Hemp as an Agricultural Commodity

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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 exceed $300 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 Industrial Hemp Farming Act was first introduced in the 109th Congress by former Representative Ron Paul. In the 113th Congress, the Industrial Hemp Farming Act of 2013 (H.R. 525; S. 359) 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.

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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 Industrial Hemp Farming Act of 2013 (H.R. 525; S. 359) would open the way 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%.

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]

[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. Grlic, "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.

[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).

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 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

[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/ncnu02/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).

[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), (continued...)

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 leaves, 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 monoecious fiber varieties that have both male and female flowers on each plant, but where the female flowers are selected to prevent the return of separate male and female plants (known as dioecious varieties). 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 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.[13] The flower and leaves are the harvested products.

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

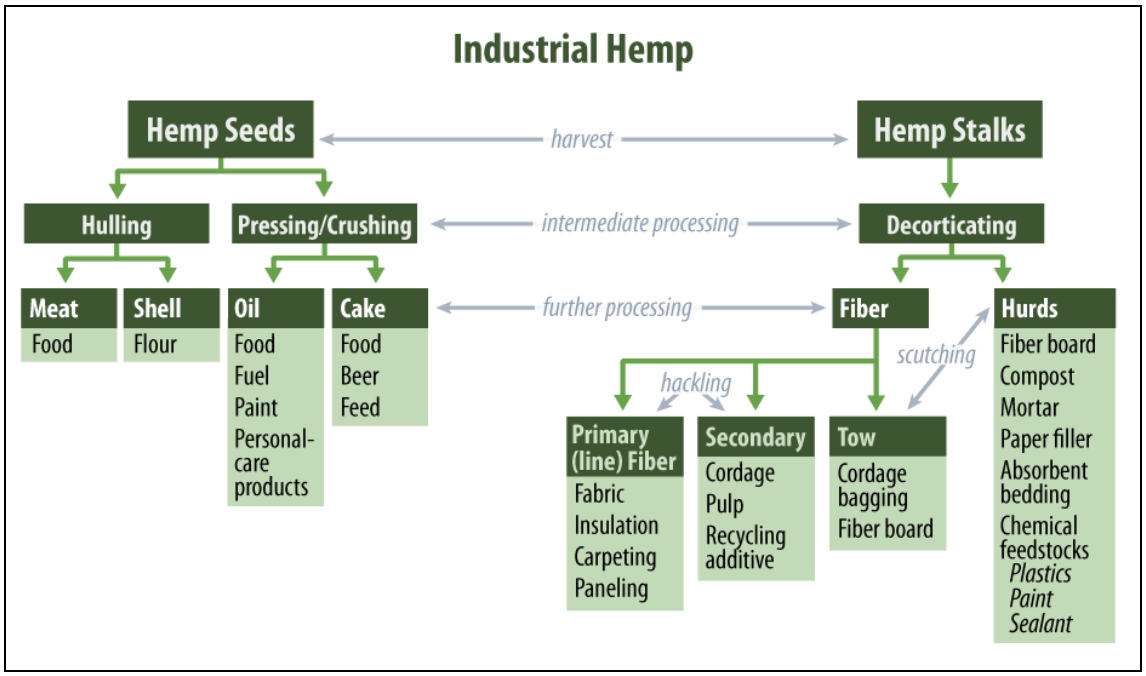
Hemp Production and Use

Commercial Uses of Hemp

Industrial hemp can be grown as a fiber, seed, or dual-purpose crop.[14] 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.[15]

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. Hemp seed is also used for industrial oils, cosmetics and personal care products, and pharmaceuticals, among other composites.

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.

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

[15] 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.

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.[16] Hemp has also been promoted as a potential biodiesel feedstock,[17] although some analysts suggest that competing demands for other products might make it too costly to use as a feedstock.[18]

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**.)

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 2011 was $452 million, which includes food and body products, clothing, auto parts, building materials and other products.[19] Of this, HIA reports that the value of hemp-based food, supplements, and body care sales in the United States is about $130 million to $152 million annually. The size of the U.S. market for hemp clothing and textiles is estimated at about $100 million annually.[20]

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;[21] 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.[22]

Available industry information indicates that sales of some hemp-based products, such as foods and body care products, is growing.[23] Growth in hemp specialty food products is driven, in part, by sales of hemp milk and related dairy alternatives, among other hemp-based foods.[24]

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

[17] 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.

