Growing Hemp in Alberta

Alberta

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Introduction

This document will assist producers to make decisions regarding crop production, storage, handling and risk management. It is suitable for all producers, including those that are:

- Considering growing hemp
- New entrants to hemp growing
- Experienced hemp growers

Why Grow Hemp in Alberta?

- World hemp markets are rising domestically and globally.
- Short season crop - Hemp can mature in as little as 90 to 100 days and is well suited to Alberta's geo-climatic conditions.
- Long hours of sunshine - Alberta has longer hours of sunshine compared to many other parts of Canada and hemp thrives best in sunshine.
- Every portion can be used – multiple revenue streams are possible as markets are advancing for every part of the plant.
- Soil health contributor – Hemp can be grown with low chemical inputs, can be a good rotation option to break up disease cycles associated with other crops, its long tap root can break up and aerate soil and it can help in carbon positive production.
- Growing expertise – Alberta has some of the world's largest hemp acreages grown by progressive farmers with vast experience and world recognized researchers.
- Crop genetics will continue to grow with advanced markets for cannabinoids and fibre composites.

Overview of Hemp in Canada

Hemp is an ancient crop experiencing a rebirth as a commercial crop. It became legal to grow hemp for commercial production in Canada in 1998.

The Industrial Hemp Regulations, part of the *Cannabis Act* 2018, in Canada allows for whole plant utilization of the hemp crop.

Food is the economic base of the Canadian hemp industry driven by a strong regulatory structure, good manufacturing processes, and long-term sales relationships.

Changes in the hemp regulations now allow opportunities for high value bioactive components from flowering heads, leaves and roots, which have seen as surge in market demand. These plant parts contain CBD and other bioactives that are being extracted for use as ingredients for cosmetics, natural health products and pharmaceuticals.

Markets are developing for straw and grain feedstock processing as inputs for bioindustrial product manufacturing including construction, erosion control, horticulture, automotive parts, paper, sustainable packaging, textiles and bedding.

Regulatory

Health Canada controls the production, processing, possession, sale, transportation, delivery and offering for sale of industrial hemp. The *Cannabis Act,* which came into effect on October 17, 2018, contains the Industrial Hemp Regulations. All industrial hemp grown, processed and sold in Canada must contain less than 0.3 percent THC in the leaves and flowering parts. In addition, a maximum level of 10 parts per million (ppm) for THC residues in products derived from hemp grain, such as flour and oil, has been set in the regulations.

A licence from Health Canada is required to possess, cultivate, sell/provide, process, produce a derivative, import and/or export industrial hemp.

All commercial industrial hemp crops must derive only from certified seeds of varieties listed in Health Canada's List of Approved Cultivars. Seed saving and the use of common seed are not allowed under the regulation.

Licensed Hemp Hectarage in Canada and Alberta

The Canadian Prairie Provinces of Alberta, Saskatchewan and Manitoba, are among the leading jurisdictions of hemp cultivation in Canada. Industrial Hemp commercial licences for cultivation by Canadian provinces and registered hectarage for cultivation of industrial hemp by approved cultivar by province are reported each year by Health Canada.

Markets: Food, Fibre, Fractions and Feed

Hemp is a crop with multiple uses (Figure 1). Its exceptional functional properties, rapid renewability and low environmental footprint are driving a number of markets with strong growth potential.

