

RAINY RIVER FUTURE DEVELOPMENT CORPORATION

# Medicinal Plants Commercial Opportunity Analysis

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Rainy River District

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A study of native plants with medicinal properties as potential commercial crops in the Rainy River District.



Ontario

Canada



# Medicinal Herbs Commercial Opportunity Analysis

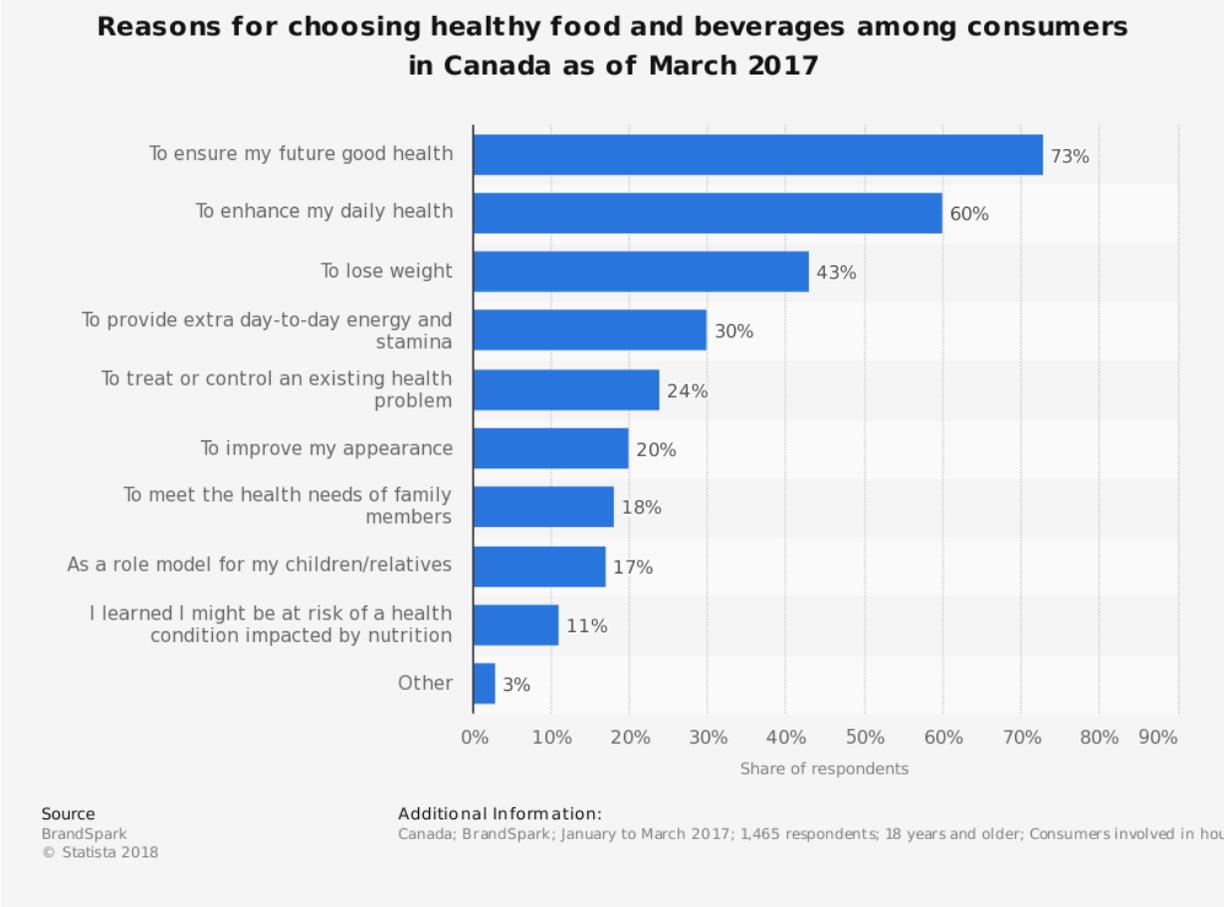
## Introduction

This study reviews the commercial opportunity for native plants with medicinal properties to be cultivated as crops in the Rainy River District in Northwestern Ontario. Traditionally, Ojibway people in the Rainy River District have foraged natively growing plants from the land for various health and wellness benefits. Increasing interest in natural products and alternative health and wellness among Canadians signals that there may be a market opportunity to commercially produce medicinal native plants. This report will examine some of those wild plants and their viability as commercial crops.

## Market Analysis

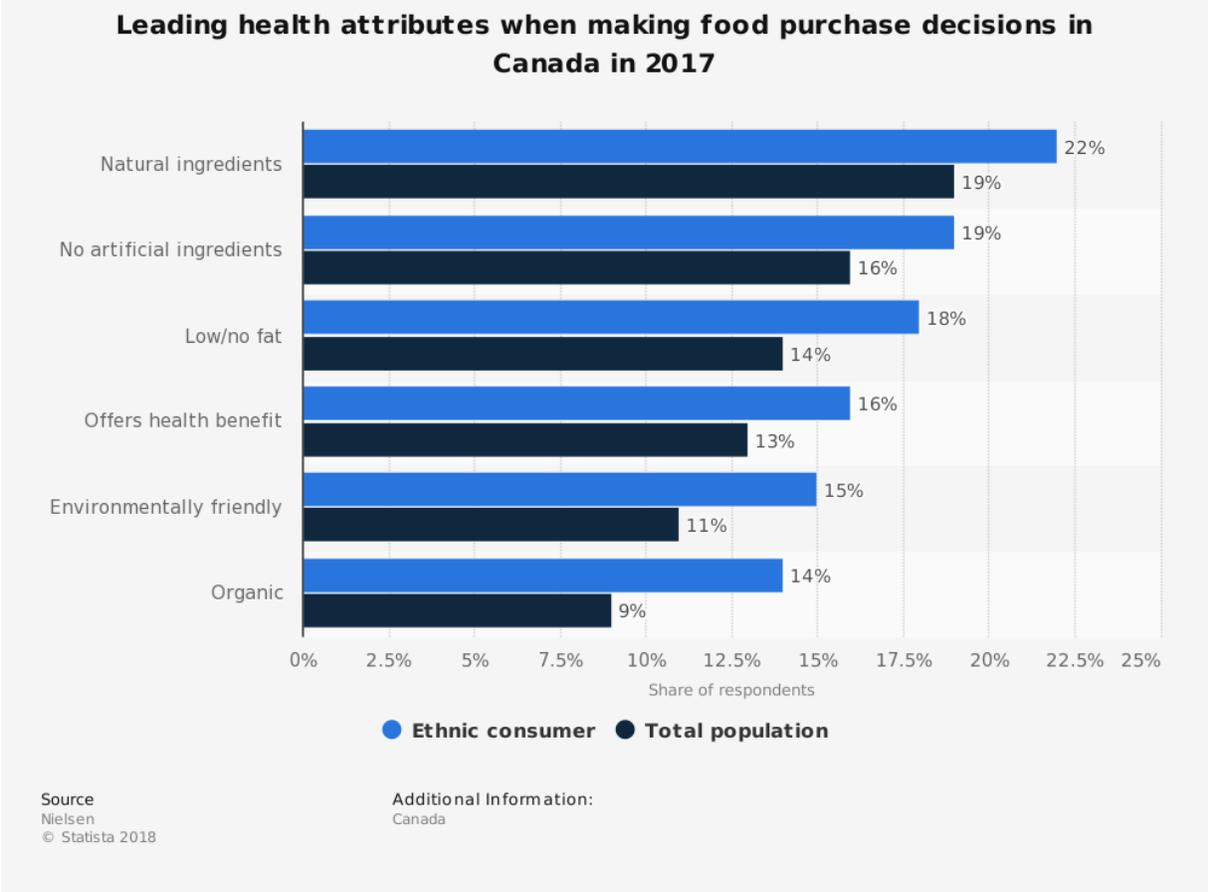
Canadians are showing increasing interest in health and wellness. Statistics show that Canadians are interested ensuring their future health and will choose products to that end. Figure 1 indicates that 73% of Canadian respondents chose healthy food and beverage products for the sake of future health.

