'Balder' Red Raspberry

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'Balder' is a new red raspberry (*Rubus idaeus* L.) cultivar released from the breeding program at the Dept. of Horticulture, Agricultural Univ. of Norway. The cultivar has been noted for its exceptionally high level of winter hardiness, early and concentrated ripening, easy fruit release, and good processing quality (Fig. 1). 'Balder' was introduced in Norway in 1988. In Norse mythology, 'Balder' is the name of a god with many good qualities.

Origin

'Balder' was selected in 1980 from a 1975 cross of 'Norna' x 'Malling Jewel'. 'Norna' is of Norwegian origin, from a 1944 cross of 'Preussen' x 'Lloyd George' at the Nijis Research Station, and was introduced in 1964 (Hjeltnes, 1964; Oydvin, 1971). 'Norna' produces high yields and is relatively frost tolerant, but problems with crumbliness have reduced its commercial value (Redalen, 1977). 'Malling Jewel' is from a cross of 'Preussen' x ('Pyne's Royal' selfed x 'Lloyd George' selfed) at East Malling, U.K., introduced in 1950 (Cormack and Woodward, 1977; Grubb, 1950). 'Malling Jewel', which was widely grown in Britain, has not been grown in Norway because of its susceptibility to winter injury. 'Balder' was tested as H 4-10-07, and has previously been mentioned under this designation (Redalen, 1986, 1987).

'Balder' is now established in plots at research sites throughout Norway, and preliminary reports on performance have been received from several of these. It has been noted for its high level of winter hardiness.

Performance and description

Yield and fruit size data for 'Balder' are compared with those of 'Veten', which is widely grown in Norway, 'Glen Clova', which is widely grown in Scotland (Cormack and Woodward, 1977), and 'Meeker' and 'Skeena', both of which are widely grown in the Pacific Northwest of North America (Daubeney, 1986) (Table 1). The data from 1985, 1986, and 1987 were obtained from a trial with two replications of 'Balder' and four replications of each of the other cultivars established at the Agricultural Univ. of Norway in 1983. There were 10 plants per plot. Each spring the floricanes were topped at a height of 150 cm and thinned to six canes per plant. Fruit size data were the mean weight of 50 fruits per harvest.

Over the 3-year period, 'Balder' generally

Table 1. Yield and fruit size of 'Balder' compared with other cultivars at Aas, Norway. Mean values over 3 years (1985-1987).

Cultivar	Total yield (kg/plant)	Fruit size (g/fruit)
Balder	2.01	3.3
Glen Clova	1.79	3.4
Meeker	1.69	3.6
Skeena	1.18	2.9
Veten	1.50	3.5
Standard error	0.046	0.038
P (F)	<0.01	<0.01

Table 2. Soluble solids concentration (SSC), titratable acids, and juice color of 'Balder' compared with other cultivars at Aas, Norway. Mean values over 3 years (1984-1986).

Cultivar	SSC (%)	Acid (% citric)	Absorption at 515 nm of 5% juice
Balder	8.9	2.25	0.988
Glen Clova	7.9	1.82	0.535
Meeker	10.6	1.69	0.623
Skeena	9.3	1.93	0.695
Veten	8.4	1.97	0.789
Standard error	0.042	0.065	0.068
P (F)	<0.01	<0.01	<0.01

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Table 3. Number of damaged buds in spring, leaf senescence and shrivelling of immature fruit, and occurrence of cane diseases of 'Balder' and other cultivars at Aas, Norway. Mean values over 3 years (1986-1988).

Cultivar	Damaged buds/cane (no.)	Immature leaf senescence and shrivelling of immature fruit (rating) ^z	Occurrence of cane disease symptoms (rating) ^z
Balder	5.7	0.2	4.7
Glen Clova	11.5	1.9	5.4
Meeker	28.7	2.5	3.5
Skeena	12.5	2.9	4.0
Veten	10.7	3.0	4.4
Standard error	0.536	0.473	0.447
P (F)	<0.01	<0.05	NS

^zRating: 0 = best, 9 = poorest.

