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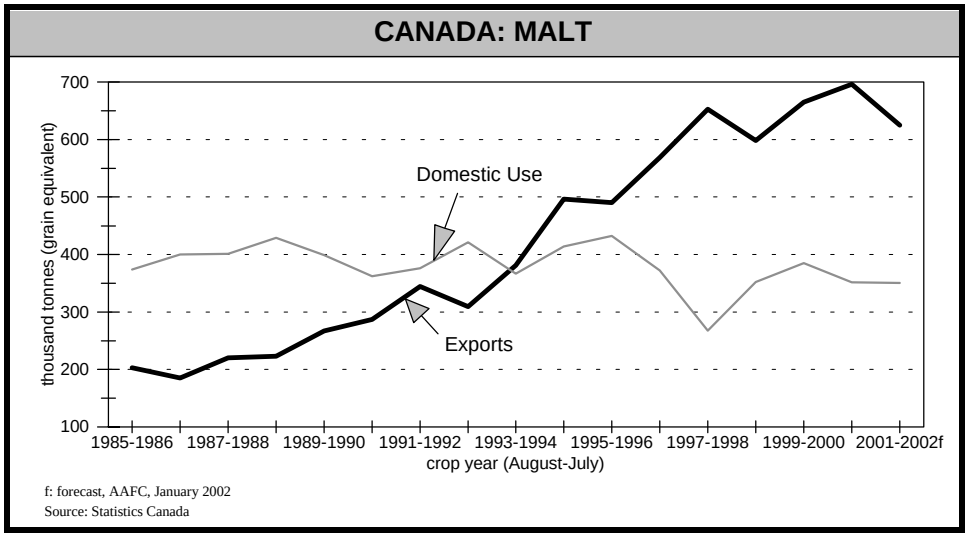
MALT

The Canadian malting industry has expanded over the past decade to provide value-added products that have become increasingly important to Canadian agriculture. Several new malting plants have opened over the period as companies have been interested in Canada's high quality malting barley. While domestic use of malt has been stable, malt exports have increased, with the value of exports increasing from $86 million dollars (M) in 1990-1991 to about $233M in 2000-2001. Malt production is forecast to decline in 2001-2002 due to increased competition into South American markets by the European Union (EU) and high prices for barley attributable to shortages caused by drought in western Canada. However, barley production is expected to recover in 2002-2003, which should reduce barley prices and support malt production. This issue of the *Bi-weekly Bulletin* highlights the Canadian malting industry, and examines the situation and outlook for Canadian malt.

THE MALTING PROCESS

Malt is the product created through controlled germination and drying (or kilning) of barley, and is primarily used for brewing beer. Malt production is a natural biological process during which barley kernels are partially sprouted resulting in the modification of the barley endosperm. This modification involves the breakdown of the cell wall components, the partial breakdown of proteins, and the generation of the enzymes necessary for converting starch into sugars during brewing. This process has been carried out for centuries, with malt originally produced by hand and germinating barley turned using a shovel. Today, malting plants are highly mechanized and automated, and operate 24 hours a day, 365 days a year.

The malting process consists of three stages. **Steeping** is the first stage of the process, where barley is intermittently immersed in water for about 36-48 hours to initiate germination. Biochemical reactions begin to take place in the steeping stage, as enzymes are released and simple sugars supply energy to the growing embryo. Barley moisture content reaches 42-45% after this process is completed and the germination stage begins. During the **germination stage**, the steeped barley continues to grow and biochemical reactions occur at a vigorous rate, as enzymes are produced which break down proteins and other cell wall components. The steeped barley is held in tanks about 5 feet deep for about 3.5 to 4.5 days, with air circulated through the germinating barley that is turned every 8-10 hours to ensure even germination. Moisture is maintained at



Canada

2001-2002 PRODUCTION CAPACITY OF MAJOR CANADIAN MALTSTERS

		tonnes of malt/year
Canada Malting Co.	Calgary, Alberta	260,000
	Thunder Bay, Ontario	130,000
	Montreal, Quebec	80,000
Prairie Malt Limited	Biggar, Saskatchewan	220,000
Westcan Malting Limited	Alix, Alberta	140,000
Dominion Malting Limited	Winnipeg, Manitoba	92,000
Total		**922,000**

Source: Canadian International Grains Institute and industry sources

about 44-47% at temperatures of 14-19 degrees Celsius. The **kilning stage**, the final stage of the malting process, occurs when heated air is circulated through the product to end germination and the associated biochemical reactions. Kilning also develops malt flavour and colour, and dries the malt to preserve its quality. The malt, at approximately 4% moisture, is very stable and can be stored for several months.