Figure 1.



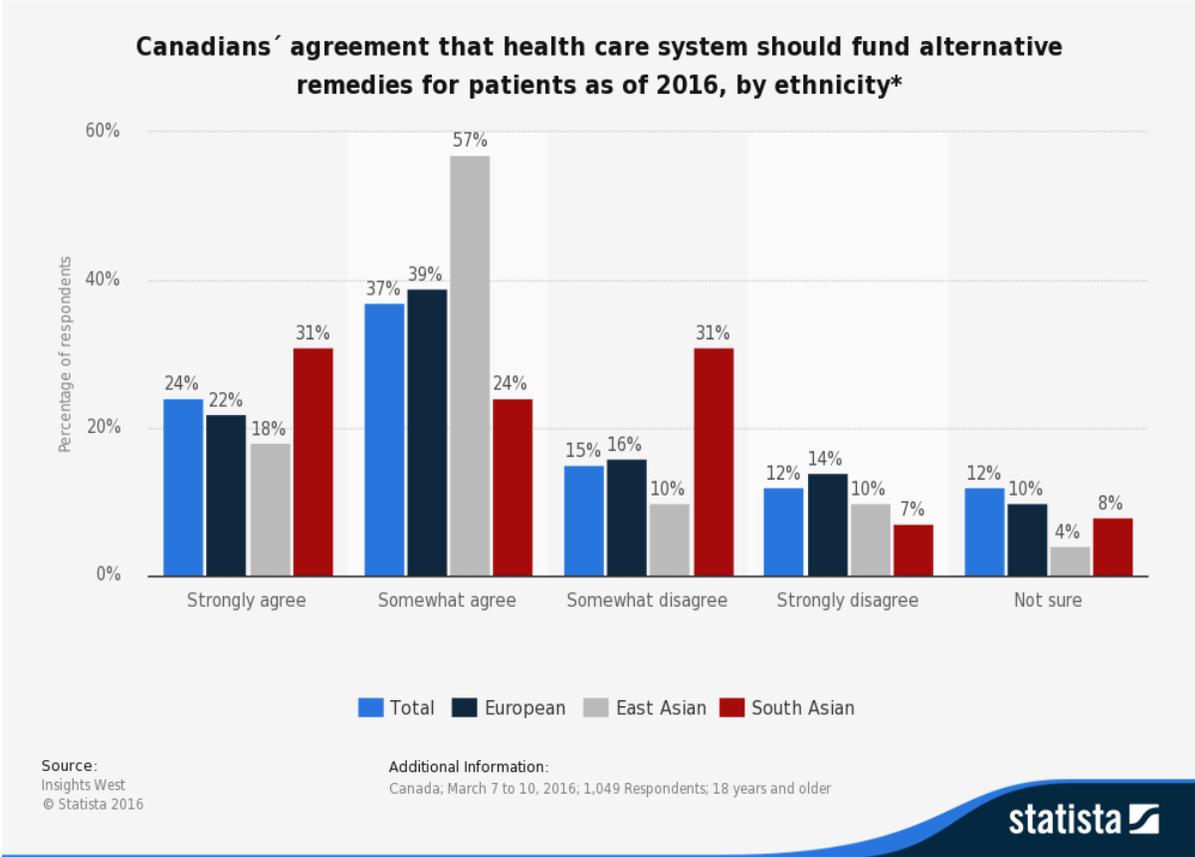
With health trends on the rise, natural products, or products that contain natural ingredients are a growing preference for Canadians.

Figure 2



Similarly, market indicators that suggest that there is interest in alternative health care and remedies. Figure 3 shows that roughly 24% of Canadian survey respondents strongly agree that the health care system should fund alternative remedies for patients. This signals that at least roughly a quarter of the population would look to alternative or natural remedies for their health care needs.

**Figure 3.**



Uses of homeopathic medicine are also good indicators of growing interest in natural medicines. Homeopathy is a form of alternative medicine that relies on natural medicines and products.

Figure 4.