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

[19] R. Fletcher, "U.S. Market for Hemp Food, Body Care and Other Products Continues to Thrive with 2011 Annual Retail Sales Estimated at $452 Million," http://www.votehemp.com/PR/2012-09-19-Market_for_Hemp_Food.html.

[20] HIA, "Hemp Fabric goes High Fashion," February 11, 2008. Estimate reflects best available current information based on personal communication between CRS and HIA.

[21] SPINS tracks data and market trends on the Natural Product Industry sales (http://www.spins.com/).

[22] 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.

[23] H. Fastre, 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.

[24] HIA, "Hemp Milk Products Boosted Growth of Hemp Food Market in 2007," March 14, 2008.

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 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."[25] Most studies generally note that "hemp ... has such a diversity of possible uses, [and] is being promoted by extremely enthusiastic market developers."[26] Other studies highlight certain production advantages associated with hemp or

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

[26] E. Small and D. Marcus, "Hemp: A New Crop with New Uses for North America," In: *Trends in New Crops and* (continued...)

acknowledge hemp's benefits as a rotational crop[27] or further claim that hemp may be less environmentally degrading than other agricultural crops.[28] Some studies also claim certain production advantages to hemp growers, such as relatively low input and management requirements for the crop.[29]

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.[30] 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."[31] 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."[32]

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.[33]

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New Uses, 2002, p. 321.

[27] 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.

[28] 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.

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

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

[31] T. R. Fortenbery and M. Bennett, "Opportunities for Commercial Hemp Production," *Review of Agricultural Economics*, 26(1): 97-117, 2004.

[32] Ibid.

[33] For more information, see congressional distribution memorandum, "Potential U.S. Market Effects of Removing Restrictions on Growing Industrial Hemp" (March 4, 2013), available upon request from Renée Johnson (7-9588).

Table 1. 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.

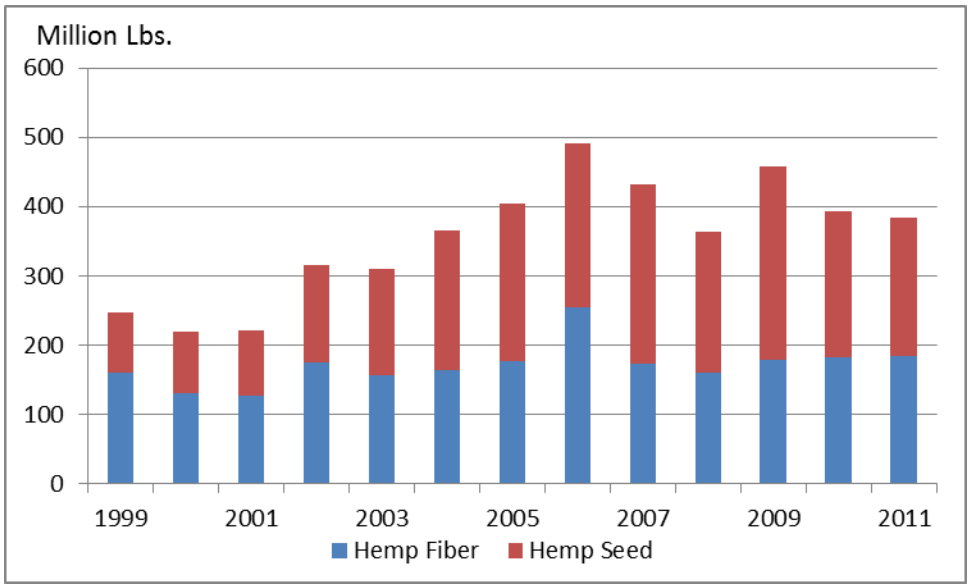
Global Production

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.[34]

Acreage in hemp cultivation worldwide has been mostly flat to decreasing, reported at about 200,000 acres globally in 2011.[35] 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 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**).

