YIELD POTENTIAL OF SEMI-DWARF AND DWARF GENOTYPES

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

About 30% of all mutants selected in our X-ray and neutron experiments are reduced in plant height. They are dwarfs or semi-dwarfs and do not represent a uniform group, neither morphologically nor anatomically nor genetically. The reduced plant height can be due to:

Reduction in number of internodes.

Reduction in length of internodes (being due to a reduction of either cell size or cell number).

The mutant genes of the short-stemmed genotypes can be dominant, recessive, or intermediate; moreover, they can belong to multiple series.

In general, the seed production of the dwarf or semi-dwarf mutants is lower than that of the mother variety. The yielding capacities of 37 short-stemmed mutants of our collection are graphically given in the left hand part of Fig. 1. Twenty-four of them have been tested in several generations. Their mean values for the character "number of seeds per plant" are connected by vertical lines. They are related to the corresponding means of the mother variety (= 100%), grown in the same year at the same location. The graph shows that only one mutant out of 24 was comparable with the initial line with regard to seed production. All others were inferior. This holds true also for the 13 mutants of this group which have been tested so far only in one generation; their single values are likewise given in the graph.

Some of the short-stemmed mutants were crossed with other mutants of our collection and a large number of different recombinant types is available at the Institute. Fifty-five dwarf or semi-dwarf recombinant lines have been studied with regard to grain yield. In 12 recombinants, values of several generations are available while 43 lines have so far only been tested in a single generation.(right hand part of the figure).

If we compare the distribution of the mean values of dwarf mutants and recombinants, a shift toward increased seed production in the recombinants is obvious. Quite a number of different recombinant types with reduced plant height and normal or even increased seed production in comparison to the mother variety is available. Some of these genotypes, derived from crosses with fasciated mutants, have small grains. In this material, the positive effect of the increased number of seeds per plant is offset by their reduced seed size. This negative correlation, however, is not present in some other recombinant lines of this group. They show a favorable combination of reduced internode length, normal seed size, and normal or even increased number of seeds per plant, and are being tested further.

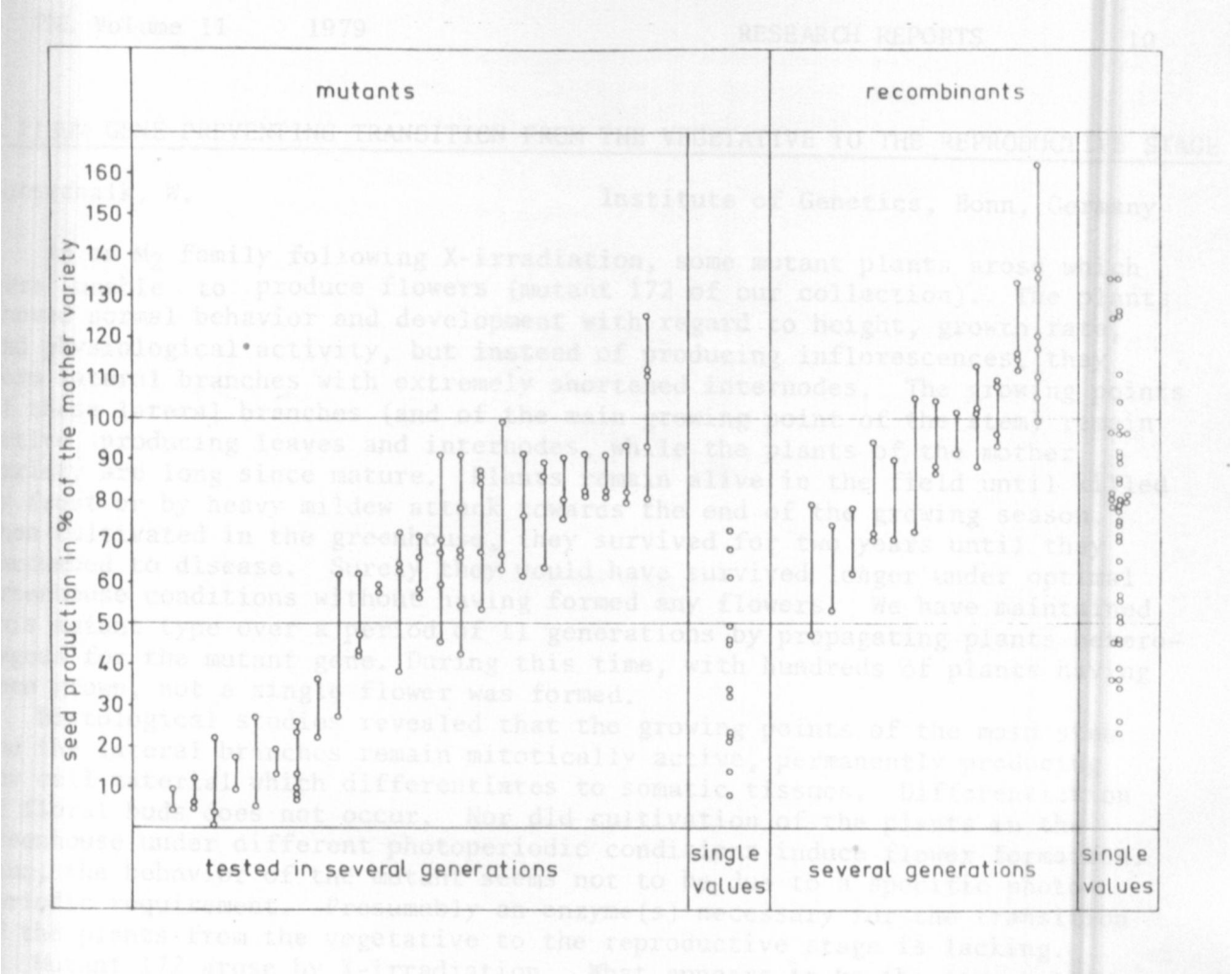

Fig. 1. The seed production of 37 short-stemmed mutants and 55 short-stemmed recombinants of Pisum sativum as related to the yield of the mother variety 'Dippes gelbe Viktoria'. Each dot represents the mean value of the character "number of seeds per plant" for one generation. The means of genotypes, tested in several generations, are connected by vertical lines. From the remaining genotypes, means of only one generation are available so far.