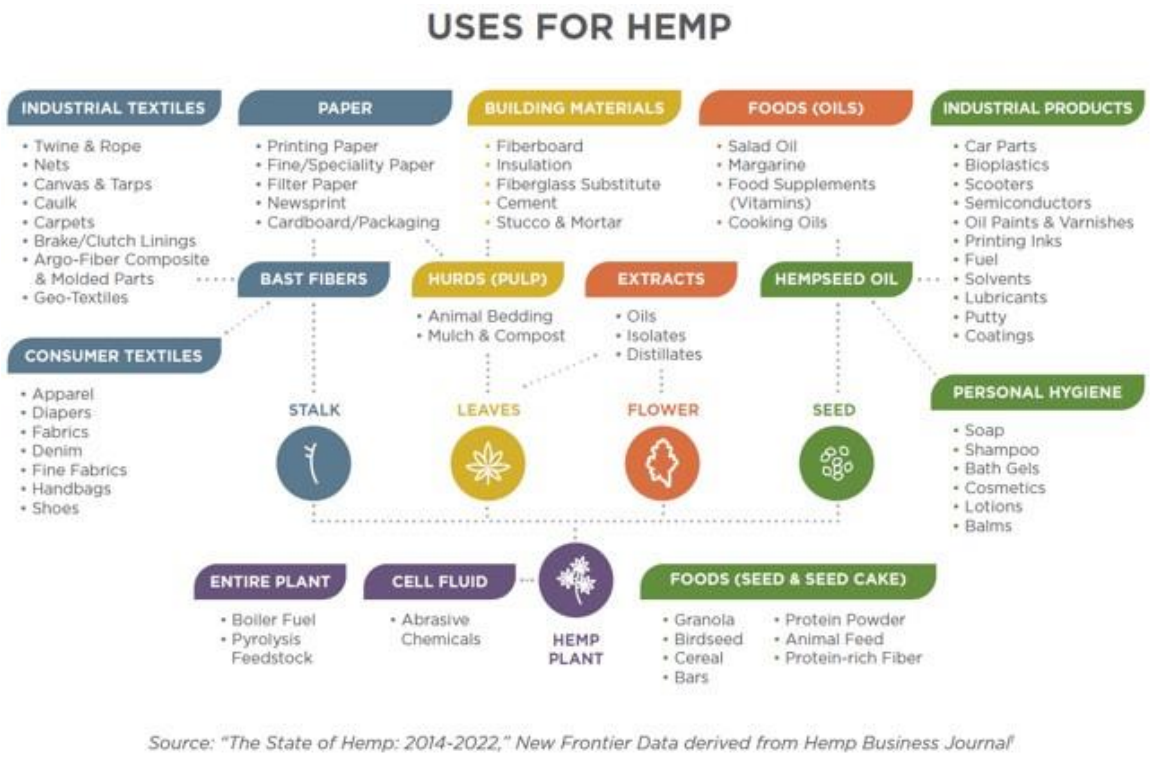

Figure 1. List of potential industrial hemp products

Food

Canada was the first country to successfully commercial hemp food products and continues to be world in hemp food product processing. There is growing demand for hemp protein in both human and pet food markets. There is also growing demand in food markets for certified organic hemp production.

As most hemp food products are sold with hemp in its raw state, developing a protocol system to maintain and track Good Agricultural and Collection Practices (GACP) on every farming operation is very important.

Fibre

Canadian hemp can produce an impressive amount of vegetative biomass in a range from 2t/ha to 10 t/ha depending on cultivar. Hemp biomass offers several components: fibre (found in the bark/outer skin) about 25 to 30 per cent of the stalk, hurd (woody inner portion of the hemp stalk) and dust (screenings/particulates). Processing provides pure elements, as well as blends of these components.

In comparison with other bast fibres (such as from flax, kenaf, jute or ramie), hemp fibre has excellent fibre length, strength, durability, absorbency, anti-mildew and anti-microbial properties.

Hemp offers super absorbency. This quality is desirable for oil and gas cleanup, livestock bedding and personal hygiene markets. Hemp's very high tensile strength, strength-to-weight ratio, flexural strength and ability to rebound are desired benefits in bio-composites for automotive parts, aerospace and packaging. The textile, paper and building markets have interest in some specialty applications due to hemp's durability, anti-microbial, acoustic and aesthetic properties.

The fibre decortication (separation) capacity is expected to increase in Canada. Expansion of decortication capacity will enable a viable market for harvested hemp straw, which today is mainly disposed of or used for lower value applications such as windbreaks for livestock. Companies using hemp to manufacture new products and to green and/or innovate existing products will be in a better position to increase their capacity and range of products.

In Alberta, the government is working with industry to advance product development and commercialization as well as facilitate supply chain development in the province. In 2009, the Government of Alberta invested in a fibre processing pilot plant for the decortication of stalk (a system to separate bast fibres from hurd) in Vegreville.

Fractions (Bioactives)

Harvest of chaff (flowers, leaves and stems) by Canadian hemp farmers occurred for the first time in 2018. Prior to this, these plant parts had to be left in the field. The sale of these plant parts is now restricted to licensed processors operating within the *Cannabis Act* or approved importers outside of Canada. In Canada, only licensed processors are allowed to extract the cannabinoids (primarily CBD), from the chaff. This market opportunity is still in its infancy.

Cannabidiol (CBD), a phytocannabinoid, is one of over 115 identified cannabinoids in cannabis plants. As of late 2019, only one pharmaceutical using CBD has been approved by the United States Food and Drug Agency (FDA) for use to treat a specific epileptic condition.

Feed

As of late 2019, hemp is not an approved livestock feed ingredient in Canada. Industry and governments are working to develop regulations to allow for hemp-based livestock feed ingredients.

