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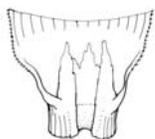
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The Canadian Botanical Association Bulletin



Bulletin de l'Association botanique du Canada

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Keith Winterhalder (1935 - 2005)

It is with very deep regret that we note the passing of Edward Keith Winterhalder on 29 October 2005 at the age of 70 years. Keith died in hospital following a long illness (scleroderma affecting the lungs). That illness did not prevent him from attending the Plant Canada meeting in Edmonton a few months earlier. His clearly weakened condition but remarkable fortitude and optimism inspired all those present. Keith was a "regular" at CBA/ABC annual meetings. His happy and friendly disposition and beaming smile contributed much to the pleasure of the event. Keith was always willing to be involved and his enthusiasm brought people together. He will be remembered not only as a great botanist and ecologist, an outstanding teacher, a committed conservationist, but also as a very special friend of the CBA.



Photo courtesy of Science North, 1987.

Keith was born in Burrington, Shropshire in UK. He loved Wales where he was head boy at Llandrindod Wells Grammar School. He completed his B.Sc. (First class honours) at the University of Wales Aberystwyth in 1956. He received an M.Sc. in plant ecology from the University of New England in Australia in 1970. From 1958 to 1962, Keith worked at the University of New England, and then served as a Research Fellow in Botany at Liverpool University until 1965 when he came to Canada as Lecturer in Botany at Laurentian University. In 1969 he was made Assistant Professor and in 1980 Associate Professor. He retired in 2000.

Although an internationally respected expert in environmental restoration, Keith is probably best known for contributing so much to the conversion of Sudbury's contaminated industrial barrens into a rich, vegetated landscape. He demonstrated that an appropriate combination of limestone, fertilizer and grass seed could be used to re-vegetate toxic soils. For two decades (1978-1999) he served as Chair of the Vegetation Enhancement Technical Advisory Committee (VETAC) for the Regional Municipality of Sudbury. For more information on this work see <http://www.udd.org/francais/forum1996/TexteWinterhalder.html> also http://www.ene.gov.on.ca/envision/sudbury/environmental_degradation/. Keith received several prestigious awards for his outstanding contributions to land reclamation including Honourary Life Membership, Science North (1987), the Canadian Parks Service Heritage Award (1990), the Noranda Mines Land

(continued on next page)

Canadian Botanical Association



Bulletin

The CBA Bulletin has been published quarterly up to now. Starting with vol. 39, it will become issued three times a year (in March, September, and December) and made available to CBA members and to subscribers.

Information for submitting texts

All members are welcome to submit texts in the form of papers, reviews, comments, essays, requests, or anything related to botany or botanists. Any medium is acceptable for submission but electronic documents are likely to speed up the publication. For detailed directives on text submission, please go to the Editor's web site: http://www.umce.ca/cours/martin/CBA_ABC_Editor/ or feel free to contact the Editor (see below). For general info on CBA, go to the web site: <http://www.cba-abc.ca>

Association botanique du Canada



Bulletin

Le Bulletin de l'ABC a paru, jusqu'à maintenant quatre fois par année. À partir du volume 39, il le sera trois fois par année, en mars, septembre et décembre. Il est rendu disponible aux membres de l'ABC ainsi qu'aux abonnés.

Soumission de textes

Tous les membres de l'Association sont invités à envoyer des textes de toute nature concernant la botanique et les botanistes (articles, revues de publication, commentaires, requêtes, essais, etc.). Tous les supports de texte sont acceptés. L'utilisation de documents électroniques peut accélérer la publication. Pour des renseignements détaillés sur la soumission de textes, veuillez consulter le site web du rédacteur: http://www.umce.ca/cours/martin/CBA_ABC_Editor/ et n'hésitez pas à contacter le rédacteur (voir ci-dessous). Infos générales sur l'ABC à l'url suivant: <http://www.cba-abc.ca>

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Next issue / Prochain numéro

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Keith Winterhalder (1935-2005) (continued from preceding page)

Reclamation Award (1991), and a Commemorative Medal for the 125th Anniversary of Canada (1993).

Keith served on numerous advisory committees for industry, native peoples, government and environmental groups where his proposals for conservation, mitigation and rehabilitation had a profound effect. He served on the editorial boards of two journals: Reclamation and Revegetation Research (1982-1986) and Restoration Ecology (1993-2005). Keith also influenced science as Chair of Science and Policy Working Group of the Society for Ecological Restoration (see <http://www.ser.org/content/Naturalcapital.asp>). He was also President of the Canadian Land Reclamation Association. Keith's wish was that the Laurentian Arboretum (which he started) or the Laurentian Herbarium (SLU, which expanded substantially during his 40 years of curation) should benefit from any funds donated in his memory. More information on Keith's work including a partial list of his publications is available at: <http://www.eman-rese.ca/eman/ecotools/botanists/WinterhalderK.html>. Although his botanical work required much of his time, Keith also enjoyed music (especially bagpipes and Celtic music) and he sang in several choirs. He was very fond of field trips and many will remember his enthusiasm as a field trip leader.

Keith joined the Canadian Botanical Association in 1968. He was treasurer from 1984 to 1989. He served as President from 1994 to 1997. He was an active member of the CBA Systematics and Phytogeography Section, Ecology Section and Conservation Committee for decades. He served two terms as chair of the ecology section and was secretary of that section when he passed away. In 1991 he received the CBA's Mary S. Elliot Award for his meritorious service (see CBA/ABC Bulletin 24(4): 67. 1991). At the award presentation the president remarked: "With an automatic reflex action that we have come to greatly appreciate, one CBA/ABC member raises his hand within seconds of hearing the word "volunteer." ...Keith Winterhalder ... known to everyone as a cheerful person with an ever present smile." Recently President Vipen Sawhney noted that "Keith was a great colleague and friend, a first rate researcher and teacher, and above all, a warm and wonderful human being." That is how we will remember him.

Paul Catling, Co-chair, Ecology Section

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Editor's Message

Big changes are coming soon. All members should have received by now their renewal form for 2006. As a sequel of the last meeting in Saskatoon, the next issues of the Bulletin, starting from **39(1)**, will be made available only as electronic documents. Paper copies will be prepared only for libraries and for members wishing to continue to receive it at extra cost (except retired members). One may wonder if that will make a difference in the way the Bulletin looks. I would say yes and no. For example, colour pictures could be used but the general layout of the electronic version will stay as it is because it must be identical to the paper version. One could imagine also that the maximum number of pages (20 at present) could be increased as mail costs will probably decrease in the hypothesis that most members will chose the electronic version only and because the number of issues per year has been reduced to three. Details of the procedure to get the file should appear later on the web site of the association <<http://www.cba-abc.ca>>.

The next issue will also bring the end of my mandate as editor. **Christine D. Maxwell**, well known in the CBA as previous Secretary and as the present Chair of the Teaching Section, will take over this position from **39(2)**.



Message du rédacteur

De grand changements se pointent à l'horizon. Tout d'abord, à l'heure qu'il est, tous les membres devraient avoir reçu leur avis de renouvellement. Vous devez alors savoir que dorénavant, donc à partir de **39(1)**, tous les numéros du Bulletin seront publiés au format électronique. Des copies papier ne continueront d'être produites que pour les bibliothèques et pour les membres prêts à payer un surplus (sauf les membres à la retraite). Est-ce que d'autres changements sont prévus ? C'est possible. Ainsi, l'utilisation de la couleur n'ajoute aucun cout supplémentaire à la version électronique. Par ailleurs, on pourrait peut-être augmenter le nombre de pages (actuellement limité à 20) puisque les couts postaux devraient diminuer (dans l'hypothèse que la plupart des membres adoptent la version électronique) et que le nombre de numéros par année est passé de quatre à trois. D'ici la parution de **39(1)** en mars 2006, le site web de l'association <<http://www.cba-abc.ca>> devrait fournir des explications sur le mode de livraison aux membres.

Le prochain numéro sera tout spécial pour moi car ce sera le dernier de mon mandat de rédacteur. En effet, **Christine D. Maxwell**, bien connue de tous pour avoir occupé jusqu'à récemment le poste de secrétaire et présentement présidente de la section Enseignement, prendra la relève pour un mandat de trois ans commençant avec le numéro **39(2)**.

Corrigendum

In our last article (Poorly Known Economic Plants of Canada - 46. Black chokeberry (*Photinia melanocarpa*), Can. Bot. Assoc. Bull. **38(3)**: 29–34), we followed the nomenclature of Robertson et al. (1991, cited in the article). Tim Dickinson has pointed out to us that the genus name *Aronia* Medikus is conserved, and so has priority over *Photinia* Lindley. Accordingly, the correct names for the three taxa discussed should have been: *Aronia melanocarpa* (Michx.) Ell. (not *Photinia melanocarpa*; *A. arbutifolia* (L.) Pers. (not *P. Pyrifolia*); *A. xprunifolia* (Marsh.) Rehd. (not *P. xFloribunda*).

E. Small and P.M. Catling

Misidentifications

Since the last issue, **38(3)**, some mistakes in captions were brought to my attention. This concerns identification of **Athena McKown** and **Jennifer Burke** who both appear in the photo of **John Macoun Travel Bursaries** in second and fourth positions from the left (see below). Jennifer Burke also got an honourable mention for the **Lionel Cinq-Mars Award** but the photo published showed Athena McKown. Apparently, no photo of Jennifer Burke with that prize was taken.



Photo by Róisín C. Mulligan.

John Macoun Travel Bursaries

From left to right, **Marie-Pierre Gauthier**, Université de Montréal **Athena McKown**, University of Toronto, **Mathieu Chouteau**, Université de Montréal, and **Jennifer Burke**, University of Lethbridge. Far right, Vipen Sawhney.

Poorly Known Economic Plants of Canada - 47.

American cranberry bush (*Viburnum opulus* var. *americanum*).

E. Small and P.M. Catling

National Environmental Program, Biodiversity Section, Agriculture and Agri-Food Canada, Saunders Bldg
Central Experimental Farm, Ottawa ON K1A 0C6

The famous American naturalist, philosopher, and writer Henry David Thoreau (1817–1862), while travelling in Maine, recorded the following in his diary: "We also stewed our tree-cranberries, sweetening them with sugar... This sauce was very grateful to us who had been confined to hard bread, pork, and moose-meat, and, notwithstanding their seeds, we all three pronounced them equal to the common cranberry; but perhaps some allowance is to be made for our forest appetites. It would be worth the while to cultivate them, both for beauty and for food." The species has yet to be developed as a crop, despite its long-recognized potential.

Latin Names

The genus name *Viburnum* is the classical Latin name of *V. lantana* L. of Eurasia. It has been suggested that the name is derived from the classical Latin *viere*, from the Greek *vieo*, to tie or bind, based on the idea that the flexible branches could be tied. *Opulus* in the scientific name *V. opulus* is the classical Latin for a kind of maple, indicating the maple-shaped leaves of the plant.



Fig. 1. Hedge of American cranberry bush (*Viburnum opulus* var. *americanum*), planted at the Central Experimental Farm, Ottawa. Photo by P.M. Catling.

