana Enforcement

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As with the Department's previous statements on this subject, this memorandum is intended solely as a guide to the exercise of investigative and prosecutorial discretion. This memorandum does not alter in any way the Department's authority to enforce federal law, including federal laws relating to marijuana, regardless of state law. Neither the guidance herein nor any state or local law provides a legal defense to a violation of federal law, including any civil or criminal violation of the CSA. Even in jurisdictions with strong and effective regulatory systems, evidence that particular conduct threatens federal priorities will subject that person or entity to federal enforcement action, based on the circumstances. This memorandum is not intended to, does not, and may not be relied upon to create any rights, substantive or procedural, enforceable at law by any party in any matter civil or criminal. It applies prospectively to the exercise of prosecutorial discretion in future cases and does not provide defendants or subjects of enforcement action with a basis for reconsideration of any pending civil action or criminal prosecution. Finally, nothing herein precludes investigation or prosecution, even in the absence of any one of the factors listed above, in particular circumstances where investigation and prosecution otherwise serves an important federal interest.

cc: Mythili Raman
Acting Assistant Attorney General, Criminal Division

Loretta E. Lynch
United States Attorney
Eastern District of New York
Chair, Attorney General's Advisory Committee

Michele M. Leonhart
Administrator
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