

Flax

HISTORY

Flax has been used by humans for thousands of years. The earliest evidence of humans using flax comes from the Caucasus region, an area between the Black Sea and the Caspian Sea, during the Late Stone Age, approximately 30,000 years ago. Evidence of cultivation in the Fertile Crescent, an area between the Mediterranean Sea, Red Sea, and Persian Gulf, goes back nearly 9,000 years. Production spread to India and China by 3000 BC.

Flax on the North American continent dates to 1617, when Louis Hébert, the first European to farm in Canada, introduced it to New France. With time, flax production expanded and moved westward. By 1875, European settlers were seeding the western prairie with flax brought from their homelands. Flax flourished in the clean environment, and production in the new land advanced.

Two types of flax are cultivated: one for seed and one for fibre. In North America, the oilseed variety is primarily produced. The coming of two world wars increased demand for flax as a source of oil for many products in the home and in factories. Following the Second World War, commercial flax production in North America expanded significantly.

Throughout the 1950s and 1960s, flax products were widely adopted for use throughout the world. Oil-based coatings beautified and protected wood and concrete surfaces, and durable linoleum became a popular flooring material. During this time, people also began including flax in their diet.

In parts of the world, flax breads and other baked goods are commonplace. Farmers and ranchers also feed flax meal to their livestock to maintain healthy coats and improve digestion.

PRODUCTION

Flax is an *oilseed* with a shallow *tap root system* from which fibrous roots grow. Flax in Manitoba is grown in black soils. Flax is not vulnerable to many of the diseases that harm cereals, pulses and other oilseeds, making it a profitable alternative for farmers. It also requires less rainfall and soil moisture than other oilseeds. It yields best when it is incorporated into a *crop rotation* after a cereal or pulse crop.

Flax seed is sown or planted between May 1 and June 1 and germinates when soil temperatures rise above 8°C. A decade ago, soils were usually *tilled* before planting. Tilling with tools or equipment turns over and breaks up the soil, which loosens and aerates it. More farmers now practice *reduced tillage* or *conservation tillage*, techniques that minimize disturbing the soil and help conserve water, capture or sequester CO₂ from the air, prevent erosion, and reduce fuel emissions from farming vehicles and equipment.

Farmers use a range of practices to manage pests such as insect, weeds and disease. *Integrated pest management* involves carefully selecting the variety of flax they grow, *scouting* (monitoring) the crop as it grows, and crop rotation. Farmers implement cultural, mechanical, biological and pesticide control measures that consider impact on other pests, beneficial organisms and the environment.

Flax seeds are planted in moist soil 2.5 to 4 centimetres below the surface – shallower than many other crops because the seedlings are more delicate.

Flax plants grow to roughly 40 to 91 centimetres in height, with a central stem and several smaller seed stalks concentrated at the top. Plants cultivated for seed are shorter and have more branches. The leaves, alternating on the stalk, are small



and lance shaped. The fruits, or *bolls*, are small, dry capsules composed of five lobes that contain the seed.

After planting and germination, the life cycle of a flax plant begins with two small leaves or *cotyledons* emerging from the seed. Gradually, the seed continues to grow new pairs of leaves and the stem extends, forming buds at the top of the plant. The main stem usually branches when it reaches a height of 30 centimetres, then the first flower opens. Flax flowers are blue and bloom longer when the weather is cool and cloudy. Flowering lasts 15 to 25 days, with each individual flower only lasting for a single day. Then the plant matures for another 30 to 40 days.

Flax ripens from the top down, beginning with the oldest (central) bolls. As the crop reaches full maturity, seeds formed in the bolls begin to lose moisture and gradually turn from green to brown. When 75 per cent of the bolls across the field are brown and seeds rattle within them, farmers will *swath* the crop (cut it down into rows) or apply a pre-harvest *desiccant* (drying chemical) to ensure the crop is uniformly dry, which makes harvesting easier.

Flax can be harvested with a combine without the need for further drying when the moisture content of the seeds drops to 10 per cent. A *combine* is a piece of equipment that cuts the stems, separates the bolls from the seed stalks, and cleans the chaff from the grain. At the same time, it processes and spreads the remaining material over the field. (It's called a combine because it *combines* several jobs into one machine.)

After harvest, flax farmers transport their harvested flax to storage bins on their farms. Farmers take great care to ensure their stored flax is maintained at the right temperature and moisture level to prevent spoilage and heating. Proper storage ventilation is also important.

Flax is later delivered to grain elevators, from where it is shipped to different markets.

SOLVING THE STRAW PROBLEM

Flax straw left on fields after harvest poses special challenges that farmers must manage effectively. Flax straw has a significant percentage of long, tough stem fibres that decay very slowly. This makes it difficult to incorporate flax straw into the soil after harvest, since the fibres wrap themselves around and/or plug discs, wheels and cultivator shovels. In the past, the only way to manage flax straw was to drop it in *windrows* behind the combine and then burn it directly on the field, or *harrow* (rake) it into piles and then burn the material.