The finished malt is then usually shipped to a brewery, where the brewer crushes the malt and adds water to it. By doing this, biochemical reactions are allowed to continue to take place and starches and protein in the malt are further broken down. A sugar mixture rich in maltose and amino acids is created from the malt and is easily converted to ethanol by brewers yeasts.

THE CANADIAN MALTING INDUSTRY

The Canadian malting industry has changed considerably over the past ten years, as two new plants were built and one expanded significantly in the early 1990s. As well, ownership of existing plants changed and specialty maltsters increased in importance. Growth in malt export markets and increasing international demand for beer contributed to the industry's expansion. This expansion increased the amount of malting barley processed in Canada from about 650,000 tonnes (t) in 1990-1991 to nearly 1,100,000 t (about 825,000 t of malt, assuming that 1 t of barley produces about 0.75 t of malt) in 2001-2002. However, it is unlikely the domestic malting industry will expand further in the short-term as new plants have recently been announced in the United States (U.S.)- Idaho. They will add a significant amount of malt production capacity to the North American market, thereby displacing some Canadian export sales of malt to the U.S. and Mexico.

MALT MARKETS

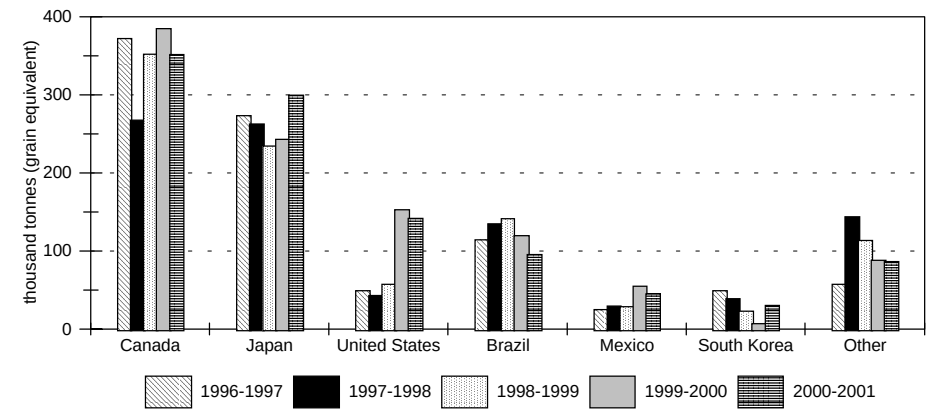
The Domestic Market

The domestic brewing industry is the single largest market for Canadian malt, purchasing about 260,000 t of malt (350,000 t grain equivalent) in 2000-2001. There has been no significant growth in sales to the Canadian brewing industry over the past decade, so the Canadian malt industry has expanded as a result of increased exports.