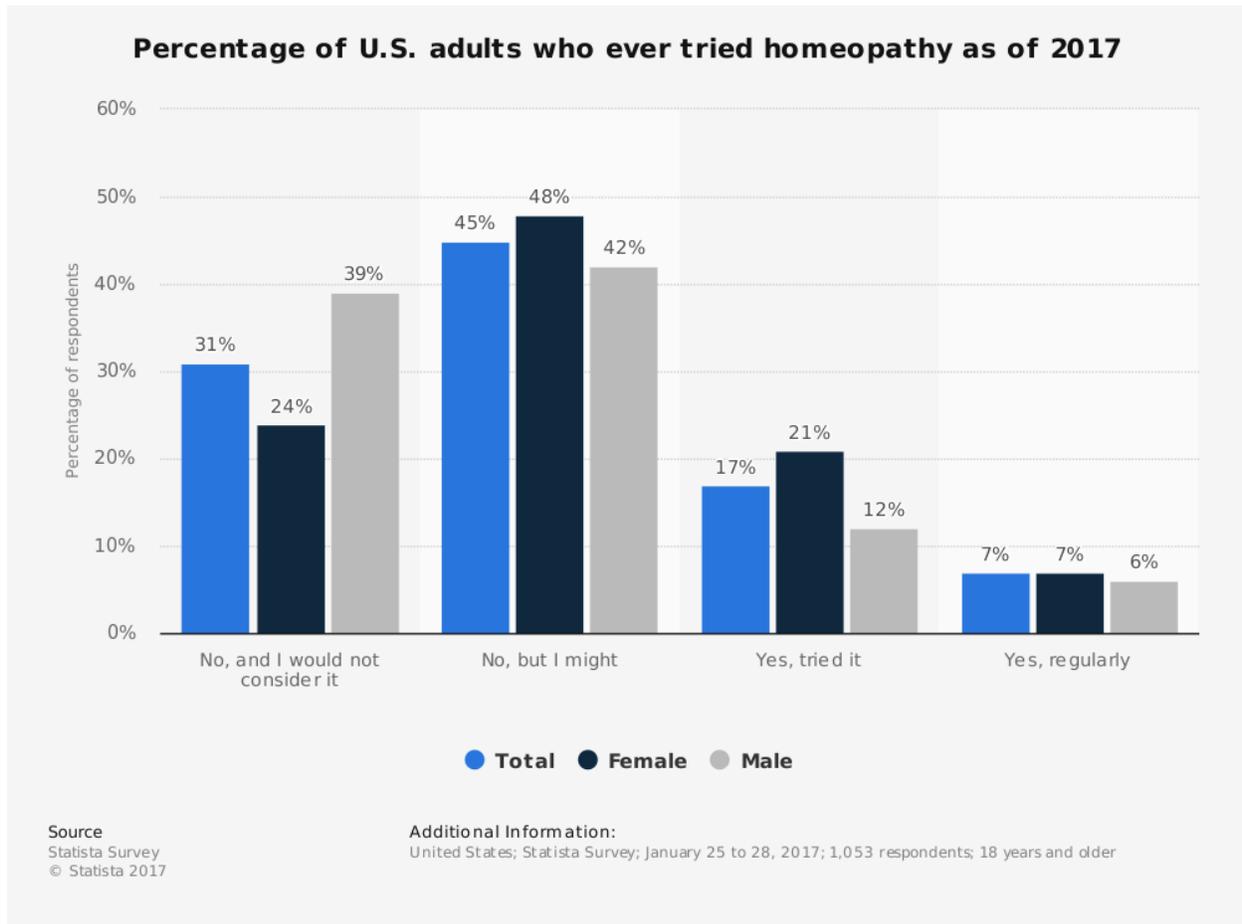


Figure 4 shows that there is a niche of people that have turned to homeopathy for their health care needs, with 17% of survey respondents having tried homeopathy and 45% indicating that they might try homeopathy.

A 2011 Statistics Canada study for Agriculture and Agri-Food Canada on the Functional Foods and Natural Health Products (FFNHP) sector found that the FFNHP sector is Canada’s fastest growing sector in the agriculture and agri-food industry.

A key opportunity area that this survey found was that of the one in three FFNHP firms that used medicinal ingredients such as flowers, herbs or spices, those agri-based inputs were not primarily sourced in Canada. There is opportunity for Canadian primary producers of these inputs to tap into the value chain of the rapidly growing FFNHP industry (Agriculture and Agri-Food Canada, 2011).

There potentially exists an opportunity in the Rainy River District to develop commercial crops of native plants with known medicinal benefits for the growing Canadian natural health products market.

# About the Rainy River District

The Rainy River District is located in Northwest Ontario, bordering Minnesota to the South, and it is just east of the Manitoba border.

The west end of the Rainy River District is where the majority of agricultural activity occurs. Underutilized land in this section of the District may hold potential for increased economic activity via productive commercial crops.

Growing conditions in the Rainy River District:

“Climate Conditions: The West of the Rainy River District sits in climate zone W, and its East zone F. In the May-October period of 2014, Rainy River had 1532 growing degree days, 2473 crop heat units, and 501mm of precipitation. The mean average growing season is 170 days.

Soils: Deep gleysolic soils (water saturated, often peat covered, nutrient-rich clay) occupy a 580,000 acre tract of land between Lake of the Woods and Rainy Lake, with some organic soils at the Manitoba border.

Agriculture: beef cattle farming and ranching is very common farm use in Rainy River District. 33,765 Hectares were in use as pasture in 2011, with the total of 23,089 cattle and calves. Hay is the most common major field crop. Hired farm labour totals 1788, with 995 year-round and 793 seasonal.” (Beef North, 2018).

## First Nations in the Rainy River District

The Rainy River District is home to approximately 5,400 people of Indigenous identity including status, non-status and Métis (Statistics Canada, 2016). First Nation communities include Couchiching, Seine River, La La Croix, Nigigoonsiminikaaning, Rainy River First Nations, Naicatchewenin, Mitaanjigaming, Big Grassy River, Anishinaabeg of Naongashiing, and Ojibways of Onigaming.

Culturally, the Indigenous peoples in the Rainy River District are largely Ojibway/Anishinaabe and Metis. It is believed that Indigenous peoples have resided in the Rainy River District for 5,000 years.

Traditional Ojibway healing philosophies and practices, including application of medicinal plants and remedies is utilized commonly in health care services at Gizhewaadiziwin Health Access Centre located on Couchiching First Nation. Gizhewaadiziwin is a primary care facility that uses both western health care practices and traditional healing methods.

# Methodology

This study reviewed native plants in the Rainy River District that were recognized as having healing properties according to traditional Indigenous knowledge. The study then explored whether those identified plants presented opportunity to be cultivated as commercial crops.