English Names

V. opulus L. var. *americanum* Aiton (*V. trilobum* Marshall) : American cranberry bush.

V. opulus var. *Opulus* : European cranberry bush.

"Cranberry" in the names "cranberry bush" and "highbush cranberry" is based on the similarity in size and colour of the berries to the true commercial cranberry (*Vaccinium macrocarpon* Ait.). Sometimes the cranberry bush is simply

called cranberry. While American cranberry bush fruit look and taste like cranberry, the two species are quite unrelated. The name "highbush cranberry" is widely employed for the American cranberry bush, but unfortunately this name is also often used for the lowbush cranberry (*V. edule* (Michx.) Raf.).

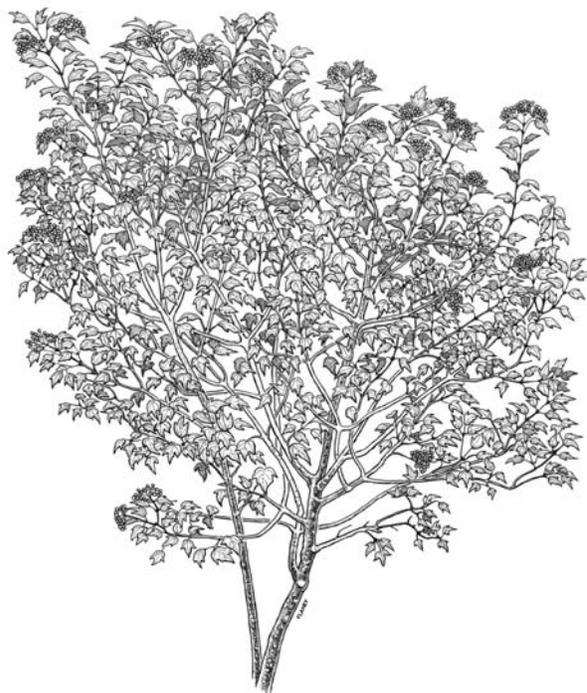


Fig. 2. European cranberry bush (*Viburnum opulus* var. *opulus*), based on a shrub growing in the Fletcher Wildlife Garden, Ottawa. Drawing by B. Flahey.

The American cranberry bush is also called crampbark, grouseberry, mooseberry, pembina, pimbina, squawbush, summerberry, and tree cranberry. (Some of these names are also applied to *V. edule*). The name crampbark (or cramp bark) reflects the old use of the bark to treat stomach and menstrual cramps (see below). The name pembina (or pimbina) is said to be derived from *anepeminan*, the Chippewa word for the fruit, supposedly a contraction of two Indian names meaning "summer berry," an allusion to the bright red fruit showing up in the depth of winter, suggesting the return of summer.

The European cranberry bush has also been called black haw, club bunches, crampbark, cranberry bush, dog rowan tree, gaitre berries, guelder rose, high cranberry, king's crown, May ball, May rose, queen's cushion, red elder, rose elder, silver bells, snowball bush, snowball tree,

squashberry, tisty-tosty, water elder, whitsun boss(es), whitsun rose, whitten tree and wild guelder rose. The name "guelder rose" is based on *guelder* from Gueldersland, a Dutch province (the modern Geldersland of the Netherlands) where the plant was first cultivated, from where it was introduced into England under the name of "Gueldres rose," an English adaptation of the original Dutch *geldersche roos*, meaning "the tree with rose-like bloom." (An alternative, less plausible explanation is that the name is a corruption of elder rose, an old European name for the plant, which was once considered to be a kind of elder.) The name "whitten tree" (as well as the names whitsun boss and whitsun rose) are based on "white," i.e. the relatively whitish branches.

French Names

V. opulus L. var. *americanum*: viorne trilobée, viorne d'Amérique, viorne pimbina, pimbina (in west and central Quebec, an Indian name also used in English, as noted above), quatre-saisons des bois.

V. opulus var. *opulus*: viorne obier, sureau d'eau.

V. opulus 'Sterilis': boule de neige, viorne boule de neige.

Morphology

The American cranberry bush is a coarse, deciduous shrub or small tree, generally 2.44 m in height, but depending on circumstances it may be no taller than 0.6 m, and dwarf cultivated varieties are available (see below). The stems may be up to 4 cm in diameter. The leaves tend to be three-lobed, and rather reminiscent of maple leaves. Although American cranberry bush has opposite maple-like leaves, unlike maples (*Acer*) there are stipules (appendages at the base of the leaf stalks), and the buds of *V. opulus* have one or two bud scales whereas those of *Acer* have several bud scales. The white flowers are in showy, flat-topped clusters up to 5 cm across. The berrylike drupes are orange to glowing red at maturity, 6–15 mm long, subglobose to ellipsoid, juicy and acidic at maturity, with a round, flat, hard stone that occupies a fairly large proportion of the fruit. The berries hang indefinitely on the plants, sometimes until the next bearing period.

Classification and Geography

Viburnum has usually been placed in the Caprifoliaceae (honeysuckle family), but recent work has shown that the Adoxaceae (moschatel family) is a better choice. Several species of *Viburnum* occur in North America, but only two are likely to be confused with *V. opulus*. *Viburnum acerifolium* L. (maple-leaved viburnum) differs in having leaves with clustered hairs and blackish resinous dots on the underside, and blue fruit. *Viburnum edule* differs in lacking stipules at the base of the leaf stalk, and is glandless at the summit of the leaf stalk.

The two varieties of *V. opulus* are very similar (Figs. 1, 2, 6, 7, 8, 10), differing mainly in the characteristics noted in the table below on this page.

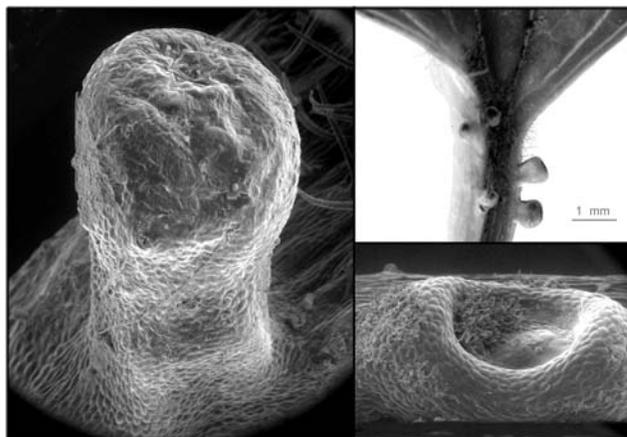


Fig. 3. Scanning electron photographs of petiolar glands. Left and upper right: stalked, circular, slightly indented glands of American cranberry bush (*V. opulus* var. *americanum*). Lower right: stalkless, wider (oval), deeply concave (volcano-like) gland of European cranberry bush (*V. opulus* var. *opulus*). Prepared by B. Brookes and A.-F. Yang.

The American variety generally produces more attractive red leaf colouration in the fall, the foliage is more resistant to aphids, and the plant is usually more cold-hardy. In addition to the leaf morphological differences noted in the above table, differences in leaf lobing and pubescence have been alleged, but seem unreliable.

Comparison of *Viburnum opulus* varieties commonly encountered in North America

	<i>V. opulus</i> var. <i>americanum</i>	<i>V. opulus</i> var. <i>opulus</i>
Petiole glands (on petiole near blade; mature glands on larger leaves show characters best) (Fig. 3)	More or less stipitate, with a columnar base; typically round in cross section; upper portion typically clavate, the upper surface somewhat concave or not	Sessile or subsessile, sometimes appearing like miniature volcanos; typically oval in cross section; top notably concave
Stipule tips (at base of petiole)	Club-shaped or thickened	Slender-pointed
Taste of berries	Piquant-pleasant to sourish	Unpleasant, often very bitter
Distribution	Mainly Eastern North America, but also Western North America	Eurasia; introduced to North America

The main part of the geographic distribution of American cranberry bush (Fig. 4) is in the eastern half of North America, including southern Canada and the northern U.S. However, the plant has been recorded growing wild in all provinces of Canada, and across all northern states bordering Canada. In the United States, American cranberry bush has been ranked as *Endangered* in Indiana and Ohio, and *Rare* in Pennsylvania. European cranberry bush, a native of Europe and western Asia, is an occasional established escape in Canada, and has more frequently established in the northeastern U.S. than elsewhere in North America.

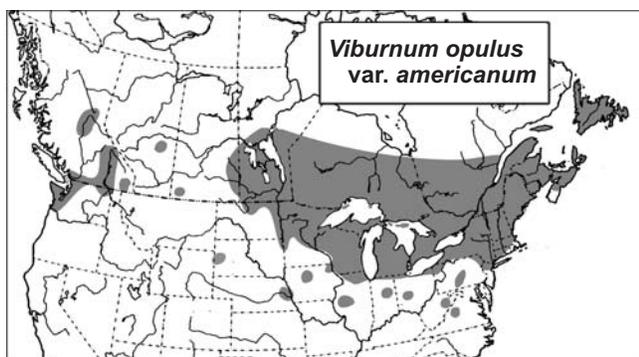


Fig. 4. Distribution of American cranberry bush (*V. opulus* var. *americanum*).

European Cranberry bush is considered to be somewhat invasive, and it is often recommended that American cranberry bush be planted instead when used as an ornamental. Another option is to plant only *V. opulus* 'Sterilis' (the "snowball bush," which does not produce seeds) (Fig. 9).

The American and European varieties of *V. opulus* are known to hybridize, and with the establishment of the European variety in parts of North America, such hybridization may have resulted in the generation of intermediate plants that make distinguishing the taxa difficult. This may explain the comment of Voss (1996, Michigan flora, vol. 3): "As a number of authors have observed, the variation is too great—and too continuous—to make clear distinctions."

The name *V. opulus* var. *sargentii* (Koehne) Takeda (*V. opulus* var. *calvescens* (Rehder) H. Hara, *V. sargentii* Koehne) has been applied to plants of eastern Asia, distinctive in having corkier bark and purple anthers.

Ecology

American cranberry bush is adapted to the relatively fertile soils of southern Canada and the northern United States where it is native. It grows well in cool, moist conditions, and does not tolerate extended drought. It grows well in partial shade, and indeed is often found naturally in shady habitats, but thrives in full sunlight. Typical habitats include stream banks, wet thickets, and old river bottoms. The berries are often a starvation food for animals, but many animals (deer, moose, foxes, racoons, chipmunks, squirrels, skunks, mice, rabbits, black bears, grizzly bears, grouse, pheasants, robins, cedar waxwings and other songbirds) eat the fruit and distribute the seeds. The seeds do not germinate until the second spring following fruit ripening.

Cranberry bush produces flat-topped masses of white flowers up to 15 cm across, composed of two different types of flowers. The showy flowers around the outside of each group are sometimes 2.5 cm in diameter, but they are sterile, while the less conspicuous flowers toward the centre of the cluster are fertile. The function of the showy sterile flowers is to visually lure pollinating insects so that they will pollinate the less conspicuous fertile flowers. Only the inner, fertile flowers provide nectar to attract pollinators. In a study in southwestern Ontario 49 species of insects were collected from the flowers of *V. opulus* var. *opulus*. The most important pollinators were solitary bees.

