Peat

Michel Bergeron

The author is with the Minerals and Metals Sector, Natural Resources Canada.
Telephone: (613) 992-8179

Peat is an accumulation of organic residue from the partial decomposition of plant debris under very moist, anaerobic conditions. In its raw state, peat is a woody, fibrous, elastic substance. It has a pH varying between 2.8 and 4.0 and contains between 0.5% and 2.5% ash. Peat is found in bogs, marshes and swamps. Its main characteristics are its high water-retaining capacity, low density, strong resistance to decomposition, low thermal conductivity, and high porosity. Peat can hold an amount of liquid and gas equal to 20 times its weight. It is classified into two major categories: horticultural peat and fuel-grade peat. Horticultural peat has undergone little decomposition and falls between the values of H1 and H5 on the vonPost scale. It has a high fibre content, is light yellowish brown in colour and contains little colloidal residue. Fuel-grade peat is highly decomposed with a value on the vonPost scale between H6 and H10. It is blackish and contains colloidal residues.

Peat bogs cover nearly 12% of Canada and their total area is estimated at 111 328 000 ha. Approximately 1.5% of this area is used for agricultural purposes, 0.8% is urbanized, 0.022% is in the forestry sector, and only 0.014% of the total area is used for harvesting peat. In 1984 Agriculture and Agri-Food Canada estimated Canadian peat resources at 3 004 996 million m^3, a volume equivalent to 338 003 Mt of dried peat.

Canada produces sphagnum peat moss, which is used mainly in horticulture. It is gathered from May to September in eastern and southeastern Quebec, in eastern and northeastern New Brunswick, and in the western provinces near Edmonton (Alberta), Carrot River (Saskatchewan), and Giroux and Elma (Manitoba). Peat is also harvested in Nova Scotia, Prince Edward Island, Newfoundland and, since 1994, in Ontario near Iroquois Falls.

CANADIAN STATISTICS

Using data obtained from producers in the Canadian peat industry, Natural Resources Canada (NRCan) has estimated the 1995 peat harvest at 1 187 000 t (30 785 000 bales, each with a volume of 0.17 m^3 and weighing 38.58 kg or 85 lb on average). This is an increase of 22.8% over the revised production figure for 1994, which was 967 392 t, or 25 067 260 bales. The data collected show a significant increase in Quebec from 247 319 to 324 278 t, or from 6 928 163 to 9 084 000 bales, a difference of +31%; in New Brunswick, from 390 573 to 474 340 t, or from 10 938 031 to 13 283 951 bales, a difference of +21%; in Manitoba[1] (+28%); and in Newfoundland, Nova Scotia and Prince Edward Island, whose combined production increased by 106%. Saskatchewan's production increased by 2.9%, while Alberta's decreased by 8.4%. Ontario, which joined the ranks of producers in 1994, produced and shipped more than 200 000 bales in 1995. As in 1994, there was no peat harvest in British Columbia.

Still on the basis of information obtained from the industry, it is estimated that shipments of peat in 1995 reached 1 006 000 t (25 870 000 bales of 0.17 m^3 each), representing a value of $143.4 million. These figures correspond to increases of 10.3% in volume and 7.7% in value relative to the revised figures for 1994 shipments. Peat shipments from New Brunswick and Quebec accounted for 33% and 36% respectively of total shipments in 1995. The remainder of the shipments came largely from Alberta and Manitoba. These two provinces, whose share of the market is growing constantly, provided 27% of total shipments in 1995. Since very little peat is imported into Canada, the 1994 data on shipments and exports were used to calculate apparent consumption in Canada. In 1994, Canadian peat consumption accounted for 17.1% of total shipments, or about 155 805 t (4 039 932 bales of 0.17 m^3). This tonnage is slightly less than for each of the last six years during which an average 188 000 t were consumed

---

[1] Figures relating to production and shipments are confidential for provinces other than Quebec and New Brunswick.

annually in Canada. In the Atlantic provinces, shipments, calculated on the basis of revised 1994 data and the estimate for 1995, increased by 5% from 346 164 t (9 655 232 bales of 0.17 m^3) to 363 500 t (10 120 000 bales of 0.17 m^3). Elsewhere, in western Canada, shipments remained more or less at the same level with a decrease from 280 437 t (6 699 054 bales of 0.17 m^3) to 269 000 t (6 412 000 bales of 0.17 m^3). In Quebec, the information provided by the Quebec Department of Natural Resources indicates that total shipments in 1995 increased substantially from 283 119 t (7 076 762 bales of 0.17 m^3) to 363 000 t (9 084 000 bales of 0.17 m^3), a rise of 28%. However, it should be noted that this increase was calculated on the basis of data obtained from Quebec where the same figure is reported for shipments and production. In the preparation of this review, there was no information that suggests that Quebec shipments in 1995 had noticeably increased over those in 1994.