This research is the result of consultations with experts in Ojibway healing practices, and the agricultural field. Experts in traditional healing provided information on medicinal plants that grew natively to the Rainy River District, their benefits, recommended uses, growing conditions and harvesting. Experts in Rainy River District agriculture spoke to potential crop development of selected native plants.

A list was compiled of fourteen local plants known to have medicinal benefits. These were cross referenced with plant identification resources obtained from Kay-Nah-Chi-Wah-Nung Historical Centre (Manitou Mounds). Kay-Nah-Chi-Wah-Nung Historical Centre is a National Historic Site located on 90 hectares of protected land in the west end of the Rainy River District. The site is a well-preserved native plant habitat.

Manitoba Agriculture's "Native Plants as Potential Crops for Manitoba" listing was valuable to this study, as the Rainy River District bears many similarities to the ecology of Southern Manitoba and the Interlakes region of Northern Manitoba, being a neighbouring region. Resources from Agriculture and Agri-Food Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Health Canada were also of value to this study.

The following native plants were determined to have the highest market viability:

1. Buffalo sage
2. Yarrow
3. Mullein
4. Anise Hyssop
5. Senega Snakeroot

These five were chosen based on the following criteria:

- Growing conditions showed potential to flourish in the Rainy River District.
- Medicinal/wellness uses were confirmed via multiple sources.
- Determined market value: has been used as ingredient or raw packaged good in the Canadian marketplace.

# Prairie Sage (Buffalo Sage)

## Prairie Sagewort

Ojibway: Kaksameea

*L. Artemisia Frigida*

### Description

4-16 inches tall. covered in dense, silky white hairs. Plant forms clusters.

Leaves give off pungent odor when crushed.

“Flowers are abundant in erect to somewhat spreading, branching clusters (panicles) or in loose racemes along the upper branches. The heads are small and indistinct, short-stalked, 1/8 inch across, semi-spherical, with yellow faces hanging downward. The leafy bracts are silvery green from fine silky hairs” (Minnesota Wildflowers, 2018)



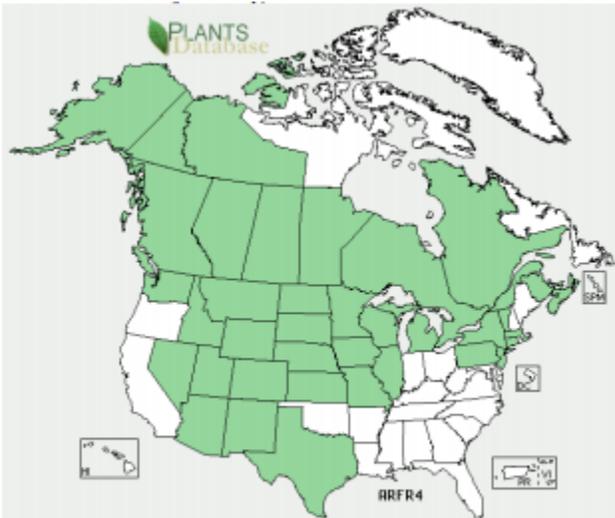
Source: Minnesota Wildflowers

### Growth Conditions

Perennial. Occurs in open plains, foothills. Grows near gravel, train tracks. Prefers dry conditions.

Has tendency to increase in areas that have been heavily grazed by livestock. Grows commonly throughout Western Canada in foothills of the Rocky Mountains throughout the Prairie provinces, and throughout the United States (Figure 5). Can be found throughout North America.

**Figure 5**



*Prairie Sage, distribution from USDA-NRCS PLANTS Database.*

### Uses

Used to treat coughs, colds, fevers.

Burnt in ceremonies to calm and purify, is considered sacred medicine by Ojibway, Metis people (Metis Nation of Ontario, 2010). Used for purification of emotions; aids with menstruation.

Used in cooking, tea, tinctures.

Bunching up leaves and applying topically calms burns, bee stings.

Plant has long history of usage for its purification properties from various Indigenous peoples (Cree, Blackfoot) throughout North America (USDA, 2003).

Should be harvested in late summer – mid-August is best in Northwest Ontario.

### Market

Prairie Sage seeds can be purchased by consumers for roughly \$4.80 USD per 480g packet in 2018.

There are multiple varieties of wild sages and sageworts with medicinal and healing properties. Consumers can purchase 5” pre braided, packaged “sacred smudge wands” for anywhere between \$4.00-\$10.00. Smudge wands are generally crafted from sweetgrasses of various varieties; the major requirement being sweet, pungent aroma. As prairie sage is used locally for smudging ceremonies, it has potential to be introduced to market in smudge wands.

There is a market for prairie sagewort as a horticultural product; it is cultivated for its foliage effects.

Prairie sagewort is not listed as an ingredient in any health products licensed by Health Canada or the Canadian Pharmacists Association.

### Discussion: Prairie Sage & the Rainy River District

This particular sagewort plant grows abundantly in the Rainy River District, in open fields and disturbed, gravelly areas near railroad tracks.

This plant may have potential to be grown and harvested to be a raw, packaged good or an artisanal product.

# Yarrow

Ojibway: Nookwezigan

L. Achillea Millefolium

## Description

Flat-topped clusters of small white flowers. Gray-green, leafy stem. Usually hair on stem. 30-90 cm in height. Flowers June-September.



## Uses

Yarrow has been used and celebrated for its medicinal purposes: it has been known to break fevers, treat headaches, rashes and hemorrhaging. It is a digestive aid. Tea is reportedly beneficial for women experiencing menopause or women with menstrual issues due to its anti-hemorrhaging properties.

Yarrow intake is not recommended for pregnant or nursing women.

Is taken by steeping leaves into a tea. Steeped in alcohol to use as tincture for topical use (for rashes, etc). Used as ingredient commercially in lip balms, shampoos.

## Growth Conditions

Yarrow grows naturally throughout Canada and most of North America. It prefers full sun and disturbed soil. It is drought resistant and prefers well-drained soil. Prefers acidic soil with a pH level of 4.5-7.0 (Manitoba Agriculture, "Yarrow").

Found in “old fields, roadsides,” (Kay-Nah-Chi-Wah-Nung Guide to Medicinal, Edible & Traditional Plants, 2006)

Grows throughout North America, Asia, South America, Europe, Australia.

### Market

Certified organic (USDA) Yarrow leaf & flower can be purchased at \$2.00/oz.