The viburnum leaf beetle (*Pyrrhalta viburni* (Paykull)) is an exotic European invader that is devastating susceptible species of *Viburnum* in North America (Fig. 5). The brownish adult is 4.5–6.5 mm long, while the caterpillar-like larvae (whitish or pale orange, with black spots) are 69 mm in length. The beetle feeds exclusively on *Viburnum*, and *V. opulus* is one of the most susceptible species. An adult female lays up to 500 eggs, the larvae hatch in very early spring, and feed on the leaves. They mature in the soil and in the summer emerge as adults and once again attack the leaves in late summer. This unusual double attack prevents the plant from building up energy reserves to survive. The leaves are often reduced to skeletons, the insects consuming everything but the veins. Biologists have speculated that certain species of *Viburnum* may become extirpated over parts of their range. The situation has been described as verging on ecological disaster.

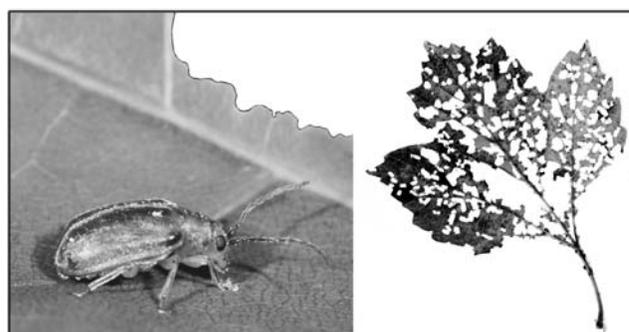


Fig. 5. Left, Adult viburnum leaf beetle. Photo by L. LeSage. Right, Leaf of European cranberry bush (*V. opulus* var. *opulus*), skeletonized by viburnum leaf beetle. Photo by P.M. Catling.

The first breeding population of the beetle in North America was discovered near Ottawa in 1977 (it may have established decades earlier elsewhere in northeastern North America). It has recently been discovered in Maine, New York state, and several other states, and it now shows every indication of spreading farther in both Canada and the northeastern United States. It is expanding in southeastern Canada (Quebec, the Canadian Maritimes), and has also been recorded in British Columbia. As well as representing a threat to the future survival of several North American species of *Viburnum*, the insect is also a substantial obstacle to the future establishment of an American cranberry bush fruit industry.

Use as Food

The fruit of *Viburnum opulus* has probably been consumed by people for thousands of years, both in the Old and New Worlds. However, only the American form of this species produces palatable fruit by commercial standards. The berries of American cranberry bush were used as food by native people, including Algonquin, Chippewa, Iroquois, Menominee, Okanagan, and Thompson, throughout the range of the plant. The European cranberry bush is quite inferior to the American cranberry bush for culinary purposes, although its comparatively bitter fruit has sometimes been marketed.



Fig. 6. American cranberry bush (*Viburnum opulus* var. *americanum*) in flower, from Dippel, L. 1889. *Handbuch der Laubholzkunde, beschreibung der in Deutschland heimischen und im freien kultivierten bäume und sträucher*. Vol. 1. Parey, Berlin, Germany.

The American cranberry bush produces fruit that is prized as a source of jelly by many familiar with it, although many others do not appreciate its unique flavour. Varieties selected for superior fruit are large, attractive shrubs that produce berries for the home gardener. The fruit is gathered from wild stands in late August or early September for use in sauces, jellies, and juices. The fresh, young fruit is hard, very sour, and high in pectin. If picked after a heavy frost, the fruits are softer and more palatable (although for many culinary uses the higher pectin of young fruit is preferable). The ripe fruits produce a somewhat musty odour that people find objectionable, and is accentuated during cooking. However, the smell eventually disappears during cooking. The addition of lemon or orange peelings during cooking will help to eliminate the natural odour. The disagreeable odour is also lessened when firm berries are used. The fruit is best when picked slightly under-ripe and firm, and prepared as sauce or jelly. The flavour is similar to that of the true cranberry. The jelly is rich in colour, and as high in pectin as that made from cranberries and currants. Cranberry bush sauces and jellies are delicious condiments for meat and game. The prominent seeds make jam and preserves difficult to prepare, although the seeds can be removed with a food mill. Pies and, rarely, distilled spirits and wines, are also manufactured from the fruit. In general, the fruit can be used in recipes for conventional cranberry.



Fig. 7. American cranberry bush (*Viburnum opulus* var. *americanum*) fruiting branch. Drawing by B. Flahey.

The only other *Viburnum* species with palatable fruit is *V. edule*, mentioned above. It is also known as squashberry (as the berries are often “squashed” in culinary preparation), lowbush cranberry, mooseberry, pimbina, and pimbina. This is a straggling shrub as tall as 2.5 m, but usually much smaller, that grows wild from Labrador to Alaska, south in the east to Pennsylvania, Michigan, and Minnesota, and in the west to Colorado and Oregon. It also occurs in northeastern Asia. Its fruit, collected from the wild, is often used fresh or cooked, and in pies, jellies, and jams. Squashberries are smaller and not as acidic as the fruit of American cranberry bush.

Non-Food Uses

The European cranberry bush is commonly cultivated as an ornamental in North America, known as the snowball, snowball bush, or snowball tree (Fig. 9). This cultivar has very large, rounded, heads of small flowers, which are generally sterile. It is often confused with ornamental *Hydrangea* that are also called snowball because their inflorescences also produce ball-like clusters of sterile flowers. Various forms of the *Viburnum* snowball include 'Roseum' (with rose-tinted flowers) and 'Xanthocarpum' (with translucent yellow flower). Other cultivars of European cranberry bush more closely resemble American cranberry bush. There are more than a dozen ornamental cultivars of the European cranberry bush, including 'Notcutt's Variety', a fruiting ornamental form with unusually large fruit. The name *Viburnum opulus* forma *nanum* (I. David) Zabel has been applied to dwarf forms of the European cranberry bush, although there are also dwarf forms of the American cranberry bush (called 'Compactum' and 'Compactum Alfredo').

“Crampbark,” one of the names of the European cranberry bush, reflects the early use of the bark to treat cramps. Europeans, Native Americans, and Asian peoples independently discovered the effectiveness of *Viburnum opulus* bark for treating cramps. Viburnine, a bitter glucoside in the bark, is apparently responsible for the antispasmodic

(muscle-relaxant) properties. A tea made from the bark has been employed historically to counter a variety of forms of muscle cramps, especially menstrual cramps. In the past, “crampbark” was used in Western medicine for several conditions, notably asthma.



Fig. 8. European cranberry bush (*Viburnum opulus* var. *opulus*) in flower, from Oeder, G.C., Müller, O.F., and Vahl, M. (Editors). 1777. *Flora Danica*. Vol. 4, plate 661. Copenhagen, Denmark.

North American Indians employed the American cranberry bush for a wide variety of medicinal purposes, in addition to the treatment of stomach cramps. The Iroquois used decoctions of roots and bark as a blood purifier, cold medicine, emetic, to prevent hemorrhage after childbirth, to develop prenatal strength, to regulate the heart, to treat kidney disorder, as a laxative, to treat child illness, and to assist breathing.

Agricultural and Commercial Aspects

There has been relatively limited study of appropriate management conditions for cultivating American cranberry bush as a crop. Harvest treatments and yield are also not well documented. Planting distances of 2–2.5 m between plants in rows, and 4–6 m between rows have been recommended. Appropriate soils include well-drained loam and silt loam with good moisture-retaining capacity and a pH of 6.0–7.5. Frequent watering and the addition of nitrogen fertilizer are advisable. Limited fruit production has been observed in 3-year old plants, and maximum production is reached by the 5th year.



Fig. 9. “Snowball” ornamental form of European cranberry bush (*Viburnum opulus* var. *opulus* ‘Sterilis’), from Nicholson, G. (Editor). 1889. *The illustrated dictionary of gardening, a practical and scientific encyclopedia of horticulture for gardeners and botanists*. Vol. 4. L. Upcott Gill, London, U.K.

Cultivars and Germplasm

During the 20th century, the Canadian and American departments of agriculture introduced cultivated varieties of the American cranberry bush with superior fruit characteristics. Named cultivars resulting from collections by A.E. Morgan of Massachusetts in the early 20th century include ‘Andrews’, ‘Hahs’, and ‘Wentworth’, respectively ripening early, midseason, and late season. ‘Manitou Pembina’ (or just ‘Manitou’), a cultivar with large fruit, was selected at the Morden, Manitoba Research Station and introduced in 1947. In 1965 the University of New Hampshire introduced ‘Garry Pink’ (with slightly pink flowers) and ‘Phillips’ (described as free from the musky flavour and odour typical in cooking fruit of the species). Cultivars derived from the European cranberry bush (mentioned above) are basically grown as ornamentals.

Prospects

The fruit of American cranberry bush has minor commercial significance at present, and the species has not yet acquired the status of a crop. It faces difficulty becoming important because it has to compete with the similar fruits of cranberry and red currant. However, it does seem to have potential for small scale, local production, and for preparation of unique processed food products. Such products are currently produced at the cottage industry level, and often marketed by Web advertisements. As with several other wild berry crops that are indigenous to Canada, current interest in the health-promoting content of flavonoids and other natural beneficial compounds may serve to stimulate commercial development.

Myths, Legends, Tales, Folklore, and Interesting Facts

- ▶ American cranberry bush was an important food for native peoples of the central and northern coast region of North America. Berry patches were often considered to be the property of families, with ownership passing from generation to generation. Boxes of fruit were given as a most prestigious gift, and the fruit was served at many feasts. The Kwakiutl Indians (of the west coast) considered a box of American cranberries to be equivalent to four blankets.
- ▶ Before guns came into common use, the fruit of American cranberry bush was used by the Chippewa as bait in snares set for snowshoe rabbits.
- ▶ Cats have been reported to be attracted to *Viburnum opulus* in the same way that they are drawn to catnip.
- ▶ The berries of European cranberry bush, after they turn black, have been used to make ink.
- ▶ In past times, flowering bouquets from European cranberry bush were placed in front of newlyweds on their wedding day to symbolize beauty and love.
- ▶ Hundreds of plants were assigned special meanings in the "Victorian Language of Flowers," popular in Victorian times, and many delighted in sending coded messages by this means, especially for romantic purposes. Guelder rose (i.e. European cranberry bush) meant "winter" or "age."
- ▶ Branches of American cranberry bush are found on the Coat of Arms of Wainfleet Township (on the northern shore of Lake Erie, in Ontario). The species is common in the area.

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Website

Cornell University viburnum leaf beetle citizen science: <http://www.hort.cornell.edu/vlb/>.

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Fig. 10. European cranberry bush (*Viburnum opulus* var. *opulus*), from Hallier, E.H. 1886. *Flora von Deutschland*, edition 5 of D.F.L. von Schlechtendal et al. Vol. 28, plate 2912. F.E. Köhler, Gera-Untermhaus, Germany.

A Prioritized List of the Invasive Alien Plants of Natural Habitats in Canada

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Since the second symposium on invasive alien plants sponsored by the Canadian Botanical Association in 2004, the most frequently asked questions about invasive alien plants have been “what are they” and “which are the most important.” These are not new questions. In fact article 8 (h) of the International Convention on Biological Diversity (CBD) ratified in 1992, stated that “each contracting party shall, as far as possible and appropriate: prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species;” and part of Canada’s strategic response (1995) was “developing and implementing effective means to identify and monitor alien organisms” and “determining priorities” Here we include the most recent prioritized list for Canada which we have circulated to answer these questions. This list was also developed to serve as a basis for the DAO invasive plant database project. It is the first fully prioritized list of invasive alien plants in natural habitats in Canada.