In early 1995, peat inventories, expressed in bales of 0.17 m^3, were 2.810 million in Quebec and 4.752 million in New Brunswick. Compared to inventories in January 1994, these figures represent a reduction of about 1.4 million bales in Quebec and an increase of nearly 3 million bales in New Brunswick. By late June 1995, inventories had reached 1.317 million bales in Quebec and 1.804 million bales in New Brunswick. For the same period in 1994, inventories were 925 000 bales in Quebec and 500 000 bales in New Brunswick. An exceptional harvest season in Quebec and New Brunswick in 1995 helped replenish peat inventories; consequently, it is expected that their inventories could reach 6.0 million bales and 8.5 million bales respectively by the end of 1995.

In 1994, exports increased by 3.1% to 756 130 t valued at $212 million. Unlike the value associated with production, the export value inherently includes costs related to packaging, handling and transportation of the peat from the plant to the customs stations. In 1994, Canadian producers exported peat to 40 countries; the United States was still Canada's largest customer by far, accounting for 88.0% of total peat exports that year. According to data compiled by Statistics Canada, Japan is a clear second, receiving nearly 10.8% of our exports; the other 38 countries accounted for 1.3% of total exports. Peat exports to the United States increased by 3.2% over the 1993 figure, while those to Japan grew by 4.5%. Exports to countries other than the United States and Japan dropped by 13% from 11 309 to 9796 t.

In the United States, sales continued to increase in 1994 for the seventh year in a row to 665 283 t. Of this total, it is estimated that about three quarters came from central Canada and the Atlantic provinces, while one quarter came from western Canada.

Japan received 81 051 t of Canadian peat exports in 1994, according to data supplied by Statistics Canada. A little more than half of these exports came from the Atlantic provinces, particularly New Brunswick, while western and central Canada supplied 37% and 9% respectively. These figures and those for the United States in the preceding paragraph are based on data collected at the customs stations in each province by Statistics Canada. Clearly, however, the province of export is not always the province of production.

CANADIAN PRODUCTION - 1995 SEASON

Weather conditions were excellent throughout Quebec in 1995. Moreover, as in other provinces, a number of producers elected to slow down their harvesting in mid-season to avoid overstocking their inventories.

In Ontario, with the new operation of Lakeland Peat Moss (Ontario) Ltd. at the site near Iroquois Falls, weather conditions were favourable, enabling Lakeland to reach its production objective.

In New Brunswick, the weather was good for the second year in a row. On the Acadian Peninsula, the weather conditions allowed an excellent harvest. In the southern part of the province, however, near the Miramichi River, the peat bogs were at times too wet to harvest peat. Nevertheless, producers in this region had a normal harvest season.

Nova Scotia, Newfoundland and Prince Edward Island also had an excellent harvest due to the favourable weather conditions that prevailed over all of eastern Canada.

Alberta, Saskatchewan and Manitoba benefited from moderately good weather conditions in 1995, allowing producers in western Canada to achieve their objectives during what may be described as a normal harvest season.

The most recent NRCan employment census shows that in 1994 there were 65 Canadian operations involved in the harvesting or processing of sphagnum peat moss, or in both activities. The peat industry in that year therefore accounted for 1907 direct jobs. (The data on employment in plants that make finished products from peat are collected by Statistics Canada and are not included in the compilation referred to above. This sector of the industry probably represents between 200 and 300 additional jobs.)

CANADIAN DEVELOPMENTS

In 1995, Canadian production of sphagnum peat moss moved well beyond the mark of 1 Mt to nearly 1.2 Mt, or 31 million bales of 0.17 m^3. This industry performance is attributable to exceptional weather conditions across Canada.

