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'Puget Reliance' Strawberry

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'Puget Reliance' is a new short-day strawberry (*Fragaria ×ananassa* Duch.) cultivar jointly released by Washington State Univ., Oregon State Univ., Univ. of Idaho, and the U.S. Dept. of Agriculture–Agricultural Research Service (USDA–ARS). 'Puget Reliance' has been noted for high yields of large, medium-red conic fruit. 'Puget Reliance' appears to be very virus tolerant. 'Puget Beauty' is present five times in the pedigree of 'Puget Reliance'. The name, 'Puget Reliance', was selected to reflect the contribution of 'Puget Beauty' in the pedigree and denote its adaptation to the Puget Sound region, its virus tolerance, and consistent high yields of large fruit.

Origin

'Puget Reliance' was selected from a cross between WSU 1945 and BC 77-2-72 made in 1983 by T.M.S. (Fig. 1). 'Puget Beauty' contributes 34% of the ancestry of 'Puget Reliance' through 'Totem', 'Cheam', and WSU 1019. The cross was made to develop virus-tolerant and aphid- [*Chaetosiphon fragefolii* (Cockerell)] resistant cultivars. The aphid-resistant parent, WSU 1945, was derived from the *F. chiloensis* (L.) Duch. clone Del Norte (Shanks and Barritt, 1974).

Seedlings from this cross were inoculated with a naturally occurring complex of mottle, mild-yellow edge, and crinkle viruses (Sjulin et al., 1986) before planting in the field at the Washington State Univ. Vancouver Research and Extension Unit. 'Puget Reliance' was selected in 1985 by T.M.S. and C.H.S. as being potentially aphid resistant. Subsequent evaluations showed that it is not aphid resistant; however, it appears to be very virus tolerant.

Performance

'Puget Reliance' was tested as WSU 1988 along with other selections and Pacific Northwest cultivars in five replicated plantings from 1989 to 1993. Four plantings were at Washington State Univ. Puyallup Research and Extension Center and one at Washington State Univ. Mt. Vernon Research and Extension Unit. 'Sumas' and 'Totem' are two of the highest yielding Pacific Northwest cultivars and were the only cultivars that were in all plantings. Plants were grown in a matted row system. 'Puget Reliance' equaled or exceeded the yield and fruit weight of other selections and cultivars in every year (Table 1). The fruit firmness of 'Puget Reliance' did not differ significantly from 'Sumas' and 'Totem' (range, 2.0 to 2.2 N). 'Puget Reliance' has an erect growth habit (Fig. 2) and usually holds unripe fruit off the ground, providing a level of avoidance of fruit rot. However, when fruit rot was high in a planting, 'Puget Reliance' was susceptible (data not shown). The midpoint of harvest for 'Puget Reliance' ranged from 3 days before 'Totem' to 1 day after 'Totem' and averaged <1 day before 'Totem'. Three of the plantings were harvested for a second fruiting season. 'Puget Reliance' had higher second-fruiting season yield, higher 2-year yield, and heavier fruit than 'Sumas' or 'Totem' (Table 2).

In 1992 at Puyallup and Mt. Vernon, virus-infected plants and virus-negative plants of 'Puget Reliance' were planted. At both locations, there were no differences between the virus-infected plants and the virus-negative plants for yield or fruit weight (data not shown), indicating tolerance of virus. Virus-free 'Puget Reliance' was not available for the 1989 and 1991 plantings at Puyallup. In those plantings, virus-infected 'Puget Reliance' plants had 58% and 53% higher first-year yields than virus-free planting stock of 'Totem' and 'Sumas', respectively.

'Puget Reliance' was tested by the USDA–ARS at Oregon State Univ. North Willamette Research and Extension Center, Aurora, and by Agriculture and Agri-Food Canada at Abbotsford, B.C. In 1994, 'Puget Reliance' produced 40% more fruit than 'Totem' in replicated trials at Aurora (data not shown). 'Puget Reliance' was rated as one of the best for fruit quality at Abbotsford (Hugh Daubeny, personal communication). However, it was susceptible to postharvest fruit rot.