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



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

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

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

Many EU countries lifted their bans on hemp production in the 1990s and, although it is a minor crop, the EU's farm programs support "flax and hemp" production under the Common Agricultural Policy.[36] EU hemp acreage was about 30,000 acres in 2008, which was below previous years, when more than 50,000 acres of hemp were under production.[37] 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.[38]

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.[39] 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) for THC residues in products derived from hemp grain, such as flour and oil.[40] 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.[41] 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).[42]

[36] See, for example, "Health Check of the CAP," May 2008, http://ec.europa.eu/agriculture/healthcheck/guide_en.pdf.

[37] European Industrial Hemp Association, "European Commission: Hemp and Flax, AGRI C5, 2009," February 2009.

[38] Additional country information is available at Hemp Industries Association, http://www.thehia.org/facts.html.

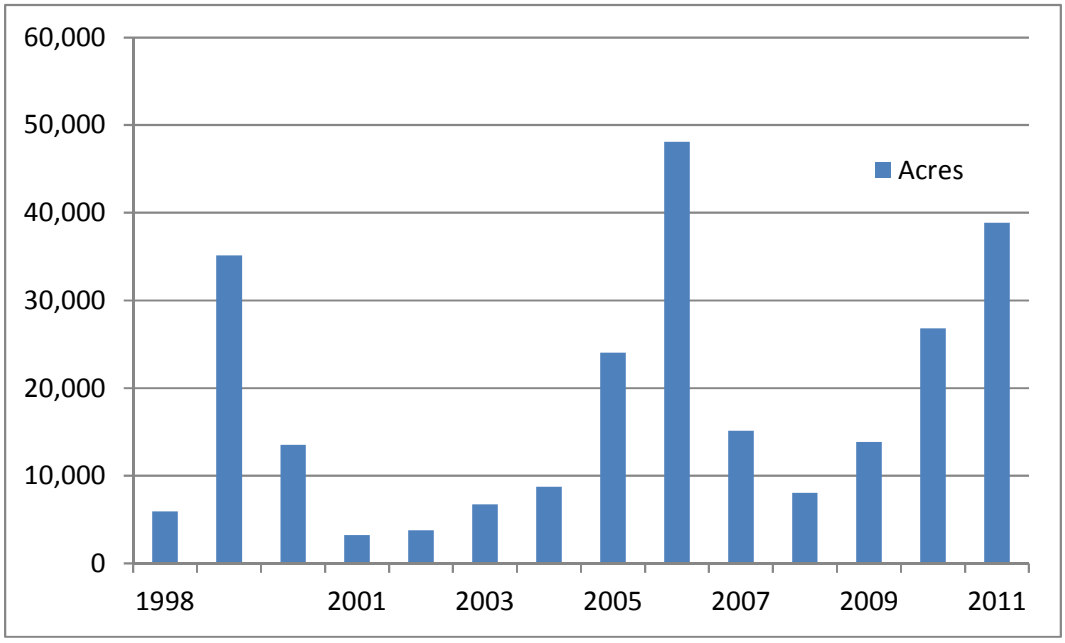
[39] Industrial Hemp Regulations (SOR/98-156), as part of the Controlled Drugs and Substances Act (http://laws.justice.gc.ca/en/C-38.8/SOR-98-156/index.html).

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

[41] 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).

[42] Health Canada, Industrial Hemp Section, "Cultivation Licenses," October 25, 2011.

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 downturn in 2007 is also attributed to "increasingly positive economics of growing other crops." Source: Manitoba Agriculture, National Industrial Hemp Strategy, March 2008 (prepared for Food and Rural Initiative Agriculture and Agri-Food Canada).

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,[43] and provided assistance to farmers promoting production and distribution.[44] 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.[45] Several hemp advocacy groups,

[43] 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.

[44] 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.

[45] 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.

including the Hemp Industries Association (HIA) and Vote Hemp Inc., have compiled other historical information and have copies of original source documents.[46]

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.[47] 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."[48]

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.[49]

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.

[46] See links at http://www.thehia.org/history.html and http://www.hemphistoryweek.com/timeline.html.

[47] 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.

[48] 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.

[49] 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."

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.[50] DEA refutes this interpretation.[51]

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.[52]

DEA issued a permit for an experimental quarter-acre plot in Hawaii in 1999 (now expired).[53] 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.

