



The Market for Herbs and Essential Oils

Herbs and essential oils have created a stir of interest among some producers in Western Canada. This has come at a time when there are low returns on traditional crops, and strong consumer demand for products made using herbs and essential oils. For instance, it was estimated by a Harvard study done in 1997 that consumers in the United States spent over \$5 billion US on herbal products. Furthermore, it was quoted in a different article a couple years ago that the market for natural food flavorings in the United States was just over \$1 billion US, and \$400 million US was spent annually for flavoring beverages. In addition, the fragrances in cosmetics and toiletries were pegged at \$900 million US annually.

The sudden growth in this industry has been the emergence of nutraceuticals, functional foods, and the growth in aromatherapy products.(1) North America is reviving an age-old interest in natural health products that was never ignored in Asia or Europe. Indeed, the vast majority of people in China have used natural plants to treat common ailments for centuries and well-over half the population in Germany use herbs in some form or another for treating sickness. Even though the growth in herbal supplements in North America has slowed down and may have reached a peak, it is unlikely to diminish. Consumers are more health conscious and could be embracing herbs for prevention or treatment of minor ailments, at least partially, because of the high cost of pharmaceutical drugs. It is unlikely that the high cost of drugs will go away. Drug companies create most of their drugs synthetically and recover the research costs in the high drug prices that consumers pay. Natural plants can't be patented and it is not in the best interests of the pharmaceutical companies to put in the costs of research for a natural plant where the costs can't be recovered. For instance, whatever costs the company incurs could be largely capitalized by another company that is marketing the same natural plant even though they did not do the research.

There are many culinary and medicinal herbs that producers are trying to grow and market in Western Canada. Probably any list of the most popular culinary herbs includes (in alphabetical order): anise-hyssop, basil, catnip, chamomile, comfrey, horseradish, licorice, lovage, oregano, parsley, summer savory, stevia, tarragon, thyme, and yarrow. Some of the more common herbs harvested for medicinal use in North America include black cohosh, bloodroot, borage, burdock, calendula, echinacea (*purpurea* and *angustifolia*), evening primrose, feverfew, fireweed, garlic, ginseng (American and Siberian), goldenseal, milk thistle, seabuckthorn,(3) seneca snakeroot, skullcap, syrian pumpkin, St. John's Wort, stinging nettle, and valerian. The more likely crops mentioned for extracting essential oils include anise-hyssop, angelica, basil, catnip, chamomile, dill weed, lavender, monarda, peppermint, rosemary, sage, and spearmint.(4)

It is worth knowing that much of the world's supply of herbs is still coming from the wild and not from commercial production on cultivated lands. However, this practice is changing, and many of the wildcrafted herbs are being over collected and can no longer meet current world demand. In response, cultivation of herbs appears to be increasing around the globe.

It has been noted that Canada could be the "Sleeping Giant" of the medicinal plant industry. Our advantages are numerous. For example, the environment is relatively pristine and the resources for crop production are vast. Producers are well educated, land is relatively cheap, and the

infrastructure offers world class plant breeders. There is close proximity to a large wealthy population with a new found interest in herbal products just south of the border.

Canadian producers experience limitations that do not challenge competing countries. A short growing season and harsh winter weather dramatically limit the number of herbs that can be economically grown. The cost of labor is prohibitive for many of the herb crops that do not lend well to weeding (with herbicides) or harvesting with mechanical means. So, after weighing the pros and cons, are there herbs (or essential oils) that producers in Western Canada can produce and market profitably?

Many producers have tried echinacea and St. John's Wort. Both of these crops are household names, and according to at least one survey, ranked number 1 and 2 in herbal supplement sales in the United States in 1998. However, there are quite a few growers who have been discouraged after trying to grow either crop. The price of echinacea *purpurea* root has dropped from over \$12 per pound in 1994 to less than \$4 per pound in 1999 for bulk non-organic product. In other words, by the time the crop was planted and the root was harvested, 3 or 4 years had elapsed, and the price for root had dropped to as much as one-third the original price. According to some sources, the price of echinacea *angustifolia* root has fared better but still suffers from overproduction. Apparently, in Ontario, many tobacco growers were encouraged to diversify by their government, and the acres of echinacea responded by increasing significantly. The price for St. John's Wort is going through a similar fate, dropping from about \$7 per pound a couple of years ago to as low as \$2 per pound for bulk non-organic this year. Furthermore, echinacea growers in Western Canada have had considerable problems with disease such as aster yellows. St. John's Wort grows relatively well in Western Canada but some regions have banned commercial production, considering it a noxious weed.

Of all the herbs and essential oils, American ginseng has been by far the most important in Canada in recent years. It has been estimated that American ginseng grown in Canada has had an export value of about \$60 million annually in the past few years. However, most of the production has been either in British Columbia or Ontario, with very little American ginseng grown in Alberta. In fact, mint has been the most important herb crop in Alberta followed by borage seed. According to Statistics Canada trade information, southern Alberta exported \$3.4 million worth of spearmint (scotch) oil and close to \$1 million worth of peppermint oil to the United States in 1998. This is a fairly substantial share of the overall market for mint oil in North America. The Pacific Northwest and the Midwest states are the primary growing regions for peppermint and spearmint in North America.

In a study done in 1989 for Agriculture Canada, the authors indicated that monarda had the most market potential of all the crops they studied for essential oil. However, in hindsight, monarda has only been grown in Canada experimentally. In southern Alberta, PANOIL Inc., tried growing monarda but reverted to growing mint and dill because of production problems. PANOIL (**George Thacker & Sons**) steam distills spearmint, peppermint, dill weed, and catnip. The essential oils are sold on contract to buyers in the United States.

The essential oils industry for refined processing and marketing in Canada is very small. The market for essential oils in North America is predominantly located in the United States along the East Coast. Wholesale distributors and brokers of culinary and medicinal herbs in Canada are mainly located in British Columbia and southern Ontario. There are not many examples of companies involved in processing herbs located in Western Canada. However, there are some exceptions.

Bioriginal Food and Science Corporation, based in Saskatoon, is a leader in production and marketing of essential fatty acids. Bioriginal's most important products are centered on Gamma

Linolenic Acid (GLA). GLA are extracted from crops such as borage seed and evening primrose. Bioriginal investigated the potential of several other crops such as echinacea, feverfew, and St. John's Wort. However, they decided against developing a medicinal herb extract plant because they perceived the market for processing these herbs was saturated. Apparently, they were concerned that higher costs for small-scale herb production in Saskatchewan could not compete with subsidized production in Ontario.

Fytokem Products Inc. of Saskatoon has created a niche market for fireweed. They are marketing a group of skin care products developed from fireweed in North America, Europe, and Japan. They recently signed a distribution deal with a German company that supplies such companies as 'Estee Lauder' and 'L'Oreal'.

Wise Owl Herbs in Unity, Saskatchewan buy certified organic echinacea *angustifolia* root for large sales in Europe and North America. The company is researching and reviewing plans to include echinacea *purpurea*, echinacea *angustifolia* flowerheads, goldenseal, feverfew, St. John's Wort, and seabuckthorn in their product line.

Nutrivim Nutraceuticals is a new company that is planning to custom process herbs from their location in Moose Jaw, Saskatchewan. They would charge a fee (toll) for performing encapsulation, tablet compression, bottling and labeling. According to an article in the *Western Producer*, this company will be processing such crops as evening primrose, ginseng, feverfew, hemp, and St. John's Wort.

Fortius Inc. of Calgary received the distinction of being placed on the list of Alberta's Fastest Growing Companies in 2000 and received the 1999 Young Entrepreneurs Award of the Year for Alberta. This company manufactures and distributes nutraceuticals and dietary supplements for both human and animal consumption. Their product ingredients include herbs such as echinacea.