Frozen fruit samples of 'Puget Reliance' and other cultivars from the 1992 season at Puyallup were analyzed for pH, titratable acidity, soluble solids concentration (Table 3), and total anthocyanins determined as pelargonidin-3-glucoside, molar absorbancy 31,600 (Wrolstad et al., 1970). The pH of 'Puget Reliance' and 'Redcrest' was similar. 'Redcrest' produces tart fruit with excellent color and texture as a frozen sliced product (Stahler et al., 1995). A pH below 3.51 is

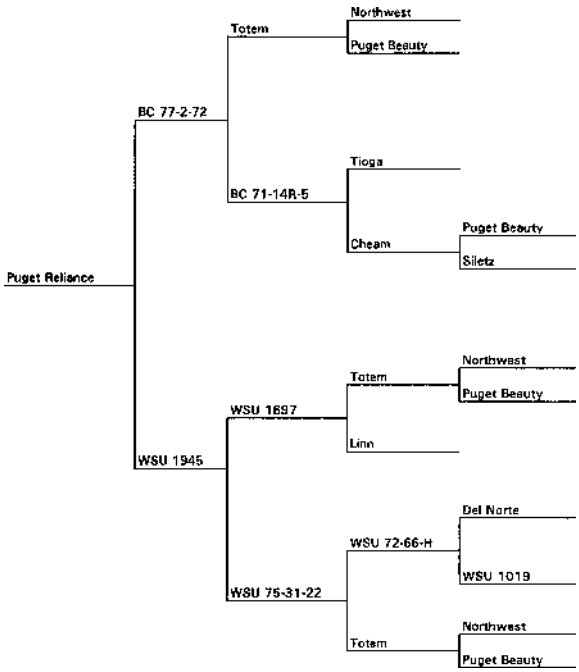

Fig. 1. Pedigree of 'Puget Reliance'. 'Puget Beauty' was also a parent of WSU 1019. Del Norte is a *Fragaria chiloensis* clone.

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Table 1. Fruit yield and weight of 'Puget Reliance' in the year after planting compared to other Pacific Northwest cultivars.

Cultivar	Yield[z] (kg/plot)	Fruit wt[y] (g)
Puget Reliance	12.0 a[x]	15.8 a
Sumas	9.0 ab	12.0 b
Totem	7.5 b	11.4 b

[z]Mean of three replications of 3.1 × 1.1-m plots in four plantings at Puyallup and one planting at Mt. Vernon, Wash.
[y]Seasonal mean.
[x]Mean separation in columns by Duncan's multiple range test, $P \leq 0.05$.

Table 2. Yield and fruit characteristics of 'Puget Reliance' in second year after planting compared to Pacific Northwest strawberry cultivars.

Cultivar	Yield[z] (kg/plot)	2-year total yield (kg/plot)	Fruit wt[y] (g)
Puget Reliance	11.0 a[x]	22.4 a	12.3 a
Sumas	8.0 b	16.5 b	10.0 b
Totem	7.6 b	14.0 b	8.7 c

[z]Mean of three replications of 3.1 × 1.1-m plots in two plantings at Puyallup and one planting at Mt. Vernon, Wash.
[y]Seasonal mean.
[x]Mean separation in columns by Duncan's multiple range test, $P \leq 0.05$.

Table 3. Chemical characteristics of strawberry fruit grown at Puyallup, Wash., 1992.

Cultivar	pH[y]	Titratable[z] acidity (%)	Soluble solids concn (%)
Puget Reliance	3.27 b[x]	0.70 ab	7.8 b
Totem	3.57 a	0.42 c	8.7 ab
Sumas	3.47 a	0.58 bc	9.3 a
Nanaimo	3.47 a	0.63 bc	9.6 a
Redcrest	3.24 b	0.87 a	8.6 ab

[z]Titratable acidity expressed as percent citric acid.
[y]Fruit data are means of three samples of 10 g for each clone, fruit from second harvest season.
[x]Mean separation in columns by Duncan's multiple range test, $P \leq 0.05$.

