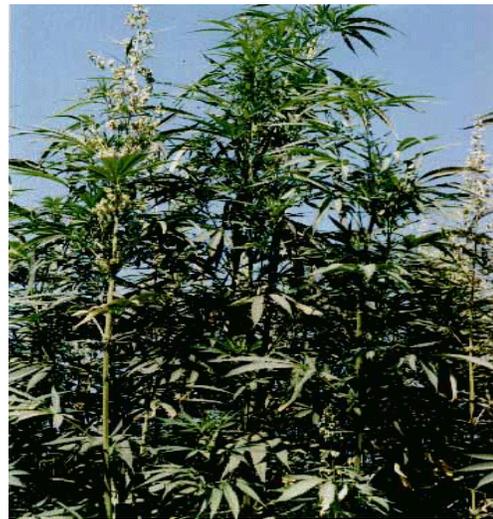


Hemp

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Hemp is an annual crop of the species, *Cannabis sativa*. It is grown primarily as a fibre crop but has many other applications including biomass fuel, lubricants, medicines, building materials, hemp seed, edible cakes and textiles. It was probably the earliest plant cultivated for textile fibre. Many of the world's major industrial countries are presently expanding their hemp industries in anticipation of the forecasted economic and environmental benefits of utilizing Hemp.



History - World production of vegetable fiber in 1992 was 10.2 million tonnes with hemp accounting for slightly more than one percent. Production of hemp is believed to have originated in China over 8500 years ago. The oldest surviving piece of paper dating back over 2000 years was made from hemp. During the 16th and 18th centuries, hemp and flax were the major fiber crops in Russia, Europe and North America. In the North American colonies, hemp quickly became an indispensable raw material. Bibles and maps were printed on hemp paper and much of their lamp oil came from pressed hemp seeds. The King of England distributed hemp seed to Canadian farmers, in the early 19th century. Growers were offered premiums to produce the crop and as a result hemp

became an important cash crop.

During the late 19th and early 20th century the increasing cost of labour encouraged industry first to shift from hemp to cotton, jute or other tropical fibres and then to synthetic fibres. Labour costs were reduced significantly by the invention of the decorticator in 1917. It separated the hemp fibres from the previously unusable hurds. This placed hemp in a stronger position to compete with other natural and synthetic products.

The United States imposed a heavy tax on producers under the Marijuana Act in 1937. Initially the law was to prohibit the use of marijuana but it created so much red tape that production of industrial hemp became nearly impossible. In

1938, Canada prohibited production under the Opium and Narcotic Drug Act. The prohibition was relaxed for a short time during WWII when supplies of manila rope and twine were cut off but renewed its prohibition of hemp after the war .

In the U.S. acreage went from 585 ha in 1939 to 59,500 ha in 1943, by 1946, total acreage had dropped back to 1950

In 1961, Health Canada allowed production for limited research. In 1994, Canada issued its first license in 40 years to a company called Hempline Inc.

Biology -Hemp is an annual crop of the species, *Cannabis sativa*. It is a high yielding fibre crop which grows well in areas of temperate climate, such as Canada. Hemp can attain a height of two to five metres in a three month growing season. Male and female flowers are borne on different plants. One acre of Hemp produces more bio-mass than most other crops.

Delta -9 tetrahydrocannabinol (THC) is the chemical substance produced by members of the cannabis species. Marijuana has an average potency of 5% - 15% THC. Low -THC or fibre hemp has a potency of less than 0.3% . At this low level of THC the psychoactive properties are nonexistent. New strains of low THC hemp have been developed by the French, although many of the traditional varieties formerly grown in Canada were low THC.

The stalk of the hemp plant is harvested for its fibres. The fibre length and content of cellulose and lignin are important quality parameters. The stalk yields three types of fibres: primary and secondary bast fibres and hurds

Bast fibres are the highest quality and comprise about 25% of the stalk. There are two varieties of bast fibres: primary and secondary. Primary fibres are long and low in lignin and are among the strongest natural fibres known to man. The secondary fibres differ from primary in that they are shorter and higher in lignin. The low lignin content of Hemp allows for friendly bleaching, without the use of harsh chlorine compounds.

Hurds are the short fibred, inner woody core of the hemp plant. They are high in lignin. Traditionally these fibres were considered waste, but with changing technologies these fibres can be used for the manufacture of a wide range of products including rayon, paper, industrial fabrication materials and bio-mass fuel.