Prioritization is based on the assessment protocol produced by Natureserve in cooperation with the The Nature Conservancy (U.S.) and the U.S. National Park Service (Morse et al. 2004). Examination of this means of evaluating non-native plants for their impact on biodiversity suggested that it was very well conceived and it was utilized without adjustment according to examples provided. Since the methods are explained in detail by Morse et al. (2004), they are not discussed here. All assessments were done by P.M. Catling during the period of one week in December 2004. The “region” employed for calculations was that part of Canada south of 60° N since this is the region primarily influenced by invasive alien plants. The species assessed included those listed in the publication by White et al. (1993), which was based on a literature review and an opinion survey of botanists across Canada. It also includes all species listed by Haber (1996) as of major, moderate or local importance in various provinces and territories, also based on a national survey. Other lists supplying species included Catling (1997) and British Columbia Ministry of Agriculture, Food and Fisheries (2002). Some of the listings and all of the assessments are based on personal experience and knowledge gained through travel across Canada and from discussions with botanists, environmentalists and landscape managers throughout Canada. Library and web searches were conducted to retrieve relevant literature. It is anticipated that details on various species including references will be made available periodically.

There are a number points to bear in mind in employing this list:

(1) *Regional basis.* The priorities suggested in this list apply to all of southern Canada. Although all species of

major importance in any provinces and territories will likely be on the list they may be at the top of the regional list but not at the top of the national list. In short this list provides a national rather than regional perspective. Of course the assessment protocol can be applied to any region.

(2) *Emphasis.* The protocol highlights potential threat and supports the concept of early detection and control through relatively high priority scores for recently established species with the capability to spread.

(3) *Regional Variation.* There is much regional variation in impact of widespread species. Plants that are only weeds of roadsides in the east are serious pests of natural habitats in the drier western prairies and rangelands. Coltsfoot (*Tussilago farfara*) has its major impact in Newfoundland and is a minor invasive over much of the rest of Canada. The widespread *Leucanthemum vulgare* is primarily impacting native communities in the Bow Valley of Alberta and is a less important invasive of natural habitats elsewhere.

(4) *Changes in rank.* It is conceivable that a species with a low impact at present could develop a high impact over a few years. Common Reed has been rated the major new invasive with regard to its impact (Catling 2005). Likewise a previously highly ranked species may become less important, at least on a comparative basis. For example, it was only a few decades ago that the spotlight was on Eurasian Watermilfoil (*Myriophyllum spicatum*) in the Kawartha Lakes of Ontario and in British Columbia. As with other invasive species, this one arrived without its full complement of diseases and pests. Possibly this, at least partly, accounted for its amazing dominance, but over the last several years it has declined, possibly as a result of pests and pathogens “catching up” with its rapid spread. Prior to its decline, it caused some massive and perhaps irreversible changes to various water bodies. As another example, Purple Loosestrife (*Lythrum salicaria*) has dominated the scene for several years yet there is some recent evidence that it can exist with a variety of native species in some situations and that the European beetles introduced to control it have in fact decreased density substantially in some areas.

(5) *A work in progress.* The information required to assess impact is frequently less than desirable and there is a very substantial amount of work to be done in this area by Canadian ecologists. Assessments should be repeated as new information becomes available. A list of this kind is always “a work in progress” and it should not lead to the impression that the job is done.

(6) *Assessment and judgement.* It is to be expected that people will prioritize in different ways and that the different prioritizations would result in differences in the relative positions of species on this list. However, it is most likely that the top 10 would be the same top 10 and the top 30 would be

the same top 30. As outlined at previous symposia on invasive aliens, prioritizations are probably best done by a committee of experts. Nevertheless a prioritized list has to start somewhere and it can be continually improved. Furthermore prioritizations are essential to management and research. At least subjectivity in prioritizing was reduced in this case through the use of a specific protocol (see above).

(7) *Native versus introduced.* Although it is usually invasive aliens that are responsible for damage to important natural habitats, native species may also be responsible for changes in occurrence and diversity as a result of succession. A good example is the conversion of diverse prairie or savanna to low diversity woodland as a result of lack of fire. Some native woody species require control and management to prevent succession. The only native species listed here are those that are problematic in parts of Canada where they are introduced outside their original native Canadian range.

In some cases it is difficult to determine whether it is a native or an introduced race of a widespread plant that is the problem. For example, *Poa pratensis* dominating some native prairies and open woods is probably an escaped European race, but it may be native. *Galium aparine* dominating the herb layer in some moist woodlands may be either native or introduced.

(8) *Native habitat.* Many introduced species colonize old fields. These are not necessarily native (although old fields used by the Iroquois prior to settlement in southern Ontario were probably rapidly recolonized by native prairie vegetation). Colonization by introduced species pre-empts native species. Nevertheless a native habitat is not being destroyed. Some introduced plants, dominant in old fields, such as *Hieracium* spp., are less likely to impact established plant communities and are therefore not on the main list.

Additional species and improvements

We would like to keep this list as current as possible. Well documented suggestions for additions to the list will be most welcome. Also we will appreciate receiving any suggestions for changes in rank.

Format of the list

The list includes the scientific name, english common name, and french common name. To the extent possible these names follow Darbyshire et al. (2000) and the more recent Darbyshire (2003). The species are listed from the most important species with the most serious impact in descending order to those with the least impact. They were sorted first by I-rank scores and secondarily by overall scores. The first 30 are considered to be very high priority species with major impact. All of these had I-rank scores exceeding 60. The list of prioritized species is followed by a list of additional species of concern in natural habitats in Canada.

Prioritized List of Invasive Alien Plants of Natural Habitats in Canada

1. *Phragmites australis* (Cav.) Trin. ex Steud. var. *australis*, common reed, roseau commun
2. *Lythrum salicaria* L., purple loosestrife, salicaire commune
3. *Centaurea diffusa* Lam., diffuse knapweed, centauree diffuse
4. *Alliaria petiolata* (M. Bieb.) Cavara & Grande, garlic mustard, alliaire officinale
5. *Pinus sylvestris* L., scots pine, pin sylvestre
6. *Euphorbia esula* L., leafy spurge, euphorbe esule
7. *Frangula alnus* Mill. (*Rhamnus frangula*), alder buckthorn, nerprun bourdaine
8. *Bromus inermis* Leyss., smooth brome, brome inerme
9. *Phalaris arundinacea* L., Canary grass, Phalaris roseau
10. *Hydrocharis morsus-ranae* L., European frogbit, hydrocharide grenouillette
11. *Agropyron cristatum* (L.) Gaertn. (*A. pectiniforme*), crested wheat-grass, agropyre à crête
12. *Lonicera tatarica* L., Tatarian honeysuckle, chèvrefeuille de Tartarie
13. *Cytisus scoparius* (L.) Link, Scotch broom, genêt à balai
14. *Carex acutiformis* Ehrh., lesser pond sedge, carex des marais
15. *Hippophae rhamnoides* L., sea-buckthorn, argousier faux-nerprun
16. *Elaeagnus umbellata* Thunb., autumn olive, chalef en ombelles
17. *Myriophyllum spicatum* L., Eurasian water-milfoil, myriophylle à épi
18. *Cynanchum rossicum* (Kleopow) Borhidi (*Vincetoxicum rossicum*), dog-strangling vine, dompte-venin de Russie
19. *Glyceria maxima* (Hartm.) Holmb., rough manna grass, glycérie aquatique
20. *Acer platanoides* L., Norway maple, érable de Norvège
21. *Betula pendula* Roth, European Birch, bouleau blanc d'Europe
22. *Potamogeton crispus* L., curly-leaved pondweed, potamot crépu
23. *Alnus glutinosa* (L.) Gaertn., European alder, aulne rugueux
24. *Centaurea biebersteinii* DC. (*Centaurea maculosa*), spotted knapweed, centauree maculée
25. *Butomus umbellatus* L., flowering rush, butome à ombelle
26. *Rhamnus cathartica* L., European buckthorn, nerprun cathartique
27. *Aegopodium podagraria* L., goutweed, égopode podagraire
28. *Rubus discolor* Weihe & Ness, Himalayan blackberry, ronce discoloré
29. *Acroptilon repens* (L.) DC., russian knapweed, centauree de Russie
30. *Elytrigia repens* (L.) Nevski (*Agropyron repens*), quackgrass, chiendent commun
31. *Hypericum perforatum* L., St. John's-wort, millepertuis commun
32. *Robinia pseudoacacia* L., black locust, robinier faux-acacia
33. *Origanum vulgare* L., wild marjoram, origan vulgaire
34. *Ulex europaeus* L., gorse, ajonc d'Europe
35. *Hedera helix* L., english ivy, lierre commun
36. *Populus alba* L., white poplar, peuplier blanc
37. *Bromus tectorum* L., cheatgrass, brome des toits
38. *Lysimachia nummularia* L., moneywort, lysimaque nummulaire
39. *Syringa vulgaris* L., common lilac, lilas commun
40. *Nymphoides peltatum* (Gmel.) Kuntze, yellow floating heart, faux-nymphéa à feuilles peltées
41. *Medicago sativa* L., alfalfa, luzerne
42. *Morus alba* L., white mulberry, mûrier blanc d'Europe
43. *Acer negundo* L., Manitoba maple, érable à Giguère
44. *Tussilago farfara* L., Colt's foot, tussilage pas-d'âne
45. *Cirsium arvense* (L.) Scop., Canada thistle, chardon des champs
46. *Poa compressa* L., Canada blue grass, pâturin comprimé
47. *Linaria vulgaris* Miller, yellow toadflax, linaira vulgaire
48. *Avena fatua* L., wild oats, folle avoine
49. *Angelica sylvestris* L., woodland angelica, angélique sauvage
50. *Rumex acetosella* L., sheep sorrel, petite oseille
51. *Ranunculus repens* L., creeping buttercup, renoncule rampante
52. *Chelidonium majus* L., greater celandine, grande chélideine
53. *Cirsium palustre* (L.) Scop., marsh plume thistle, chardon des marais
54. *Matricaria perforata* Merat, scentless chamomile, matricaire inodore
55. *Melilotus alba* Medik., white sweet-clover, mélilot blanc

56. *Sonchus arvensis* L., perennial sow thistle, laitern des champs
57. *Linaria dalmatica* (L.) Mill., Dalmatian toadflax, linair à feuilles larges
58. *Leucanthemum vulgare* Lam., ox-eye daisy, marguerite blanche
59. *Geum urbanum* L., herb bennett, benoîte commune
60. *Polygonum cuspidatum* Sieb. & Zucc., Japanese knotweed, renouée du Japon
61. *Galium mollugo* L., smooth bedstraw, gaillet mollugine
62. *Robinia viscosa* Vent., Clammy locust, robinier visqueux
63. *Caragana arborescens* Lam., Siberian peashrub, caragana arborescent
64. *Ambrosia artemisiifolia* L., common ragweed, petite herbe à poux
65. *Anthriscus sylvestris* (L.) Hoffm., wild chervil, anthriscus des bois
66. *Vinca minor* L., periwinkle, pervenche mineure
67. *Verbascum thapsus* L., common mullein, grande molène
68. *Polygonum sachalinense* F. Schmidt ex Maxim., giant knotweed, renouée de Sakhaline
69. *Silene latifolia* Poir., white cockle, lychnide blanche
70. *Potentilla recta* L., sulphur cinquefoil, potentille dressée
71. *Berteroa incana* (L.) DC., hoary-alyssum, bertéroa blanc
72. *Sonchus palustris* L., marsh sow-thistle, laitern des marais
73. *Rorippa amphibia* (L.) Bess., great yellow cress, rorippa amphibie
74. *Rosa multiflora* Thunb. ex Murr., rambler rose, rosier multiflore
75. *Acinos arvensis* (Lam.) Dandy, basil-thyme, sarriette acinos
76. *Poa pratensis* L., Kentucky blue grass, pâturin des prés
77. *Iris pseudacorus* L., pale-yellow iris, iris jaune
78. *Carduus nutans* L., smooth-leaved nodding thistle, chardon glabre
79. *Elaeagnus angustifolia* L., Russian olive, olivier de Bohème
80. *Dipsacus sylvestris* Huds., teasel, cardère
81. *Hesperis matronalis* L., dame's rocket, julienne des dames

