'Pacific' Lettuce

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'Pacific' is the third lettuce (*Lactuca sativa* L.) cultivar released from a big vein resistance breeding program begun in 1957. Of the two cultivars that were released in 1981 (Ryder, 1981a, 1981b), 'Thompson' was more resistant to big vein than 'Sea Green', but the latter had a more acceptable appearance and head conformation. 'Pacific' combines big vein resistance comparable to 'Thompson' with head conformation, color, and general appearance similar to 'Salinas', the standard cultivar for the California coastal lettuce areas.

Origin

'Pacific' was released in 1986. It was selected from progeny of a cross 72-136 × 'Salinas' (Fig. 1). 72-136 was the breeding line later released as 'Thompson'. It was derived from a cross between 'Merit' and breeding line 2741, both of which showed low to moderate resistance to big vein. The cross with 'Salinas' was made in 1976, and the F₁ was grown in the greenhouse in Winter 1976-77. A program of pedigree selection followed, using both single-plant and mass selection. Low temperature encourages big vein symptom expression (Westerlund et al., 1978). Therefore, to select for resistance, the F₂ and subsequent generations were grown in an unheated section of the greenhouse during the winter months in soil naturally infested with the big vein virus vector *Olpidium brassicae* (Wor.) Dang. Symptomless F₂ plants with the 'Salinas' leaf type were selected to produce seed, and 133 F₃ lines were grown in the greenhouse the following winter. Families with uniform leaf type and no or few plants with big vein symptoms were identified. Within these families, symptomless plants were selected to produce the F₄ generation. The same procedure was followed with the F₄ generation. Seed was bulked within families. Line 78-1034-83-3 was one of 26 F₄ families superior to 72-136 in the proportion of plants free of big vein symptoms. The families ranged from 81.6% to 97.2% without symptoms, compared to 79.5% for 72-136. Seed from symptomless plants of these families were bulked.

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During the 1980-81 season, F₂ families were tested for resistance in the greenhouse during the winter and in the field during the spring. Line 80-1671(78-1034-83-3M) performed relatively poorly in the greenhouse, but was one of the 10 best lines in three field trials. In four field trials during Spring, 1981-82, it was one of the four best lines out of 11 for harvest percentage, but ranked ninth for big vein percentage. It was increased in the greenhouse in Summer 1982 and planted as 80-1671M in six field trials in 1982-83. Another greenhouse increase under the number 83-1022 (F₂) was followed by field trials in 1983-84 and 1984-85. Five single-plant (F₃) selections were increased in 1984-85. These were homozygous for black seed and scallop margin leaf type and were massed for release as 'Pacific'.

Description

'Pacific' has dull, medium-dark-green

leaves, similar to 'Salinas'. Green pigmentation extends close to the core on a partially trimmed head. The interior is creamy yellow. The heads are firm to hard at maturity and will normally pack 24 heads to a standard lettuce carton. Under cold stress, the heads maintain acceptable size. Heads are well rounded, usually well covered on top, and occasionally spiralled. The butt is flat, with broad-based overlapping leaves and large core diameter. Ribs are slightly less flat than those of 'Salinas'. Leaf margins are similar to 'Salinas', with relatively shallow indentation and rounded rather than pointed lobes. The texture is relatively soft and slightly less crinkled than 'Salinas'. Seed is black.

Disease reactions

'Pacific' is big-vein-resistant (Table 1). The term is used in a relative sense and is based on the proportion of plants showing big vein symptoms in a given environment at a given time. The proportion varies depending on the conditions in the field. A population with a consistently lower proportion of plants showing symptoms is thus considered more resistant than one with a higher proportion. In these terms, the level of resistance has been increased with breeding. Modern cultivars may be compared with 'Great Lakes', which has a low level of resistance. 'Calmar' and 'Salinas' have low to moderate resistance; 'Merit' and 'Sea Green' have mod-

Table 1. Incidence of big vein and percentages of heads harvested of 'Pacific' lettuce compared to two other commercial cultivars in 1982, 1983, and 1985 trials.

