

THE GENOTYPIC CONSTITUTION OF SOME LINEARLY FASCIATED RECOMBINANTS DERIVED FROM THE STRONGLY FASCIATED MUTANT 489C

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Mutant 489C of the variety 'Dippes Gelbe Viktoria' (DGV) shows a pronounced stem fasciation in the upper part of the stem combined with a strong shortening of the uppermost internodes. It is homozygous for about 15 mutant genes, most of them being hypostatic. Therefore, their action cannot be discerned in the mutant itself but only in specific recombinant types selected after having crossed 489C with non-fasciated genotypes. The mutant contains at least three, possibly four, genes causing different kinds of stem fasciation, the gene for strong fasciation being epistatic over the other genes of this group. Moreover, five different mutant genes for plant height and internode length are present in 489C1/. In 1980, they caused the following lengths of the main stem:

|                       |   |         |                    |
|-----------------------|---|---------|--------------------|
| - very long           | : | 160 cm  |                    |
| - long                | : | 122 cm; | manifested in 489C |
| - short I             | : | 99 cm   |                    |
| - short II            | : | 49 cm   |                    |
| - short III           | : | 28 cm   |                    |
| Dippes Gelbe Viktoria | : | 108 cm  |                    |

The gene for long internodes was found to be epistatic over the other four genes of this system. Some fasciated recombinant types were crossed with non-fasciated genotypes in order to clarify their genotypic constitution particularly with regard to the presence or absence of hypostatic genes. Theoretically, a variety of recombinants should be expected from such hybridizations differing from each other with regard to the total number of mutant genes derived from the parental mutant 489C. Hypostatic genes for a slightly reduced chlorophyll content and for extremely late flowering and ripening are not considered in these investigations. The following results were obtained:

Recombinant R 98B - from the cross of mutants 489C x 176 (narrow leaves, gene dim-1). The plants show the following characters: Short I (from 489C); linear stem fasciation, uppermost internodes not shortened (from 489C); stem in the top region often bifurcated (from 489C); later than the mother variety (from 489C); small seeds (either gene sg from 489C or the pleiotropic gene dim-1 from 176A). In F<sub>2</sub> of the cross DGV x R 98B, only two classes of phenotypes were observed: Normal plants, equal to the mother variety, R 98B. Thus, recombinant R 98B has a very simple genotypic constitution. Not present in its genome are: The epistatic genes for strong fasciation and for long internodes of 489C, and the hypostatic genes very long, short II, short III of 489C.

Recombinant R 161 - from 489C x 1201A (dichotomous stem bifurcation, gene bif-1). Characters: Short I (from 489C); linear stem fasciation (from 489C); later than DGV (From 489C); stem bifurcation (probably from 1201A). According to the F<sub>2</sub> segregations of the cross R 161 x DGV, the following genes of 489C are not present in the genome of R161: The epistatic genes for strong fasciation

"-Definite symbols are not yet given to the genes of mutant 489C because it is not yet clear whether some of them are identical with Pisum genes already designated.

and for long internodes; the hypostatic genes very long, short II, short III; and gene *sg* for reduced seed size.

Recombinant R 661 - from 489C x 26 (extremely shortened internodes; plant height only about 15 cm). Characters: Plant height equal to 489C; very weak linear fasciation (from 489C); normal seed size (from 26); normal flowering time (from 26). According to the  $F_2$  of the cross R 661 x DGV, the following genes of 489C are not present in the genome of R 661: The epistatic gene for strong fasciation; the hypostatic genes very long, short I, short II; the gene for lateness.

Recombinant R 667 - from 489C x 169 (chlorina). Characters: Plant height equal to 489C; very weak linear fasciation (from 489C); reduced seed size (gene *sg* of 489C); normal flowering time (from 169). According to the  $F_2$  of the cross R 667 x DGV, the following genes of 489C are not present in the genome of R 667: The epistatic gene for strong fasciation; the gene for lateness; whereas the hypostatic genes very long, short I, short II, and probably also short III as well as the gene for stem bifurcation are present. Thus, R 667 has a much more complicated genotypic constitution than the other recombinants mentioned so far.

Recombinant R 177 - from 489C x 1201A (dichotomous stem bifurcation; gene *bif-1*). Characters: Reduced grain size (gene *sg* of 489C); stem in the upper part of the shoot bifurcated (gene *bif-1* of 1201A); possibly a gene for weak stem fasciation (from 489C). According to the  $F_2$  of the cross R 177 x DGV, the recombinant contains exclusively gene *sg* and perhaps one of the *fasciata* genes of 489C whereas all the other genes of the mutant are not present.

R 177 is the simplest recombinant type selected in all the crosses in which mutant 489C has been used as one of the partners.