Additional Species of Concern in Natural Habitats in Canada

- Acer ginnala* Maxim., Amur maple, érable ginnala
Artemisia absinthium L., absinth, armoise absinthe
Barbarea vulgaris (L.) W.T. Aiton., yellow rocket, barbarée vulgaire
Berberis thunbergii DC., Japanese barberry, épine-vinette du Japon
Buddleja davidii Franch, orange-eye butterfly-bush, arbre aux papillons
Carum carvi L., caraway, carvi commun
Celastrus orbiculatus Thunb., Asian bittersweet, célastré asiatique
Centaurea repens L., Russian knapweed, centaurée de Russie
Cirsium vulgare (Savi) Ten., bull thistle, chardon vulgaire
Cynoglossum officinale L., hound's tongue, cynoglosse officinale
Cyperus esculentus L., yellow nut sedge, souchet comestible
Daphne laureola L., spurge-laurel, daphné lauréole
Datura stramonium L., jimsonweed, stramoine commune
Daucus carota L., wild carrot, carotte sauvage
Digitalis purpurea L., foxglove, digitale pourpre
Echinocystis lobata (Michx.) wild cucumber, concombre grimpant
Echinops sphaerocephalus L., globe thistle, boulette commune
Echium vulgare L., blueweed, vipérine commune
Erucastum gallicum (Willd.) dog mustard, moutarde des chiens
Euonymus alata (Thunb.) Sieb., winged spindle tree, fusain ailé
Euonymus europaea L., European spindle tree, fusain d'Europe
Galium aparine L., cleavers, gaillet gratteron
Glechoma hederacea L., ground-ivy, lierre terrestre
Hieracium spp. L., hawkweeds, épervière
Hordeum jubatum L., foxtail barley, orge queue-d'écureuil
Ilex aquifolium L., English holly, houx commun
Impatiens glandulifera Royle., balsam, impatiante

- Ipomoea purpurea* (L.) Roth., common morning glory, volubilis
Ligustrum vulgare L., European privet, troène commun
Lotus corniculatus L., bird's-foot trefoil, lotier corniculé
Lupinus polyphyllus Lindl., large-leaved lupin, lupin polyphyllé
Lygodesmia juncea (Pursh) skeletonweed, herbe squelette
Malva neglecta Wallr., common mallow, mauve négligée
Matricaria maritima L., seaside chamomile, matricaire maritime
Medicago lupulina L., black medick, lupuline
Pimpinella saxifraga L., burnet-saxifrage, petite pimprenelle
Polygonum X bohemicum (J. Chrték & A. Chrtkova) P.F. Zika & A.L. Jacobson (*P. cuspidatum* X *P. sachalinense*), a hybrid knotweed, un hybride de renouée
Potentilla recta L., sulfur cinquefoil, potentille dressée
Quercus robur L., English oak, chêne anglais
Ranunculus acris L., tall buttercup, renoncule âcre
Senecio jacobaea L., tansy ragwort, séneçon jacobée
Sisymbrium loeselii L., tall hedge mustard, sisymbre de Loesel
Tanacetum vulgare L., tansy, tanaisie vulgaire
Tragopogon dubius Scop., goat's-beard, salsifis majeur
Tribulus terrestris L., puncture vine, croix-de-Malte
Urtica dioica L., European stinging nettle, ortie dioïque
Viburnum opulus L., European high bush-cranberry, viorne obier

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A Key to the Common Grasses of Southeastern Canada by Vegetative Characteristics.

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Grasses are important plant components of most terrestrial ecosystems around the world. Whether as community dominants, rare plants, agricultural weeds, invasive alien species of natural and semi-natural habitats, remediation vegetation, or agricultural crops, grasses are among the most important ecological and economic plants in the landscape.

Many grasses can be identified by their vegetative characteristics alone. This is useful in field studies where distinguishing species at various growth stages and conditions is important. The current key is presented as a tool to help those interested in identifying grasses of eastern Canada in their vegetative state. Several identification tools have been previously published for Canadian grasses, but they are all long out of print (Nowosad et al. 1942, Clarke, et al. 1944, Best et al. 1971). The publication on western grasses by Best et al. (1971), however, has been made available by Agriculture and Agri-Food Canada as a web-based document (see references for URL).

The present key attempts to rely on characteristics observable in the field with a good hand-lens. Characteristics which are more easily used and more reliable tend to be given first in the couplets. Microscope examination of leaf blade epidermises and cross-sections will reveal many additional characteristics useful for identification (e.g., Clifford and Watson 1977), but this is beyond the scope of the current contribution. Although this key partly borrows from the previous works, it is hoped that the new information and arrangement will be useful as well as timely. Grasses included in this key are primarily common introduced and native species which are often present as important components of plant communities in eastern Canada. The decision to include or exclude any particular is, however, rather subjective. In some cases the key leads to groups which cannot be reliably identified to species level using vegetative characteristics utilized in this key. The species contained in these groups are indicated in Table 1.

Authorities of scientific names, English common names and some common synonyms are given in Table 1. The taxonomy follows that used by the Flora North America project. A short glossary of terms is provided and a series of illustrations is included to assist in the interpretation of character states. The drawings are taken from Best et al. (1971) and Aiken and Darbyshire (1983).

A word of caution. Material must be examined carefully as not only are many characteristics inconspicuous, but growing conditions as well as disease and predation can influence the expression or condition of character states. Leaf auricles and the joining of leaf sheath margins are particularly delicate and susceptible to physical damage or deterioration with age. Selecting parts that are mature but not becoming senescent will give the best results. Examining more than one leaf or plant (if available) will also be helpful.

The key is certainly an imperfect thing because of various constraints as well as deficiencies. Some couplets will work better than others, but all should work better with experience. Of course users attempting to identify a species not included will mis-identify their specimen. The author welcomes any comments or suggestions aimed at improvement.

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Glossary of terms

- Abaxial:** The surface or portion of a structure facing away from the main axis of the plant part from which it arises.
- Adaxial:** The surface or portion of a structure facing toward from the main axis of the plant part from which it arises.
- Auricle:** A small expansion of the leaf at the top of the sheath and the edge of the collar (not always present). See Fig. 5.
- Blade:** The upper (distal) portion of the leaf (above the ligule) that does not clasp the stem (may be flat, folded or rolled). See Figs. 1, 2, & 4.
- Ciliate:** Having a line of hairs in one plane (usually along a margin).
- Cleistogenes:** Small cleistogamous flowers present singly or in small groups in the basal leaf sheaths.
- Collar:** The back (abaxial) side of the leaf at the junction of the blade and sheath. See Fig. 1.
- Conduplicate:** Folded inwardly along the central longitudinal axis so that the adaxial surfaces on either side are facing each other.
- Convolute:** Laterally rolled with the margins overlapping and each leaf completely surrounding and/or surrounded by the next one.
- Decumbent:** With the lower (basal) part of the stem lying more or less prostrate and the distal end erect (curved upwards from the base).
- Distichous:** Arranged in two (opposite) ranks along the axis.
- Emarginate:** With a shallow notch or indentation.
- Entire:** An uninterrupted, smooth margin (without teeth, lobes or other projections).
- Glabrous:** Without hairs.
- Glaucous:** With a whitish cast (as if frosted); usually from a thin microscopic deposit of wax.
- Internode:** The region of a stem between two nodes.
- Inflated:** Swollen or enlarged (and loose in the case of leaf sheaths).
- Involute:** Edges in-rolled towards the centre.
- Keel (keeled):** A conspicuously raised portion (usually a vein) along the edge of a fold or curve (as in the keel of a boat).
- Ligule:** A structure on the adaxial side of the leaf at the junction of the sheath and the blade; may consist of a ring of hairs, a short membrane topped with hairs or a thin (usually translucent) membrane. See Figs. 5 & 6.
- Membranous:** Thin, pliable, like a membrane (see ligule).
- Recumbent:** Lying down, prostrate, flat on the ground.
- Rhizome:** An underground stem giving rise to roots and other stems. See Fig. 1.
- Scabrous:** With minute prickly hairs; rough to the touch.
- Sheath:** The lower (proximal) part of the leaf which forms a tube and clasps the stem (at least when young). See Figs. 1 & 3.
- Stolon:** A stem which grows more or less horizontal to the ground giving rise to roots and other stems at the nodes. See Fig. 1.
- Truncate:** An end (proximal or distal) that is in a straight plane perpendicular to the main axis.
- Vernation:** The arrangement and shape of leaves when young, prior to unfolding from the bud-shoot. See Fig. 2.

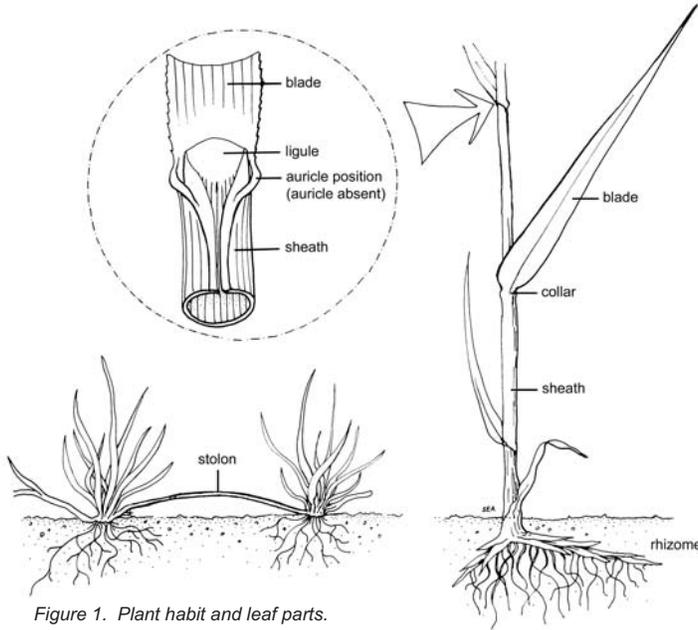


Figure 1. Plant habit and leaf parts.