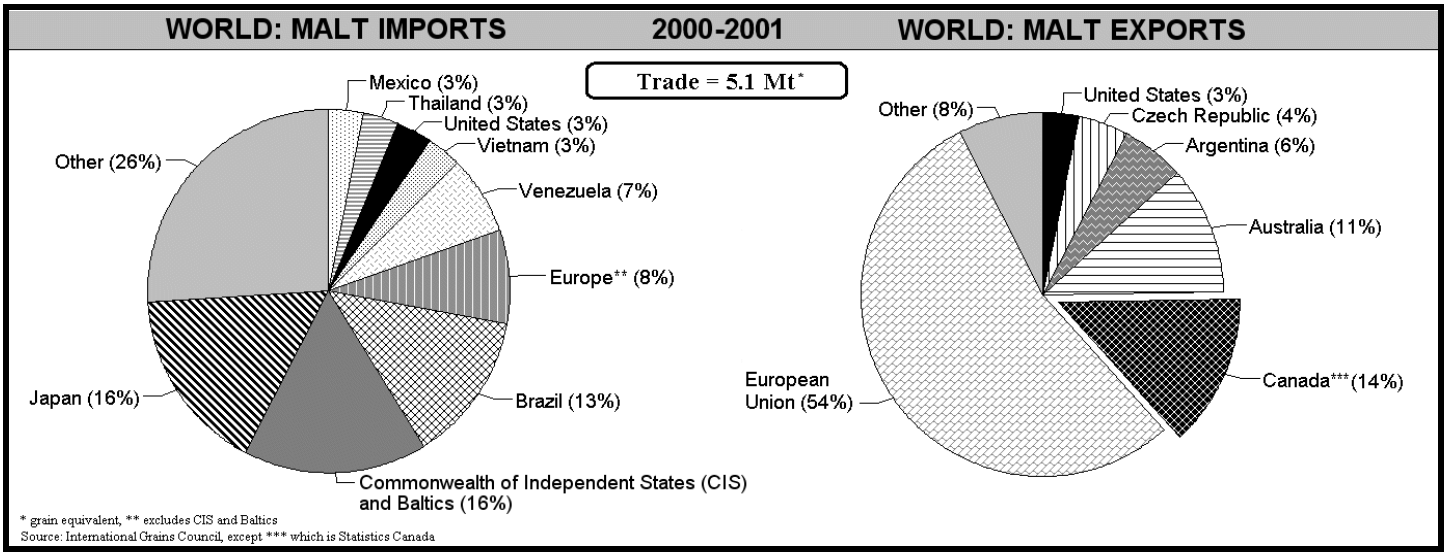
Major Importers

Japan has been the largest importer of malt in the world for several years importing 640,000 t (850,000 t grain equivalent) in 2000-2001, and has been Canada's largest export market, purchasing about 200,000 t of malt from Canada annually. The **U.S.** is Canada's second largest export market, and over the past two years exports to the U.S. have grown rapidly, with exports of malt surpassing 100,000 t (nearly 150,000 t grain equivalent). U.S. barley production has declined and diseases (fusarium) have been a problem, contributing to the increased demand for Canadian malt. It is also interesting to note that the U.S., which has mainly purchased six-row malting barley in the past, began to increase the amount of two-row barley that it imports from

CANADA: MALT MARKETS



Source: Statistics Canada



Canada in the latter part of the decade. Two-row malting barley imports by the U.S. increased from about 15-20% of their total imports in the mid-1990s, to about 30% currently. **Mexico** has also become an important market for Canada as beer production and consumption in that country have been growing rapidly with about 35,000 t (50,000 t grain equivalent) of Canadian malt exported to that country in 2000-2001.

Some of Canada's increased malt production over the past decade has been driven by increased exports to Latin America and Asia. **Brazil** is the world's second largest importer of malt, importing nearly 525,000 t (700,000 t grain equivalent) of malt in 2000-2001, with about 70,000 t of malt imported from Canada that year. Canadian exports to Brazil have declined since 1998-1999, as competition from the EU has been intense and has limited Canadian sales. Sales to **South Korea** have declined from their peak in 1994-1995, as Australia has been competitive into that market.

China, one of Canada's largest markets for malting barley, has not been an important market for malt due to a prohibitive tariff on malt imports. There is a possibility that this could begin to change as China's import tariff on malt has been reduced from 26% in 2001 to 10% in 2002 as a condition of joining the World Trade Organization (WTO). This reduced tariff might encourage some interest in malt by China in the future, however the country is likely to continue to import malting barley as the tariff on the bulk grain remains low (3%) and China has recently made substantial investments in malting infrastructure. China has recently built large modern malt plants and has begun to incorporate some of Canada's newer barley varieties into their operations. As a result of continued improvement in varieties and a reputation for reliable supplies of high quality products, Canada has been successful at increasing exports of malting barley to China, and China is expected to remain a major market for Canadian malting barley.

