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# Lingonberry Cultivars— Building Blocks For An Industry?

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The lingonberry (*Vaccinium vitis-idaea* L.) is a woody, evergreen dwarf shrub distributed worldwide in northern temperate, boreal and subarctic areas. The fruit is an important berry crop, harvested mostly from the wild in Russia, Scandinavia, the Baltic countries, Poland and to a lesser extent in Japan, Germany, Canada and Alaska (10, 13, 16, 18).

Camp characterized the lingonberry *Vaccinium vitis-idaea* in the *Ericaceae*, subgenus *Vitis-idaea* (Moench) W. Koch (3). Plant stems are semi-woody, bearing numerous shoots 1-2 mm in diameter. Simple, petiolate, evergreen, leathery, obovate leaves alternate in a spiral. Leaf upper surface is dark green; the lower surface is pale green, waxy with black glandular dots. Plants reproduce by seed and rhizomes from which shoots arise at nodes. Roots consist of tap roots with finely divided rootlets at the extremities and adventitious roots occurring at nodes along creeping stems and rhizomes. Flowers are produced singly or in clusters in terminal racemes, with four locules per ovary, four sepals, a bell-shaped corolla and eight stamens with non-spurred anthers (8). Pollen is borne in tetrads shed through a terminal pore in the anther. The ovary is inferior producing a true globose berry, carmine in color when ripe, up to 1.2 cm in diameter.

Fernald considered the smaller north American form as a variety *V. vitis idaea* L. var. *minus* Lodd. and the larger European plant as the variety *vitis-idaea* (6). Hulten recognized the two races as subspecies with *vitis-idaea* as the larger lowland race and the dwarf arctic montane race as *minus* (Lodd.) Hult (12). Both are distinguished mainly by plant size. Leaf size in *V. vitis-idaea* may average 2.5 cm in length and 1.0 cm in width, in *V. vitis-idaea* var. *minus* 1.0 cm in length and 0.5 cm in width (28). Plant height for *V. vitis-idaea* may exceed 30 cm, for *vitis-idaea* var. *minus* height rarely exceeds 20 cm. Both North American and European varieties are reported by various authors to have chromosome numbers $2n = 24$ (8).

Worldwide, at least 25 English names for *V. vitis-idaea* are reported (10). Among the more common are lingonberry, cowberry, moss cranberry, mountain cranberry, red whortleberry or alpine cranberry. In Newfoundland, the fruit is called the *partridgeberry*, in Finland *puolukka*, in Germany the *preiselbeere* and in Sweden *lingon* or *lingen*. For aesthetic and marketing reasons, Pliszka suggested the name lingonberry be used as the English name rather than cowberry (20).

Numerous uses for lingonberry fruit are reported. In northern Europe and Japan, these include juice, sauce, preserves, candy, jelly, syrup, in ice cream, as pickles, wine and liqueurs (10, 13, 18, 19). In eastern Europe, extraction of arbutin from the leaves for use as a medicinal for stomach disorders is described (22). Rehder suggested use of the plant as an ornamental ground cover (23).

Despite the fact large quantities of lingonberry fruit are still harvested from the wild, worldwide, urban encroachment, changes in forest management, variable fruit quality from native stands and fluctuations in annual yield

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have stimulated research on plant improvement and methods for domestication and cultivation of this species (10, 24, 26). The most concerted attempts at domestication were carried out in Finland, Germany and Sweden beginning in the late 1960's (7, 14, 15, 16, 17). Subsequent research in North America involved screening of seedlings, characterization of the species and vegetative and reproductive responses (10, 11). Successful small scale commercial production of lingonberries in Germany was first described by Dierking in 1985 (4).

A key to domestication and development of any prospective new crop is a genetic pool of adapted and productive cultivars. Development of lingonberry cultivars has been minimal in comparison to other fruit species and only relatively recently has resulted in a limited series of promising clones. To date the few cultivars available are exclusively selections from native material. The origin and brief descriptions for nine lingonberry cultivars herein are gleaned from various sources, cited after the description.

'Red Pearl,' 1981 Originator: A. Blanken, Boskoop, The Netherlands. Origin: not reported. Wide, bushy plant, upright in growth habit, height 20-30 cm; 5-12 fruit in clusters, large fruited (7-12 mm), round, ripening in September-October (2).

'Koralle,' 1969. Originator: H. van der Smit, Origin: Reeuwijk, The Netherlands. Origin: not reported. Strongly branched, height up to 30 cm, round fruit in clusters of 5-12 berries varying from light red to dark red. Note: 'Koralle' was originally a collection of 35 plants selected from a population of seedlings as a mixture under the name 'Koralle.' Thus identity may be confused, depending on the clone propagated from the original stock (1).