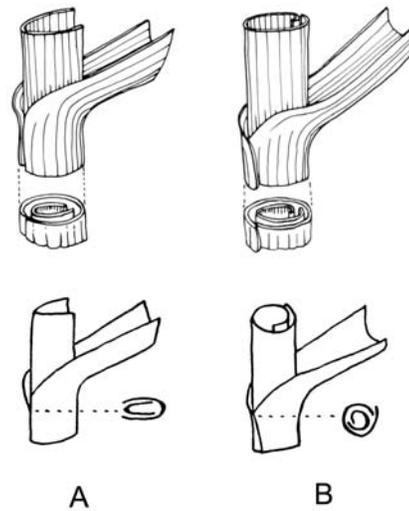


Figure 2. Leaf vernation. A. Leaf folded; B. Leaf rolled.

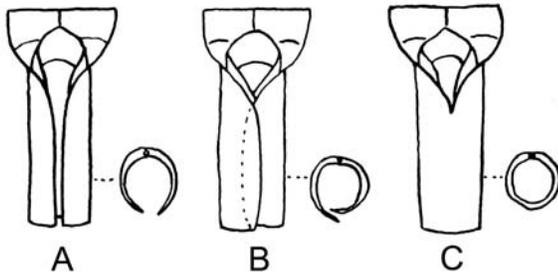


Figure 3. Sheath types. A. Sheath open, margins not joined and not overlapping; B. sheath open, margins not joined but overlapping; C. Sheath closed, margins joined.

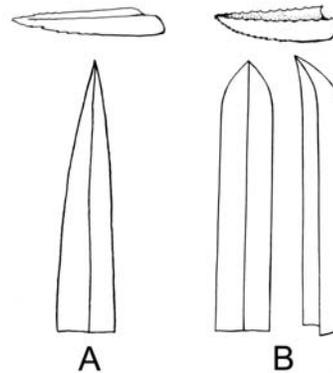


Figure 4. Leaf blade tips. A. Leaf blade tapering to a sharply pointed apex; B. Leaf blade curved at the tip into a "boat-shaped" or prow-like apex.

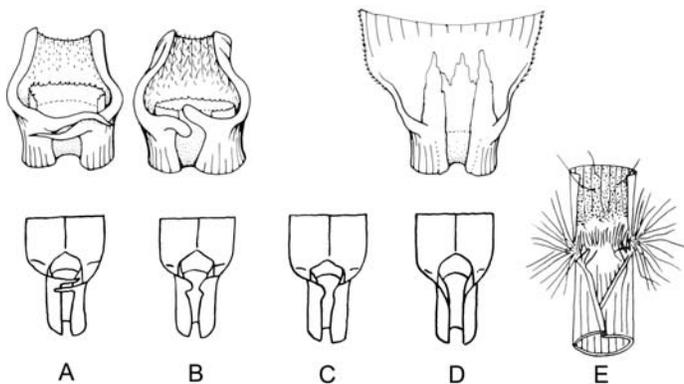


Figure 5. Auricle types and leaf blade vestiture on adaxial surface. A. Auricles claw-like, blade scabrous (above); B. Auricles rounded, blade pubescent (above); C. Auricles rudimentary; D. Auricles absent, blade glabrous (above); E. Auricles with a tuft of hairs, blade with scattered long hairs.

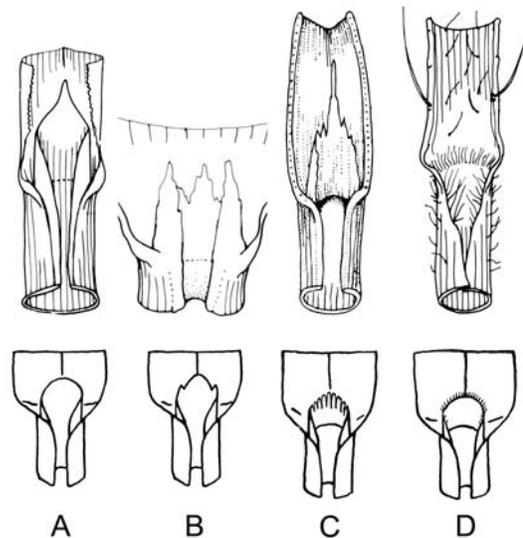


Figure 6. Ligule types. A. Ligule entire, rounded (below) or acute (above); B. Ligule notched; C. Ligule lacerate; D. Ligule with hairs, a membrane.

Vegetative character key to the common grass in southeastern Canada

1. Vernation of leaf blades folded (conduplicate) in the bud-shoot (Fig. 2A)2
1. Vernation of leaf blades rolled (convolute) in the bud-shoot (Fig. 2B)17
 2. Auricles present; basal sheaths reddish at base; leaves glabrous*Lolium perenne*3
 2. Auricles absent; sheaths various; glabrous or pubescent3
3. Ligules a fringe of hairs (Fig. 5E, 6D); tuft of long hairs at margins of collars (Fig. 5E); old blades strongly curved or curled; sheaths with long hairs (sometimes glabrous); plant tufted*Danthonia spicata*4
3. Ligules membranous; no long hairs at margins of collars; old blades not strongly curved or curled; sheaths glabrous or densely pubescent4
 4. Blades conduplicate and bristle-like or sometimes flat, prominently ridged on the adaxial surface5
 4. Blades folded or flat and not bristle-like, not prominently ridged on the adaxial surface6
5. Ligules less than 0.5 mm, long or obsolete; sheaths open (Fig. 3B); leaves glaucous or blue-green; plant in dense tufts, without creeping rhizomes*Festuca* species7
5. Ligules about 0.5 mm long; sheaths closed nearly to top; leaves green or dark green; plant in loose tufts, usually with creeping rhizomes*Festuca rubra*8
6. Medial lines absent on the adaxial blade surface; tip of blades taper-pointed (the young basal blades may be slightly boat-shaped) (Fig. 4A)7
6. Median lines present on the adaxial surface (two light coloured lines running along either side of the mid-vein); tip of blades boat-shaped (Fig. 4B)10
7. Ligules 4 to 10 mm long, white coloured or transparent; basal sheaths glabrous, strongly compressed (flattened) and keeled; basal blades glabrous; rhizomes absent*Dactylis glomerata*9
7. Ligules 6 mm long or less (if more than 3 mm then sheaths not compressed or keeled), yellowish or brownish coloured; basal sheaths usually pubescent (at least sparsely), round or only weakly compressed; basal blades often pubescent with long hairs; short rhizomes usually present8
 8. Ligules 2 to 6 mm long, the lateral margins hardened and similar to the sheath tissue so as the sheath margins appear to form upward projections past the collar; nodes pubescent (sometimes sparsely)*Sorghastrum nutans*9
 8. Ligules 1 to 3 mm long, the lateral margins not hardened and appearing as upward projections of the sheath margins; nodes glabrous9
9. Blades usually 5 to 10 mm wide; blade mid-ribs abaxially distinct and prominent, usually yellowish in colour (at least basally) and much wider than other major veins*Andropogon gerardii*10
9. Blades usually 2 to 6 mm wide (sometimes wider); blade mid-ribs not abaxially distinct or prominent, usually whitish- or greyish-green and only slightly wider than other major veins *Schizachyrium scoparium*11
10. Ligules truncate, short (less than 1 mm long)11
10. Ligules obtuse or acute, long (more than 1 mm long)12
11. Sheaths keeled; ligules usually about 1 mm long, emarginate (sometimes obscurely); blades short (2 to 10 cm), broadest at base, gradually tapering to the apex; foliage blue-green, often glaucous; minute hairs on margins of collars absent; plant not in tufts and without basal tufts of leaves*Poa compressa*12
11. Sheaths not keeled; ligules usually about 0.5 mm long, entire; blades long (5 to 30 cm), parallel-sided (not evenly tapering); foliage deep-green, not glaucous; minute hairs often present on margins of collars; plant in loose tufts with a small basal tuft of leaves*Poa pratensis*13
12. Sheaths closed to near the top (Fig. 3C), with distinct cross-veins joining the main veins13
12. Sheaths open with the margins overlapping (Fig. 3B), without evident cross-veins14
13. Blades 3 to 5 mm wide; sheaths not keeled*Glyceria striata*14
13. Blades 6 to 15 mm wide; sheaths keeled14
 14. Sheaths smooth, not minutely roughened; foliage yellow-green to bright green, not glossy dark green; stem bases usually less than 1 cm wide*Glyceria grandis*15
 14. Sheaths usually minutely roughened (feel with lips or tongue); foliage bright green or glossy dark green (best assessed in a fresh condition); stem bases often 1 cm or more wide*Glyceria maxima*16
15. Blades not tapering (parallel-sided) to the abruptly pointed and boat-shaped tip, often puckered or wrinkled in places; sheaths smooth; plants annual*Poa annua*16
15. Blades truncate at base and tapering to a narrow boat-shaped tip, not puckered or wrinkled; sheaths usually scabrous; plants perennial16
 16. Blades glossy on abaxial surface; sheaths minutely roughened; stems weak and usually strongly decumbent*Poa trivialis*17
 16. Blades not glossy on the abaxial surface; sheaths smooth; stems stiff and erect or only slightly decumbent*Poa palustris*18
17. Auricles present (sometimes rudimentary or deciduous) (See Figs. 5A-C). Note that clawlike auricles are not always well developed on all leaves and are often deciduous; several fresh leaves in good condition should be examined18
17. Auricles absent or rudimentary (Figs. 5C-D)27
 18. Plants of beaches and sand dunes (unstable sands) and long rhizomes present; leaves usually glaucous; blades strongly ribbed on adaxial surface*Leymus mollis*19
 18. Either plants not of beaches and sand dunes or long rhizomes absent; plants glaucous or not; blades strongly ribbed on adaxial surface or not19
19. Blades glossy on the abaxial surface; ligules usually entire, sometimes lacerate (Fig. 6C), but not ciliate; auricles rounded to clawlike (sometimes rudimentary)20
19. Blades not glossy on the abaxial surface; ligules ciliate or lacerate; auricles clawlike (sometimes rudimentary)22
 20. Plants annual; blades smooth on the margins near the base; ligules usually 1 mm long or more*Lolium multiflorum*21
 20. Plants perennial; blades scabrous on the margins (sometimes obscured by involute blade margins); ligules usually 0.5 mm long or less21
21. Auricles ciliate (sometimes sparsely)*Schedonorus arundinaceus*22
21. Auricles glabrous*Schedonorus pratensis*23
 22. Blades somewhat stiff, bluish green or glaucous, narrow and flat or rolled23
 22. Blades stiff or lax, usually green or bright green, broad and flat (if somewhat glaucous and rolled then blades 8 to 15 mm wide) ...24
23. Auricles usually small or rudimentary but sometimes well-formed and claw-like (sometimes absent), often only one; blades and sheaths glabrous or pubescent*Elymus trachycaulus*25
23. Auricles small and fragile, in pairs; blades and sheaths pubescent (at least the lower ones)*Hordeum jubatum*26
24. Blades usually at least sparsely pubescent on the abaxial surface, 2 to 10 mm wide; sheaths, especially the basal ones, with short hairs; collars glabrous or pubescent25
24. Blades glabrous, 8 to 18 mm wide; sheaths glabrous (except sometimes on margins); collars glabrous26