Last September, Jean-Yves Daigle, Director of the Peat Research and Development Centre of New Brunswick, took part in an important symposium in Estonia on the peat industry and the environment. Mr. Daigle was accompanied by François Quinty of Laval University in Québec City. These two Canadian research scientists presented the results of their research in the environmental field, thereby showing Canada's interest in environmental research related to the peat sector.

In May 1995, the public relations agency of the Canadian Sphagnum Peat Moss Association prepared a complete update of a visual presentation on the Canadian peat industry. This promotional tool comprising 72 slides now consists of five distinct components.

The rehabilitation of harvested peat bogs continues to be a major concern for Canadian peat producers and governments. An initial research phase in this area has provided positive results. This first stage showed the feasibility of establishing the elements of a process for rehabilitating peat bogs after harvesting. It also demonstrated the possibility of an effective partnership involving the industry, governments and the university community in the environmental field. A project proposal, intended as a phase to refine and consolidate the results of the first stage, is currently under review. This second project will take five years to complete.

In 1995 it was decided that the Canadian peat industry will host the International Peat Congress (IPC) in the year 2000, after Germany. This congress, which takes place every four years, will be held in Québec City. A committee of representatives from the industry, governments and the university community has already been set up to ensure the success of this event.

USES

Because of its broad range of physical and chemical properties, peat has many applications. In its natural state, it is used in agriculture and horticulture to improve clay soils, to retain moisture in sandy soils, and to add organic matter and fertilizer to depleted soils. Peat is also used as bedding in stables, barns and henhouses where it absorbs liquids and odours. In addition, it is used in the manufacture of artificial mixtures such as potting soil, seedling flats, peat-perlite and peat-vermiculite blends, fertilizers and compost. It is also made into pots for the germination of seeds.

Peat has a number of industrial applications. It can be used in the production of paper serviettes, chemicals, metallurgical coke and activated charcoal. It is also used to purify industrial and domestic effluents. Its cell structure, absorbent properties and high ion exchange capacity make it an ideal natural filter.

Peat can reduce the acidity of drainage from old mines and eliminate iron oxides from waste water and drain water. Moreover, peat can be used to absorb oil spills and for certain medical applications.

Fuel-grade peat is an alternative energy source. This type of biomass is widely used as a fuel in a number of European countries such as Ireland, Finland and the Commonwealth of Independent States (C.I.S.). Fuel-grade peat is characterized by a high degree of humification, high apparent density, high heat of combustion, low ash content, and a low concentration of pollutants such as sulphur and mercury. The heat of combustion of Canadian peat varies from about 4700 to 5100 kilocalories per kilogram (kcal/kg). By comparison, the heat of combustion of coal is between 4800 and 5800 kcal/kg and that of oil is between 9900 and 10 000 kcal/kg. Fuel-grade peat is burned in furnaces to produce steam to drive turbine generators. It can also be processed to produce coke, synthetic natural gas and methanol.

OUTLOOK

The American market, which accounts for more than 85% of Canadian peat exports, will probably continue to increase over the next five years. Since 1988 this export market has had a growth rate of about 7%/y, and it grew from 445 000 t to 665 000 t in 1994. In the United States, the demand for ornamental plants for outdoor recreational activities continues to increase at an impressive rate. The U.S. Department of Agriculture is forecasting that this particular agricultural sector will perform better than the traditional agricultural sectors from now until the year 2000.

The upward trend should also hold in the Japanese market where about 10% of Canada's exports are shipped. According to data compiled by Statistics Canada, Canadian exports to Japan between 1988 and 1994 increased by about 60%. However, in the opinion of the Canadian embassy in Tokyo, if Canada is to ensure continued growth in this market and avoid being edged out by other producing countries, the Canadian peat industry should perhaps increase its promotional efforts.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 70. (2) Information in this review was current as of February 1, 1996.

PRICES[1] IN THE UNITED STATES, BY TYPE OF PEAT, 1994

Type	Domestic			Imported[2]
	Bulk	Packaged or Bales	Average	Total
	(U.S. dollars per short ton)			
Sphagnum moss	47.78	97.99	78.81	171.31
Hypnum moss	16.78	64.49	27.16	n.a.
Reed-Sedge	16.32	16.94	16.65	n.a.
Humus	19.21	22.23	21.36	n.a.