Fig. 2. Plant of 'Puget Reliance' showing fruit and growth habit.

Table 4. Leaf, inflorescence, and fruit characteristics of 'Puget Reliance', 13 months after planting, compared to Pacific Northwest cultivars.

	Central leaflet[z]			Petiolule[z]	Peduncle[y]	Fruit[x]	
Cultivar	Length (cm)	Width (cm)	Serration no.	length (mm)	length (cm)	Length (cm)	Width (cm)
Puget Reliance	8.5 a[w]	6.7 b	20.0 bc	15.5 a	15.1 b	4.1 a	3.5 a
Benton	6.9 b	5.3 b	18.6 c	6.1 b	20.4 a	3.6 a	3.0 b
Sumas	9.1 a	8.3 a	24.3 a	12.1 a	20.9 a	3.9 a	3.1 b
Totem	6.5 b	6.1 b	21.3 b	7.8 b	15.6 b	3.8 a	3.0 b

[z]Mean of 10 leaves, collected 29 June 1994.
[y]Mean of 10 inflorescences, collected 22 June 1994.
[x]Mean of 10 primary fruit, collected 22 June 1994.
[w]Mean separation in columns by Duncan's multiple range test, $P \leq 0.05$.

desirable for maintaining fruit quality of frozen fruit (Wrolstad et al., 1970). The anthocyanin concentration of 'Puget Reliance' fruit did not differ from that of the other Pacific Northwest cultivars (range, 406 to 562 $\mu g \cdot g^{-1}$, fresh weight basis). Wrolstad et al. (1970) concluded that anthocyanin concentration of fruit should be in the approximate range of 450 to 700 $\mu g \cdot g^{-1}$ to have acceptable color quality. Thus, 'Puget Reliance' fruit should be satisfactory as a processed product.

Plant description

'Puget Reliance' plants are vigorous with an erect growth habit. The leaves are medium in size and the petiole hairs are irregularly perpendicular to the axis of the petiole. The leaves rarely have leaflike bracts. The leaf color of 'Puget Reliance' is similar to that of 'Totem' and 'Sumas'. The base of the terminal leaflet forms about a 90° angle where it joins the petiolule. The serrations on the leaf are generally even-sized and begin one-third of the way from the petiolule. The fruit of 'Puget Reliance' is usually smooth, glossy, and symmetrically conic with inserted seeds. The calyx is easily removed at picking. 'Puget Reliance' can be readily distinguished from the leading Pacific Northwest cultivars by leaf, fruit, and inflorescence characteristics (Table 4).

Disease and pest reactions

'Puget Reliance' is susceptible to the strawberry aphid, *Chaetosiphon fragefolii*, an aphid vector of viruses, but is highly tolerant to virus complexes common in the Pacific Northwest. It is susceptible to leaf scorch (*Diplocarpon*), anthracnose fruit rot (*Colletotrichum*), and to adult and larval root weevils in a field with black vine weevil [*Otiorhynchus sulcatus* (Fabricius)] and obscure root weevil (*Sciopithes obscurus* Horn). Common leaf spot [*Mycosphaerella fragariae* (Tul.) Lindau] and powdery mildew [*Sphaerotheca macularis* (Wallr. ex. Fr.)] have not been a problem. 'Puget Reliance' has not been tested for resistance to specific races of red stele, causal organism *Phytophthora fragariae* Hickman, but performed well at Mt. Vernon on nonfumigated land.

Availability

Names of propagators with certified 'Puget Reliance' plants will be supplied by P.P.M. on request. 'Puget Reliance' will be patented, patent pending.

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