Marketing for Producers

Anyone considering growing industrial hemp is recommended to secure market contracts before planting the crop. Growers should have conversations with buyers regarding market outlooks and the respective grower/buyer responsibilities. As the markets for hemp products are emerging, global supply, demand and prices will fluctuate. Growers may have to store and maintain crop quality over subsequent growing seasons.

Growers who want to sell fractions (the flowering heads, leaves, and branches) must sell them to Health Canada Licensed Processors. For export, sales can only be made to certified buyers in countries with an approved medical and scientific system. An import/export permit is also required for each shipment.

Hemp growers should prepare to undertake market research, including the following:

- Consider the different revenue streams and identify buyers for hemp products in these streams.
- Question buyers about price projections in these streams, including the varieties and production systems which will yield the best results for these markets as well as the ability to access support from these companies for meeting these requirements.
- Source certified seed for planting; some buyers will provide certified seed or links to companies who provide certified seed.

- Understand the technical requirements for different hemp products and ensure the necessary systems are in place to maximize yield and desired characteristics for these different revenue streams.
- Become informed about certifications, such as organic or environmental, to determine the cost-benefit.
- Become informed about environmental stewardship programs such as carbon offsets as an additional source of revenue and market benefit.
- Become informed about risk mitigating tools such as crop insurance.
- Ensure proper data collection methods to meet buyer(s) and/or certifier(s) requirements.

Organic and Natural Production

Generally, the demand for hemp products is expected to benefit from a growing demand for products that are healthy and environmentally sustainable. Organic and natural production certification programs can also provide growers with additional access to market channels, in particular, food, cosmetics and personal care, natural health products, textiles and in the future feed. Contact organic certification organizations and natural production industry organizations for more information on certification requirements and best management practices.

Environmental Benefits

With its fast growth and significant biomass yield, second on land only to bamboo, hemp supports efficient land use.

Research is underway in various locations to provide robust documentation to support hemp environmental claims. This includes:

- Once established, the hemp plant thrives well against competitors. Therefore, it may lessen the introduction of chemical inputs into the hemp industry as compared to some other commercial crops.
- Hemp maybe useful in carbon foot printing equations, as on average, it yields 4 times the biomass of an average forest in 90 days compared to 25 years in tree growth.
- Hemp is thought to provide a valuable break in a crop rotation for the purposes of disease and pest management.
- Hemp's root system can break up compacted soil, it is thought to provide aeration. The roots may also help to control erosion.
- Hemp may contribute to pollution abatement through its ability to mitigate toxins from the ground through phytoremediation (decontaminating soil or water using plants and trees).

Environmental stewardship programs, such as Agricultural Carbon Offset programs in Alberta may provide additional revenue to producers growing hemp. Agricultural Carbon Offset program in Alberta, the program used by hemp growers, requires farmers to register with an aggregation company prior to May 1st to claim credits for that year for the Conservation Cropping protocol.

Licence Application

Industrial hemp is a regulated crop in Canada. Under the *Cannabis Act* (2018), a person is required to obtain a licence issued by Health Canada in order to conduct various activities with industrial hemp including cultivation. In addition, licence holders are responsible for compliance with the *Cannabis Act* and its regulations, and with other applicable federal, provincial and territorial legislation and municipal by-laws.

Cannabis Tracking and Licensing System (CTLS)

Health Canada developed the Industrial Hemp Cannabis Tracking and Licensing System (CTLS) User Guide to enable applicants to submit online applications for industrial hemp and cannabis licences. Industrial hemp licence applications must be created, submitted, and, if necessary, withdrawn through the CTLS. The guide outlines the steps necessary to register a user account in the CTLS, provides a detailed walkthrough of the online application form and highlights important information and requirements.

If the applicant does not have access to a computer or the internet, contact the Cannabis Legalization and Regulation Branch by phone at 1-866-337-7705.

Industrial Hemp Licence Management Guide

Industrial Hemp Licence Management Guide provides holders of an industrial hemp licence issued under the *Cannabis Act* and the Industrial Hemp Regulations with information on how to manage their licence, including amending and renewing the licence and applying for an import/export permit. This guide also outlines the notification and reporting requirements that must be fulfilled by licence holders.

Licence Renewals

All licences have an expiry date. The licence must be renewed before the expiry date if the licence holder wishes to continue to conduct the activities authorized by the licence. Renewals cannot be started until the last 4 months before the licence expiry date. Health Canada recommends beginning the renewal process at least 3 months prior to expiry.

Varietal Selection and Sourcing Pedigreed Seed

There are over 50 approved cultivars for industrial hemp production in Canada. Please see Health Canada's list of Industrial Hemp Varieties Approved for Commercial Production.