Source: U.S. Bureau of Mines, "Peat," 1994.
n.a. Not applicable.
1 Prices are f.o.b. plant. **2** Average customs values.

TARIFFS

Item No.	Description	Canada			United States
		MFN	GPT	USA	Canada
2703.00	Peat (including peat litter) whether or not agglomerated	8.8%	5%	Free	Free
6815.20	Articles of peat	5.9%	3%	1.3%	Free

Sources: Customs Tariff, effective January 1996, Revenue Canada; Harmonized Tariff Schedule of the United States, 1996.

TABLE 1. WORLD PRODUCTION OF PEAT, BY COUNTRY, 1990-94

Country	1990	1991	1992	1993	1994 p
			(000 tonnes)		
AGRICULTURAL USE					
Former Soviet Union e	149 655	140 600	119 800	113 500	103 500
Germany, Republic of	3 000	2 880	2 900	2 740 r	2 800
Canada	715	856	740	873	967
United States	690	632	600	616	547
Netherlands e	300	300	300	300	300
Ireland	230	248	300	300	250
Finland	325	220	355	300 r	550
Sweden	255	260	260	250	250
France e	200	200	200	200	200
Poland e	50 r	50 r	50 r	50	50
Denmark	110 r	100	100	189	190
Spain	70	70	70	70	70
Hungary e	70	60	60	65	65
Norway	30	30	30	30	30
Other	55	55	55	25	36
Subtotal	155 792	146 571	125 820	119 515 r	109 804
FUEL USE					
Former Soviet Union e	14 965	10 000	9 100	10 000	12 700
Ireland r	6 400	4 800	6 200	6 500	6 400
Finland r	4 500	2 300	5 100	5 000 r	8 000
Sweden	1 400	1 400	1 400	1 400	1 400
West Germany r	232	230	210	180 r	180
Other countries	..	..	..	..	20
Subtotal	27 497	18 730	22 010	23 080 r	28 700
Total world	183 289	165 301	147 830	142 595 r	138 504

Sources: Natural Resources Canada; U.S. Bureau of Mines, "Peat," 1994.
.. Not available; e Estimated; p Preliminary; r Revised.

TABLE 2. CANADA, PEAT SHIPMENTS BY PROVINCE, 1993-95

Province	1993		1994		1995 p	
	Quantity	Value	Quantity	Value	Quantity	Value
	(000 t)	($000)	(000 t)	($000)	(000 t)	($000)
Newfoundland	3	537	4	779	x	x
Prince Edward Island	–	–	x	x	x	x
Nova Scotia	x	x	x	x	x	x
New Brunswick	317	39 783	328	40 378	338	42 554
Quebec	261	43 495	283	43 793	363	53 341
Ontario	x	x	x	x	x	x
Manitoba	x	x	x	x	x	x
Saskatchewan	x	x	x	x	x	x
Alberta	129	28 248	x	x	x	x
British Columbia	–	–	–	–	–	–
Total	830	128 773	914	133 345	1 010	143 641

Sources: Natural Resources Canada; Statistics Canada.
– Nil; p Preliminary; x Confidential.
Note: Numbers may not add to totals due to rounding.