HerbTech Inc. (subsidiary company of **CV Technologies Ltd.**) recently signed a deal to supply HerbTech brand name products to Safeway. This includes products made from ginseng and St. John's Wort extracts.

Norac Technologies Inc. of Edmonton, is probably the largest commercial extraction facility in the province of Alberta. This company is a subsidiary of UFL Foods, and processes and distributes oleoresins, essential oils, cosmetic oils, and nutraceuticals.

Sakai Spice of Lethbridge, grows and markets Japanese horseradish. They are a subsidiary of a Japanese company, Arashiya Shiro Co. Ltd., and process a condiment product called 'wasabi' (made from horseradish and yellow mustard) for the Japanese export market.

Canada Seabuckthorn Enterprises Limited is a new entry in Saskatchewan from British Columbia that is converting a former water distillation plant to process seabuckthorn. The facility is to be up and running in 2001, and has plans for processing extracted essential oils for use in nutritional supplements, skin creams, and pharmaceutical products.

Natural Performance Industries Inc. in Onoway, Alberta is a manufacturer of herbal and natural products. This company is a custom manufacturer for tablets, encapsulation and cold liquid filling. They also offer packaging and private labeling.

Flora Beverages Co. Ltd. of Calgary manufactures, and custom formulates packages of botanical beverages, tonics, and liquid herbal preparations. The company exports product to the United States, Norway, Mexico, Japan, Hong Kong, and Taiwan.

Bedrock Seed Bank is a seed company located in Edmonton that is involved in seed production, processing, procurement, and brokering of herbs, native species, and specialty crops. This company also markets directly to the consumer at the farmers' market in Edmonton.

Blooming Prairie is another seed company located in Edmonton. This company supplies organic seed for a wide variety of herbs, and supplies fresh and dried flowers. The company also acts as broker and consultant to culinary and medicinal herb growers.

West Country Herbs (the sister company of Morinville Greenhouse) of Morinville, Alberta sells organic seedlings of echinacea *angustifolia*, valerian, St. John's Wort, milk thistle, French tarragon, mountain mint, among others.

Northern Alberta Herb Growers Ltd. of Opal, Alberta operate a greenhouse that specializes in supplying echinacea *angustifolia* and St. John's Wort plants. This company is in the process of setting up threshing, washing, drying & grinding facilities at Redwater, Alberta.

Ultimate Herbs Ltd. of Sherwood Park, Alberta is another greenhouse operation that specializes in supplying orders of echinacea *angustifolia* plants. As well, the company sells dried echinacea root.

Herbs for Your Health of Hayter, Alberta grows and markets certified organic medicinal herbs and oilseeds. For instance, they advertise for sale angelica, burdock, borage, caraway, catnip, comfrey, dandelion, echinacea (*angustifolia*, *purpurea*, and *pallida*), feverfew, hemp seed, St. John's Wort, and valerian.

Herbal Greenhouses Inc. of Rockyford, Alberta grows fresh herbs such as feverfew in an aeroponic greenhouse. It is possibly the first greenhouse to grow herbs in an aeroponic environment. Aeroponics is a system designed to mist water through the air to coat the roots with oxygen-enriched water and food.

Caribou Ginseng of Williams Lake, British Columbia grows and sells certified organic herbs. They have a branch outlet in Edmonton. At their Williams Lake location in the BC interior, they grow organic ginkgo biloba trees.

Even though there is an impressive list of companies in Alberta and Saskatchewan that are involved in this industry, the fact remains that the market for herbs is small. For example, the results from a survey done in 1997 by Saskatchewan Agriculture and Food,(5) indicated that most producers sold less than \$2,500 worth of product. Only a small number of growers reported sales over \$5,000. Plus, producers mainly sold unprocessed product through farmers' markets, other growers, private sales and wholesalers. The survey indicated that few crops were marketed outside Saskatchewan and none were direct marketed outside Canada. The producers ranked finding new markets as the greatest concern.

In the author's discussions with wholesalers and processors, they expressed the following criteria when buying herb crops: consistent, high quality, certified organic product, available in a large volume, and probably located close by. For instance, a company on the West Coast indicated that they were sourcing many of their herb crops from the Okanagan Valley. The farmers were all located in close proximity where the buyer could look at all the crops in a day trip.

Perhaps in response to such concerns, producer groups have been created for the purposes of pooling their herb crops and offering bulk supply. In northern Saskatchewan, seven producers teamed together to form **Northern Lights Herb Growers**. This group grows and markets several

organic herb crops that include motherwort, echinacea *angustifolia*, astragalus, German chamomile, calendula, fireweed, skullcap, Siberian morthwort, valerian, marshmallow, feverfew, and Siberian ginseng. In Alberta, **Western Canadian Organic Herb Association** was created with about 50 members growing certified organic echinacea *angustifolia* and St. John's Wort. Other groups in Western Canada include **NorSask Botanicals** in the Melfort, Saskatchewan area, **Mekiwin** in Manitoba, and **Coulee Pickings** in Regina.

Provincial and National associations are also playing an important role in the industry. For instance, **BC Herb Growers Association** and **Saskatchewan Herb and Spice Association (6)** represent the industry in each of their respective provinces. In Alberta, last year the **Alberta New Crops Network** was created as an umbrella from several smaller associations, e.g., Alberta Dried Flower and Herb Growers' Association, Alberta Alpine Herb Association, and the Alberta Ginseng Association. Nationally, there is the **Canadian Herb Society**, **Herb Info Canada**, and the **Saskatchewan Nutraceutical Network** (with membership outside the province). Plus there is the Canadian Functional Food Network located at the University of Alberta.

In education, there are a couple educational institutions that offer courses in the province of Alberta. These include Olds College Centre for Innovation and Wild Rose College of Natural Healing.

Nevertheless, there remain some major obstacles for the industry to overcome. For example, the Saskatchewan survey from 1997 indicated less than half of the growers were using organic production methods. Even though, in the author's discussions with the wholesalers and processors, many of them indicated that they are no longer buying or using non-certified organic herbs.

Another challenge in this industry is the lack of resources, infrastructure, and proper equipment to grow and process herbs and essential oils. For example, steam distillation units cost more than most producers could afford. It is estimated that the cost is as much as \$1 million for a modern unit. In response, the province of Alberta and the Alberta New Crops Network have developed a portable oil distillation unit. They are testing several herb crops across the province. As well, **Ben-Don Innovators** of Saskatoon have manufactured a medicinal harvester. The harvester is suppose to be able to harvest a variety of herbs that could include chamomile, feverfew, calendula, St. John's Wort, and echinacea.

Government regulations and standardization are key outstanding issues that finally appear to be getting addressed. In 1997, the government of Canada launched a full review on how natural health products were regulated in Canada. The government reached a consensus with those in the industry on how to regulate the industry, and then drafted up a regulatory framework. The government has set up an Office of Natural Health Products to provide consumers some quality assurances on what they are buying. Information pertaining to the new Office and the regulatory framework that was drafted can be found at the following web address: www.hc-sc.gc.ca/hpb/onhp. In a similar context, in the private sector there is a concerted effort on the part of the more progressive companies to self regulating the industry. For example, **CV Technologies Ltd.** of Edmonton made an arrangement with the multinational company, Dupont, to endorse CV Technology's patented *ChemBioPrint* technology platform for testing natural health products. CV Technologies Ltd. plan to revolutionize the industry by using this technology to identify, extract and standardize the natural compounds. This could ensure that batch-to-batch production is consistent and formulated for optimal use.

It is the author's opinion, that there are market opportunities for new crops, however, the producer must be selective. It is advised that producers in Western Canada consider the following remarks prior to embarking on any herb crop:

1. it is often preferable to grow native versus introduced species;
2. plants which are perennial in other areas are often annuals on the prairies;
3. better to concentrate on herbs or essential oils that are ideally suited to a northern climate, i.e., the so-called 'northern vigor' in plants from the carrot or mint family; (7)
4. large scale production is more likely to succeed when growing dried herbs or essential oils that don't compete on cost with low wages for labor in other countries. In other words, the production process should be highly mechanized;
5. it is wise to grow high quality, certified organic herbs; and
6. Field or greenhouse fresh herbs should probably be grown with the intention of selling in the local urban market where the transportation advantage and timing is of critical importance to the quality of the product.

