

Industrial Hemp as a Cash Crop for Colorado Farmers

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Boulder Hemp Initiative Project P.O. Box 729 Nederland, CO 80466 (303) 784-5632 Email:
hip@darkstar.cygnus.com

HTML editing by [Sam Corl](#) of the University of Iowa Chapter of NORML

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I. Definition

Industrial hemp means those parts of the *Cannabis sativa* plant which contain less than 1.00% tetrahydrocannabinols (THC). THC is the psychoactive chemical found in *Cannabis sativa*. Industrial hemp is not to be confused with marijuana. Marijuana comes from the flowers of the *Cannabis sativa* plant and contains more than 1.00% THC. [1](#) Industrial hemp has no psychoactive properties.

Industrial hemp can be grown as a profitable, high-quality fiber crop without producing marijuana. Registered seed varieties that produce hemp containing less than 0.3% THC even in the flowers are available throughout Europe. [2](#) Farmers in the European Community have been growing hemp for over 20 years without any problems related to marijuana. [3](#)

II. Hemp Production in Other Countries

Industrial hemp is grown as a profitable fiber crop in many countries. [4](#) Industrial hemp crops have been subsidized in the European Community since before 1988. [5](#) In 1993, England began to produce hemp for fiber. [6](#) In 1994, Canada harvested its first crop of industrial hemp after more than 50 years of prohibition. [7](#) The re-emerging world hemp industry is growing steadily, and farmers are excited and enthusiastic about the potential of hemp crops.

III. Hemp Production in the United States

Hemp has been valued throughout this country's history as an important raw material. Until the late 1800s, almost all of our cloth was made from hemp, and virtually all of our paper was made from hemp rags.⁸ From 1631 to the early 1800s, hemp was such a valued commodity that it was considered legal tender (money).⁹ Regions of Kentucky and Wisconsin were among the largest hemp producers.¹⁰

Hemp production seemed destined to increase dramatically in the 1930s, when an invention called the decorticator began getting wide attention.¹¹ The decorticator strips the hemp fiber from the stalk. This had been the most labor-intensive and expensive part of producing hemp.¹² The decorticator was to hemp what the cotton gin was to cotton. The invention prompted a 1937 Popular Mechanics magazine to call hemp the "New Billion Dollar Crop"¹³ and Mechanical Engineering magazine to call it "The Most Desirable Crop That Can Be Grown."¹⁴

However, the 1937 Marijuana Tax Act dealt a fatal blow to the promising hemp fiber industry. The Act established a prohibitive tax on hemp manufacturers and distributors as well as on hemp transactions.¹⁵ It was modeled after a similar tax that was enacted to prohibit machine guns. The transfer tax of \$1.00/ounce effectively ended all hemp production in the United States by making commerce in hemp prohibitively expensive.

Restrictions on hemp production were eased briefly in the United States during World War II when Japan invaded the Philippines, cutting off the supply of abaca (Manila hemp).¹⁶ The U.S. Navy desperately needed a domestic supply of hemp to provide the lines and rigging for its fleet. The U.S. Department of Agriculture encouraged farmers to produce hemp for the war effort by distributing a film called "Hemp for Victory!"¹⁷

After World War II, the hemp industry declined as the federal government again began to restrict hemp production.¹⁸ Farmers continued to produce hemp on a limited scale until the 1950s.¹⁹ However, legislation eventually came to treat industrial hemp crops as marijuana (drug) crops, and hemp fiber production was no longer promoted.

Currently, hemp production is treated as a felony in the United States because it is assumed that all hemp crops will produce marijuana. With the advent of industrial hemp and low-THC seed varieties, this is no longer true. Hemp can now be grown as a profitable fiber crop in the United States with absolutely no danger of increasing marijuana use.

IV. Raw Materials and Products from Hemp

Hemp consists of three principal raw materials: fiber, seeds, and hurds. Hemp is principally grown for the bast fiber it produces from its stalk. However, the seeds and hurds are also important economically.

1. Fiber:

The hemp stalk is composed of 20% fiber.²⁰ Hemp is the strongest natural fiber in the world.²¹ It is valued for its strength and durability when used for textiles, cordage, and paper.

- Textiles: The fiber can be made into any type of cloth, from the finest linen to the coarsest canvas.²² The word canvas comes from the Arabic word for hemp.²³ Cloth made from hemp fiber is stronger, warmer, more durable, more absorbent, and softer than cotton.²⁴
- Cordage: Hemp rope has been valued throughout history for its superior strength and resistance to deterioration in salt or fresh water.²⁵
- Paper: Paper made from hemp is known as the "archivist's perfect paper" because it lasts much longer than tree pulp paper and does not harden, crack, yellow, or crumble with age.²⁶ Hemp fiber can be used to make every grade of paper.²⁷

2. Hurds:

The hemp stalk is composed of 80% hurds.²⁸ The hurds are the woody inner portion of the hemp stalk

that are separated from the hemp fiber.[29](#) The hurds are 50% - 77% cellulose,[30](#) which makes them ideal for use in paper and plastic products.

- Paper: One acre of hemp hurds can make as much pulp for paper as four acres of trees.[31](#) Hemp paper can be whitened without producing dioxins and lasts much longer than paper made from trees.[32](#)
- Particle Board: Hemp hurds can be pressed and injected with phenolic resin to make a particle board that is resistant to fire and water.[33](#) The board also makes a good insulation and thermal barrier.[34](#)
- Plastic: Plastics were first made from plant cellulose (i.e., cellophane, celluloid).[35](#) The hemp hurd is one of the richest sources of plant cellulose,[36](#) a building block of modern industry. Plastics made from hemp instead of petroleum would be biodegradable.[37](#)
- Animal Bedding: The hurds make an excellent animal bedding because they absorb more liquid and compost faster than wood shavings.[38](#)

3. Seed:

The hemp seed is composed of two raw materials: the seed oil and the seed cake.

