

IMPROVEMENT OF THE SEED PRODUCTION OF THE *afila* MUTANT

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The *afila* mutant, spontaneously arisen in Argentina and Russia, has branched tendrils instead of leaflets, giving a high degree of standing ability to the plants in dense stands. The *af* gene is being utilized in England and other countries in breeding programs. We have used Goldenberg's *afila* mutant for combining the *af* gene with specific mutant genes of our collection and for testing the seed production of the respective recombinant strains. The results (Fig. 1) obtained in 1979 are related to the control values of the variety 'Dippes gelbe Viktoria' which has been used as initial line for our radiation genetic experiments.

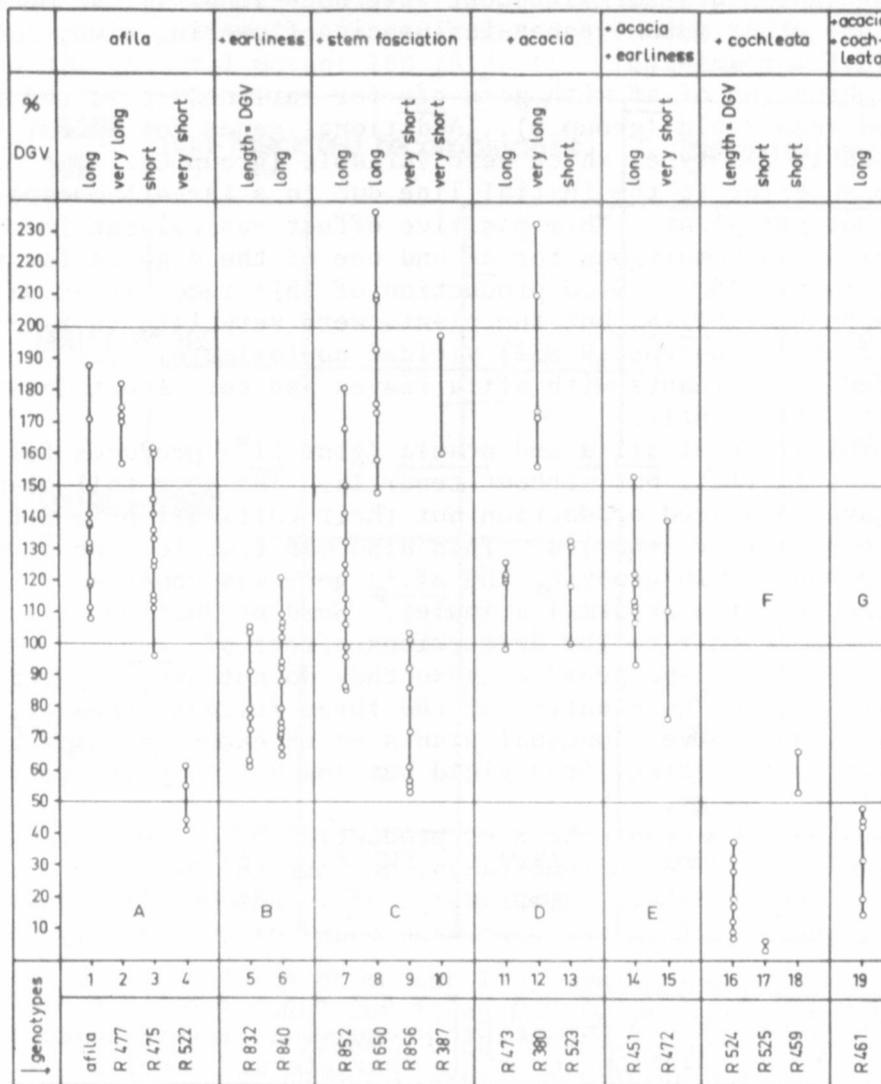


Fig. 1. Seed production of Goldenberg's *afila* mutant and of 18 different recombinant types homozygous for *gene af* and distinct mutant genes of our collection. Circles: Mean values for the number of seeds per plant in several replications of several successive generations as related to the control values of Dippes gelbe Viktoria.

The mean values for the number of seeds per plant of Goldenberg's afila mutant varied between 108 and 188% of the control values in the replications of 8 generations. The plants were somewhat taller than those of Dippes gelbe Viktoria. Group A of the figure contains some recombinant types, in which gene af is combined with genes for different internode lengths. A gene for shortened internodes reduced the plant height considerably, whereas the seed production over a long period was only slightly reduced (R 475). This was an improvement over the afila line from Goldenberg. A stronger reduction of the stem length, however, led to a very strong reduction of the seed yield (R 522). Recombinant R 477, on the other hand, which contains a gene for very long internodes, showed excellent yielding capacity, but the plants are too tall for cultivation in the field.

The groups B to G contain recombinants in which gene af is not only combined with the genes for different internode lengths just mentioned but also with some other mutant genes influencing flowering time, shoot structure, and leaf morphology.

The combination of af with gene efr for earliness resulted in genotypes with reduced seed yield (group B). Additional genes for apical stem fasciation resulted in genotypes which were variable (group C). Our fasciated mutants are superior to the initial line due to a large increase in the number of pods per plant. This positive effect was evident in the plants of R 650 which was homozygous for af and one of the 4 genes for stem fasciation of the mutant 489C. Seed production of this recombinant was clearly better than that of afila, but the plants were very late in ripening. A similar fasciated genotype (R 852) yielded approximately the same as afila. Two fasciated recombinants with afila leaves and very short internodes each yielded quite differently.

The combination of afila and acacia (gene tl') produces foliage leaves with many tiny leaflets but without tendrils. The very tall plants of R 380 (group U) gave good seed production but their cultivation is difficult because of the lack of tendrils. This also was true for the other recombinants of group 1). In group F, the afila gene was combined with the cochleata gene causing abnormal stipules. Seed production of these genotypes was very low due mainly to the deleterious effect of coch. These plants represent truly "leafless peas" because they do not have any leaf-like organs. Finally, the combination of the three foliage genes af, tl, and coch (R 461) leads to very unusual plants which cannot readily be discerned as peas prior to flowering. Seed yield was low but they are very interesting for theoretical reasons.

Our findings show that the seed production of Goldenberg's afila mutant could be improved in some cases, but not to the extent it has in England [or elsewhere--Ed.]. Obviously, af is not able to realize its optimal efficiency in the genotypic background of our variety Dippes gelbe Viktoria.

Editor's Note: A new commercial processing variety named 'Novella' combines the fasciation and afila characters. Novella is a freezer variety developed by the Rogers Bros. Seed Company in the U.S.

The practical merit of af from a breeding standpoint is seen chiefly in solid (commercial,) plantings where there is intense interplant competition.