All in all, after reviewing a long list of herbs, **German chamomile**, an annual herb, may have the best potential. Even though German Chamomile is an introduced species, it is an annual crop well-suited in a northern climate such as in Western Canada, and it can be grown on a large scale using new technology for harvesting the flower heads. Plus, there is a diversified and growing market for chamomile in North America and Europe. For instance, the dried chamomile flowers are used in herbal teas, and the extracted oils are used in confectionery products, beverages, cosmetics, perfumes, and medicinal products. In fact, Richters Seed (8) estimated that the market size for chamomile was about 12,000 acres in North America and Harvey Clark from the Canada-Saskatchewan Irrigation Diversification Centre in Outlook, SK estimated that roughly 2,500 acres were being grown in Canada and the United States. As well, Richard Alan Miller, who published the book, "The Potential of Herbs as a Cash Crop," stated that the prairies could conceivably grow 50,000 acres of chamomile. However, it should be noted that any production in Western Canada would need to compete with production already established elsewhere in the world such as France, Eastern Europe, and Egypt.

It is quite likely that **echinacea** (*purpurea* and *angustifolia*) and **St. John's Wort** will continue to be grown in Western Canada by those who can grow a high quality certified organic product in a size large enough to meet market needs in any given year. Richard Alan Miller has noted that the highest quality of echinacea *angustifolia* in North America comes from the northern Midwest states and the bordering provinces of Canada. Furthermore, Harvey Clark stated that one Western Canadian company claimed they are still offering a good price of \$30 CDN per pound and can not get enough good quality echinacea *angustifolia* roots with 1% or more echinacosides. Nevertheless, it is the author's opinion that it is unlikely that either of these herbs, echinacea or St. John's Wort, will sustain continued growth in bulk production. It is more likely that production will retrench, and there will be more emphasis on a high quality product grown only by well-informed producers that probably belong to cooperatives that can pool their products and sell them as a commodity. Richter's market information would indicate that echinacea and St. John's Wort volumes and prices are down.

Borage seed was, up until this year, an important seed crop in Western Canada. The seed is crushed to extract an essential fatty acid, gamma linolenic acid (GLA), that is sold in a packaged health product to end consumers. However, borage acres were estimated to have dropped dramatically this past spring in response to a sharp drop in the price (\$2.50 per pound last year to \$1.00 spot price). Responding to a good price of \$2.50 per pound in the spring of 1999, Saskatchewan producers grew 25,000 acres of borage, up from 10,000 acres the prior year. In Alberta, it was estimated that seeded acres jumped from 8,000 in 1998 to 11,500 in 1999. The borage producers largely agreed as a group to cut back in 2000 to prevent the further depression of prices. The two major companies buying borage in Western Canada, Bioriginal Food and Science

Corporation and Specialty Distributing both pulled production contracts and asked producers to store the previous years borage seed in their bins. There was also over production in other countries, in particular England and New Zealand. As well, evening primrose from China, another source of GLA, was flooding into the North American market last year at a lower price. In parallel the demand for GLA had softened in both North America and in Asia. For instance, it has been suggested that consumers are confused about the differences between the health benefits of the different essential fatty acids, i.e., omega 3 and 6, and GLA. Plus, poor economic performance in Japan has slowed demand for health products in general, including GLA. It is expected that the market for borage seed will recover, in a year or two, after the world oversupply is used up.

Evening primrose is a perennial native to North America but the hybrid recognized as a commercial source of GLA does not over-winter well in Western Canada. Evening primrose can be started in a greenhouse and planted out, but this leads to a higher cost of production than in Eastern Canada or in competition with borage. It appears to be better suited to Eastern Canada where there is production already in Nova Scotia and Ontario. The majority of GLA production in the world is accounted for by evening primrose. Prior to 1995, according to one source, it was estimated that 90% of GLA market was evening primrose. However, until there are varieties that can over-winter in Western Canada, borage is a better option. More information on the evening primrose market can be found at Saskatchewan Agriculture and Food web site:

www.agr.gov.sk.ca

The **American ginseng** market is expected to rebound. The industry has made significant adjustments in production, and can probably sustain stronger prices. For instance, in British Columbia the ginseng industry peaked in 1997 with about 129 growers in the province and dropped to 60 growers this past year. Chai-Na-Tai Ltd. of British Columbia, the world's largest grower of American ginseng, filed for creditor protection this past year, and has since restructured its finances and scaled down production. According to one source, the price quoted in 1999 for American ginseng was between \$9 and \$13 per pound versus \$15 to \$17 per pound the year before. The main reason for lower prices, besides over supply, was a substantial drop in demand when Hong Kong reverted back to China in 1997 (9), and the economic crisis in Asia during the same time frame. The economic crisis in Asia is no longer an issue and there are other markets besides China, such as the United States and South Korea. However, it is expected in the future that the number of cultivated acres of woodland grown ginseng will increase at the expensive of shade-cloth ginseng. The price for woods-grown ginseng has been quoted as much as ten times the price of shades grown ginseng. However, Harvey Clark stated that the price of woods-grown ginseng is falling in response to rising production. The ginseng naturally growing in North America is seriously depleted from wildcraft harvesting. (10) The U.S. Fish and Wildlife Service Office has enforced regulations on the export of American ginseng. They only allow the export of roots harvested from the wild that are 5 years of age or older. The harvesting of wildcraft species is the jurisdiction of each state. Some of the US states have taken measures to stop wildcrafting of American ginseng in their respective states. Richter's market information would indicate that ginseng volume is up and prices are down.

The production of **black cohosh** and **goldenseal** is currently about 99% and 95% wild origin species, respectively, but this is expected to significantly decrease, and more production will have to be cultivated commercially to meet consumer demand. According to Harvey Clark, many herbalists are discouraging consumers from buying wildcrafted goldenseal and substituting with Oregon grape root or cultivated production. Nevertheless, wild origin goldenseal and black cohosh are depleted and it is expected that local US states will be taking more action to regulate the wildcraft harvest. Goldenseal is used in combination with echinacea and other herbs for strengthening the immune system and black cohosh is used in medicinal treatments for female menopause problems. Harvey Clark reported that Saskatchewan growers have had mixed experiences and few have succeeded in commercializing goldenseal production. However, he

further remarked that goldenseal is one of the highest priced medicinal crops, so that it is quite likely growers in Western Canada will continue to try. Clark pointed out that the price of goldenseal was so high that the supplier to Eclectic Echinacea in Victoria, who had succeeded in growing goldenseal in BC, was reluctant to show his plot to buyers for fear of theft. However, Richter's market information would indicate that this might be changing. They stated that goldenseal volume is up but the price is down.

Black cohosh is also an important medicinal plant but it, as well, is unlikely to become established for commercial production in Western Canada. This crop is better suited to climate conditions in Eastern Canada and the United States.