Year	Ranch, lot ^a	Cultivar	Percent big vein ^b	Percent harvested ^b	Date ^c
1982	Westphal, 40	Pacific	10.4 BCD	67.6	29 Apr.
		Salinas	37.7 E	48.3	
		Thompson	12.2 CD	61.5	
	Westphal, 43	Pacific	18.5 AB	87.4 AB	26 May
		Salinas	36.0 CD	68.2 BCD	
		Thompson	19.3 AB	62.0 CD	
1983	Silva, 1	Pacific	16.0 ABC	72.0 A	2 May
		Salinas	35.0 BCD	28.0 CD	
		Thompson	28.1 ABCD	28.0 CD	
	Williams, 5	Pacific	9.5 A	84.0 A	5 May
		Salinas	60.2 C	48.0 CD	
		Thompson	14.5 AB	35.0 D	
	Westphal, 38	Pacific	40.8 BC	20.0	5 May
		Salinas	72.8 E	6.0	
		Thompson	47.0 CD	18.0	
	Westphal, 40	Pacific	13.0 BCD	58.0 ABC	25 May
		Salinas	28.7 EF	59.0 ABC	
		Thompson	8.4 ABC	44.0 BCDE	
	Westphal, 39	Pacific	12.0 AB	86.0 A	26 May
		Salinas	46.9 EF	53.0 BC	
		Thompson	16.6 ABC	50.0 BC	
	Silacci, 53	Pacific	10.0 A	69.0 A	1 June
		Salinas	61.6 C	55.0 AB	
		Thompson	11.7 AB	44.0 ABC	
1985	Corda, 3	Pacific	4.2 AB	50.0 AB	13 May
		Salinas	32.2 DE	13.6 E	
		Thompson	12.1 ABC	52.6 A	
	Thompson, 2	Pacific	6.8	65.6	13 May
		Salinas	4.0	55.4	
		Thompson	2.3	59.3	

^aLot number identifies a field location on the named ranch.

^bThese data were extracted from replicated tests made in commercial lettuce fields. Mean separation within locations for each trait by Duncan's multiple range test. Uppercase letters indicate significance at *P* = 0.01. Other comparisons are nonsignificant.

^cDate of first harvest.

Fig. 1. Pedigree of 'Pacific' lettuce.

erate resistance; and 'Thompson' and 'Pacific' have moderate to high resistance. No cultivars are yet available with complete resistance.

'Pacific' is susceptible to lettuce mosaic. It is resistant to Pathotype 1 of *Bremia lactucae* Regel (downy mildew), but susceptible to Pathotypes 2 and 3 (T. Schettini and R. Michelmore, personal communication). Under some conditions, it is subject to rib discoloration, a field problem of uncertain cause, but usually associated with high temperatures (Lipton et al., 1972). It is susceptible to corky root rot (*Rhizomonas suberifaciens* gen. nov., sp. nov.) (van Bruggen et al., 1990). It has not been tested against lettuce root aphid (*Pemphigus bursarius* L.), lettuce infectious yellows, or *Sclerotinia mi-*

nor Jagger. It is moderately resistant to tipburn, but less so than 'Salinas'.

The reaction of 'Pacific' to postharvest disorders, such as pink rib and russet spotting, has not been tested.

Adaptation and yield

'Pacific' has been developed for production during periods of low temperature and big vein stress, most specifically for the coastal districts of California in the spring. Under these conditions, it is less prone to big vein than the principal cultivar for the area, 'Salinas', and often produces a higher percentage of heads of adequate size, shape, and uniformity (Table 1). However, a low level of big vein does not always mean higher

yield; yield can be affected by other factors, including the condition of the lettuce market (Ryder, 1979; Zink and Grogan, 1954). The principal constraint on the future use of 'Pacific' may be its sensitivity to rib discoloration.

Availability

'Pacific' has been released to the seed industry and is available in commercial quantities.

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