A SECOND costata GENE (lum-2) ON CHROMOSOME 3

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The chlorophyll gene costata (Lum) was Isolated, described, named, and localized to chromosome 4 by Monti (1). The mutant was induced in cv. 'Parvus' alter DES treatment and is characterized by lighter interveinal leaf tissue; veins are normal green (Fig. 1). Linkage between Lum and Le was calculated as 12.0 + 4.6.

Some costata mutants were also recovered from an experiment with combined treatment 200rNt + 0.014% NEU of cv. 'Paloma' (2), one of which was designated Wt l5307. A locus Identity test cross revealed that the mutant in Wt l5307 is different from Wl. 6011, the type line for lum, i.e. the F1 plants were normal.

Preliminary linkage studies involved the analysis of an F2 population of 202 plants from the cross Wl. 851 (Blixt's tester-line) x Wt 15307 (costata mutant). Monogenic inheritance was shown for the mutant character costata and other marker genes (Table IA). The dihybrid segregation suggested linkage with St in chromosome 3 (Cr0=28.6) but not with the B segment (Table IB). For this reason line Wt l5307 was crossed with WL I288, a tester-line with b, st, and M markers. The dihybrid segregation (480 F2 plants in 1986) confirmed the results of the earlier cross (Table 2): monogenic segregation for the costata mutant, linkage with St (32.4 + 4.02) and no linkage with B. Additionally, very close linkage was found between the costata mutant and M (CrO = 1.74). A multi-point analysis involving eg. Lap-2 and/or uni should be performed to establish the order of mutants in the M region of chromosome 3.

It is suggested that the symbols lum-1 and lum-2 be applied to the two costata genes located in chromosomes 4 and 3 from Portici and Wiatrowo, respectively.

1. Monti, L. M. 1970. PNL 2:21-22.
2. Swiecicki, W. K. 1984. PNL 16:84-86.

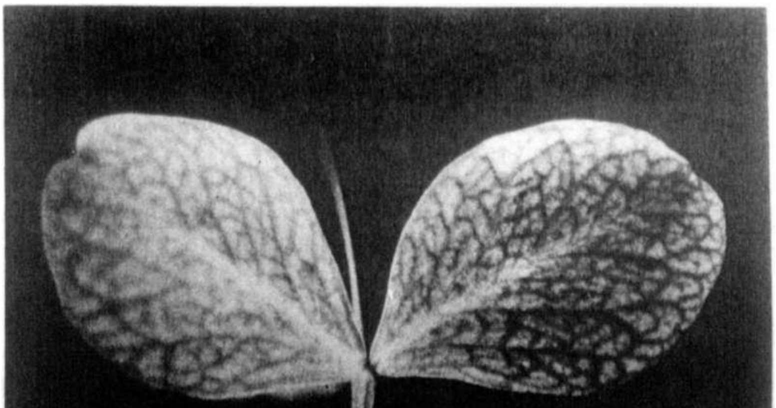

Fig. 1. Costata mutation type.

Table 1. Phenotypic distribution in an F2 population from a cross between Wt 15307 (costata) x WL 851 (testerline).

A. Monohybrid F2 segregation

B	b	Total	Chi-square (3:1)
119	46	165	0.73
St	st		
142	60	202	2.38
Lum-2	lum-2		
161	41	202	2.38

B. Joint segregation of <u>Lum-2</u> with <u>B</u> and <u>St</u>

B St	B st	b St	b st	Total	Joint chi-square	Recomb. fract.	S.E.
94	25	20	26	165	20.43	29.54	4.37
B-Lum-2	B lum-2	b Lum-2	b lum-2				
95	24	34	12	165	0.71	54.66	5.52
St Lum-2	St lum-2	st Lum-2	st lum-2				
105	37	56	4	202	9.44	28.64	6.37

Table 2. Phenotypic distribution in an F2 population segregating for <u>costata</u> from Wt 15307 (<u>lum-2</u>) x WL 1288 (testerline).

A. Monohybrid F2 segregation

St	st	Total	Chi -square (3:1)
350	130	480	1.11
M	m		
289	71	360	5.35
Lum-2	lum-2		
374	106	480	2.18

B. Joint segregation of <u>Lum-2</u> with St and M

St M	St m	st M	st m	Total	Joint chi-square	Recomb. fract.	S.E.
202	62	87	9	360	8.96**	34.97	4.55
St Lum	St lum	st Lum	st lum				
256	94	118	12	480	17.64**	32.45	4.02
M Lum	M lum	m Lum	m lum				
287	2	4	67	360	313.00**	1.74	0.69

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