In Western Canada, **seneca snakeroot** and **bloodroot** are wildcrafted. Manitoba and Saskatchewan are the major sources of seneca snakeroot. Their production is either exported to Japan or Europe, or it is sold to pharmaceutical companies in North America. There are several patented medicines that use seneca snakeroot. For instance, Ernest Small and Paul Catling in their publication from 1999 entitled "Canadian Medicinal Crops" gave the following examples: cough medicine, veterinary medicine, and prescription drugs in the treatment of bronchitis and asthma. There are two opposing views in current literature. Small and Catling stated that the wild plant population is still plentiful, and they suggested that the market was in a decline. Manitoba Agriculture stated that seneca snakeroot has been over harvested in the past few years and demand is growing by 5 percent annually. Manitoba Agriculture also reported that in 1995 about ten tons of wild harvested root product was going to Japan, Europe and the United States. It is the author's opinion that seneca snakeroot will likely continue to be predominantly wildcrafted for a few more years with little or no cultivated seneca snakeroot commercially produced in Canada. According to literature sources, Japan, India, and Brazil have commercially cultivated seneca snakeroot but overall production cultivated in the world remains small. There are no natural bloodroot plants in Alberta but it does grow naturally in Manitoba. Most of the production of bloodroot in North America is harvested from wild origin species in the eastern United States. However, it is apparently depleted in the United States with annual use estimated at 2,000 MT. In a report by Andrea Gunner from 1998, "Technical Feasibility Study for Medicinal and Aromatic Herbs," this is a crop that could be commercially cultivated and could yield as much as 2,000 pounds per acre in the third or fourth year after planting. Bloodroot is used medicinally for the active ingredient of sanguinarine that is extracted from the root rhizomes. Sanguinarine is used in toothpaste and mouthwash rinse because it interferes with bacteria that may cause cavities and damage gum tissue. However, Small and Catling pointed out that sanguinarine occurs also in plume poppy and that this species is easier to cultivate and produce commercially. It is expected that cultivated commercial production in Western Canada is still a few years off, or until other uses for the active ingredients in bloodroot find commercial use. Bloodroot is used as an ingredient in cough syrups and in the Chinese rubbing oil called 'Po-Sum-On'. It was used in the Colgate toothpaste, 'Viadent', however, the company discontinued the use of bloodroot in this product.

Anise-hyssop is a native plant originally used, according to Manitoba Agriculture, by the Native Americans as a breath-freshener, as a tea, and as a sweetener. It is now mainly used in dried flower arrangements and as an essential oil in perfume, aromatherapy products, liqueurs, and even some root beer formulas. Manitoba Agriculture reported strong demand in the dried flower trade and some demand in the herbal tea market. According to quoted sources in Small's publication from 1997, "Culinary Herbs," there are several strains of anise-hyssop that have been selected and developed for essential oil containing high concentrations of methyl chavicol. This constituent is used in many industries.

Dandelion is a plant naturalized to North America by early European settlers, yet the United States is evidently importing something like 45 MT of dandelion in some years. Ernest Small wrote in the publication from 1997 that dandelion is found in over 50 commercially sold

medicinal preparations in Canada and it has the value of over a half million dollars in the Canadian market alone each year. The dandelion greens and root extracts are used for a variety of problems that include treating jaundice and other liver ailments. The root is supposed to be used as a coffee substitute and in anti-smoking preparations. Small and Catling wrote in their publication in 1999 that no modern investigation on medicinal claims of dandelion has been done and most research on the plants effectiveness are dated pre-World War II. It was Small's view in his 1997 publication that there was a small commercial market for dandelion greens and that it was quite possible that cultivated dandelion would increase. Richter's market information would concur, indicating that volume and prices are up.

Fireweed is native to Western Canada but it is likely contracted for commercial production only in Saskatchewan. Most of the supply has been obtained by harvest of wild fireweed in northern Saskatchewan. Fytokem Products Inc. use fireweed in their cosmetic and personal care products because it is reported to have active constituents that help soothe skin irritation and burns. Even though, it is expected that commercial production will heavily dependent on the needs of Fytokem, there could emerge other players in this market in the future. Fireweed is one of the more successful commercial herbs in Saskatchewan.

Stinging nettle is a native species that has a wide range of uses. It is used as a specialty tea for weight loss and maintenance. Manitoba Agriculture reported that the worldwide demand for nettle was estimated at 100 tons in 1996 and that 'Clairol' uses more than 40 tons/year as a hair conditioner. It is also found in a beer product, tonics, capsules, and in a juice product. It has potential for fibre applications similar to flax and hemp. Harvey Clark pointed out that herbalists like to prescribe nettle for a wide variety of ailments when the use of other herbs is unclear. However, it should be noted that stinging nettle is a skin irritant and it is generally regarded as a noxious weed. It was Danielle Simonot's opinion in March 2000 in the report "Bio-manufacturing in Saskatchewan" that stinging nettle is one of the most undervalued of economic plants with potential applications in a wide range of uses. However, Richter's market information would indicate that the volume and prices are stable.

Yarrow, is a perennial native that according to Small and Catling (1999) is used in more than 20 pharmaceutical products marketed in Canada, and is very popular in commercial European herbal remedies. Robert Rogers a herbalist in Alberta in a presentation at the Prairie Medicinal and Aromatic Plant Conference in 1997 indicated that yarrow is used for such things as menstrual pain, nervous disorders, and poor digestion. Small and Catling wrote in their publication that most of the commercial supplies of medicinal yarrow are obtained from Europe. They estimated the production of yarrow in the world to be about 800 MT, worth \$88 million US annually. It is a crop that is relatively easy to grow in Western Canada. Manitoba Agriculture stated that there is a steady market as an ornamental and in dried flower arrangements. However, Richard Alan Miller, indicated on Richter's Q & A web site that yarrow flowers hold a limited market and requires special equipment not yet invented to be competitive. It was his thoughts that the entire domestic market needed less than 400 acres, with most being imported from India at a landed price of less than \$1.20 per pound. He did state that yarrow could have some potential as a mosquito repellent, although these types of markets are limited.

Siberian ginseng is a crop quite different from its counterpart, the American ginseng. It is a perennial that originates from Siberia. Supposedly, it could easily be grown in Canada and is much cheaper to grow than American ginseng. However, it is reported to be difficult to get established in a stand and for the best medicinal properties, it should be grown with shade. This crop is grown in some small acre plots in Western Canada and the market will likely hold up until the agronomics of growing it are better understood. However, Harvey Clark mentioned that Siberian ginseng is widely grown and prescribed in China, and North American growers may not grow it cheaply enough to compete effectively with imports from China. Devil's club (also known

as Alaskan ginseng) is another herb that could have similar medicinal properties but is native to Western Canada. According to Small and Catling in their publication in 1999, the market outlook for Devil's club could be quite promising.

Licorice is a well-known plant used in medicine and by the flavoring industry. Even though, true licorice probably won't survive winter in Western Canada, wild licorice is native to Western Canada. There could be markets where wild licorice could be a substitute for true licorice. For example, Manitoba Agriculture suggested that it could be used as a natural sugar substitute, for flavoring root beer and chewing tobacco. True licorice is used as a natural sweetener in beverages, confections, candy, chewing gum, ice cream, and as a medicine in cough syrups and cough drops. However, the market is expected to be quite small. Wild licorice is regarded as inferior to true licorice and many products that taste like licorice are actually flavored with anise oil. Harvey Clark mentioned that there is reported to be good demand for licorice from Europe. He further stated that Chinese licorice is used in many Chinese formulations, but has been placed on Canada's restricted list of herbal products for concerns over safety. Richter's market information would indicate that for true licorice the volume is up and the price is down.

Skullcap is native to North America and is used in the medicinal and cosmetic industries. Medicinal claims include treatment of nervous disorders, high fever, and respiratory tract infections. In cosmetic products it is described as having anti-inflammatory and anti-allergic properties. It is also stated in the report by Danielle Simonot that it is used in herbal teas and tobacco products. Supposedly there are skullcap species growing in marshlands in Western Canada that could be wildcrafted. Richter's market information would indicate that the volume is stable and the price is up.