25. Long creeping rhizomes present; collars minutely pubescent; blades with midrib not pronounced on the abaxial surface of blades and not prominently ridged on the adaxial surface, 3 to 10 mm wide; ligules 1 mm long or less.....***Elymus repens***
25. Rhizomes absent; collars glabrous; blades with midrib conspicuous on the abaxial surface and prominently ridged on the adaxial surface, 2 to 6 mm wide; ligules 0.5 to 1.5 mm long ***Agropyron pectiniforme***
26. Margins of sheaths ciliate; blades almost smooth on the abaxial surface; ligules about 1 mm long***Elymus canadensis***
26. Margins of sheaths glabrous or scabrous, rarely ciliate; blades scabrous on both surfaces; ligules about 0.5 mm long***Elymus virginicus***
27. Ligules absent; sheaths compressed, keeled; plants glabrous; plants annual***Echinochloa*** species
27. Ligules present, although sometimes very short; sheaths usually round or compressed; plants pubescent or glabrous; plants annual or perennial28
28. Nodes swollen when fresh and collapsed when dry, densely pubescent with downward pointing hairs; plants rhizomatous29
28. Nodes not swollen when fresh, glabrous or inconspicuously puberulent; plants rhizomatous or not30
29. Margins of leaf blades harshly scabrous, cutting to the touch; sheaths harshly scabrous, the basal ones glabrous; rhizomes long (up to several dm), usually without imbricate scaly leaves***Leersia oryzoides***
29. Margins of leaf blades smooth or lightly scabrous (not harsh or cutting to the touch); sheaths not harshly scabrous, the basal ones usually sparsely pubescent sometimes glabrous (examine several leaves); rhizomes short (up to several cm), with imbricate scaly leaves***Leersia virginica***
30. Ligules a fringe of hairs, sometimes a short membrane fringed with longer hairs (Figs. 5 E and 6D, above)31
30. Ligules membranous (sometimes very short), sometimes indistinctly puberulent-ciliate with hairs much shorter than membrane (Figs. 5A-D, 6A-C and 6D, below).....47
31. Blades glabrous or slightly pubescent (usually long hairs) near base on the adaxial surface32
31. Blades pubescent on the adaxial surface and usually on both surfaces (sometimes sparsely on one or other surface).....42
32. Plants perennial33
32. Plants annual38
33. Plants without rhizomes.....34
33. Plants with long creeping rhizomes35
34. Plants loosely tufts, without a dense tuft of basal leaves; basal sheaths without scattered hairs; sheath margins and collars pubescent with long hairs***Sporobolus cryptandrus***
34. Plants densely tufted, with leaves in a dense basal tuft; basal sheaths usually with scattered hairs; sheath margins and collars mostly glabrous***Sporobolus heterolepis***
35. Basal leaves with blades much shorter than sheaths (sometimes minute); basal sheaths usually not overlapping (nodes usually exposed), blades acute, to 30 mm wide, usually flat***Phragmites australis***
35. Basal leaves with blades about as long as to longer than sheaths; basal sheaths usually strongly overlapping (nodes rarely exposed); blades long acuminate, to 15 mm wide, usually rolled or involute (sometimes flat)36
36. Leaves more or less strongly distichous, not coarse (somewhat fleshy); basal sheaths often wrinkled (more evident on fresh material); rhizomes and rhizome scales with large air spaces***Spartina alterniflora***
36. Leaves not strongly distichous, coarse and hard in texture; basal sheaths not wrinkled; plants usually of fresh-water or marine shores; rhizomes and rhizome scales without large air spaces ..37
37. Stems 3 to 10 mm in diameter basally, erect and rarely branched; blades 5 to 15 mm wide, involute or flat; ligules 1 to 3 mm long***Spartina pectinata***
37. Stems 1 to 2 mm in diameter basally, usually decumbent or procumbent and branched; blades 1 to 4 mm wide, mostly involute; ligules 0.5 to 1 mm long.....***Spartina patens***
38. Sheaths often conspicuously inflated, margins usually not overlapping; cleistogenes usually present in basal sheaths (plants often appearing vegetative); lower margins of blades often with scattered glands and/or long hairs with pustulate bases (usually varying on different leaves of the same plant).....***Sporobolus*** spp.
38. Sheaths not or scarcely inflated, margins usually over-lapping; cleistogenes absent; lower margins of blades without glands or scattered long hairs with pustulate bases39
39. Margins of the collars (auricle position) with a conspicuous tuft of long hairs (see Fig. 5E); blades 1 to 2 mm wide; the margins usually involute***Eragrostis pectinacea***
39. Margins of the collars glabrous or hairs not in a tuft; blades usually wider than 2 mm; the margins usually not involute.....40
40. Stems usually not erect from the base (recumbent, decumbent or somewhat trailing), zigzagging at the nodes; basal part of sheaths often reddish***Panicum dichotomiflorum***
40. Stems erect from the base, straight and not zigzagging; basal part of sheaths usually green41
41. Margins of sheaths glabrous; blades sparsely pubescent at base on the adaxial surface, the hairs long, twisted and flexuous; collars glabrous***Setaria pumila***
41. Margins of sheaths pubescent; blades glabrous; base of collars fringed with hairs.....***Setaria viridis***
42. Margins of the blades with small raised glands which have a central depression and appear somewhat crater-like, often glands are also present on the sheaths, especially the mid-vein (the glands are small requiring magnification to see properly and may be hidden when the margins are involute); blades and sheaths usually with scattered long hairs (some leaves may be glabrous).....43
42. Margins of the blades and the sheaths without small raised glands (sometimes long hairs have swollen bases); hairs on blades and/or sheaths dense44
43. Blades 2 to 8 mm wide; sheaths usually with scattered glands (especially near top); reputed to have a disagreeable odour (not always detectable).....***Eragrostis cilianensis***
43. Blades 1 to 4 mm wide; sheaths usually without glands or with glands only on the mid-vein.....***Eragrostis minor***
44. Blades with long hairs only on the adaxial surface; sheaths pubescent on the distal margins, elsewhere glabrous***Setaria faberi***
44. Blades with long hairs on both surfaces (sometimes glabrous); sheaths glabrous or pubescent.....45
45. Basal leaves short, ovate and coarse, forming a rosette; ligules a loose or dense ring of hairs with at least some hairs 3 to 5 mm long; plants perennial with short (usually less than 5 cm long) leaves***Dichanthelium acuminatum***
45. Basal leaves long, soft and similar to the stem leaves, not forming a rosette; ligules a dense ring of hairs up to 2 mm long; plants annual with large (10 to 40 cm long) leaves.....46
46. Ligules 0.5 to 1.5 mm long; young sheaths usually reddish***Panicum capillare***
46. Ligules 1 to 3 mm long; young sheaths usually greenish***Panicum miliaceum***
47. Sheaths closed to near the top (Fig. 3C).....48
47. Sheaths open (margins usually overlapping) at least half way (Fig. 3A, B).....52

48. Sheath margins hyaline, joined to top and continuous with ligule margins which are joined in front forming a tube around the stem. Initially there is simply a longitudinal strip of hyaline tissue at the front of the sheath where the margins would normally be. The tissue is very delicate and easily splits with age, often with a few oblique transverse fibres temporarily remaining before complete separation **Schizachne purpurascens**
48. Sheath margins hyaline or not, not joined to the top and continuous with ligule margins to form a tube49
49. Long creeping rhizomes present; sheaths and blades mostly glabrous (western genotypes usually at least partly pubescent) **Bromus inermis**
49. Rhizomes absent; sheaths and blades pubescent50
50. Plants perennial; ligules 0.5 to 1 mm long, truncate **Bromus ciliatus**
50. Plants annual; ligules 1 to 5 mm long, acute51
51. Basal part of sheaths reddish (sometimes the whole plant with a reddish colour), hairs on sheaths straight and retrorse; ligule 1 to 5 mm long **Bromus tectorum**
51. Basal part of sheaths green, hairs on sheaths usually somewhat wavy and spreading or retrorse; ligule 1 to 2 mm long **Bromus japonicus**
52. Rhizomes short and shallow, with hardened and densely imbricate scaly bracts; plants perennial; stem internodes and basal parts of sheaths usually reddish; ligules a minute truncate membrane **Muhlenbergia** species
52. Rhizomes present or absent, but if present then strongly creeping and without hardened densely imbricate scaly bracts; plants annual or perennial; stem internodes and sheaths reddish or green; ligules various53
53. Sheaths (at least basal ones) usually pubescent; blades mostly pubescent (at least on adaxial surface and basally); collars with long hairs (except *Hordeum jubatum*)54
53. Leaves completely or mostly glabrous (except with short retrorse hairs on basal blade margins in *Phleum pratense* and the basal sheaths and blade margins of *Avena fatua*) or scabrous58
54. Sheaths compressed (flattened); auricle region with crinkly hairs; ligules entire (crenate but not ciliate); plants annual55
54. Sheaths not compressed; auricle region glabrous or with straight hairs; ligules minutely ciliate; plants perennial56
55. Sheaths with long hairs; blades pubescent, 4 to 10 mm wide **Digitaria sanguinalis**
55. Sheaths (at least the basal ones) usually sparsely pubescent; blades glabrous except for crinkly hairs near base (adaxial surface), 1 to 4 mm wide (rarely to 6 mm) **Digitaria ischaemum**
56. Long hairs on margins of collars; ligules about 2 mm long; blades usually yellow-green or bright green, broad and flat; coumarin scented when crushed **Anthoxanthum odoratum**
56. Margins of collars glabrous; ligules 0.5 to 1 mm long; blades bluish green, glaucous, narrow and flat or rolled; not scented when crushed57
57. Auricles, if present, small or rudimentary, often only one **Elymus trachycaulus**
57. Auricles, if present, small and fragile, in pairs **Hordeum jubatum**
58. Blades less than 1.5 mm wide, soft, usually rolled (or involute) and thread-like especially when dry; plants tufted, without rhizomes **Agrostis scabra**
58. Blades more than 1.5 mm wide, flat, rolled or involute, plants with or without rhizomes59
59. Ligules less than 1.5 mm long, truncate60
59. Ligules more than 1.5 mm long61
60. Basal leaf blades 30 to 90 cm (much longer than twice the sheath length), recumbent, evergreen (persisting through the winter), gradually narrowed to a more or less stiff and twisted base (mature blades are oriented "upside down"), opposite surfaces distinctly different in colour, the upper (abaxial) surface glossy dark green, the lower (adaxial) surface glaucous **Oryzopsis asperifolia**
60. Basal leaf blades less than 30 cm long (less than twice as long as leaf sheath), erect of lax but not recumbent, not evergreen, not gradually narrowed to a stiff and twisted at base, surfaces similar in colour, not glossy dark green, sometimes glaucous61
61. Blades 1.5 to 3.5 mm wide, never glaucous; auricles absent; plant with short rootstocks or stolons **Agrostis capillaris**
61. Blades 3 to 8 mm wide, sometimes glaucous; auricles rudimentary or absent; plant caespitose **Elymus trachycaulus**
62. Margins of collars with retrorse hairs; ligules with a prominent notch at either side, abaxially glabrous; stems often with corm-like bases **Phleum pratense**
62. Margins of collars glabrous; ligules without a notch at either side (sometimes lacerate), abaxially minutely pubescent; stems without corm-like bases, except rarely in some varieties of *Arrhenatherum elatius*63
63. Sheaths keeled; nodes usually puberulent **Arrhenatherum elatius**
63. Sheaths not keeled; nodes glabrous64
64. Rhizomes absent (or if present, short and non-creeping, plants being loosely caespitose)65
64. Rhizomes present (plants not caespitose)68
65. Plants annual; basal sheaths glabrous or with scattered long hairs; young blades with long hairs along basal margins **Avena fatua**
65. Plants perennial; basal sheaths glabrous; young blades without long hairs on margins66
66. Stolons and rhizomes absent; blades 1 to 20 mm wide, usually about 10 mm, widest near the middle and gradually tapering toward both ends; ligules 2 to 10 mm long, usually about 5 to 8 mm; stems erect; plants usually of forests **Cinna latifolia**
66. Stolons or rhizomes usually present; blades less than 8 mm wide, widest near the base and gradually tapering toward the apex; ligules less than 4 mm long; stems usually decumbent at base; plants usually of open or semi-open habitats67
67. Stolons absent, short non-creeping rhizomes often present (loosely caespitose); stems more or less erect; blades 3 to 8 mm wide; ligules on basal leaves 1.5 to 2.5 mm long, truncate **Alopecurus pratensis**
67. Stolons present, long, leafy, prostrate, rooting at nodes; stems usually decumbent or recumbent; blades usually less than 3 mm wide; ligules on basal leaves 2 to 4 mm long, rounded or obtuse **Agrostis stolonifera**
68. Stems stiffly erect from base; new shoots dark brownish, stiffly erect and long attenuate (subulate); base of stems with reduced scaly leaves that are hard and sharp; sheaths glabrous or sometimes pubescent **Calamagrostis canadensis**
68. Stems erect, decumbent or recumbent; new shoots pale or light brown, erect or decumbent, acute but not long attenuate; if reduced leaves present at the base of stems, then not hard and scaly; sheaths glabrous69
69. Large robust plants, usually in moist areas; base of the stems 3 to 8 mm wide; blades 5 to 15 mm wide; ligules white, papery, 2 to 8 mm long, acute or obtuse; sheaths often with cross veins visible (especially on older sheaths) **Phalaris arundinacea**
69. Plants various; base of stems 1 to 3 mm wide; blades 1.5 to 7 mm wide; ligules translucent, thinly membranous, 1.5 to 4 mm long, rounded or acute; sheaths with cross veins rarely visible70
70. Stolons absent; long creeping underground rhizomes; leaf blades usually more than 3 mm wide **Agrostis gigantea**
70. Stolons long, leafy, prostrate, rooting at nodes; leaf blades usually less than 3 mm wide **Agrostis stolonifera**