Each hemp cultivar on the List of Approved Cultivars has been approved under the Policy for the Inclusion of Cannabis Varieties on the List of Approved Cultivars. The most common approved varieties presently being contracted and grown in Canada are Finola, X 59, Katani, Picolo, Grandi and CFX-2.

In recent years, several new varieties have been released that have been bred specific to the food market (shorter plants) or fibre markets (taller plants). Dual-purpose varieties are under development, including Silesia. Silesia is a new, licensed variety of InnoTech Alberta and is performing well at field trials in various locations on the Canadian prairies. Yields vary depending on a number of geo-climatic factors.

In North America, hemp seed for growing can become scarcer as it comes closer to planting season. It is a good practice to source seed as you are applying for your licence. For a list of hemp seed sources please see Canadian Hemp Trade Alliance website and other websites of commercial pedigree seed provides such, as but not limited, to Uniseed, Terramax, Parkland Industrial Hemp Growers, Hemp Genetics International, and Hemp Fresh Canada.

Hemp growing in field Photo: Canadian Hemp Trade Alliance

Growing Hemp

Plant Biology: Flowering

Hemp is a short-day plant, which means it requires a long period of darkness to form flowers. Short-day plants develop flowers only when the day length is less than about 12 hours. Its flowering is delayed by long days and hastened by short days. The hemp stem grows until the end of June or beginning of July. Shorter days then typically trigger flower development.

Hemp is primarily dioecious, that is, the pollen-bearing parts are found in one plant and the seed-bearing flowers on another. Cannabis has a diploid genome (2n = 20). The male and female plants are not distinguishable before flowering. The male inflorescence can be identified by the development of round, pointed flower buds with five radial segments, while the female inflorescence can be identified by the presence of calyx. Male plants die shortly after flowering. The female plants live 3 to 5 weeks until seed is fully ripe.

In a dioecious crop, the number of female plants is 10 per cent to 50 per cent higher than the number of male plants. There are a few monoecious cultivars now that have both male and female flowers on the same plant (Table1).

Table 1. List of Industrial Hemp Varieties by Type	
Dioecious	CanMa, Carmagnola, Carmen: CFX-1, CFX-2, CRS-1, Crag CS (Carmagnola Selezionata, ESTA-1, Finola, Kompolti, Lovrin 110, Petera, USO-14, USO-31, Zolotonosha 11, Finola, X59, Katani, Grandi, Picolo, GranMa, CanMa
Female predominant	Alyssa, Fédrina 74, Felina 32, 34, Fibriko, Kompolti hybrid TC, UNIKO-8
Monoecious **(have male and female flower parts on same plants)**	Silesia, Ferimon, Fedrina 74, Joey, Delores, Anka, Core, Bast, Canda

Stem

Plant height varies significantly among cultivars ranging from 100 cm to 250 cm. The hemp plant stem can range from 4 mm to 11 mm in diameter in Alberta.

Biomass Properties

Table 2 below shows the physical-chemical properties of hemp varieties grown at two sites in Alberta. The cellulose content of the bast component of hemp varieties ranged between 57 per cent and 65 per cent. The mean cellulose content was 61 per cent. The core of the hemp stalk has 46 per cent cellulose, while the fibrous sheath (bast) has more cellulose (60 per cent).

Table 2. Physical and Chemical Composition of Hemp Stems

	Cellulose (%)	Lignin (%)	Pentosan (%)	Yield (kg/ha)
Core	48	22	22	5,543
Bast	60	3	6	2,697

Crop Physiology

A hemp crop is high yielding, partly because it already shows full ground cover after a thermal time of about 400 to 450° Cd (Cd = thermal time units).[1] Thermal time is the accumulation of temperature to which a plant has been exposed.

Hemp is a short-day plant, which affects crop production. Once the flowering starts, the efficiency with which intercepted radiation is converted to dry matter drops rapidly.[2] Cultivars grown in Europe are usually of French origin and have a critical photo-period of between 14 and 15.5 hours. Hemp has been photo-period sensitive, meaning it tends to flower at the same calendar date no matter when it is planted. New varieties are available that are not photo-period sensitive.

The differences in growth rate and development between male and female plants are large.[3] Male plants tend to flower and senesce (deteriorate with age) earlier. This variation may limit yields, reduce the efficiency of resource use and may result in variable quality.

Crop Growth

The base temperature for leaves to appear is 1°C and for canopy establishment 2.5°C.[4] Starting from sowing to 50 per cent plant emergence, hemp requires 56°Cd (base 3°C). To reach canopy closure, hemp (at 64 plants m^2) requires another 340° Cd (base 2.5°C).