Production - Hemp is a short day annual crop. Under cultivation it grows to an average height of between two to five metres. In four months it can produce seven to 15 tons per hectare of dry matter. In the last few years emphasis in European breeding programs has been to develop plants that bear both female and male flowers on the same plant. The selection of these strains would reduce maturation variation.

Hemp grows best in a humid environment, in temperatures between 14 °C and 27 °C. It has a high water requirement, especially during the first six weeks of growth.

Once it has developed a good root system it can survive most drought conditions. The crop should be seeded late March to mid May, depending on location. Hemp grows best in fertile, well drained, slightly alkaline soils. Fertilizer rates vary depending on soil type, end use and crop rotation. A general rule of thumb is 120 kg/ha Nitrogen, 100 kg/ha

Phosphorus and 160 kg/ha Potash. There are few pesticides registered for use on the crop. Densely planted seed for fibre can easily out compete weeds.

There are two approaches to growing Hemp: production for the fibre market or the seed market. Hemp grown for the fibre market should be seeded very densely at 55 - 70 kg/ha providing a plant density of 200 to 750 plants per square meter. This will promote the development of long, thin stalks and ultimately long fibres. Hemp for the seed market is planted less densely at 10 -15 kg/ha (five to 120 plants per square meter). Row spacing is usually six to 15 cm when using a narrow row width seeder.

Seed can either be drilled or broadcast. All seed must be imported into Canada mainly from Europe. The price for seed varies depending on world supply and demand. At present the demand has out grown the supply and prices are quite high. The crop can be cultivated with standard farm equipment. Harvesting of fibre Hemp occurs as soon as the crop is in flower. The hemp is mowed or cut and then put through a retting process.

Retting is the process of breaking down the pectin that binds the fibre and the non-fibrous portion of the stalk. After the retting process the hemp fibre and the stalk are separated. The remaining pieces of stalk, broken fibres and extraneous materials are all removed.

Harvesting for seed is somewhat different. A conventional combine is utilized to cut the upper portion of the plant, thresh and remove the seed. The remaining stem is then cut and left to dry before baling. Seed yields vary as does the oil content. Average expected yields range from 0.7 - 1.2 t/ha and oil content is generally between 25 - 35%. The quality of fibre from seed hemp is significantly lower than more densely planted fibre hemp.

Returns from hemp stalk, fibre, hurds or seed depend on the quality, quantity and end use. The hemp industry in Canada is at a stage in its development where determining the income is difficult. Economics of scale will tend to reduce costs. Processing and capital investment figures can only be estimated at this time.

	Gross return per hectare		
	price (\$/t)	yield (t/ha)	gross return (\$/ha)
Raw fibre (textile and cordage)	770 - 880	0.90 - 2.6	693 - 2288
Hurds (Pulp and paper)	60 - 75	7 - 12	420 - 900
Seed (Oil and feed)	370 - 450	0.4 - 0.94	148 - 423
Raw Stalk (Fibreboard)	60 - 75	7 - 15	420 - 1125

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Prices shown in the table are gross values, production and transportation costs need to be factored in to determine farmgate prices.

Legislation - Bill C-8 (formerly C-7), the Controlled Drugs and Substances Act, was introduced in February 1994 by the Ministers of Health and Justice to bring Canadian Law in line with International accords. The bill received Royal Assent on June 20, 1996 which means it was adopted by both chambers: The House and The Senate. The cultivation of hemp is still illegal without a license issued by the Minister of Health. Commercial cultivation will always remain a regulated process.

A research license for fibre was authorized to one grower in 1994. Health Canada has since issued seven more research licenses to grow hemp for fibre on a total of 36 acres in Ontario, Manitoba, Saskatchewan and Alberta.

Application for licenses must be approved by Health Canada and Agriculture and Agri-food Canada. Agriculture Canada is involved to reduce the risk of introducing

quarantine pests into Canadian agriculture. The importation and production of all hemp products, including plants and seeds for propagation, are regulated under the Narcotics Act and Regulations. The importation of hemp seed for pet and wild bird seed is regulated under the Health of Animal Act and Regulations.

More information may be obtained from the Agricultural Resources Team of the PEI Department of Agriculture and Forestry, phone (902) 368-5657 or 1-800-959-8929.