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.[54] 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.

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

[51] 66 *Federal Register* 51530.

[52] See DEA, Registration Procedures (http://www.deadiversion.usdoj.gov/drugreg/process.htm) and DEA, Registration Applications (http://www.deadiversion.usdoj.gov/drugreg/reg_apps/onlineforms_new.htm).

[53] 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.

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

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).[55] 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."[56] 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."[57] 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 cannabis (marijuana) plant."[58] 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)."[59] 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.[60] 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

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

[56] Information posted on International Narcotics Control Board (INCB) website.

[57] Ibid.

[58] DEA, "DEA History in Depth," 1999-2003, and other DEA published resources.

[59] Ibid.

[60] 66 *Federal Register* 51530.

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.[61] 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.[62] The court stated that "the DEA's definition of 'THC' contravenes the unambiguously expressed intent of Congress in the CSA and cannot be upheld."[63] In late September 2004 the Bush Administration let the final deadline pass without filing an appeal.

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:[64]

> 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."[65] The DEA further maintains that the CSA does not differentiate between different varieties of cannabis based on THC content.[66]

[61] 21 U.S.C. §802 (19) and (20).

[62] 68 *Federal Register* 14113.

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

[64] DEA, "DEA History in Depth," 1999-2003, and other DEA published resources.

[65] NIDA, "Marijuana: Facts for Teens" (no date), http://www.drugabuse.gov/MarijBroch/teenpg1-2.html.

[66] DEA, "DEA History in Depth," 1999-2003, and other DEA published resources.

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:[67]

> 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."…[68] 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:[69]

> 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 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."[70]

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.[71] 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.[72]

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[67] Ibid.

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

[69] 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 I (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).

[70] DEA, "DEA History in Depth," 1999-2003, and other DEA published resources.

[71] 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."

[72] J. B. Kahn, "Hemp ... Why Not?" Berkeley Electronic Press (bepress) Legal Series, Paper 1930, 2007.

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.[73] 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.[74] In 2010, USDA recommended $835,000 for the program.[75] 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.

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):[76]

- Eight states have defined industrial hemp as distinct and removed barriers to its production (Colorado, 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.)

[73] USDA's 2011 Explanatory Notes, http://www.obpa.usda.gov/17nifa2011notes.pdf.

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

[75] See USDA's 2011 Explanatory NotesNIFA, http://www.obpa.usda.gov/17nifa2011notes.pdf.

[76] Vote Hemp, "U.S. Federal Industrial Hemp Legislation," http://www.votehemp.com/legislation.html.

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/measures/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).

In California, efforts in 2011 to allow for a hemp pilot program in selected counties were vetoed by the state's governor.[77]

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 but been denied a DEA permit to grow hemp even in states that authorize cultivation under state laws. Two ongoing cases involve attempts to grow hemp under state law in North Dakota and Montana.

North Dakota passed its state law authorizing industrial hemp production in 1999.[78] 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. That same year 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."[79] The case was dismissed in November 2007.[80] The case was appealed to the U.S. Court of Appeals (Eighth Circuit), but was again dismissed in December 2009.[81] They filed an appeal in May 2010.[82]

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.[83]

Legislative Activity

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.[84]

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[77] S. Nidever, "Brown Vetoes Bill That Would Have Allowed Industrial Hemp," *Hanford Sentinel*, October 11, 2011.

[78] 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.

[79] *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

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

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

[82] S. Roesler, "ND farmers file another industrial hemp appeal in district court," *Farm & Ranch Guide*, June 4, 2010.

[83] M. Brown, "First license issued to Montana hemp grower," *Missoulian*, October 27, 2009.

[84] 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 (continued...)

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. These bills have been referred to the House Committee on Energy and Commerce and to the House and Senate Committees on the Judiciary.

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.[85]

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) has adopted as part of its 2010 farm policy regarding specialty crops a policy that supports "urging the President, Attorney General and Congress to direct the U.S. Drug Enforcement Administration (DEA) to differentiate between industrial hemp and marijuana and adopt policy to allow American farmers to grow industrial hemp under state law without requiring DEA licenses."[86]
- 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 (ONDCP) 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

(...continued)

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.