Table 3. Morphological Development of Finola (sown mid-May to early June latitude 50°N)[5]

Morphological stages	Days after sowing
Emergence of seedlings	Day 5 - 7
First true leaves	Day 7 - 10
Second true leaves	Day 10 - 12
Third true leaves	Day 12 - 15
Fourth true leaves	Day 15 - 25
Beginning of flowering	Day 25 - 30
Beginning of pollination	Day 30 - 35
Peak time of pollination	Day 40 - 45
Apparent seed formation	Day 55
End of pollination	Day 55 - 65
Small smell from females	Beginning day 50 - 60
30 – 70% mature seed	Day 70 - 80
60 – 80% mature seed	Day 90 - 100
Male flowers	Normally dead by day 100
Harvest time	Day 100 – 120 after sowing

Plant Density

Hemp plants are grown at a wide range of plant densities, depending on the goal of the production and the expected yield level. Plant density is significantly affected by cultivar, seeding rate and year. Seeding rate has no significant effect on plant height.

Seed sowing rates vary. In Alberta, the recommended hemp stand at harvest for hemp grain production is approximately 100 to 120 plants m2. According to Innotech Alberta thousand kernel weights of the current varieties range from 12 g for Finola to 21 g for X59. These figures give a seeding rate of 24 to 36 kg/ha, depending on variety.

Overall, a high plant density produces a better crop with early growth competition with weeds. Seeds should be drilled at a depth of 2.5 cm in rows spaced 15 to 50 cm apart. Planting at 20 cm row spacing using large seed openers (12.7 cm) gives 67 per cent seed utilization.

For fibre production, seed is sown densely so that growth produces tall, slender stems with small bast cells. Dense stands (300 – 375 plants/m2) are preferred when growing hemp as a fibre crop. The recommended seeding rate for hemp fibre production is 67 kg/ha. The higher seeding rate for fibre is due to the need for many fine stems with a higher percentage of fibre in the stems.[5]

Climate and Soil Conditions

Hemp is well adapted to growing on the Canadian prairies. It survives dry conditions better than most crops because of its extremely well developed fibrous root system, but it does not like growing in saturated soils for the same reason. For juvenile plants, frost tolerance is similar to other crops, but at the later stages in crop development, the plants can take much harder frosts without damaging seed yield or germination.

Hemp can be grown on a wide range of soil types. Hemp grows best on well drained, loamy soils with high levels of organic matter. Moist, sandy loams with near pH 6 to 7 are best. Heavy compacted clays and low wet areas are not ideal for hemp production.

Rotation

A rotation of industrial hemp following cereals is useful because volunteer cereals are controlled more easily than volunteer broadleaf crops. Detailed crop rotation studies aimed at identification of optimal sequences maximizing hemp performance are currently conducted at three locations across Alberta. Organic hemp is best preceded by perennial alfalfa, green-manure fields, legumes and potatoes because hemp is a high nutrient user. Avoid growing hemp after canola as both crops can be infected with sclerotinia.

Volunteer hemp plants emerging in other crops in the rotation must be destroyed. It is not recommended to grow hemp on hemp stubble. Detailed research on the fit of hemp in Prairie crop rotations is warranted.

Time of Sowing

Hemp seedlings can survive a short frost of up to -10°C[6] and older hemp plants can tolerate frosts of up to -6°C with little effect on seed quality.[7] Hemp should only be sown once the risk of hard frost has passed. In Alberta, mid to late May is the optimum seeding window, but seeding up to the end of June is possible, often without severe grain yield penalty.

Hemp seedlings are frost tolerant to about -4°C. Prolonged cold at this stage is detrimental, but not fatal to the plants.

Seedbed Preparation and Planting

The seedbed should be firm and relatively fine, similar to that prepared for canola.[8] Industrial hemp is normally sown using standard seeding equipment such as air drills being used for other crops. Ideal seeding depth is 1 to 2 cm, but in good moisture conditions, shallower seeding works very well.

Optimum soil temperature for fast germination is 8 to 10°C, although hempseed will germinate at 4 to 5°C. Packing is good, but do not pack too tightly as excess soil compaction will reduce emergence. Soil compaction due to heavy rainfall after planting can significantly reduce plant emergence.

Fertilizer

In research studies, hemp has shown a significant yield response to applied fertilizers when levels of plant-available nutrients in soil were low and soil moisture conditions were adequate for plant growth. On the other hand, hemp was generally not responsive to additional phosphorous (P) fertilizer on soils not deficient in available P, or to the addition of sulphur (S) fertilizer on a soil deficient in available S.[9]

Increasing nitrogen (N) rates significantly increased plant height, biomass and seed yield, when data were averaged across all sites (location-years), reaching maximum values at about 150 kg N ha of nitrogen, depending on soil fertility and past cropping history.

