THE REACTION OF PISUM GENOTYPES TO EXTREME SHORT DAY CONDITIONS

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Three mutants and 29 recombinants of our Pisum collection were grown together with their mother variety 'Dippes Gelbe Viktoria' (DGV) in the phytotron under extreme short day (SD) conditions with only 6h light per day. All the other environmental conditions were the same as in our former trials (25C day, 15C night; 60% humidity). Ten plants of each genotype were grown in Mitscherlich pots. Flowering behavior, plant height, number and length of internodes were evaluated. The material may be subdivided into two groups. All the genotypes of the first group are homozygous for efr, a gene for earliness derived from recombinant R 46C. In addition, the recombinants of this group contain one or several other mutant genes. The second group of genotypes do not contain gene efr.

Only three of 20 plants of DGV reached the flowering stage; all others died earlier in development. A similar behavior was observed for two mutants and five recombinants, four of them containing gene efr for earliness. All these genotypes showed abnormal development under the unfavorable light conditions. In another group of six recombinants, flower buds appeared but did not develop further. Four recombinants of this group are homozygous for efr. The fasciated mutant 489C and recombinant R 142F were still in a purely vegetative stage when the trial was terminated 83 days after sowing.

The flowering behavior of the other recombinants tested is shown in Fig. 1. Out of ten plants of R 46C, the donor of gene efr for earliness, only a single plant formed some fully developed flowers whereas the others had undeveloped flower buds or they died in earlier stages. Thus, this recombinant showed the same negative reaction to the low amounts of light as its mother variety DGV. A completely different behavior was observed for the recombinants R 840, R 427, and R 430, likewise homozygous for efr. Their development was relatively normal and they produced small amounts of seed, thus demonstrating a high degree of tolerance to the unfavorable light conditions.

The table below shows the comparison of the flowering behavior of these genotypes under normal and under extreme SD conditions.

	Number of days to flower	
	Normal short day	Extreme short day
Genotype	12/12h	6/18h
R 840	32 - 36	40 - 51
R 427	32 - 42	45 - 50
R 430	38 - 48	64 - 78

As expected, a considerably longer time was required to reach the flowering stage in extreme SI) as compared to normal SD. The difference was espe cially great in R 430. The significant point, however, is that the; recombinants were at all able to survive and to produce seeds under these unfavorable conditions.

The results show that the selection value of specific genotypes, in our case the cultivar 'Dippes Gelbe Viktoria' and the early flowering recombinant R 46C, can be considerably improved under the influence of distinct mutant genes even under extremely unfavorable environmental conditions.

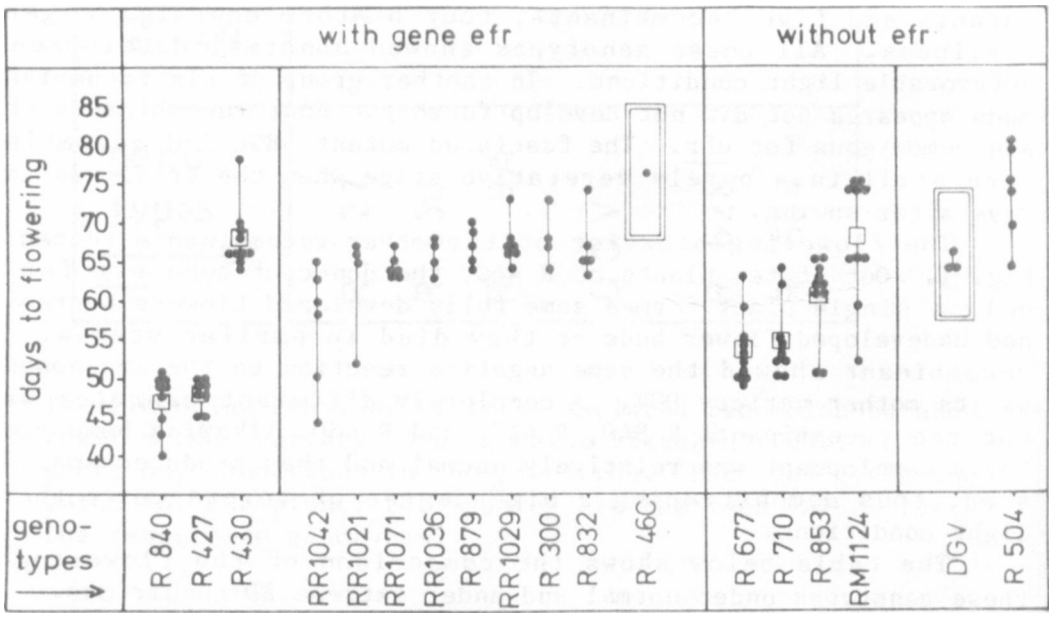

Fig. 1. The flowering behavior of 17 Pisum recombinants under extreme short day conditions in the phytotron. The genotypes of the first group contain gene efr for earliness derived from R 46C. The genotypes of the second group do hot contain this gene. DGV ('Dippes Gelbe Viktoria') is the mother variety of our radiation genetic experiments. Each dot gives the value for one plant.