Milk thistle and **feverfew** are quickly moving toward commodity status. Milk thistle is a native species but feverfew is native to southeastern Europe. For either of these crops, low cost production using mechanized farming technology is needed. There are already quite a few producers in Western Canada growing milk thistle or feverfew, and the number of acres required for growing either for medicinal purposes is estimated to be small. Harvey Clark indicated that milk thistle tends to be a long season crop and may therefore have difficulty competing with more southerly climates. But the comparative advantage for milk thistle in Western Canada is that our winter prevents it from spreading significantly, especially if producers are careful to harvest all the seed heads. Milk thistle has gained notoriety as a liver cleanser. The active constituent in the seeds of milk thistle are called 'silymarin' and it is supposed to increase protein synthesis in liver cells to stop the absorption of toxins by the liver. It is worthwhile mentioning that milk thistle is often regarded as a problem weed because it spreads and creates a near impenetrable barrier to get rid of. It can also supposedly reduce forage production and cause nitrate poisoning in cattle and sheep. Contrary to some other sources, Richter's stated that milk thistle volume and prices are up. Harvey Clark mentioned that organic production is being popularized for the North American market.

Feverfew leaf prices were reported by Agriculture Canada to have been at one time as high as \$50 per pound but dropped considerably in the past few years. It is estimated that the price for certified organic feverfew leaf is now no more than \$15 per pound. There is supposed to be a wide variability in parthenolide content in the leaf material. According to Richters, the buyers want a minimum parthenolide content to be between 0.4 and 0.8%. Harvey Clark stated that in discussions with an Ontario company, they reported that they had developed a process for extracting the active ingredients from feverfew but instead of developing the market themselves, the company was sold to a large European pharmaceutical company. Feverfew is used as a medicinal crop for the treatment and prevention of migraine headaches. Richter's market information would indicate that feverfew volume is down and prices are stable.

Calendula is an annual native to the Mediterranean region. The flower petals are used to make creams, salves and teas. According to literature from Alberta Agriculture it can be used as a substitute for saffron in cooking. According to the report by Andrea Gunner in 1998, calendula is under commercial cultivation in Europe, the United States, and even in Canada. The United Kingdom is supposed to be researching calendula as a source of resins for the paint and varnish industry. There is also research aimed at lubricant additives and it was Gunner's opinion that the market for calendula looked promising with potential for several thousand tonnes of production. Richter's market information would indicate that volume and prices are stable.

Catnip is a perennial native to Europe and Asia. The essential oils are used in perfumes, candies, and pharmaceuticals. The fresh leaves and stems are used in herbal teas, and as a flavoring in foods. The dried leaves and flower tops are also found in cat toys. Alberta Agriculture reported that this crop has good economic potential. However, it was Small's opinion in his publication in 1997 that the culinary use was too restricted to be of economic interest. He did indicate that there could be some potential as a source of oil but foreign competition would limit possibilities. There is already a well-established production base in Europe and in some locations in the United States. However, Richter's market information would indicate that volume is stable and price is up.

Valerian is a perennial crop native to Europe and Western Asia but has naturalized in Canada and the United States. This plant is important for its medicinal properties. The essential oil extracted from the root and rhizomes is used in production of Valium. A number of scientific studies have shown that the active ingredients of valerian, the valepotriates, act as a sedative. Agriculture Canada reported that valerian oil is used in the flavor and pharmaceutical industries, and limited quantities are also used in the fragrance industry. Valerian is approved as a GRAS (generally recognized as safe) food ingredient in the United States. Extracts and the essential oil are also used in flavoring components in many food products and beverages. Agriculture Canada indicated that the major commercial producers of valerian preparations are Belgium, France, Holland, Germany, Russia, China, and Eastern European countries. Harvey Clark in his presentation this past spring indicated that the demand for valerian was increasing but it was probably over produced. Richard Alan Miller, indicated in a Q & A on Richter's web site that the market for valerian root was in excess of 4,200 tons and that North America valerian was very competitive with product originating from Europe. However, he concurred that the market is currently oversupplied. In fact, Harvey Clark stated that when he examined the expected world demand, and the yield given for valerian root in New Zealand, it appeared that a very small area (several acres) would supply a large portion of world demand. He also stated that valerian had not overwintered well at the Canada-Saskatchewan Irrigation Diversification Centre (CSIDC), and was dropped from targeted studies. Harvey Clark mentioned that Jo Detillieux from the Conservation Learning Centre stated that when the valerian root is irrigated the root does not grow straight down which is desirable for commercial production. Richter's market information would indicate that the volume is up and the price is down.

Angelica is a native of northern Europe. There is very limited production in Western Canada and most production in the world is wildcrafted from northern Europe. The extracts from the root and the seeds are used in flavoring for candy-making and liqueurs. It is also used for medicinal purposes. The essential oil from the root is used as an antibiotic agent, and it is used in the pharmacological and chemical industries. However, note that the use of angelica is cautioned because of blood thinning properties of the constituents in the plant. Harvey Clark stated that angelica is on the restricted list for herbs in Canada, indicating a safety caution from the Health Protection Branch. He also mentioned that angelica has grown well in small plots at the CSIDC. However, even though, this crop could likely be grown successfully in Western Canada, it would need to compete with imported production harvested in the wild from Northern Europe. Furthermore, this market is relatively small and could easily be oversupplied with a few growers

commercially producing this crop. Small indicated in his publication in 1997 that angelica would remain of minor importance as a food plant because of the potentially dangerous chemicals in the plant's constituents. Although, Harvey Clark indicated that some herb distributors are asking good prices for the root.

Burdock is a biennial crop native to North America that yields a large biomass. All parts of the plant can be harvested and used but the roots have the most value. The plant is used for medicinal purposes such as a blood purifier, mild laxative, for skin treatment, and as an ingredient in "Essiac" or "Floressence" herbal formulas. Harvey Clark stated that the main demand for burdock root has been as an ingredient in the "Essaic" formula. He further stated that while the success of "Essiac" has been questioned as a treatment for cancer, and a doctor in the US was jailed for malpractice when he prescribed this to a patient (and the treatment was unsuccessful), most herbalists feel that burdock root has properties as an anti-carcinogen, possibly better used in the prevention of cancer than as a major cure. In Japan, burdock is eaten as a vegetable called 'gobo'. Most burdock production is still wildcrafted in North America. It is produced commercially in Eastern Europe and in China. Note that it is regarded in some regions to be a noxious weed. It remains more economical to wildcraft this crop for the time being. However, it was stated in the report by Andrea Gunner (1998) that wholesalers in Vancouver were importing burdock sprouts as an edible in limited quantities from China two or three times a year. Richter's market information would indicate that volume and prices are up.

Horseradish is a perennial plant that originated in Russia or southern Europe. It is an introduced species in the United States. The plant (rhizomes and the root) is used in condiments and can be eaten as a vegetable. Small indicated in his publication in 1997 that the primary use of Canadian-grown horseradish is for the extraction of horseradish peroxidase. This is an enzyme that was used for the treatment of the AIDS virus. However, supposedly the price is not high for this purpose, and the company has only used local producers thus far to reduce cost. Sakai Spice in southern Alberta grows horseradish for the preparation of 'wasabi', a Japanese spice condiment. Small stated in his publication that horseradish is well suited to Canada and production could easily increase. However, the market is stable and an expansion in the market would need to occur to increase production of the raw or processed product. Furthermore, Harvey Clark stated that the demand would be limited as a condiment because of the strong, pungent flavor it has.

Syrian Pumpkin has gained notoriety for medicinal use for preventing and treating prostate and bladder problems. This crop is grown in Austria and there is only one grower known in Canada, located in Ontario. There is supposedly a growing market for it in Japan and North America. The seed is consumed like a nut or the oil is extracted from the seed and sold in health food stores. The crop is reported to take 120 to 125 growing days frost free, and soil type will apparently influence the medicinal properties. It is unlikely that the market size or the agronomics are viable for this crop in Western Canada. Although, Harvey Clark stated that pumpkin seeds are known to have some beneficial medicinal effects, and it is quite possible that this market could be expanded for other types of pumpkins in Western Canada. For instance, he pointed out that Nicaragua is exporting certified organic pumpkin seed to the United States.