Research to date supports the application of 40 to 90 km/ha of potash for fibre hemp. Growers should base phosphorus (P205) and potash (K20) applications on a recent soil test.[10]

Hemp will grow taller and produce more biomass with increased fertilization. In-depth fertility studies that address the needs of different usage types of hemp on the Canadian Prairies are still required.

Increasing fertilization may also delay seed maturation.[11] Organic producers often precede a hemp crop with a perennial alfalfa crop followed by plowing it back into the soil, referred to as “green manure”. This is done to add nutrients and nitrogen into the soil, as hemp is a heavy nitrogen user. The value of green manure can vary with the type of crop and the timing of the plow-down process.

Weed Control and Management

Edge ® is a registered product for pre-emergence weed control in hemp and will control some broadleaf weeds, as well as some of the grassy weeds. For natural and organic growers, a cultivation pass is a weed control option.

Hemp can out-compete weeds if several conditions are met including: if the hemp germinates before the weeds, is grown in a relatively clean field and spring growing conditions are good. Given a good start, hemp can be an effective weed suppressant. A quick, even emergence is the key to effectively competing with weeds by rapidly creating a dense leaf canopy within the first month of growth.[12]

Problem weeds in hemp include hemp nettle, wild buckwheat, wild oat, pigweed, lamb's quarters and Canada thistle. Wild buckwheat seed is especially difficult to clean away from small hempseed.

In Canada, there are no in-crop herbicides registered for use on broadleaf weeds in hemp crops. Pesticide trials are ongoing through the Minor Use Program.[13] Grassy weeds can be controlled by Assure II ® (Quizalofop-p-ethyl).

Maturing hemp crops with beneficial field crop insects Photo: Alberta Agriculture and Forestry

Disease and Pest Management

Industrial hemp seems to be fairly disease-free in western Canadian conditions. Under wet fall conditions, stem rot and gray mould or bud blight may be a problem. Early harvest is recommended to avoid fungal damage.

Management practices include rotation with non-susceptible crops, disease-free seed and management of hosts such as volunteer canola.

Though major pest issues have not been reported in Canadian hemp crops, research is required to fully understand this area of crop management.

Field Sampling for THC

Field sampling and testing for THC content is only required for cultivation for seed and plant breeding.

Hemp farmers planting registered cultivars are not required to test plants for THC during the growing season.

Harvesting Grain

Yield

Production is estimated using information gathered on yield and acres harvested. Industrial hemp yield (grain or fibre) varies with variety, plant population, soil conditions, timing of harvest and annual climatic conditions.

The highest grain yield recorded in Canada to date has topped 2,000 lb per acre (2,242 kg/ha), and average yield is between 600 to 800 lb. per acre (673 to 897 kg/ha), but rising.

In Manitoba, hemp grain yields range from 100 to 1,200 lb per acre (112 to 1,300 kg/ha), while yield for crops grown and managed solely as fibre crops range from 1 to 6 tons per acre (1 to 6 tonnes/ha). Typical grain yields in Saskatchewan vary from 660 to 1,070 lb per acre (740 to 1,200 kg/ha).

In Alberta, hemp grain yields from research plots have been found to vary from 200 to 1,600 lb per acre (220 to 1,800 kg/ha). The expected yield would likely average nearly 760 lb per acre (850 kg/ha).

Harvesting

Harvest of seed is approximately 100 to 120 days after sowing, depending on variety. Hemp shatters very easily and makes excellent birdseed. Harvest should begin soon after birds are noticed in the field.

Straight combining industrial hemp seems to be the preferred harvest method, especially with taller varieties. Excess biomass material going through the combine can cause problems, so harvesting only the inflorescences is preferred.

Since seed is easily damaged, many farmers will combine in the 18 to 20 per cent moisture range and dry the seed to around nine percent for storage. It is important to aerate the grain immediately off the combine down to about nine percent moisture – this step is critical to prevent seed heating, to reduce mould growth and to preserve seed quality.

Reduce cylinder, rotor and unloading auger speeds to prevent seed damage while harvesting. Watch for fibre wrapping around shafts, particularly the drive shaft and sprockets of the feeder chain, or front beater, and front drum for the feeder chain. There are some combine modifications that may limit fibre wrapping and speed up harvesting.

Modest ground speeds and input rates, with high engine speeds, should help limit potential problems. As always, careful attention is the best way to prevent mechanical problems.