'Sussi' (BV 401, 1985. Originator: Prof. Sven Dahlbro, Copenhagen. Named and released (patented) by the Swedish University of Agricultural Sciences, Division of Fruit Breeding, Balsgård. Origin: A selection from seed collected in Småland, Sweden. Lowbush plant form with erect shoots 15-25 cm height, flowering late May in southern Sweden, berries globular, dark red, large (0.4 g/fruit) uniformly ripening about 20 August in Sweden. Productive, averaging 11 fruit per cluster (27).

'Sanna' (BV 35), 1987. Originator: Prof. Sven Dahlbro, Copenhagen. Origin: A selection from seed collected in Småland, Sweden. Named and released (patented) by the Swedish University of Agricultural Sciences, Balsgård. Erect shoots 15-25 cm in height, flowering late May in southern Sweden. Fruits red, globose, ripening in mid August. Fruits comparable in size to 'Sussi' (5).

'Scarlet,' date and originator unknown. Origin: Norway. A selection from seed suggested for use as a pollinator for 'Koralle.' Plant height 30-38 cm, spread 38-45 cm at maturity (9).

'Erntedank,' 1975. Originator: Albert Zillmer, Uchte, Germany. Origin: Plant selected from the wild in a upland moor west of Uchte, Germany. Moderate growth, fruit small to medium sized, very productive, producing both a spring and summer crop (29).

'Erntekrone,' 1978. Originator: Albert Zillmer, Uchte, Germany. Origin: Selected from the wild near Uchte, Germany. Vigorous, stiff and rigid upright growth, leaves somewhat more circular compared to characteristic oval shape in lingonberry. Fruit large, dark red, highly productive. Summer crop not as consistent as for 'Erntedank' (29).

'Erntesegen,' 1981. Originator: Albert Zillmer, Uchte, Germany. Origin: Selected from the wild near Uchte, Germany. Long, soft shoots with unusually large leaves. Very large fruit, some exceeding 1.0 cm in diameter, bright red, productive, sug-

gested by the originator for commercial production, patented (29).

'Masovia,' 1985. Originator: Lech Kawecki, Poland. Origin: Selected from the wild in the Lasy Bolimowskie forest, 60 km west of Warsaw in 1981. Vigorous growth and rhizome production, heavy fruit set. Named and released by K. Pliszka, Warsaw Agricultural University (21).

Since 1984, our preliminary screening trials and research with lingonberry in Wisconsin have suggested the potential for cultivation in the northern U.S. (25). Sandy acidic soils in central Wisconsin with ample water for irrigation provide virtually unlimited suitable sites for cultivation of the plant. Current objectives in our program are to screen cultivars, seedling and clonally propagated lingonberry populations for adaptability and productivity; to evaluate critical cultivation practices including soil amelioration with organic matter, mulches, herbicides for weed control, and to determine plant nutrition and irrigation water requirements. Establishment of small scale grower demonstration trials concurrent with studies of fruit processing requirements and market development are subsequent objectives, as recently described by St. Pierre for native fruit species in Saskatchewan (26).

In 1987, I had the opportunity under the auspices of a Fulbright research grant to spend a four month sabbatical at the Agricultural Research Centre, Department of Horticulture, Piikkiö in southwest Finland in collaboration with Professors Jaakko Säkö, Heimo Hiirsalmi, and others. My primary objective was to collect and catalogue native Finnish lingonberry plant material for further testing in North America. Characteristics such as plant vigor, freedom from obvious pests, flowering period, approximate ripening date, number of fruit per cluster and general fruit size were recorded for 122 individual plant selections and 22 collections of seed from individual plant clones or pooled seed sources. From the seed collections, approximately 15,000 seedling lingonberry plants were established at the Hancock Experiment Station, Hancock, WI in 1988. Since then, 17 selections have been made from this planting, most for inclusion in advanced screening trials. Of the initial whole plant selections, six outstanding clones were chosen to be included in a screening trial. Two of these, WI 102 and WI 108 have displayed hardiness, precocity, excellent fruit size and fruit color. Initial yields of WI 102 and 108, albeit limited, were comparable to 'Erntedank.' Naming and release of these clones by the University of Wisconsin-Madison is proposed for 1993. Of the named cultivars in the earliest selection trial terminated in 1991, 'Erntedank' appears to be better adapted, more hardy and productive than 'Koralle,' 'Erntesegen' or 'Erntekrone.' 'Sussi,' 'Sanna' and 'Masovia' have not as yet fruited sufficiently for a meaningful comparison.

The development of widely adapted lingonberry cultivars for potential use in commercial production of this delightful small fruit is in its infancy. Substantial further testing of the limited number of cultivars currently available is necessary. Regardless, our early results with the few cultivars available and our advanced selections suggest great promise for further development of *Vaccinium vitis-idaea* as a new crop for cool temperate regions where blueberries and cranberries already are important in berry production.

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