There is a steady market for yarrow as an ornamental and in dried flower arrangements.

“The estimated annual demand for yarrow flowers is approximately 50 tons domestically and 250 tons worldwide. Yarrow sold for US\$2.35/lb for non-medicinal use, and US\$19.10 - \$24.75/lb for organically grown (as of Feb. 14, 1998). A tincture of yarrow is registered with Health Canada in the Herb and Natural Product over-the-counter drug category, and there are also registered homeopathic tablet preparations,” (Manitoba Agriculture, 2016).

### *Commercially Available Health Products Featuring Yarrow (Canada)*

<b>Product</b>	<b>Manufacturer</b>
GTF Chromium (metabolism aid)	Nature’s Sunshine Products of Canada
Lym-Mx (vitamin supplement)	Nature’s Sunshine Products of Canada
Epoch Blemish Treatment	NuSkin Canada Inc.
Joint Roll On / Joint & Muscle Roll-On / Joint Care Roll On	WN Pharmaceuticals Ltd.
Natural Anti-Blemish Solutions Targeted Spot Treatment	The Clorox Company of Canada Ltd. / Burt's Bees Canada / Renew Life Canada / Advanced Naturals Canada.
Gluco-Lib Tisane Lalma (Tea)	Virage Santé Inc.
Divine Essence Serum Peau Anti Acné	Union Nature Aroma-Phyto Inc.
All Good Spf15 Organic Lip Balm	Elemental Herbs Inc.
All Good Spf20 Organic Lip Balm	Elemental Herbs Inc.
Divine Essence Numéro 4	Union Nature Aroma-Phyto Inc.

Source: Health Canada (2016) Licensed Natural Health Products Database

### Discussion: Yarrow & The Rainy River District

Yarrow grows throughout the Rainy River District. Is foraged locally and used for traditional healing purposes. It grows plentifully at Kay-Nah-Chi-Wah-Nung Historical Centre.

Based on its wide usage in natural health and cosmetics products, yarrow’s market value is undeniable. It grows naturally and plentifully over a broad geography. Further research into natural health product manufacturers’ current sources of yarrow may reveal a market opportunity as it is likely that Canadian firms import it from the U.S. A reliable, domestic source of yarrow may be welcomed by natural health product firms.

# Mullein

*L. Verbascum*

## Description

Mullein is a hardy biennial with gray-green, woolly leaves and yellow flowers in the summer. The leaves near the base of the stem are large and numerous, 6 to 8 inches long and 2 to 2 1/2 inches broad, but become smaller as they ascend the stem.



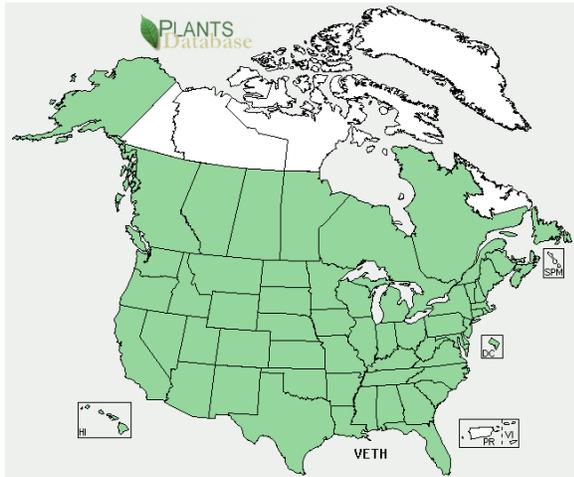
Source: Live Science

## Growth Conditions

Mullein is a plant with extensive history and folklore from its European origins; the plant was naturalized in North America. It grows throughout Southern Canada and the United States, “from BC to Newfoundland.”

Mullein thrives in dry, sunny, sandy conditions: disturbed soil, open fields, railway embankments.

**Figure 6**



Mullein growth range. Source: ontariowildflowers.com

### Uses

Mullein is used for its expectorant properties. It has been used to treat asthma, bronchitis, respiratory disorders, tuberculosis, sore throats. Flowers and leaves are ground and made into a tea for ingestion; can be applied topically in a salve (infusion in oil) or smoked. Flowers and leaves are edible but preferable steeped in a tea.

### Market

Dried leaves can be purchased at \$7.00/lb. USDA Organic certified product is often sold to consumers for double that price.

Sold in capsules to be taken for coughs & colds. 100 capsules retail price: \$24.08 USD.

### *Commercially Available Health Products Featuring Mullein*

#### **Product**

Wild Rose - C-Herbaplex 500

Iron with Vitamin C

Source: Health Canada, Licensed Natural Health Products Database

#### **Manufacturer**

Trophic Canada

Nature's Sunshine Products of Canada Inc.

### Discussion: Mullein & the Rainy River District

Mullein is very common throughout the Rainy River District.

Mullein is widely accepted as a useful natural remedy for coughs, sore throats and lung irritation, and it boasts a long history of that usage.

It is commonly regarded as a weed that will spring up in places where many other plants cannot grow.

It has broad geographic availability that is far from exclusive to the Rainy River District. However, commercially available products that use mullein as an input, or products that feature mullein as a

primary medicinal ingredient do feature in the consumer marketplace. There may be opportunity to develop mullein health and wellness products for the Canadian market.

# Anise Hyssop

Licorice Mint.

Hyssop Mint – Licorice

Giant Hyssop.

*L. Agastache foeniculum*



## Description

Anise Hyssop is a perennial with blue flowers.

