'Salinas 88' Lettuce

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The crisphead lettuce (*Lactuca sativa* L.) cultivar Salinas was released in 1975 and has become the most widely grown lettuce cultivar in the world (Ryder, 1979). A cultivar that has achieved this level of dominance is best improved by backcrossing, to enhance an already stable and valuable genotype by adding favorable alleles for disease resistance and other useful traits. One of the necessary improvements for 'Salinas' was the addition of resistance to lettuce mosaic virus (LMV). 'Salinas 88' is the product of such improvement and is the first in an anticipated series of cultivars incorporating several genes for disease and insect resistance.

Origin

'Salinas 88' was released in 1988. It was developed in a greenhouse backcross program that began with the cross 74-909-9 $\times$ 67-345-7-6. The male parent was increased another generation and released as 'Salinas'. The female parent was LMV resistant; it was derived in a series of crosses incorporating LMV resistance from PI 251245, an accession from Egypt (Fig. 1). Eight F_2 plants from 74-909-9 $\times$ 'Salinas' were crossed to 'Salinas' (BC_1). Seven resistant segregates from BC_1F_2 were crossed to 'Salinas' (BC_2). Four resistant segregates from BC_2F_2 were crossed to 'Salinas' (BC_3). Each of these crosses was made with the resistant segregates as females; successful crosses were separated from selfs by inoculation with LMV. Selfs were all resistant, while crosses segregated for disease reaction. BC_4 was made with 'Salinas' as the female parent and four heterozygous BC_3F_2 plants as male parents. Seed was increased from BC_4F_2 resistant

segregates and planted in the U.S. Dept. of Agriculture field plots for observation and comparison to 'Salinas' for similarity in appearance and growth characteristics. BC_4F_4 seed was used for 1987 commercial field trials in the Salinas Valley. Four lines were included in the trials; one was discarded because it was slightly off-type. The other three, 86-102M, 86-107M, and 86-114M, were bulked to form the 'Salinas 88' seed lot for release.

Description

The appearance and performance of 'Salinas 88' is the same as 'Salinas', except for reaction to LMV, as described below. 'Salinas 88' has dull, dark-green outer leaves, matching chip 143B on the Royal Horticultural Society Colour Chart (1966). The green pigmentation extends close to the core. The interior is creamy yellow. Heads are firm to hard at maturity, varying in size according to temperature and other growing conditions, but usually ≈ 15 cm in diameter and packing 24 heads to the carton. The head is well rounded. It is usually partially covered, rarely spiralled. The butt is usually flat. Ribs are flat, the core is large, and the bases of the outer leaves overlap well.

Leaf margins are slightly incised and indented and mildly undulated. Texture is relatively soft and flexible, minimizing breakage during handling. The leaf surface is slightly crinkled. Outer leaves are broader than long. Seed is black.

Disease reactions

'Salinas 88' has the same LMV resistance gene, *momo* (Ryder, 1970), as found in 'Vanguard 75', 'Winterset', and 'Autumn Gold'. Reaction to the common strain of LMV is the same as reported previously: late expression of symptoms, which are small, irregular chlorotic lesions. This form of resistance may be described as a high level of tolerance to a systemic infection. The same gene confers virtual immunity to a new strain of LMV, which first appeared in the Salinas

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Fig. 1. Pedigree of 'Salinas 88' crisphead lettuce.

Table 1. Yields of lines combined as 'Salinas 88' compared to 'Salinas' in 1987 field trials in the Salinas Valley, Calif.^z

Item	Trial no.				Mean
	1	2	3	4	
86-102M	2100	1850	350	1360	1415
86-107M	1930	1730	470	1480	1402
86-114M	2120	2050	370	1380	1480
Salinas	1930	1800	640	1210	1395
	NS	NS	NS	NS	

^zPercent of heads harvested, converted to cartons of 24 heads each per hectare based on a maximum of 2470 cartons per hectare.

Valley in 1986 and has persisted in the valley in subsequent years. The new strain, designated as the Firestone strain because it was first seen in the vicinity of the Firestone tire plant in the area, is more virulent than the common strain, but causes no reaction in resistant cultivars and cannot be recovered from them.

'Salinas 88' has the same high level of resistance to tipburn as 'Salinas'. It has the same level of susceptibility to big vein and corky root (*Rhizomonas suberifaciens* gen. nov., sp. nov.) (van Bruggen et al., 1990) as 'Salinas'. 'Salinas 88' has the same series of downy mildew (*Bremia lactucae* Regel) resistance genes as 'Salinas' and therefore shows resistance to Pathotype I and susceptibility to Pathotypes II and III in California (R. Kesseli, personal communication). Other disease reactions have not been tested but can be assumed to be the same as or very similar to 'Salinas'.

Performance and adaptation

Data from four replicated trials in the Salinas Valley in 1987 showed no significant difference in the percentage of heads harvested (converted to cartons per hectare) among the three lines making up 'Salinas 88' and 'Salinas' (Table 1). There was no lettuce mosaic in these trials, and the results are consistent with expectations in a comparison between a backcross-derived cultivar and its recurrent parent. 'Salinas 88' should have the same adaptation as 'Salinas' when planted in other districts or time periods. The occurrence of LMV should be the only important factor to cause a yield difference.

Availability

'Salinas 88' has been released to seed companies and is available in commercial quantities.

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