Comfrey is a perennial high biomass crop with a wide array of uses. It was used as a forage crop for livestock but this practice has been discontinued. The root is used in the cosmetic industry in such products as skin creams, bath oils, and hair care products. It could also have medicinal uses, however, it is a restricted plant and may not be used for internal use in humans in Canada, Australia, and Germany. The plant has a high level of pyrrolizidine alkaloid content that is regarded as toxic for consumption. In the United States, it appears that this crop can be used for products that does include internal use but there are many hazard warnings that discourage such use. The market for this crop will remain small until the plant is deemed safe for medicinal use. Harvey Clark mentioned that Richard Alan Miller has reported that the tests done reporting the

dangers of comfrey use are fraudulent. For example, a case of comfrey causing a death in the United States turned out to be another herb entirely, but this did not prevent the US Food and Drug Administration from restricting its use. Miller also pointed out that concerns over alkaloid content can be alleviated by harvesting the comfrey at a young age which is a practice being followed by comfrey growers in the United States. Nevertheless, according to the literature, even though it could make an excellent forage crop, the level of toxicity would have to be much lower for acceptance, and until such time, it is not advised that this crop be used as a livestock feed or for internal use in humans. Richter's market information would indicate that volume and prices are up.

Stevia, a perennial plant native to South America, has several people in industry in Canada keenly interest in its future. This crop has already captured a significant share of the low-calorie sweetener market in Japan. The leaves are ground into a natural sweetener that could go head-to-head with the artificial sweetener, 'Nutrisweet'. According to Ontario Ministry of Agriculture, it is measured to be 200-300 times sweeter than that of sucrose. However, this plant doesn't have approval for use in the United States as a food product or additive. It is unclear what guidelines Health Canada has. It is reported on the Internet that the stevia leaf in its unrefined form can be sold as a food in Canada but not as a refined product. As well, there is concern that the public in North America would not accept the taste of stevia as a sweetener. According to some literature, stevia extracts are regarded as too bitter with a metallic aftertaste, while others contend that there is no reason why stevia could not be used as a replacement for artificial sweeteners. It is reported to be used in Japan and several other countries in a wide range of products such as a tabletop sweetener, baked goods, candies and gum, cereals, ice cream, toothpaste and mouthwashes, and in numerous salty products (dried seafood, miso, pickled vegetables, soy sauce, and so on). It was even suppose to have been in Diet Coke in Japan until Cola-cola standardized the coke products globally using aspartame. Agriculture Canada and the provincial governments are experimentally growing stevia and the results have been mixed. It is reported by Small in his publication in 1997 that there is low fertility and a great variability in the stevia plants grown. This poses difficulties for generating a uniform, high quality crop. Harvey Clark stated that CSIDC tested stevia a number of years ago but it did not yield well, while Alberta Agriculture report that this crop will produce more leaf tissue in a northern climate because of the longer daylight available for growing. Clark also stated that the costs of production appeared prohibitive in comparison to the prices it was expected to receive. Further, he mentioned that it appeared that stevia uses have been exaggerated for commercial production. Nevertheless, this is a crop worth watching.

The future of comfrey and stevia will largely depend on changes in government regulation in Canada and the United States. For example, comfrey cannot be sold for internal use in Canada until Health Canada recognizes that comfrey is safe for human consumption. This could require the development of new varieties, and the research to prove that it is safe for consumption. As well, stevia cannot be sold for human consumption or as an additive until the United States government grants "generally recognized as safe" (GRAS) status. This could require more lobbying on the part of stevia industry, or the development and research of cultivars that can be recognized as GRAS. However, Harvey Clark mentioned even if stevia was accepted by consumers in the United States, Canadian producers could be at a disadvantage with any growers in the United States. Apparently, stevia is currently regarded as an artificial sweetener and would not fall under the US sugar policy but the United States is re-examining its sugar policies to comply with free trade provisions, and this may change stevia's status. If stevia qualifies under the US sugar policy, then tariffs designed to protect the US sugar industry would be applicable to stevia grown in Canada.

Garlic, a perennial native to west central Asia, is a good example of a crop that likely has little potential in Western Canada unless it is fresh and/or grown certified organic. For instance, there is little chance that producers in Western Canada can compete on price with bulk garlic from China

or California. Harvey Clark stated this past spring in a presentation, that California is producing garlic at \$0.35 US per pound and Chinese garlic is being imported at a price of \$0.54 US per pound. However, fresh garlic is wholesaled in the United States at a price of \$1.15 US per pound and organic garlic wholesale price is quoted between \$4.75 and \$7.30 US per pound. A plant breeder in Western Canada also suggested that garlic grown in plots in Western Canada have much higher active constituents and tastes better than garlic grown elsewhere. Plus garlic active constituents rapidly deteriorate, and imported products have usually been in shipment and storage for an extended time period. Harvey Clark indicated that in British Columbia garlic is planted in the fall and overwintered so that it is ready for the summer tourist season. Tourists buy braided organic garlic at fairly high prices, but once the tourist season is over, the prices drop substantially. He also noted that even though organically grown garlic has higher prices on the prairies, CSIDC and others have had difficulty growing garlic organically. Harvey Clark indicated that an area of northeastern Saskatchewan, however, has been growing good quality crops of garlic, which can be sold for \$5 or \$6 per a pound to limited markets. Saskatchewan Agriculture have information on medicinal garlic worth checking out on their web site at www.agr.gov.sk.ca.

Canada recently established a countervailing duty against garlic imported from China during the in-season period for Canadian growers, in order to preserve a portion of the garlic market for Canadian growers. The duty on garlic does not apply in the off-season period. As such, Harvey Clark points out that since garlic stores reasonably well when properly dried, importers simply bring in sufficient supplies early in the season, which continues to depress prices for local growers.

Seabuckthorn is a shrub native to Asia that is growing in shelterbelts across Western Canada. There has been quite a bit of interest in the berries from the shrub for medicinal purposes. The medicinal properties include antibiotic, anti-inflammatory and analgesic uses. The berry is also a good source of vitamins C and E, beta-carotene, and essential fatty acids. It is used in fruit drinks, jams and jellies, and the leaves in herbal teas. This shrub is already being commercially utilized in Russia and China. According to an article in *The Furrow* in October 1998, there were suppose to be 100 small plants processing seabuckthorn in China. There were also suppose to be processors scattered through the former Soviet Union and Eastern Europe. It is expected that this crop will be used in North America by the cosmetic and pharmaceutical industries. According to the same article in *The Furrow*, Global Seabuckthorn Agro Products (alias Canada Seabuckthorn Enterprises Ltd.) anticipated paying growers about \$3.85 per kilogram for the fruit at the farmgate. Their field trials indicated that an orchard planting of 1,700 shrubs per acre would yield about 4,000-7,000 kilograms per acre. It should be noted that several people within the new crop industry have indicated in discussions that there is a potential for this crop in Canada. However, as Harvey Clark has pointed out, there is the challenge for seabuckthorn, as in most fruit production, in developing a cost-effective method of mechanical harvesting. The Prairie Agricultural Machinery Institute in Portage la Prairie, Manitoba has developed a seabuckthorn berry harvester that is reported to effectively remove the fruit without damaging the shrub. The sharp spines tend to reduce its attraction for U-pick enterprises (which are the most successful form of fruit orchard on the prairies), and its demand within North America will probably require some additional promotion.