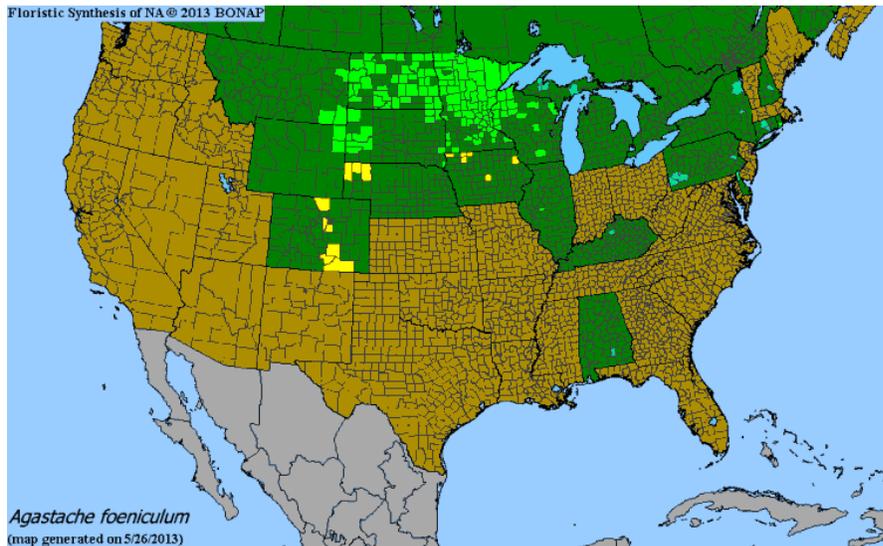
Is an upright plant that forms a clump that grows up to 1 metre tall. It is a member of the mint family with square stems and opposite leaves. “The leaves are medium green with a paler green underside. They are 2.5 to 7.5 cm long (1"-3") with a serrated edge. The 10 cm (4") lavender flower spikes are made of many small flowers packed together. Each plant produces a mass of flower spikes,” (Nature North).

## Growth Conditions

Anise hyssop’s growth area is throughout Southern Canada - Alberta across the prairies to Ontario, and into the Northern Central States. It grows well in full sun or partial shade. Self germinates via seed cracking.

Figure 7 reveals the growth range of Anise Hyssop throughout the United States; a Canadian map could not be obtained. The lime green colours on the map represent areas that Anise Hyssop is “Native, Not Rare.” Notably, the lime green range is concentrated directly where Minnesota borders with the Rainy River District, signalling that it is likely that Anise Hyssop grows as abundantly in the Rainy River District as it does in neighbouring northern Minnesota.

**Figure 7**



**Source: Minnesota Wildflowers**

### Uses

Is cultivated as an edible garden perennial throughout the prairie provinces, Ontario.

Can be harvested at any time of year for tea, providing an anise flavour, but is best harvested mid-summer.

Is beneficial for upset or gassy stomach.

### Market

In multiple instances, hyssop has been cultivated as a honey plant for beekeepers (Small, 2006; Lim, 2014).

The Manitoba market for Anise Hyssop is listed as follows by Manitoba Agriculture:

“There is a strong demand in the dried flower trade for anise hyssop, and some demand in the herb tea market. Marketing is generally handled by a broker who will deal with quantities typically produced from half an acre. Methyl chavicol, one of the main constituents of the essential oil in some varieties, is in demand for many industries and could be obtained by fractional distillation.”

“Anise hyssop has little commercial potential as a culinary herb. Strains of the plant were developed by Agriculture and Agri-Food Canada for possible use as a source of essential oil.

The species may find a market as a source of a specialty honey plant (Small, “Culinary Herbs” National Research Council, 2006, pg 106).

*Commercially Available Health Products Featuring Anise Hyssop (Canada)*

**Product**

Homestead Blend

Source: Health Canada, Licensed Natural Health Products Database

**Manufacturer**

The Algonquin Tea Company Inc.

**Discussion: Anise Hyssop & the Rainy River District**

Anise Hyssop grows in the Rainy River District and is used for its stomach benefits.

It is a plant in the mint family; mints and anise flavoured plants are quite common and widely available. Could be cultivated for beekeepers, or for essential oil purposes as was previously explored by Agriculture and Agri-Food Canada.

Plants that are members of the mint family are known to grow plentifully. It is unclear whether this particular strain of mint has value over any other mints.

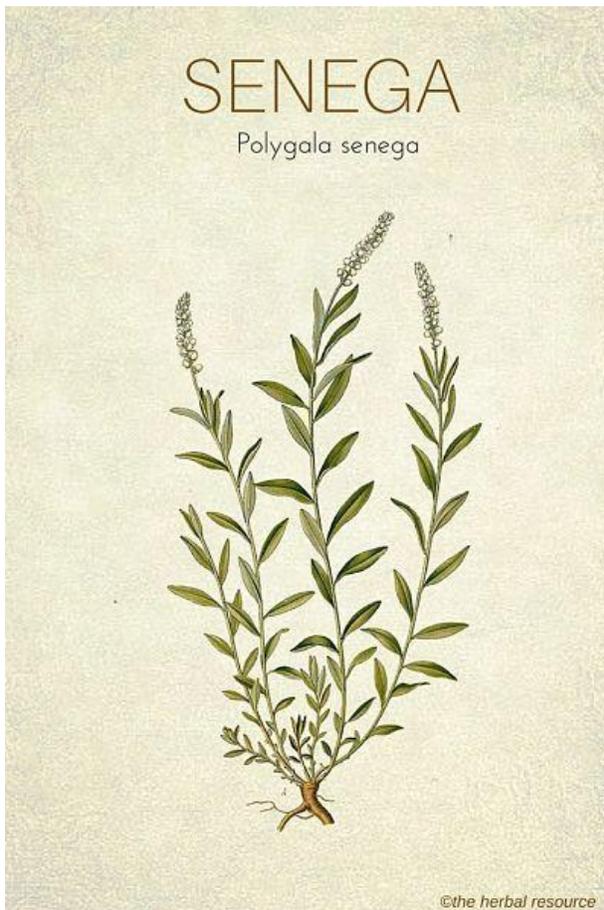
Given its current limited use as an ingredient in natural health products and its perceived limited market value, anise hyssop appears to represent limited economic opportunity as a crop.

# Senega Snakeroot

Ojibway: Ginebigo-ojibik

*Polygala senega* Latin: Polygalaceae

Common names: Milkwort, Mountain flax, Rattlesnake root



**Source: The Herbal**

## Description

“One to several, unbranched stems grow 15-45 cm tall. Alternate, short-stalked leaves have a prominent central vein, and vary from small and scale-like at the bottom to larger and lance or oval-shaped further up. Very small flowers occur in a spike-like cluster, with the lower flowers blooming first. Each one has three white petals around the reproductive organs, two white petal-like sepals forming wings, and three light green to purple sepals. Fruits are somewhat flattened capsules containing two seeds,” (The Manitoba Museum, 2014).

