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

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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.

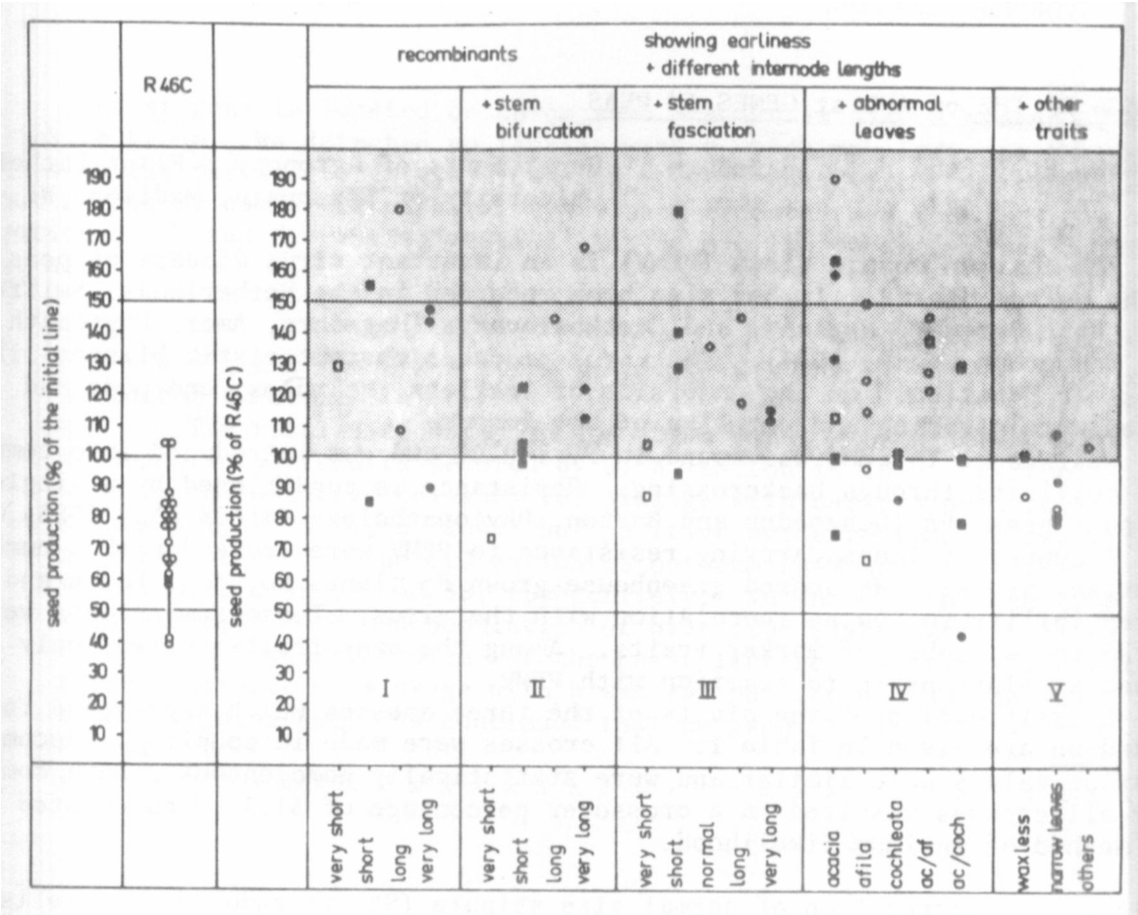

Fig. 1. Left: Seed production of the early flowering recombinant R 46C in 21 generations. Each dot represents the mean value for the number of seeds per plant for one generation as related to the control values of the mother variety 'Dippes gelbe Viktoria'.

Right: The seed production (number of seeds per plant) of 59 early flowering recombinant lines as related to the control value of R 46C. Each dot represents the mean value for one line grown in 1979.

The genetically heterogeneous material can be subdivided into five morphologically different groups according to internode length, stem fasciation or bifurcation, leaf morphology, or other mutant characters. In each group, some of the genotypes produced considerably more seed than R 46C. This was true not only for longstemmed genotypes, but also for some recombinants with reduced internode length or even for some dwarfy genotypes.

The findings show that it was possible to improve the selection value of the early flowering recombinant R 46C by combining its two mutant genes with other mutant genes of the genome. The recombinants available represent an interesting series for studying problems of interactions between mutant genes.