[85] 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.

[86] 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 development of domestic industrial hemp production by American farmers and manufacturers."[87]

- The National Grange voted in 2009 to support "research, production, processing and marketing of industrial hemp as a viable agricultural activity."[88]
- 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."[89] 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."[90]
- In California, efforts in 2011 to establish a pilot program to grow industrial hemp in selected counties was supported by the county farm bureau and two sheriff's offices (although the bill, SB 676, was later vetoed by the state's governor).[91]

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."[92] 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 require costly and time-consuming lab work to be conducted.[93] 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.[94] 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.[95]

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

[87] NASDA, "New Uses of Agricultural Products," 2010, http://www.nasda.org/cms/7196/9017/9350/7945.aspx.

[88] 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/.

[89] NDFU, "2010 Program of Policy & Action," p. 8; also see http://www.ndfu.org.

[90] RMFU, "Policy 2010," http://www.rmfu.org/pdfs/RMFUPolicy10.pdf, p. 6, pp. 15-16, and p. 24.

[91] 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).

[92] See, for example, Drug Watch International, "Position Statement on Hemp (*Cannabis sativa* L.)," November 2002.

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

[94] CRS conversation with John Coleman, August 22, 2011.

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

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.[96]

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.[97] 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.

[96] 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 CRS Report RL33211, *Medical Marijuana: Review and Analysis of Federal and State Policies*.

[97] 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.
- Agriculture and Agri-Food Canada, *Canada's Industrial Hemp Industry*, March 2007, http://www.agr.gc.ca/misb/spcrops/sc-cs_e.php?page+hemp-chanvre.
- Maine Agricultural Center, *An Assessment of Industrial Hemp Production in Maine*, January 2007, http://www.mac.umaine.edu/.
- N. Cherrett et al., "Ecological Footprint and Water Analysis of Cotton, Hemp and Polyester," Stockholm Environment Institute, 2005, http://www.sei-international.org/mediamanager/documents/Publications/Future/cotton%20hemp%20polyester%20study%20sei%20and%20bioregional%20and%20wwf%20wales.pdf.
- T. R. Fortenbery and M. Bennett, "Opportunities for Commercial Hemp Production," *Applied Economics Perspectives and Policy,* 26(1): 97-117, 2004.
- E. Small and D. Marcus, "Hemp: A New Crop with New Uses for North America," In: *Trends in New Crops and New Uses*, 2002, http://www.hort.purdue.edu/newcrop/ncnu02/v5-284.html.
- T. R. Fortenbery and M. Bennett, "Is Industrial Hemp Worth Further Study in the U.S.? A Survey of the Literature," Staff Paper No. 443, July 2001, http://ageconsearch.umn.edu/bitstream/12680/1/stpap443.pdf.
- J. Bowyer, "Industrial Hemp (Cannabis sativa L.) as a Papermaking Raw Material in Minnesota: Technical, Economic and Environmental Considerations," Department of Wood & Paper Science Report Series, May 2001.
- K. Hill, N. Boshard-Blackey, and J. Simson, "Legislative Research Shop: Hemp," University of Vermont, April 2000, http://www.uvm.edu/~vlrs/doc/hemp.htm
- USDA, Economic Research Service, *Industrial Hemp in the United States: Status and Market Potential*, AGES001E, January 2000, http://www.ers.usda.gov/publications/ages001e/ages001em.pdf.
- M. J. Cochran, T. E. Windham, and B. Moore, "Feasibility of Industrial Hemp Production in Arkansas," University of Arkansas, SP102000, May 2000.
- D. G. Kraenzel et al. "Industrial Hemp as an Alternative Crop in North Dakota," AER 402, North Dakota State University, Fargo, July 1998, http://ageconsearch.umn.edu/handle/23264.

- E. C. Thompson et al., *Economic Impact of Industrial Hemp in Kentucky*, University of Kentucky, July 1998.
- D. T. Ehrensing, *Feasibility of Industrial Hemp Production in the United States Pacific Northwest*, SB 681, Oregon State University, May 1998, http://extension.oregonstate.edu/catalog/html/sb/sb681/.

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