Combining Hemp and Hemp in Aeration Bins Photo: Alberta Agriculture and Forestry

Drying and Cleaning

Ideally, drying should begin in the field. In wet conditions, combined grain can be dried in a grain dryer and aerated in grain bins, the same as with other crops. For the highest quality, SLOWLY dry hempseed down to nine per cent moisture in a grain dryer, immediately after harvest, at LOW temperatures (20° – 25°C maximum) and HIGH volumes of air flow. Faster drying temperatures can be used for lower quality grain.

Moisture should be checked with a calibrated meter. Finola grain can be effectively cleaned with the following sieve sizes: 1.60 to 3.25 mm oblong and 2.50 to 5.00 mm round. A gravity table may be necessary to remove some seeds. All seed cleaning facilities handing hemp must obtain a licence from Health Canada.

Storage

The grain should not be stored for any amount of time without sufficient drying. Mould problems can ruin a harvest within a few hours, in some cases. Be sure that the drying facility is nearby and available at harvest time, and be sure that the moisture meter is pre-calibrated for oilseed hemp.

Store dried grain in bins or tote bags, away from birds. Hempseed should keep well for two to three years if properly dried and stored.

Harvesting Stalk

Yield

Hemp straw yields under dryland conditions have an average of between 2.4 to 4.8 tonnes per acre (6 to 12 tonnes/ha) for the higher yielding varieties like Carmen, Alyssa, Delores and Silesia.

The harvest timing for top quality fibre to be used for textiles is important. If harvested too early, plants may be immature, and yield will be low and fibre strength weak. If harvested too late, fibres may become too coarse to use in textile products. For most industrial applications, hemp stalk harvesting after seed harvest is permissible.

Baling hemp stalks Photo: Innotech Alberta

Harvesting

Hemp can be cut strictly for fibre and the remaining stalk after combining can be cut with a disc-bine or sickle bar mower. Ideally for good decortication, this material will then be baled using either a big round or big square baler after some retting has taken place, but it can be baled immediately upon dry-down.

Retting

The quality and quantity of hemp fibre yield is affected by retting, the process of partially breaking down the gummy substances, especially pectin, that bind the fibres together in bundles and to the plant core. Retting can be done chemically or biologically.

In field dew retted approaches, the stems are left spread over the surface of the field after the crop has been cut. During this time, the spread stems are normally turned a number of times to expose them evenly to light and moisture. Field retting micro-organisms attack the hemp stems and break down the cementations that bind them together. An alternative method of stem harvest is to leave the stalk standing through the winter and roll the stems in the spring to break them off at ground level before raking and baling. This approach is called winter retting. Other forms of retting in and beyond the field include water, chemicals and enzymes.

Storage

Hemp bales can be stored outside (outside edges will weather when exposed), under a tarp or in a building.

Harvesting Fractions

Flowering Heads & Leaves

As this is a new commercial revenue stream, research and data on yield, harvest, drying and storage is being collected. Please keep checking for current information from trusted resources including the buyers whom you hold contracts for your floral biomass harvest.

Approaches of harvesting hemp for CBD and other bioactives vary widely including collecting individual heads at flowering to collecting chaff while combining the seed. Harvesting flowering head and leaves can be done through a number of mechanical and manual methods. Timing of the harvest of this biomass is important in order to achieve optimal bioactive content. The grower can also monitor hemp bud for visual clues. For instance, growers have reported as trichomes (resin glands of the cannabis plant that contain THC, CBD, and other active medicinal cannabinoids) on the hemp bud start to appear more milky white than clear, is one indicator that the crop is ready for harvest.

Tests of bioactive content can inform growers when to begin harvest. Though tests for CBD, other cannabinoids, terpenes, pesticide residue, mould and heavy metals can be costly, the return on investment may prove to be significant. For instance, the value of hemp biomass can be significantly reduced if mould and mildew are present. Depending on your contract, this cost may be covered or shared by your buyer.

Once hemp fraction biomass is harvested the drying process should promptly begin. It has been reported by growers that this must be done within a short window, about 1 to 4 hours. Appropriate ventilation is critical for moisture control. However, overheating is also a concern. A process of slow drying with high airflow is best to cure the hemp and to maintain quality for storage and transport.

Roots

Hemp roots can be harvested after the other plant parts are harvested. Dried cannabis roots have bioactive content and should be stored in consistent temperature and humidity to maintain quality.

Additional Resources

Alberta Agriculture and Forestry

Production costs and returns of industrial hemp seed in Alberta, 2017-2018

This report provides a summary of the 2017-2018 cost of production for industrial hemp seed grown in Alberta. It supplements and updates information gathered through a previous cost of production study completed for Alberta in 2015.