TABLE 3. CANADIAN DOMESTIC EXPORTS OF PEAT, BY COUNTRY, 1991-95

Country	1991		1992		1993		1994		1995p	
	Tonnage	Value	Tonnage	Value	Tonnage	Value	Tonnage	Value	Tonnage	Value
		($000)		($000)		($000)		($000)		($000)
American Samoa	–	–	–	–	36	8	–	–	–	–
Argentina	–	–	–	–	15	28	19	53	309	162
Australia	2 490	445	3 188	700	4 500	987	4 103	913	5 702	1 281
Austria	–	–	–	–	–	–	–	–	–	–
Barbados	38	28	15	7	23	18	43	35	30	27
Belgium	57	19	28	10	–	–	4	9	–	–
Belize	–	–	–	–	55	48	–	–	–	–
Bermuda	31	7	47	8	17	6	8	2	7	3
Brazil	–	–	–	–	60	70	60	118	28	4
British Virgin Islands	–	–	–	–	6	2	–	–	18	6
Chile	36	4	4	10	11	22	633	118	932	156
China, People's Republic of	16	6	54	23	50	19	49	19	170	13
Colombia	–	–	–	–	36	7	500	112	1 172	242
Costa Rica	–	–	–	–	–	–	–	–	–	–
Cuba	–	–	–	–	–	–	80	36	–	–
Denmark	68	154	–	–	85	194	72	199	466	327
Dominican Republic	–	–	107	100	9	4	81	24	100	96
Ecuador	–	–	15	17	48	32	47	53	27	30
Egypt	–	–	44	14	–	–	–	–	356	96
Finland	–	–	–	–	–	–	–	–	–	–
France	8	10	–	–	15	3	–	–	90	71
Germany	23	32	7	22	18	38	4	13	9	12
Greece	–	–	–	–	–	–	–	–	–	–
Guadeloupe	–	–	–	–	–	–	–	–	–	–
Guam	–	–	–	–	–	–	14	8	15	8
Guatemala	–	–	–	–	–	–	25	5	238	107
Haiti	22	13	–	–	–	–	–	–	–	–
Hong Kong	96	28	102	33	328	179	261	108	232	92
Iceland	9	2	9	2	9	2	–	–	13	3
India	–	–	–	–	–	–	23	3	–	–
Indonesia	–	–	114	179	4	5	27	52	40	47
Ireland	18	2	–	–	–	–	–	–	–	–
Israel	134	35	28	5	91	21	–	–	16	4
Italy	–	–	–	–	–	–	–	–	13	3
Jamaica	–	–	–	–	239	46	–	–	–	–
Japan	66 196	14 654	71 980	16 211	77 554	19 234	83 720	23 696	87 995	24 866
Jordan	148	73	65	48	–	–	–	–	18	4
Korea, North	–	–	96	21	–	–	80	20	81	17
Korea, South	594	160	1 283	261	753	312	812	330	1 370	437
Kuwait	–	–	57	20	263	78	–	–	–	–
Lebanon	3	4	–	–	–	–	–	–	10	3
Malaysia	219	38	313	57	13	5	57	13	19	4
Mauritius	–	–	–	–	–	–	48	6	–	–
Mexico	215	61	76	39	60	9	34	13	18	5
Netherlands	247	48	255	76	363	80	126	29	99	22
Netherland Antilles	–	–	–	–	–	–	60	32	48	8
New Zealand	–	–	–	–	–	–	–	–	12	3
Nigeria	–	–	24	11	–	–	–	–	55	21
Norway	–	–	–	–	–	–	–	–	23	41
Panama	–	–	–	–	–	–	47	4	–	–
Philippines	–	–	–	–	–	–	76	13	33	31
Russia	–	–	–	–	–	–	–	–	13	21
St. Pierre and Miquelon	–	–	31	7	69	6	–	–	14	5
Saudi Arabia	–	–	–	–	580	295	826	335	1 889	544
Singapore	539	100	16	3	39	11	19	11	13	4
Somalia	–	–	–	–	–	–	–	–	13	4
South Africa	1 382	323	883	190	945	195	606	166	899	239
Spain	–	–	16	27	8	2	–	–	16	47
Sri Lanka	–	–	–	–	–	–	14	24	–	–
Switzerland	–	–	16	40	207	41	64	89	7	21
Taiwan	783	331	1 823	862	2 326	944	1 188	424	1 582	617
Thailand	23	4	–	–	–	–	–	–	–	–
Trinidad and Tobago	46	15	22	20	17	12	36	27	41	35
Tunisia	–	–	–	–	–	–	–	–	40	6
United Arab Emirate	–	–	–	–	–	–	–	–	378	40
United Kingdom	8	17	15	5	17	47	34	36	300	36
United States	576 675	119 505	637 051	144 510	644 724	164 236	665 283	185 620	667 305	181 058
U.S. Outlying Islands	–	–	–	–	–	–	16	4	–	–
Uruguay	–	–	–	–	–	–	–	–	66	137
Venezuela	–	–	–	–	–	–	88	47	49	19
Vietnam	–	–	–	–	9	8	–	–	–	–
Total	650 124	136 132	717 784	163 551	733 602	187 273	759 287	212 838	772 389	211 108

Sources: Natural Resources Canada; Statistics Canada.
– Nil; **p** Preliminary.
Note: Numbers may not add to totals due to rounding.