

ACTION OF GENE *gf* AS INFLUENCED BY ENVIRONMENT AND BACKGROUND GENOTYPE

Gottschalk, W. Institute of Genetics, University of Bonn, West Germany

Gene *g_f* of *Pisum* causes reduced flowers which are greenish in color due to the presence of some chlorophyll in the petals. Plants of the X-ray induced mutant 189 of our collection are homozygous for *gf* but are otherwise normal. They flower belatedly and show unusual sensitivity to changes in environmental conditions. Plants of this genotype produced a seed yield about 50% higher than that of the mother variety in 1978, but no seeds at all in 1977. In the other 13 generations tested so far, the mean values for seed yield per plant ranged between 1 and 79% of the control values of the initial line.

In 1979, 22 different recombinant lines were available at our institute, all homozygous for *gf* and one or several other mutant genes of our collection. They were grown in several replications and their seed production was compared with that of the parental mutant 189 (Fig. 1). The seed yield of mutant 189

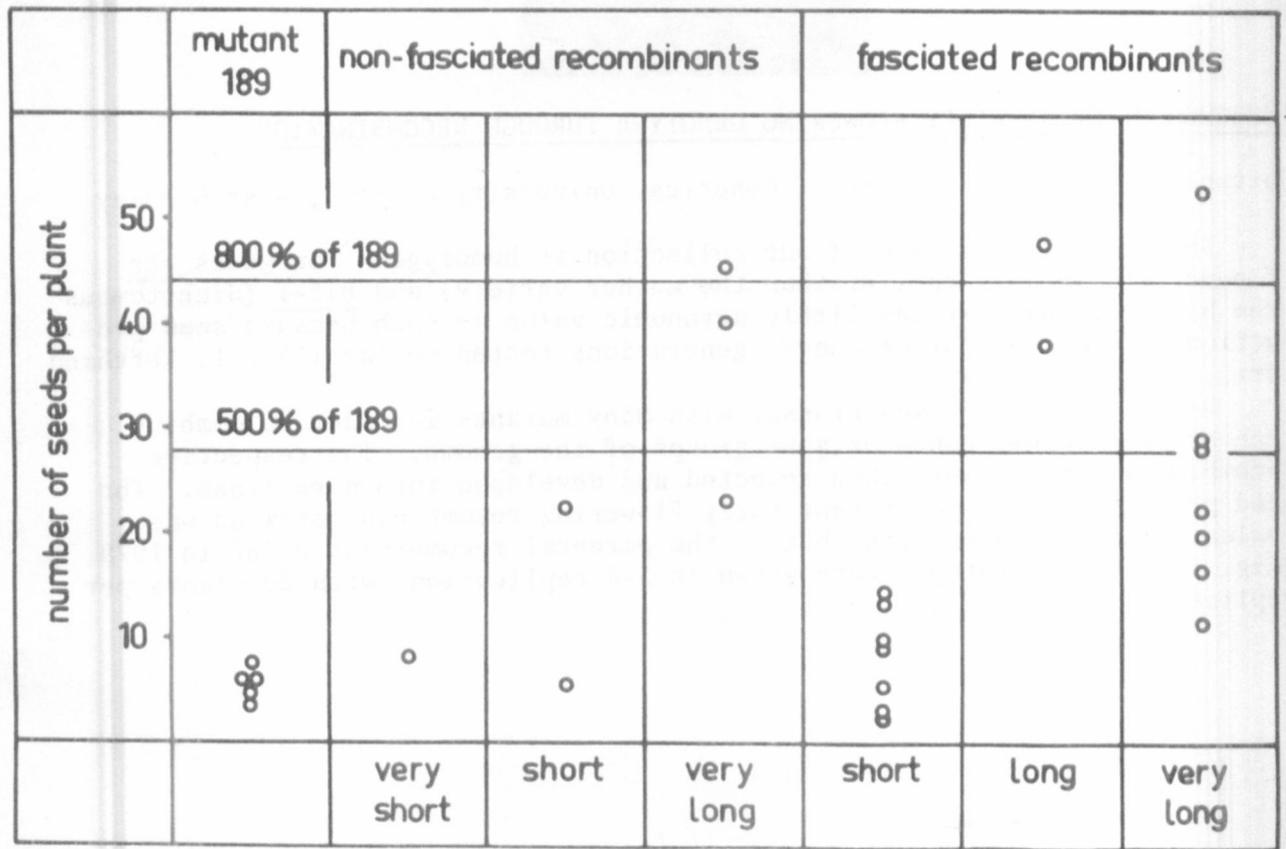


Fig. 1. Seed production of mutant 189, homozygous for gene *gf*, and of 22 recombinant lines homozygous for *gf* and for other specific genes. Each dot represents the mean value for the number of seeds per plant obtained in 1979. All the values are related to the control values of the initial line.

was very low, ranging between 3.6 and 7.6% of the control over 5 replications (lefthand part of the figure). Some of the green flowering recombinants had an equally low seed production so yield was not improved by combining gene gf with the other genes involved. Some other recombinant types, however, showed a strikingly better yield than mutant 189; details can be seen from the figure. Of particular interest is a small group of long-stemmed recombinants exceeding mutant 189 by 400 to 800%. This holds true for certain fasciated as well as for certain non-fasciated genotypes, the genes for stem fasciation and long internodes deriving from mutant 489C of our collection.

These findings show that the reduced seed production of mutant 189 is not necessarily correlated with the presence of gene gf. On the contrary, combinations between gf and other mutant genes gave excellent yields. Thus, gene gf shows a high degree of dependence not only on certain environmental factors but also on the genotypic background.

Mutant 189 is without any interest for pea breeding. It is quite possible, however, that other genes of known agronomic value might show a similar behavior.

IMPROVEMENT OF AN EARLY FLOWERING GENOTYPE THROUGH RECOMBINATION

Gottschalk, W. Institute of Genetics, University of Bonn, West Germany

The recombinant R 46C of our collection is homozygous for genes efr (flowering 7-10 days earlier than the mother variety) and bif-1 (dichotomous stem bifurcation). It has little agronomic value as such because seed production was low in most of the 21 generations tested so far (Fig. 1; lefthand part).

Recombinant R 46C was crossed with many mutants in order to combine gene efr with other genes or gene groups of the genome. The respective recombination types were then selected and developed into pure lines. The seed production of 59 different early flowering recombinant strains was evaluated and compared with that of the parental recombinant R 46C in 1979 (Fig. 1). Most genotypes were grown in 3-5 replications with 20 plants per replication.