Mint, spearmint and peppermint, are perennial herbs that escaped cultivation and have naturalized in North America. Peppermint is used in herbal teas and the essential oil is one of the most important. It is used in flavoring and adding to food and beverages. It is also used in household products, perfumes, cosmetics, and hygiene products. Spearmint oil is also used to flavor food and beverage products. It is added to soft drinks, baked good, condiments, and pharmaceutical products. The United States imports about \$5 million worth of peppermint each year and exports approximately \$80 million worth. The United States also imports approximately \$5-6 million worth of spearmint each year and exports between \$20 and \$35 million worth. The largest US

export markets were the United Kingdom, Mexico, France, and Japan. The largest import markets were Canada, China, and India. Canada exported \$1.3 million of peppermint and over \$4.6 million of other mints in 1998. The vast majority was exported to the United States. There are reports that China is planting record acres of spearmint, and that India's production of peppermint is increasing. Small indicated in his publication in 1997 that the mint oil market was controlled by five or six companies in the United States that contracted with growers. The number of growers stayed relatively constant because of the capital investment required for distilling the oil. It was his view that the market for peppermint and spearmint didn't have significant potential for increasing in Canada. It was further his opinion that there was enough competition from existing producing areas to limit market opportunities. However, Richter's market information would indicate that volume and prices are up. There could be potential for increasing mint production in Western Canada but the initial investment and the time it takes to establish a market are enough to restrain any new entry and expansion will likely continue to occur with existing producers.

Monarda, is a perennial herb native to North America. It is one of the highest quality sources of geraniol. This essential oil is used in perfumes, soaps, and other scented consumer products. Robert Rogers in his presentation at the Prairie Medicinal and Aromatic Plant Conference in 1997 stated that medicinal properties of monarda oil included that it was a general nerve tonic and it was strongly anti-fungal, anti-bacterial, and anti-viral. Monarda production peaked in Alberta in 1991 with about 100 acres. However, the market price for the essential oil went down and the crop was later discontinued. Reife Gaudiel stated at the Prairie Medicinal and Aromatic Plant Conference in 1997 that it was in his opinion that this crop could be attractive again in Western Canada if the market price for the oil rebounded. Manitoba Agriculture stated that Canada has the potential market for 2,500 acres of monarda. However, they cautioned that the markets tend to be volatile, and the quality of the oil is very important to the marketing of the product.

Marjoram is a perennial herb native to North Africa and the Middle East that could be grown in Western Canada as an annual. It is used in the food and flavoring industries as a fresh or dried herb. The extracts have anti-oxidant properties and the oil is used in cosmetics, perfumes, creams and lotions. Egypt produces about 90% of the world's supply. Small indicated in his publication in 1997 that marjoram was one of the herbs most frequently found in short supply. It was his view that there was potential for a few growers to produce it in the warmest parts of Canada but he cautioned that Egypt has shown a quick response to periodic short supplies and that the growth in demand for marjoram was not increasing much. Richter's market information would indicate that volume and prices are stable.

Lavender, is a perennial native to the Mediterranean region that probably could not survive winter in Western Canada. It is a multi-purpose herb that is used for culinary, medicinal and aromatic uses. The oil is used in cosmetics, perfumes, lotions, and soaps. It was Small's opinion in his publication in 1997 that there was little prospect for commercial production of lavender in Canada and it was better suited to a warmer climate. Richter's market information would indicate that volume and prices are stable.

Lovage is a perennial native to the Mediterranean region but growing as an introduced species in parts of North America. It is primarily used as a culinary herb added to food dishes. The essential oil extracted from the plant is used in condiments, perfumes, and liqueurs. It was quoted in Small's publication in 1997 that the estimated annual world value of lovage essential oil was only \$1.2 million US in 1993. This crop could have some minor use as an herb and essential oil. It was Small's judgment that this crop was well adapted to a northern climate and could be grown for the markets near urban regions.

Savory (summer) is an annual shrub native to the Mediterranean region and grows as an introduced species in parts of North America. The leaves are used for flavoring and blended into

cooking. The essential oils are used as a seasoning and in the perfume industry. It was Small's opinion in his publication in 1997 that commercial production would be limited to small quantities sold in the local markets and that the demand for summer savory was flat with little prospect for growth. However, Richter's market information would indicate that volume is stable and price is up.

Sage is a perennial evergreen shrub used in the flavoring and fragrance industries. The fresh or dried leaves are used as ingredients in packaged meats. The essential oil is used in the pharmaceutical and cosmetic industries in perfumes and mouthwashes. JR Reynolds, the tobacco company, has about 4,000 acres of clary sage contracted in North Carolina for essential oil production. The United States imports as much as \$5 million or 2,000 MT of sage in any given year. The largest producers are in the plants native habitat of the Mediterranean. It has only been grown experimentally in Canada. It was Small's opinion in his publication in 1997 that sage could grow in warmer parts of Canada but it would not likely be able to compete with cheap high quality imported sage from southeastern Europe. Richter's market information would indicate that volume and prices are stable.

Rosemary, is a perennial native to the Mediterranean region that could only be grown in Alberta as an annual. The leaves are added fresh or dried to meat products and baked goods. The oil extracts are used as antioxidant additives for the food and beverage industry. As well, the oil is added to soaps, cosmetics, perfumes, lotions, and creams. The United States imported nearly 250 MT of rosemary oil in 1998 worth approximately \$1.5 million US. Morocco and France were the major suppliers to the United States.

It was Small's opinion in his publication in 1997 that it had little prospect in northern areas of North America. This plant is better adapted to a warmer climate. Richter's market information would indicate that volume is up and price is stable.

Thyme, is a perennial herb native to southern Europe. Thyme is used for culinary purposes for flavoring foods and the essential oil is used to preserve meats. The oil is also used in condiments, beverages, mouthwashes, and soaps. Spain is the leading producer with most production from the wild. According to one source, producers in France cultivate a higher quality selection of thyme for a premium market at a higher price. The United States imports \$250,000 US worth of thyme each year or about 150 MT. There is some garden production of thyme in Canada but there is no commercial cultivated production that the author is aware of. Small indicated in his publication in 1997 that thyme produced in Canada would not be able to compete with wild harvested thyme imported from Europe. Richter's market information would indicate that volume and prices are stable.

Tarragon is a perennial herb used in culinary cooking. The oil extracted from the plant is used in perfumes, beverages, and condiments. French tarragon is the type used universally. Another type, Russian tarragon, is mostly grown in Eastern Europe for domestic consumption. According to information from Alberta Agriculture, even though Russian tarragon is more likely to survive winter, the flavor is inferior to French and the plant does not dry properly. It was Small's view in his publication in 1997 that French tarragon had little potential in Canada but could perhaps be grown for the local market in greenhouse production. Richter's market information would indicate that volume and prices are stable.

Parsley is a biennial that could be grown as an annual for fresh or dried leaves. It is used as a food garnish in a wide array of culinary dishes. Dehydrated parsley flakes are used as a condiment and the essential oil is used in fragrances for perfumes, soaps, and creams. Information from Alberta Agriculture indicates that parsley seed oil is used in fragrances for perfuming soaps and creams. Canada is a major producer of dehydrated parsley flakes and exports limited quantities to

the United States in some years. The United States imports over \$2.5 million US or about 700 MT of manufactured parsley in any given year. It was Small's opinion in his 1997 publication that fresh parsley production could be increased to meet growing consumer demand. Richter's market information would indicate that volume is up and price is stable.

Oregano is a perennial that is wildcrafted from its native habitat in the mountains of Greece. The other major producers of oregano include Mexico and Turkey. The herb or the extracted oil is used in a variety of meat and sausage products, salads, stews, sauces and soups. There is an ever-growing market for using it as a dried herb on pizza. It is only being grown in Western Canada experimentally. Small stated in his publication in 1997 that oregano is better adapted to warmer climates and that there was little commercial potential. Richter's market information would indicate that volume is up and price is stable.

Basil is an annual herb, the leaves and stems are used for cooking purposes and the essential oil extracted from the leaves is used in food and flavoring industries, and also in cosmetics. It is cultivated commercially in Europe and North Africa. The largest producer of basil is Egypt. The biggest growing region in North America is California. Small indicated in his publication in 1997 that there was some potential for greenhouse basil production but little potential for field production. Richter's market information would indicate that volume is up and price is stable.

