

DETERMINATE GROWTH (det) IN PISUM; A NEW MUTANT GENE  
ON CHROMOSOME 7

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A characteristic feature of the growth and development of legume plants is the lack of clear demarcation between the vegetative and generative phases. Conversely, in cereals the growth of the vegetative mass ceases at the time of flowering and assimilates are destined for filling grains. A similar plant model for legumes wherein there is a clear end of the vegetative growth may result in assimilates being transported to seeds and resulting in earlier, more uniform maturity with possibly higher seed yield. Other mechanisms of changing the vegetative/reproductive relationships are known. In white lupine, for example, the cultivar 'Wat' sheds its leaves in the full, green pod stage. Moreover, narrow-leaved, unbranched genotypes of white and yellow lupine have been selected, i.e. a single main stem develops with the inflorescence on the top. Additionally, nodes with single flowers appear instead of branches (3). The field bean (Vicia faba), like the pea, produces inflorescences on successive nodes along the stem axis. But a mutation type with determinate growth, controlled by a single gene, has been found (1); the stem is terminated with an inflorescence.

A gene with similar effect was found in pea in 1980 after seed treatment of line Wt 3527 with a combined dose 200r Nf + 0.014% NEU (2,A) and reported for the first time at the Eucarpia meeting, Section for Gene Resources (5). Plants are characterized by an inflorescence at the top of the stem and a small number of flowering nodes (Fig. 1). Sometimes apical flowers are abnormal (open) but fertile. The mutant was assigned catalog number Wt 16100 in the Wiatrowo genebank.

The line is phenotypically similar to a mutant collected at John Innes Institute (Matthews, personal communication). In the locus/allelism test (Wt 16100 x JI 1358) the F1 plants were of the determinate growth type, indicating that both mutants are controlled by the same gene.

For the linkage test, tester line WL 1238 was crossed with mutant Wt L6100. F1 plants were normal and the F2 segregation showed monogenic, recessive inheritance (Table 1A). The suggested symbol for this character is det (determinate growth).

Dihybrid segregation showed linkage between Det and markers on chromosome 7, viz. R and T1 (Table 1B). Further analyses for mapping with selected testerlines for chromosome 7 are in progress.

1. Starzycki, St. 1981. Proc. XIV Int. Conf. Genet., Vol. I, Book II, Moscow, pp. 260-267.
2. Swiecicki, W. K. 1983. Hod. Ros. Ak. Nas 27(4):221,276.
3. Swiecicki, W. 1984. Proc. Illrd Intl. Lupin Conf., La Rochelle, France, JLA:191-205.
4. Swiecicki, W. K. 1984. PNL 16:84-86.
5. Swiecicki, W. K. 1986. Eucarpia, Genetic Resources Sect., Symposium, Warsaw/Radrikow. p. 24.

Table 1. Phenotypic distribution in F<sub>2</sub> population segregating for determinate growth from the cross WL 1238 (tester line) x Wt 16100 (det).

A. Monohybrid F<sub>2</sub> segregation

R	r	Total	Chi-square (3:1)
333	123	456	0.95
Tl	tl		
361	133	494	0.97
Det	det		
378	111	489	1.38

B. Joint segregation of Det with R and Tl

Tl R	Tl r	tl R	tl r	Total	Joint chi-square	Recomb. fract.	S.E.
321	17	12	106	456	317.1**	6.35	1.18
Tl Det	Tl det	tl Det	tl det				
253	107	125	4	489	37.7**	18.61	4.33
R Det	R det	r Det	r det				
231	102	119	4	456	38.8**	18.66	4.48

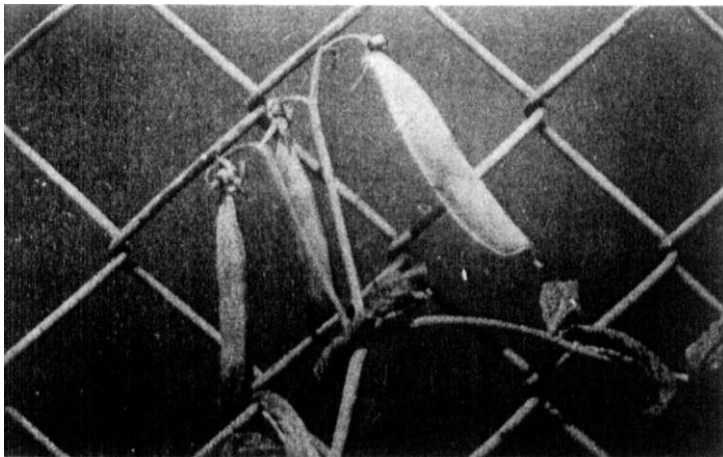


Fig. 1. Determinate growth in Pisum.

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