Major Exporters

The **EU** is the world's largest exporter of malt and is very competitive with Canada, especially into Latin American markets. In 2000-2001, EU countries exported 2.1 million tonnes (Mt) of malt (about 2.8 Mt grain equivalent) and accounted for more than half of global malt trade. In the past, the EU has used subsidies to support the EU malting industry but the EU has not offered them since the 1999-2000 crop year due to tight barley supplies, budget constraints, and trade policy considerations. The EU is not expected to offer subsidies for the rest of the 2001-2002 crop year as supplies in that region remain tight. The EU's restrained use of export subsidies has helped to support world prices of malt and malting barley, as well as feed barley. There is, however, a substantial farm support program paid directly to farmers that has prevented the full effect of the drop in subsidies from being realized.

In **Australia**, another major competitor, a number of changes have taken place in the malting barley marketing structure over the past few years. Two large barley sales agencies (ABB Grain Ltd. and the Grain Pool of Western Australia) recently joined together to form Grain Australia. The company holds a monopoly on exports of barley from two of Australia's largest barley producing states, South Australia and Western Australia, while the domestic industry operates under a dual marketing system. The company is also expected to be a major competitor in the state of Victoria. Grain Australia is expected to export about 80% of Australia's barley and will play an important role in Australia's malt industry. More recently, ConAgra Foods Inc. and Grainco Australia, the only buyer of malting barley in the states of New South Wales and Queensland,

merged marketing and logistics operations to form a new company called MarketLink (Aust) Pty Ltd. This new company is also expected to support Australia's competitiveness in the global malt industry. Australia exported 0.6 Mt (grain equivalent) of malt in 2000-2001, and this amount is likely to increase in 2001-2002.

CANADIAN WHEAT BOARD (CWB)

The CWB holds a monopoly on Canadian malting barley sales to domestic and international customers. Sales are made in two ways: (1) the CWB works directly with customers to negotiate the purchase price and delivery conditions, and (2) accredited exporting companies purchase malting barley from the CWB for sales on their

VARIETIES RECOMMENDED BY THE MALTING BARLEY INDUSTRY GROUP

TWO-ROW VARIETIES

AC Metcalfe

This variety has good disease resistance, fair lodging resistance, and is resistant to loose smut. In the malting process, AC Metcalfe has good levels of malt extract with enzyme levels similar to Harrington. It modifies quickly during the malting process, so it must be malted carefully to avoid excess levels of soluble protein. Area seeded to this variety of two-row malting barley increased sharply in 2001-2002. Of the area seeded to two-row malting barley, the percentage seeded to AC Metcalfe increased from 20% in 2000-2001 to 27% in 2001-2002 and is expected to increase in 2002-2003. It is now the number one recommended variety, as it is widely accepted domestically and for export.

Harrington

This variety matures early and has average yields. Its area has declined, primarily due to agronomic reasons as other varieties have improved disease resistance and field performance. Although more area was seeded to Harrington than any other two-row malting variety in 2001-2002, area seeded to Harrington declined from 45% of all two-row area planted in 2000-2001 to 37% in 2001-2002. Harrington is expected to decline even more as acceptance of other varieties by farmers and maltsters continues in the future. Industry demand for Harrington is declining as the demand for other recommended varieties is increasing.

CDC Kendall

This variety has better yield, disease resistance, and straw strength than Harrington. It has low levels of beta-glucan, and malt extract levels are similar to Harrington while enzyme levels are slightly higher. Area seeded to this variety also increased sharply, from 5% of two-row malting barley area in 2000-2001, to 10% in 2001-2002. It is expected to increase further in 2002-2003, with expanding domestic markets and potential export markets.

Other recommended two-row malting varieties include **Stein**, **CDC Stratus**, and **Merit**.

SIX-ROW VARIETIES

Excel

Excel yields well, has good straw strength, and has better disease resistance than other six-row varieties. It has malt extract and enzyme levels typical of other six-row barley varieties. This variety was the most common six-row variety produced on the prairies in 2001-2002, making up 42% of the area seeded to six-row varieties, but is expected to show reduced demand in 2002-2003.