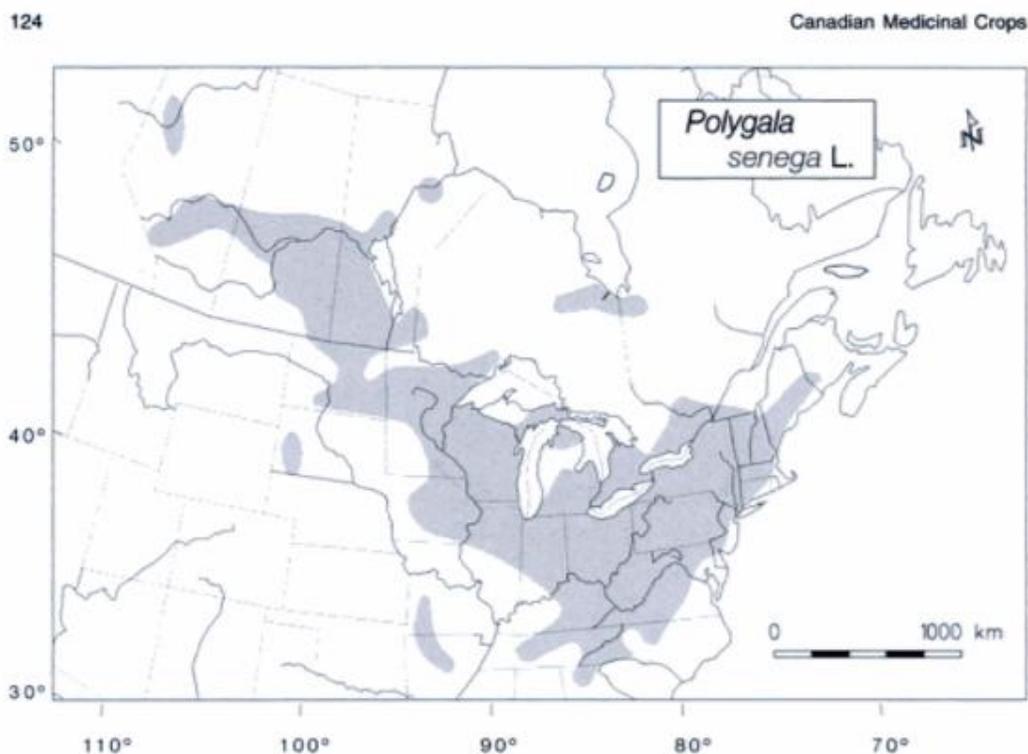
## Uses

Valued for its expectorant properties: can be made into tea to sooth sore throats, coughs, chest congestion. Used commercially in tinctures, cough syrups, lozenges. Historically used to treat snake bites.

"Seneca snakeroot was sent to Europe in the early 1700s and held a regular place in European drug stores during the 1800s for use in treatment of pneumonia...The root is ground into powder and used in various patent medicines, particularly in cough medicines, as a stimulant expectorant. It is present in some prescription drugs used in the treatment of bronchitis and asthma..."(Agriculture and Agri-Food Canada, 2013).

## Growth Conditions

**Figure 8**



Source: Catling, Small, 1998.

In Canada, the species is particularly common in Manitoba and Saskatchewan. It is also found in Alberta, Ontario (primarily south of the Canadian Shield), south-western Quebec, and in the St. John River valley of western New Brunswick.

Senega grows natively in the Rainy River District, and can often be found near gravel, railroad tracks. It enjoys either full or partial sun.

## Market

In the mid-1990s there were numerous studies produced regarding the marketability of a commercialized crop of senega snakeroot (Catling, Porebski, 1998; Torcotte, 1996). It has been identified as a plant with economic importance to Canada for its medicinal properties.

Senega Snakeroot has been successfully cultivated in Japan, with an annual production at times as much as 8-10 tonnes per year (Turcotte, 1996).

Numerous accounts of wild crafting of this plant by First Nations in the Interlakes Region of Northern Manitoba, sold to commercial markets at an average price of \$8-\$14/lb (Lee, 2013).

“Senega snakeroot takes 4 years to produce a marketable root,” (Manitoba Agriculture, 2018). The seed requires cold stratification for two months prior to planting, and shows a 60-80% chance of germination rate.

Root sells at a retail price to consumers at \$29.99/lb.



Senega Sakeroot as it is sold to consumers. Source: botanicuniverse.com

### *Commercially Available Health Products Featuring Polygala Senega (Canada)*

#### **Product**

Bronchial Cough Syrup  
Bronchosyl Md  
Multimineral Tablets With Vitamin D  
Sirop Cocillana Composé  
Nervyl  
Km  
Nin Jiom Pei Pa Koa  
Nin Jiom Herbal Cough Syrup  
Bronchial  
Matol Kaps

#### **Manufacturer**

PendoPharm, Division of Pharmascience Inc.  
Bronchosirum Inc.  
Adams Labs Ltd.  
Laboratoires Atlas Inc.  
Distributions Multi-Pro Inc.  
Univera Canada Ltd.  
Nin Jiom Medicine Manufactory (Hong Kong) Ltd.  
Nin Jiom Medicine Manufactory (Hong Kong) Ltd.  
Laboratoires Atlas Inc.  
Univera Canada Ltd.

Source: Health Canada, Licensed Natural Health Products Database

## Discussion: Senega Snakeroot & the Rainy River District

### Pros

- Has proven health benefits
- Has proven market value as a cultivated crop
- Relatively limited growth area increases demand; Rainy River District is within that area

### Cons

- Takes four years to produce a marketable root
- Seeds require 60 days cold stratification

It has been noted throughout the research that Senega Snakeroot takes about 4-5 years to produce a root of marketable size (Turcotte, 1996). However, while senega snakeroot requires four years to produce a marketable root, consultations with agricultural researchers suggest that this cultivation time is quite normal to establish a new crop.

Senega snakeroot appears to have promising market conditions as a cultivated plant. It has previously been cultivated for export in Japan and has already been sold to the commercial market in the Interlakes Region of Manitoba. It is worth exploring the cultivation of Senega Snakeroot in the Rainy River District further.

## Discussion & Recommendations

It is the Rainy River Future Development Corporation's recommendation that, of the five native plants in this study, Senega Snakeroot and Yarrow be pursued as potential crops for the Rainy River District, based on the following:

- Shows proven market value; are present in a number of Canadian and foreign health products.
- Natural geographic growth distribution includes the Rainy River District.
- Have been successfully cultivated in foreign countries (Japan, USA).
- Body of research on cultivation in Canada & other countries already exists; further networks to tap into should cultivation research proceed.