Table 1. List of grass species in the key with authorities, common names and common synonyms.

Name and Authority	Common name	Common synonyms and comments
<i>Agropyron pectiniforme</i> Roem. & Schult.	Crested wheatgrass	<i>Agropyron cristatum</i> auct.
<i>Agrostis capillaris</i> L.	browntop	<i>Agrostis tenuis</i> Sibth.
<i>Agrostis gigantea</i> Roth	redtop	<i>Agrostis alba</i> auct.
<i>Agrostis scabra</i> Willd.	hair grass	
<i>Agrostis stolonifera</i> L.	creeping bent grass	<i>Agrostis palustris</i> Huds.
<i>Alopecurus pratensis</i> L.	meadow foxtail	
<i>Andropogon gerardii</i> Vitman	big bluestem; turkey foot	
<i>Anthoxanthum odoratum</i> L.	sweet vernal grass	
<i>Arrhenatherum elatius</i> (L.) J. & C. Presl	tall oat grass	
<i>Avena fatua</i> L.	wild oat	
<i>Bromus ciliatus</i> L.	Canada brome	
<i>Bromus inermis</i> Leysser	smooth brome	
<i>Bromus japonicus</i> Murray	Japanese brome	
<i>Bromus tectorum</i> L.	downy brome, hairy brome	
<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.	Canada blue joint	<i>Calamagrostis langsdorffii</i> (Link) Trin.
<i>Cinna latifolia</i> (Trevir. ex Göpp.) Griseb.	drooping woodreed	
<i>Dactylis glomerata</i> L.	orchard grass	
<i>Danthonia spicata</i> (L.) Roem. & Schult.	poverty oatgrass	
<i>Dicanthelium acuminatum</i> (Sw.) Gould & Clark	hairy panic grass	<i>Panicum lanuginosum</i> Elliot; <i>Panicum acuminatum</i> Sw.
<i>Digitaria ischaemum</i> (Schreber) Muhl.	smooth crab grass	
<i>Digitaria sanguinalis</i> (L.) Scop.	large crab grass	
<i>Echinochloa</i> species	barnyard grass	including <i>Echinochloa crusgalli</i> (L.) P. Beauv., <i>E. microstachya</i> (Wieg.) Rydb., <i>E. wiegandii</i> Dore, <i>E. muricata</i> (P. Beauv.) Fernald
<i>Elymus canadensis</i> L.	Canada wild-rye	
<i>Elymus repens</i> (L.) Gould	quack grass	<i>Agropyron repens</i> (L.) P. Beauv.; <i>Elytrigia repens</i> (L.) Nevski
<i>Elymus trachycaulus</i> (Link) Shinnery	slender wheatgrass	<i>Agropyron trachycaulum</i> (Link) H.F. Lewis
<i>Elymus virginicus</i> L.	Virginia wild-rye	
<i>Eragrostis cilianensis</i> (All.) Janchen	stink grass	
<i>Eragrostis minor</i> Host	little love grass	<i>Eragrostis pooides</i> P. Beauv.
<i>Eragrostis pectinacea</i> (Michx.) Nees	tufted love grass	
<i>Festuca rubra</i> L.	red fescue	
<i>Festuca</i> species	sheep fescue, hard fescue, etc.	including: <i>Festuca filiformis</i> Pourret (= <i>F. capillata</i> Lam.), <i>Festuca trachyphylla</i> (Hackel) Krajina (= <i>F. longifolia</i> Thuill., <i>F. brevipila</i> Tracey), <i>F. saximontana</i> Rydb., <i>F. brachyphylla</i> Schult. & Schult. f.)
<i>Glyceria grandis</i> S. Wats.	American manna grass	
<i>Glyceria maxima</i> (Hartm.) Holmb.	English water grass	
<i>Glyceria striata</i> (Lam.) Hitchc.	fowl manna grass	
<i>Hordeum jubatum</i> L.	foxtail barley	
<i>Leersia oryzoides</i> (L.) Swartz	rice cut grass	
<i>Leersia virginica</i> Willd.	white grass	
<i>Leymus mollis</i> (Trin.) Pilger	American dune grass	<i>Elymus mollis</i> Trin.
<i>Lolium multiflorum</i> Lam.	annual ryegrass	<i>Lolium perenne</i> var. <i>aristatum</i> Willd.
<i>Lolium perenne</i> L.	perennial ryegrass	
<i>Muhlenbergia</i> species	muhly	including: <i>Muhlenbergia frondosa</i> (Poir.) Fernald, <i>M. glomerata</i> (Willd.) Trin., <i>M. mexicana</i> Trin., <i>M. sylvatica</i> (Torr.) Torr.
<i>Oryzopsis asperifolia</i> Michx.	rough-leaved mountain-rice, winter grass	
<i>Panicum capillare</i> L.	witchgrass	
<i>Panicum dichotomiflorum</i> Michx.	fall panic grass	
<i>Panicum miliaceum</i> L.	proso millet	
<i>Phalaris arundinacea</i> L.	reed canary grass	
<i>Phleum pratense</i> L.	timothy	
<i>Phragmites australis</i> (Cav.) Steudel	common reed	<i>Phragmites communis</i> Trin.
<i>Poa annua</i> L.	annual blue grass	
<i>Poa compressa</i> L.	Canada blue grass	
<i>Poa palustris</i> L.	fowl blue grass	
<i>Poa pratensis</i> L.	Kentucky blue grass	
<i>Poa trivialis</i> L.	rough-stalked blue grass	
<i>Schedonorus arundinaceus</i> (Schreber) Dumort.	tall fescue	<i>Festuca arundinacea</i> Schreber.; <i>Lolium arundinaceum</i> (Schreber) Darbysh.
<i>Schedonorus pratensis</i> (Huds.) P. Beauv.		<i>Festuca pratensis</i> Huds.; <i>Lolium pratense</i> (Huds.) Darbysh.
<i>Schizachne purpurascens</i> (Torr.) Swallen	false melic	
<i>Schizachyrium scoparium</i> (Michx.) Nash	little bluestem	<i>Andropogon scoparium</i> Michx.
<i>Setaria faberi</i> R.A.W. Herm.	giant foxtail	
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	yellow foxtail	<i>Setaria glauca</i> (L.) P. Beauv.
<i>Setaria viridis</i> (L.) P. Beauv.	green foxtail	
<i>Sorghastrum nutans</i> (L.) Nash	Indian grass	
<i>Spartina alterniflora</i> Loisel.	saltwater cord grass; cord grass	
<i>Spartina patens</i> (Aiton) Muhl.	salt-meadow cord grass	
<i>Spartina pectinacea</i> Link	tall cord grass; freshwater cord grass	
<i>Sporobolus cryptandrus</i> (Torr.) A. Gray	sand dropseed	
<i>Sporobolus heterolepis</i> (A. Gray) A. Gray	prairie dropseed	
<i>Sporobolus</i> species	dropseed	including: <i>Sporobolus neglectus</i> Nash, <i>Sporobolus vaginiflorus</i> (A. Gray) A.W. Wood

Announcing the Canadian Journal of Botany in full-text HTML

NRC Research Press is proud to announce that in the September 2005 issue of the Canadian Journal of Botany, a full-text HTML version of all articles is available as part of the electronic edition of CJB (in addition to the PDF version). Full-text HTML adds many new features and functions to our electronic journals, including enhanced capability to search the material and reference linking to external documents.

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Les Presses scientifiques du CNRC annoncent que le numéro de septembre 2005 de la Revue canadienne de botanique signale l'arrivée du texte intégral HTML de tous les articles dans la version électronique de la Revue (en plus de la version PDF). Le texte intégral HTML ajoute nombre de caractéristiques et de fonctions à nos revues électroniques, y compris des capacités accrues de recherche et des liens vers des documents de référence externes.

Les lecteurs canadiens bénéficient déjà d'un accès Internet gratuit à la Revue canadienne de botanique, et, jusqu'à la fin 2005, les lecteurs hors pays pourront accéder gratuitement au numéro de septembre 2005 en texte intégral HTML. Toute personne intéressée est invitée à soumettre ses commentaires par courrier électronique à l'adresse suivante : Presses.scientifiques@nrc-cnrc.gc.ca.

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Offre de rabais aux membres de l'ABC

Le président de l'ABC, Vipen Sawhney, a obtenu des **Presses du Conseil national de recherches du Canada** une réduction de 20% sur toutes les monographies en **phytologie** pour les membres en règle qui n'ont qu'à se rendre au site suivant et procéder à leurs achats: http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2_list_f?mlist7

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In case you're moving, don't forget to update your mail info by communicating with **Vanda Wutzke**, the executive assistant of the association (see in page 46).



Vous déménagez ?

C'est à notre adjointe à la direction, **Vanda Wutzke**, qu'il vous faut vous adresser pour mettre à jour vos coordonnées (voir en page 46).

Next Meeting on 25-28 June 2006, Concordia University, Montreal – Be ready !



Prochain congrès à l'université Concordia, Montréal, 25-28 juin 2006. – Préparez-vous !