Robust

This variety has average yields, and has good straw strength. This variety was popular with six-row barley growers, as 37% of the area seeded to six-row malting varieties was of this variety in 2001-2002. It has established demand.

B1602

This variety has average yields, good straw strength, and has less time to maturity than other varieties. It modifies well in the malting process and has less water sensitivity than other varieties, which simplifies steeping. In 2001-2002, about 10% of the area seeded to six-row varieties was of the B1602 variety. It has established demand in the U.S. and for export to Japan for barley tea use.

CDC Sisler and **Legacy** are also on the list of recommended six-row malting barley varieties, with both showing some growing demand.

own accounts. Canadian maltsters purchase all of their malting barley requirements from the CWB, with prices for malting barley based on North American and international market prices.

SELECTION PROCESS

Canadian barley goes through a rigorous screening process before being selected for malting. Representative barley samples are sent by farmers to grain companies or malting companies, where the samples are tested to evaluate numerous quality characteristics. The CWB, and subsequently the farmer, is notified if a barley sample is selected for malting. Later, prior to delivery to the grain company or malting company, the stored barley is sampled again to ensure that the barley has maintained its quality, once while the barley is stored on farm, and a second time while on the truck just prior to being received by the grain company or malting company. If the malting barley is for export then the Canadian Grain Commission performs a final quality check as the barley is being loaded into the vessel to ensure that it meets customers' specifications.

CANADIAN RESEARCH AND VARIETIES

Choice of variety is very important to both brewers, maltsters, and farmers, as varieties may perform differently in the malting and brewing processes, and agronomic performance can vary considerably. Harrington two-row barley was first registered in Canada in 1981 and has been the king of Canadian malting barley, setting standards for malting performance internationally. More recently, researchers have developed a number of varieties of malting barley with malting performance as good as or better than Harrington, and with superior agronomic performance. Some of these varieties are now well established in the market place and many customers are switching to these new varieties from Harrington.

Two-row malting barley has been increasing in importance in western Canada for a number of years, and this trend continued in 2001-2002. The proportion of barley area seeded to two-row malting varieties increased to 51% from 44% in 2000-2001, while six-row malting varieties declined to 15% from 21% in 2000-2001. There have been a number of reasons for this shift, with pressures coming from both the supply and demand sides of the market.

SITUATION AND OUTLOOK

For 2001-2002, Canada is forecast to select 2.0-2.2 Mt of malting quality barley this year, below the 2000-2001 level of about 2.3 Mt. Drought in Saskatchewan and Alberta, which are normally important malting barley producing provinces, reduced yields and resulted in crop failure in some areas. A higher than normal amount of barley fields were harvested for forage rather than for grain, due to the very low yields expected and to try to make up for poor hay and pasture growth. The shortage of barley has been magnified by high protein levels which further reduced the supply of malting quality barley.

Domestic maltsters processed about 1.1 Mt of barley into malt in 2000-2001, but domestic processing is expected to be below that level in 2001-2002 as the limited Canadian supplies of barley have played a role in the dynamics of the market. Japan, the U.S., Mexico, and the domestic market are expected to be the primary buyers of Canadian malt this year, with declining exports to Latin America and some Asian nations.

Although Japan remains a very important customer, demand from that country has fallen. One of the reasons behind the decline has been related to the popularity of happoshu, a beer which uses much less malt than regular

BREWING AND MALTING BARLEY RESEARCH INSTITUTE (BMBRI)	CANADIAN MALTING BARLEY TECHNICAL CENTRE (CMBTC)
www.bmbri.ca	**www.cmbtc.com**
The BMBRI supports research, development, and evaluation of new malting barley varieties by funding research projects, coordinating trials of new malting barley varieties, and participating in the varietal registration system. The BMBRI also helps to relay information about important barley quality traits from brewers and maltsters to researchers, breeders, and producers. The BMBRI is funded by members of the malting and brewing industry.	The CMBTC is an applied research facility that evaluates brewing and malting characteristics of malting barley varieties using pilot scale malting and brewing equipment. The Centre has a 100 kilogram pilot malting plant and a three hectolitre pilot brewery which replicates the performance of commercial equipment. In addition to its research capabilities, the Centre also offers technical assistance and educational programs to domestic and international customers. The CMBTC is a non-profit organization created by its members, who include some major stakeholders in the Canadian malting barley industry.