As demand for natural health products increases, in some cases these products must be brought under cultivation to supply commercial markets. For example, there are numerous anecdotal accounts of senega snakeroot overharvesting by wildcrafters for commercial use to the point of depletion of the resource (Lee, 2013). This increases the opportunity for the cultivation of senega snakeroot in the Rainy River District.

Yarrow has proven benefits, and use in the commercial market, both as an ingredient and packaged good. Based on Agriculture and Agri-Food Canada's (2011) findings that there is an opportunity for more Canadian agri-based inputs in the FFNP, it is likely that many of the Canadian manufacturers of natural wellness products that feature yarrow are sourcing it from the U.S. or elsewhere. There is likely an opportunity to cultivate yarrow in the Rainy River District to supply the existing market. There may also be an opportunity for certified organic yarrow to be grown in the Rainy River District. The RRFDC recommends that cultivation of yarrow also be explored further.

Prairie sage, anise hyssop and mullein appear to present less of a unique market opportunity, though they may present opportunity to be sold as artisanal products or ingredients.

## References

Agriculture and Agri-Food Canada (2011). "Results from the Functional Foods and Natural Health Products Survey" Web: accessed February 28, 2018. <<http://www.agr.gc.ca/eng/industry-markets-and-trade/market-information-by-sector/functional-foods-and-natural-health-products/trends-and-market-opportunities-for-the-functional-foods-and-natural-health-products-sector/results-from-the-functional-foods-and-natural-health-products-survey-2011/?id=1387481727299>>

Agriculture and Agri-Food Canada (2013). "Polygala Senega." Web: accessed January 30, 2018. <<http://www.agr.gc.ca/eng/science-and-innovation/science-publications-and-resources/resources/canadian-medicinal-crops/medicinal-crops/polygala-senega-l-seneca-snakeroot/?id=1301436228908>>

P. M. Catling and S. Porebski (1998). Rare wild plants of potential or current economic importance in Canada — a list of priorities Agriculture and Agri-Food Canada, Research Branch, Eastern Cereal and Oilseed Research Centre, Biological Resources Program, Saunders Building, Central Experimental Farm, Ottawa, Ontario, Canada K1A 0C6. Received 15 September 1997, accepted 26 March 1998.

Beef North (2018). District Profile: Rainy River. Web: accessed February 10, 2018. <<http://www.beefnorth.com/rainy-river>>

Edible Wild Food "Common Yarrow." Web: accessed 22 January 2018. <<http://www.ediblewildfood.com/common-yarrow.aspx>>

Hallworth, Beryl. "Yarrow" *The Canadian Encyclopedia*. Historica Canada. <<https://www.thecanadianencyclopedia.ca/en/article/yarrow/>>

Health Canada, 'Licensed Natural Health Products Database,' Web: accessed 23 January 2018. <<https://www.canada.ca/en/health-canada/services/drugs-health-products/natural-non-prescription/applications-submissions/product-licensing/licensed-natural-health-products-database.html>>

Keeler, Kathleen. February 25, 2013. Blog Post. Plant Confusions: Garden Sage and Sagebrush are Different <<http://khkeeler.blogspot.ca/2013/02/sages-garden-sage-and-sagebrush.html>>

Kenle, N.C. and Turcotte, C. 1996. The Ethnobotany and Economics of Seneca Snakeroot, *Polygala senega* L. Unpublished manuscript, Department of Botany, University of Manitoba, Winnipeg, MB.

Lim, T.K. (2014). Edible Medicinal and Non Medicinal Plants: Volume 8, Flowers, *Springer*: New York.

Hayward, D. (2013). "Root has long provincial history" *Yorkton This Week* December 2013. Web: accessed January 30 2018 <<http://www.yorktonthisweek.com/opinion/columnists/root-has-long-provincial-history-1.1504340>>

Lee, Robert F. (2013) Eating Wild. *CreateSpace*. Self-published.

Manitoba Agriculture, Native Plants as Potential Crops for Manitoba. "Anise hyssop." Web: accessed January 23, 2018. < <https://www.gov.mb.ca/agriculture/crops/production/anise-hyssop.html>>

Manitoba Agriculture, Native Plants as Potential Crops for Manitoba. "Senega Snakeroot." Web: accessed January 23, 2018. < <https://www.gov.mb.ca/agriculture/crops/production/senega-snakeroot.html>>

Manitoba Agriculture, Native Plants as Potential Crops for Manitoba. "Yarrow." Web: accessed January 23, 2018. < <https://www.gov.mb.ca/agriculture/crops/production/yarrow.html>>

The Manitoba Museum (2014). "Prairie Pollination: Senega Snakeroot." Web: accessed February 3, 2018. <[http://www.prairiepollination.ca/plante-plant/polygale\\_seneca-seneca\\_snakeroot/](http://www.prairiepollination.ca/plante-plant/polygale_seneca-seneca_snakeroot/)>

Metis Nation of Ontario (2010) Traditional Plant Use Study. Southern Ontario Metis <[http://www.metisnation.org/media/81616/so\\_on\\_tek\\_darlington\\_report.pdf](http://www.metisnation.org/media/81616/so_on_tek_darlington_report.pdf)>

Minnesota Wildflowers (2018). "Blue Giant Hyssop." Web: accessed February 10, 2018. < <https://www.minnesotawildflowers.info/flower/purple-giant-hyssop>>

Turcotte, Candace L. (1996). Towards sustainable harvesting of seneca snakeroot, *Polygala Senega L.* on Manitoba Hydro rights of way. University of Manitoba Graduate Thesis

Small, E.; Catling, P.M. (1999) Canadian Medicinal Crops. National Research Council of Canada, Ottawa. Pg. 124

Statistics Canada (2016). Rainy River, District.

Stevens, Michelle. (2003). USDA Plant Guide: "PRAIRIE SAGEWORT *Artemisia frigida* Willd." <[https://plants.usda.gov/plantguide/pdf/cs\\_arfr4.pdf](https://plants.usda.gov/plantguide/pdf/cs_arfr4.pdf)>

Wood, Matthew (2009). "Achillea millefolium: yarrow. The Indispensible Blood Remedy." *The Earthwise Herbal*. Web: Accessed 31 January 2018. < <http://www.matthewwoodherbs.com/Yarrow.html>>