Besides basil, there could be potential for some other greenhouse fresh herbs. The most likely candidates include chives, cilantro, sweet marjoram, oregano, parsley, and French tarragon. As well, there are some herbs specific to ethnic markets that could be grown locally in greenhouse or field conditions. These include, but are not inclusive to, lemon balm, lemon grass, Mexican oregano, mitsuba and Vietnamese balm.

Some herbs have alternative uses besides the market for culinary and medicinal uses. For instance, they could be used in ornamental gardens, agri-tourism, dried flower arrangements, industrial use, as livestock forage, a nectar source for honey production, and herb food products for pets and show horses.

There are several crops that would be complementary to agri-tourism. For instance, the Purple Haze Lavender Farm in Washington States have done this very well. They have a purple lavender farm located within an hour and half of Seattle. According to the owner, his farm averages 1,000 visitors each day between June and September. Each visitor to the farm pays \$5.00 US and receives a spike of lavender plus a small glass vial with a stem of lavender in it to take home. (11) This year a farm in Lacombe, Alberta made a corn maze, and has already had over 3,000 visitors by mid-September. A maze could be created from any number of fast, tall growing crops such as hemp (depending on Health Canada regulations).

Selling herb crops for dried flower arrangements is an another alternative market. The byproducts from root crops could find a supplementary market, or if the market for culinary or medical purposes dries up, this could become the primary market. For example, selling echinacea flowers for dried floral arrangements may at times be more profitable then selling the roots for medicinal purposes.

The herb crops that make for a good source of nectar for honeybees include anise-hyssop, borage, catnip, dandelion, fireweed, mountain mints, summer savory, and yarrow. It is often the case that both the honey bee producer and the producer of the herb can mutually benefit. The honey bee producer has a good source of nectar and the bees pollinate the crop for higher seed production.

There are herb crops that could be used for forage for livestock. These include dandelion, fireweed, monarda, stinging nettle, yarrow, among others. In the report by Danielle Simonot it

was stated that stinging nettle was found to have amino acids that were nutritionally superior to the amino acid concentration of dehydrated alfalfa meal. Dandelion greens are regarded as a nutritious plant for beef cattle. Some livestock consume yarrow but it can create undesirable flavor in dairy products. Fireweed is regarded as only fair forage. Comfrey could have potential as a livestock feed source if there were varieties developed with low pyrrolizidine alkaloid content. Richard Alan Miller suggested in his book from 1998 that 60% comfrey/40% alfalfa pellets might have excellent opportunities as a cattle food. However, current cultivars of the crop should not be used for livestock feed because of the toxicity found can supposedly cause serious health problems in livestock and humans.

There are also several forage crops with potential for culinary and medicinal use such as alfalfa, sweet clover, and red clover. **Alfalfa** has generated interest for its potential for nutraceutical properties. **Sweet clover** is stated in a report by Danielle Simonot to be used for taste enhancement in herbal remedies and for medicinal purposes in several drug products such as Venalot, Phlebodril-Crème, and Pascovenol. Harvey Clark in a presentation this past spring noted that demand was increasing for **red clover**, however, the medicinal use was being questioned by those with a pharmaceutical background.

Herb crops could offer hobby farmers a viable economic opportunity to farm. For instance, most acreage owners or young farmers, mostly likely, could not afford the modern equipment and the large land base needed for conventional crop production. However, some herbs can generate much higher returns per acre and do not require a large capital investment. In unison, herb crops may offer the large conventional farm operations a means of diversifying their farm and maximizing their farm's returns.

There are literally hundreds of herb crops that have not been discussed in this article. Robert Rogers gave the following crops as plants for the future for the northern prairies in a presentation at the International Herbs Conference in Saskatoon in July this year: roseroot, black cohosh, seabuckthorn, purslane, hemp, periwinkle, fleecflower, tassel flower, bear root, and lomatium. As well, discussions with the industry indicated potential for these crops: andrographis (Chinese herb), astragalus (Chinese milkvetch), bearberry, calamus, foxglove, hawthorn, mandrake, schisandra (Chinese herb), slippery elm, wild indigo, and wormwood. (12) The crops given above and many others could well be worthwhile exploring for market potential. It is the author's suggestion that some of the best opportunities are with crops that have not yet received much attention and have yet to be discovered.

In the table below are the estimated farmgate prices for several herbs and expected yields. Note that the market for all these crops are small and the prices are only a rough estimate based on discussions with the industry. As well, the yields were sourced from a literature review and may not pertain to local area conditions. A subjective adjustment was made to the yields from the literature to be more realistic with local growing conditions and growing the crops organic. Note that no expenses are included and it could be 3 or 4 years before harvest. It is also to be understood that these figures are provided only for the reader to get a ballpark idea of which crops could have market potential. It is advised that each producer do their own thorough research for their specific farm operation prior to embarking on growing any of these crops.

The costs of growing any of the crops in the table vary but, in general, the costs will be considerably higher for seed (or propagation method) and labor than traditional crops.

* Prices are certified organic unless otherwise stated

It is worth mentioning again, that all of the crops discussed in this article are niche crops and the market size is very small. For example, the table on the right is recreated using Richter's estimates of the market size for several herbs in North America and in the world.

Estimated Market Size (Acres)		
Crops	North America	World
Alfalfa*	12,000	30,000
Arnica	400	2,500
Lemon balm	200	2,500
Basil	2,500	25,000
Bay laurel	500	5,000
Borage***	5,000	12,400
Burdock	400	7,400
Calendula	500	2,200
Caraway**	6,200	47,000
Catnip	500	6,000
Chamomile	12,000	100,000
Chives	8,000	60,000
Comfrey	600	4,200
Coriander** (cilantro)	12,000	1,500,000
Dandelion	1,200	17,000
Dill**	10,000	91,500
Echinacea	10,000	40,000
Elecampane	60	2,000
Fennel**	17,000	175,000
Fenugreek**	17,000	225,000
Feverfew	400	3,200
Scented Geranium	1,000	10,000
Ginkgo	1,500	12,400
Ginseng	18,000	175,000
Goldenseal	17,000	42,000
Lavender	2,500	22,000

Lemongrass	6,500	125,000
Licorice	1,200	110,000
Lobelia	4,200	22,000
Marjoram	2,000	30,000
Milk thistle	1,200	12,500
Chinese Milkvetch	1,400	4,200
Mint	40,000	600,000
Nettle	600	4,000
Oregano	6,000	20,000
Parsley	62,000	620,000
Rosemary	500	NA
Sage	6,000	400,000
Savory	800	2,000
St. John's Wort	2,000	6,000
Skullcap	1,000	12,500
Sorrel	350	1,000
Tarragon	500	7,500
Thyme	6,000	82,000
Valerian	NA	NA

Source: Richter's Herbs 2000 Catalogue, ProGrowers Information fact sheets; note that numbers have been converted from hectares to acres, and rounded off.

* Alfalfa excludes acres seeded for fodder

** These crops are discussed in detail in another article, "The Market for Spices and Other Specialty Crops."

*** Borage acres actually seeded in Alberta and Saskatchewan were estimated to be about 36,500 in 1999.

A directory of companies in the herb and essential oil industries in North America will be available later this year from Alberta Agriculture, Food and Rural Development. The directory will complement a full report on the "Market Opportunities for New Crops in Alberta." The report will have more detailed information on many of the herbs and essential oils discussed in this article.

There are directories available now on the World Wide Web with their lists of the companies involved in herbs and essential oils.

These include the following web sites:

www.agric.gov.ab.ca/crops/special/directory

www.agric.gov.ab.ca/store/specialcropsales

www.bherbgrowers.com

www.nutranet.org/subpages/members.htm

www.contactcanada.com – Natural Health Products

www.hort.purdue.edu/newcrop/med-aro/default.html

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