Thankfully, *straw choppers* on today's largest new combines can effectively chop and spread flax straw, but this only works if the straw is relatively short. Straw that can't be chopped can be *baled* and used as animal bedding, lining for drainage ditches in new road construction, horticultural mulch, or as a *bio-fuel* source in bale burners.

PROCESSING

Flax seed is processed into a wide variety of food and non-food products.

The use of flax in food products is growing rapidly in North America, including bread and bread-based foods such as muffins, as well as cereals, crackers, energy bars, cookies, pancakes and pasta.

Flax is also processed into *linseed oil* for paints, linoleum and industrial lubricants.

Flax produces large volumes of high-quality fibre. *Flax fibre* can also replace the fiberglass used to make automotive parts, such as dashboards and body panels.

Flax straw can be used for animal bedding, horticultural mulch, particleboard, insulation board, loose-fill insulation, plastic composite filler, and heating fuel.

Canadian flax is exported mainly to China, the United States and the European Union.

NUTRITION

Canadian flax is a high-quality food. Flax contains the Omega-3 fatty acid alpha-linolenic acid (ALA), fibre and lignans. Health experts recommend these nutrients for better health.

About 43 to 45 per cent of flax seed is oil, and more than 70 per cent of that oil is polyunsaturated fat, a healthy fat. Fifty-eight per cent of flax fats are made up of ALA. Flax seed contains soluble and insoluble fibre. Soluble fibre can lower blood cholesterol levels, while insoluble fibre moves the stool through the colon more quickly, helping bowel movements.

Flax seed is also one of the richest plant sources of *lignans*, providing up to 800 times more lignans than most other foods in a vegetarian diet. Lignans are *phytoestrogens* – compounds revealed by laboratory studies to protect animals against certain kinds of cancer, particularly cancers of the breast and colon, by blocking tumour formation.

Flax seed contains numerous *essential amino acids* the human body can't produce and must obtain from the diet.

DID YOU KNOW?

In Canada, we typically use the name flax, but the same plant is called **linseed** in other parts of the world.



WHOLE VS. GROUND FLAX

Both whole and milled flax seed are rich in dietary fibre, lignans, protein and the essential fatty acid, ALA. Milled (ground) flax seed provides more nutritional benefits than whole seed.

That's because flax seeds are hard and difficult to crack. Whole flax seeds pass undigested through the body, reducing their nutritional advantage. It takes careful chewing to break the seed coat of a whole flaxseed and release the nutrients within. Grinding the flax seed does that work ahead of time, making it easier to digest when eaten, and allowing the body to profit fully from the flax nutrients.

All vegetable oil products require care in handling and storing. Once you grind flax seed, there's a greater risk it will develop an off flavour. To ensure flax seed's freshness, it's best to grind the whole seed only as you need it. After grinding, refrigerate it in an airtight, opaque container. Ground flax seed handled this way will keep for up to 90 days.

Flaxseed oil results from the pressing of oil from the seed. Flaxseed oil provides more ALA on a per-weight basis compared with whole or milled seed (approximately 15 to 18 per cent).

FARMER PROFILE



NICK MATHESON Stonewall, Manitoba

"I grow flax along with wheat, barley, oats, corn, canola, soybeans, and forages. I also raise cattle. Growing flax is important to me because it's profitable, sustainable and versatile. You can find flax in everything from human food to pet food to livestock feed. Even the straw is useful."

INDUSTRY IN MANITOBA

Production: 46,000 metric tonnes (2020)

Number of Producers: 158 (2020)

Value to Economy: \$31 million in farm cash receipts (2020)

INDUSTRY IN CANADA

Production: 578,100 metric tonnes (2020)

Producers: 6,600 (2018)

Value to Economy: \$390,651,075 in farm cash receipts (2020)

ENVIRONMENT

Flax is a resilient, sustainable plant to grow for several reasons. It boasts natural pest resistance and requires less irrigation than other crops. The plant itself is also extremely versatile and can be used in a variety of ways, which means very little of the material produced from the crop is wasted.

Manitoba farmers put tremendous effort into making sure the crops they produce are safe and grown in a sustainable way. They use modern agriculture practices and tools to reduce greenhouse gas emissions, address climate change and help build biodiversity. Some of the innovations they use to grow flax crops include:

- **Reduced tillage** and **conservation tillage**
- **Integrated pest management**
- **GPS and precision agriculture** that help farmers reduce unnecessary seed, fertilizer and pesticide use, and reduce fuel consumption from farming vehicles and equipment.

BY-PRODUCTS

Flax meal is a by-product of flax oil extraction. High-protein meal is made into animal and pet foods. Flax is used as a high-quality animal feed in rations for beef, dairy, poultry, swine and fish.

Perhaps one of the most famous industrial uses for flax is as the primary ingredient of *linoleum*, a durable, biodegradable flooring. Flax is also used as a replacement for petroleum-based solvents in a wide range of paints, stains, coatings, sealants, plastics and resins. Using flaxseed oil to make these products reduces the need for solvents, which can be environmentally hazardous.



CAREERS

- » Farmer
- » Plant operator
- » Food scientist
- » Dietician
- » Grain merchant/trader
- » Agronomist



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