Seed Oil:

The hemp seed is composed of 30% oil.[39](#)

- Food: Hemp seed oil contains over 70% cholesterol-fighting essential fatty acids, the highest of any seed oil.[40](#)
- Fuel: Hemp seed oil can be chemically combined easily with 15% methanol to provide a premium diesel fuel substitute.[41](#)

This hemp bio-diesel fuel burns 70% cleaner than petroleum diesel in soot and particulate pollution.[42](#)

- Paints and varnishes: Hemp seed oil dries quickly and leaves a thin elastic film.[43](#)
- Lubricant: Hemp seed oil makes an ideal all-purpose lubricant.[44](#)

Seed Cake:

The seed cake is the solid part of the seeds that remains after the oil is expelled.

- Food: Hemp seed cake makes a nutritional, high-protein supplement to wheat flour. It contains 25% protein.[45](#)

Whole Seed:

The whole hemp seed contains 20% high-quality digestible complete protein.[46](#)

- Food: The hemp seed can be eaten as a nutritious snack, like sunflower seeds.
- Bird Feed: Birds like hemp seed because of its nourishing, oily content.[47](#)

V. Economics of Hemp Production

A hemp crop could be sold for at least \$860 per acre. Since a hemp crop produces three different raw materials each year, the total value of hemp far exceeds other crops grown for a single material.

The chart below compares yields of hemp and comparable crops. Since there are currently no domestic hemp crops being sold in the United States, the prices for comparable crops were used to estimate the prices for domestic hemp fiber, hurds, and seed.

Hemp fiber is compared to cotton for textile production. Hemp hurds are compared to wood chip prices and Douglas fir yield for paper production. Hemp seed is compared to soybeans for oil seed production.

Production costs were not factored into this estimate, although hemp would be considerably less expensive to produce than cotton (see Section VI -- Hemp Cultivation).

Estimated Value of a Hemp Crop

	Yield* 48	X	Price	=	Value/Acre
Fiber:	1,100 lbs./acre		\$.60/lb. (cotton)		\$660.00
Hurds:	2.5 tons/acre		\$50/ton (wood chips)		\$125.00
Seed:	15 bu./acre		\$5/bu. (soybean)		\$75.00

			Hemp Total Value/Acre		\$860.00

Value of Comparable Crops 49					Total
Yield	X	Price	=		Value/Acre
Cotton	578 lbs./acre		\$.60/lb.		\$347.00
Douglas Fir	1 ton/acre		\$50/ton		\$50.00
Soybeans	34 bu./acre		\$5/bu.		\$170.00
Corn					\$205.00
Wheat					\$78.00

Value of Comparable Crops (data from above)						
\$900						XXXX
\$800						XXXX
\$700						XXXX
\$600						XXXX
\$500						XXXX
\$400	XXXX					XXXX
\$300	XXXX					XXXX
\$200	XXXX					XXXX
\$100	XXXX		XXXX	XXXX		XXXX
0	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
	Cotton	Doug.Fir	Soybeans	Corn	Wheat	Hemp

* The hemp yields are based on historical and limited current figures. These are conservative estimates; the actual yields will probably be 2 to 3 times higher. Hemp prohibition has stifled contemporary research in the field of hemp production.

Please see the [References](#).

VI. Hemp Cultivation

Hemp is easy to grow.[50](#) Hemp is an annual herbaceous crop that grows from 5 to 16 feet tall in a season of four months.[51](#) It will grow in all 50 states.[52](#) It is a good rotation crop.[53](#) Hemp has long roots that penetrate

and break the soil to leave it in perfect condition for the next crop.[54](#)

Production costs for hemp would be considerably lower than cotton's. Herbicides are not needed because fiber hemp is sown thickly and chokes out competing weeds.[55](#) Pesticide use is limited because hemp has few insect enemies.[56](#)

VII. Current Hemp Market in the United States

Hundreds of entrepreneurs are now selling imported hemp products. However, they are stifled by high prices and uncertain availability since all of the hemp is imported from overseas. Demand for hemp products in the U.S. is enormous. Hemp clothing and accessories have become a fashion trend.[57](#) Tree-free hemp paper is also in demand.[58](#) The market has a potential of as much as \$15 to \$30 billion a year.[59](#)

VIII. Potential for New Jobs

Hemp production in Colorado would create new farming opportunities and make Colorado farmers competitive in the global market against countries that already grow hemp for fiber. It would also create thousands of processing and manufacturing jobs in such industries as textiles, plastics, pulp paper, energy, timber, construction, and food. The retail market for tree-free paper and building materials, for biodegradable plastics, for soft and durable natural clothing, and for other hemp products has huge potential.

IX. Benefits of Hemp Production

Hemp will be a profitable crop for farmers because of the volume of hemp each crop produces, the number of different products that can be made from hemp, and the demand for hemp products.

Not only is hemp profitable, but it is a desirable crop to grow for other reasons. Hemp is a renewable and sustainable resource. It will help shift our economy away from dwindling non-renewable petroleum resources and help preserve our forest resources.

Hemp is the strongest natural fiber.[60](#) It has an extremely high cellulose content.[61](#) It is biodegradable.[62](#) It requires no herbicides to grow.[63](#) It can be used to make paper, cloth, rope, particle board, plastic, paint, varnishes, linoleum, dynamite, fuel, food, and cardboard. It will create new jobs and make Colorado competitive with other countries. It is the fiber of the 1990s.

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Boulder Hemp Initiative Project P.O. Box 729 Nederland, CO 80466 (303) 784-5632 Email:
bhip@darkstar.cygnus.com

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