Norquest College Online Hemp Courses

Hemp Farmer

Created with input from experienced hemp farmers and industry experts, the Hemp Farming course is designed for conventional and organic farmers considering hemp. Farmers who grow industrial hemp will also benefit from this course by gaining a deeper understanding of how to harvest hemp for different business end uses. Note there is fee for this course.

Hemp Processing and Products

The course is designed for entrepreneurs and innovators to learn how to make products from hemp. This class will teach how to differentiate between cannabis and hemp, industrial hemp regulations and licences in Canada, understanding how farming can impact product quality, and how to process hemp seeds, hemp fiber and cannabinoids. Note there is fee for this course.

Canadian Hemp Trade Alliance (CHTA)

The CHTA is a national organization that promotes Canadian hemp and hemp products globally. The key functions of the Alliance are to disseminate information, promote the use of hemp and coordinate research. The CHTA hosts an annual conference and tradeshow, usually in November. It is a good source of information and networking for new and experienced growers.

CHTA Hemp Production eGuide

The guide provides producers with specific hemp production and marketing information, including photos and videos.

Alberta Hemp Alliance (AHA)

An association representing farmers, municipalities, Metis, First Nations, businesses and industry supporters, helping to develop the Alberta hemp Industry.

Alberta Hemp Directory - Bio Alberta

A directory of Alberta processing and manufacturing companies, services and support organizations in the hemp industry.

InnoTech Alberta

Crop Production Research Farm

Research includes agronomic practices and new varietals for industrial hemp. InnoTech Alberta hosts an annual Field Day in the summer featuring field walks and talks in hemp fields.

Fibre Processing and Pilot Plant

The Pilot Plant located at the Vegreville facility concentrates on decorticating hemp and flax fibres. This one of a kind, state of the art facility was completed in 2011 with funding provided by the Alberta Government. InnoTech Alberta works with clients to develop best practices that can provide the highest quality fibres.

Alberta Agriculture and Forestry

Food Processing Development Centre Food scientists, engineers and technologists at the Centre help entrepreneurs.

Agrivalue Processing Business Incubator The Agrivalue Processing Business Incubator supports new food businesses and established food manufacturers.

Food Science and Technology Centre The Centre helps entrepreneurs develop pet-food products.

Bio Processing Innovation Centre (BPIC) BPIC supports Alberta's bio-economy with specialized services and access to state-of-the-art equipment.

For further information on hemp farming and value-adding contact:

Ag-Info Centre: 310-FARM (3276) or aginfocentre@gov.ab.ca

References

[1] Van der Werf H M G. 1994. Crop physiology of fibre hemp (Cannabis sativa 15.). Ph.D. Thesis, Wageningen Agricultural University. 153 pp.

[2] Van der Werf H M G. 1994. Crop physiology of fibre hemp (Cannabis sativa 15.). Ph.D. Thesis, Wageningen Agricultural University. 153 pp.

[3] Van der Werf H M G. 1994. Crop physiology of fibre hemp (Cannabis sativa 15.). Ph.D. Thesis, Wageningen Agricultural University. 153 pp.

[4] Van der Werf H M G, Brouwer K, Wijlhuizen M, Withagen J C M. 199%. The effect of temperature on leaf appearance and canopy establishment in fibre hemp (Cannabis sativa L.). Annals of Applied Biology 1265.51-561.

[5] Senchenko G I, Timonin M A. 1978. Hemp [in Russian]. Moscow: Kolos. 285 pp.

[6] Growing Hemp in Ontario

[7] Vera, C. L., Malhi, S. S., Raney, J. P. and Wang, Z. H. 2004. The effect of N and P fertilization on growth, seed yield and quality of industrial hemp in the Parkland region of Saskatchewan. Can. J. Plant Sci. 84: 9 39 947.

[8] Dr. Jace Callaway, CEO POB 236, FI-70101 Kuopio, Finland Basic information on FINOLA Agronomy for 2013. February 2013

[9] Dr. Jace Callaway, CEO POB 236, FI-70101 Kuopio, Finland Basic information on FINOLA Agronomy for 2013. February 2013

[10] Dr. Jace Callaway, CEO POB 236, FI-70101 Kuopio, Finland Basic information on FINOLA Agronomy for 2013. February 2013

[11] Dr. Jace Callaway, CEO POB 236, FI-70101 Kuopio, Finland Basic information on FINOLA Agronomy for 2013. February 2013

[12] Industrial Hemp Production and Management - Manitoba

[13] Hemp Production - Saskatchewan