NS Nonsignificant.

Fig. 1. Lateral and fruits of 'Balder' red raspberry.

produced significantly higher yields than the other cultivars. It was surpassed in yield by 'Glen Clova' with 0.20 kg/plant in 1985, but had higher yields than the other cultivars in 1986 and 1987. Fruit size of 'Balder' was comparable to the other cultivars.

Fruit of 'Balder' has a somewhat dark and dull appearance and is relatively soft; it is well-suited for processing but not for fresh use. Juice from fruits of 'Balder' is medium-sweet, has high acidity and dark color (Table 2). Flavor and color of jam produced from fruits of 'Balder' have been judged as excellent (Heiberg, 1989), while fresh fruit flavor has been judged to be only acceptable. Fruits of 'Balder' separate readily from the receptacle and thus should be well-suited for machine harvesting (Redalen, 1987).

Flowers of 'Balder' are self-fertile, and druplet set has been high. No problems with crumbliness have been noted.

The harvest season for 'Balder' starts about the same time as for 'Glen Clova' and 'Veten' and is usually 2 to 5 days earlier than for 'Skeena' and 'Meeker'. The season ends at the same time as for 'Veten' and before those of 'Glen Clova', 'Skeena', and

'Meeker'. Like 'Veten', 'Balder' has a relatively concentrated season, another trait desirable for machine harvest.

'Balder' produces numerous primocanes that are erect and vigorous, with dark purple prickles largely restricted to the basal portions. The primocanes are slightly waxy and glabrous (nonpubescent) and have the gene *h* in the homozygous recessive state. Floricanes are light brownish-grey. Fruits may be hidden by large leaves and can be rather difficult to find for hand harvest.

'Balder' has shown exceptionally good winter hardiness in trial plantings at several locations in Norway. For example, in 1988 at a location near Vegaarshei, where winter injury frequently occurs, 'Balder' had a mean score of 1.5 for injury on a 1 to 5 scale, where 1 = the least and 5 the most damage. In contrast, 'Veten' had a score of 4.5, 'Malling Admiral' and 'Malling Orion', both from England, had scores of 3.0 and 2.0, respectively, and 'Glen Moy' and 'Glen Isla', both from Scotland, had scores of 4.0 and 3.0, respectively. Over a 3-year period, at Aas, the buds on canes of 'Balder' were relatively intact while 'Glen Clova', 'Meeker',

'Skeena', and 'Veten' showed varying degrees of winter injury (Table 3). Also, 'Balder' showed less premature leaf senescence and shrivelling of immature fruit than the other cultivars. These symptoms could be caused by several factors including cane diseases and winter injury.

Although the buds on the floricanes of 'Balder' burst relatively early in the spring, no problems with late spring frost have occurred (Redalen, 1986). The leaves on the primocanes of 'Balder' are shed early in the fall compared with most other cultivars.

'Balder' and the other cultivars growing at Aas were equally susceptible to several cane diseases (Table 3), among which spur blight [*Didymella applanata* (Niessl) Sacc.] predominated. It appeared particularly susceptible to cane spot, *Elsinoë veneta* (Burkh.) Jenkins.

Fruits of 'Balder', like those of 'Veten', were rather susceptible to postharvest fruit rot (*Botrytis cinerea* Pers. and *Mucor* spp.).

Adaptability and use

'Balder' seems well-adapted in locations where other cultivars, e.g., 'Veten', have problems with winter injury. The fruit seems to meet the requirements of the processing industry, and machine harvesting should be possible because of the easy fruit abscission. The high level of winter hardiness gives 'Balder' a potential value as parent in breeding for hardiness.

Availability

Limited quantities of root cuttings or small plants free of raspberry bushy dwarf virus and the raspberry mosaic virus complex are available from The National Seed Council, Moerveien 2, N-1430 Aas, Norway.

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