A DWARFY' PISUM GENOTYPE WITH AN EXCEPTIONALLY HIGH PHYSIOLOGICAL EFFICIENCY

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The spontaneously arisen acacia mutant of Blixt's collection is homozygous for gene tl^{w} causing terminal leaflets instead of tendrils. It was crossed with our X-ray induced fasciated mutant 489C homozygous for, among other mutant genes, at least 4 genes responsible for different internode lengths. In F2, a dwarfy non-fasciated recombinant with acacia leaves was selected. It was crossed with recombinant R 46C homozygous for genes efr (earliness) and bif-1 (stem bifurcation) giving rise to recombinant R 455.

The plants of this remarkable recombinant are only about 25 cm long whereas the plant height of the mother variety 'Dippes gelbe Viktoria', used for our treatments, is about 85 cm, that of R 46C about 70 cm. In spite of their dwarfness and strongly reduced leaf area, the number of seeds per plant was equal to Dippes gelbe Viktoria and surpassed that of R 46C by more than 10% in 1979. This was due both to a high number of pods per plant and a relatively high number of seeds per pod (although the seed size is reduced). The plants of R 46C, used as one of the cross-parents for producing R 455, flower 7-10 days earlier than the mother variety because the lowest inflorescences are already formed at the 4th to 6th node (Dippes gelbe Viktoria: 10th to 14th node). However, the plants do not produce any seeds in the first 3-5 inflorescences although the meiotic behavior and the pollen fertility are completely normal. This behavior—together with certain structural anomalies of the lowest flowers which, however, do not influence their fertility - appears regularly in each generation and evidently is part of the pleiotropic action of the efr gene. lor this reason, plants of R 46C did not exhibit an improved seed yield. This disadvantage does not occur in the dwarfy plants of recombinant R 455. They begin to flower even earlier than R 46C and ripen considerably earlier and all flowers produce seeds. This behavior in comparison with R 46C could be due to an alteration of the pleiotropic action of gene efr under the influence of the gene for strong reduction of the internode length.

The surprisingly good seed production of the dwarfy plants of R 455, equal to that of vigorous pea plants of normal stature, indicates a very high physiological efficiency of the dwarfs. This will be analyzed in more detail. However, the absence of tendrils reduces the standability of this line leading to considerable seed damage in wet summers. We shall therefore replace the tl^{w} gene of R 455 by the af gene of the afila mutant. Dwarfy recombinants homozygous for the genes efr, af and the gene for strongly reduced plant height would have an excellent standing ability and would thus be better suited than R 455 for cultivation in the field.