beer (less than half). Happoshu is priced much lower than traditional beers as its low malt content permits it to be taxed at a much lower rate. Happoshu has the same alcohol content as regular beer, and its relatively low price and light flavour have helped to stimulate demand. In the longer term, if the popularity of happoshu continues to increase then Japanese demand for malt may fall further.

The January CWB Pool Return Outlooks for Special Select Two-Row (SS2R) and Special Select Six-Row (SS6R) Designated Barley are $214/t and $189/t, respectively, compared to $201/t and $176/t for the final realized price in 2000-2001. Maltsters have had to compete for supply with a very strong domestic feed market and the highest domestic feed barley prices seen since 1995-1996. Feed barley prices (in-store Lethbridge) are forecast by Agriculture and Agri-Food Canada at $150-170/t, with the mid-point $31/t above the 2000-2001 price of $129/t.

Longer Term Issues

A concern facing the industry is disease, such as fusarium head blight, which produce toxins that render barley unsuitable for brewing. Canadian researchers are working to develop new varieties to address this concern. Some new varieties have been developed, primarily two-row barley varieties, which have somewhat better resistance to fusarium than previous varieties and this improved resistance may push the preference toward two-row varieties even further. However, even these new varieties are susceptible to fusarium and research in the area is continuing.

As well, the expansion of the domestic livestock industries will play a role in the development of the malting industry. Although the strong domestic feed industry increases the amount of competition for Canadian barley supplies, the expanding livestock industry is generally supportive of barley production through demand and prices. Assuming that area seeded to barley increases as livestock production increases, then maltsters may have more high quality barley to select from and may have improved selection quality. The Canadian livestock market is expected to continue to expand over the next five years, and its impact on Canada's malting industry will be a factor to watch.

For more information:
Dennis Jackson
Coarse Grains Analyst
Phone: (204) 983-8461
E-mail: jacksond@em.agr.ca

CANADA: BARLEY SUPPLY AND DISPOSITION

August-July crop year	**1999 -2000**	**2000 -2001**	**2001 -2002f**
Harvested Area (Mha)	4.1	4.6	4.4
Yield (t/ha)	3.2	3.0	2.6
	.....million tonnes.....		
Carry-in Stocks	2.7	2.8	2.5
Production	13.2	13.5	11.4
Total Supply	**15.9**	**16.3**	**13.9**
Feed, Waste & Dockage	9.8	10.5	9.7
Food, Seed & Other	0.8	0.8	0.8
Total Domestic Use	**10.7**	**11.3**	**10.5**
Feed	0.5	0.7	0.1
Malting	1.2	1.2	1.0
Malt	0.7	0.7	0.6
Total Exports	**2.4**	**2.6**	**1.7**
Carry-out Stocks	**2.8**	**2.5**	**1.7**
Prices ($/t)			
CWB in-store VC/SL			
SS2R Designated Barley	187 1/	201 1/	214 2/
SS6R Designated Barley	182 1/	176 1/	189 2/
Lethbridge (WCE)			
Feed Barley, 1 CW	110	129	150-170

1/ CWB final realized price
2/ CWB January 2002 PRO
f: forecast, AAFC, January 2002
Source: Statistics Canada

***Grain*World 2002 Conference**
Winnipeg, Manitoba
February 24-26, 2002
http://www.cwb.ca/other/gw/index.shtml

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500-303 Main Street
Winnipeg, Manitoba, Canada R3C 3G7
Telephone: (204) 983-8473
Fax: (204) 983-5524

Director: Maggie Liu
Chief: Fred Oleson

Editor: Gordon MacMichael

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