

AN APPLICATION OF THE BACKCROSS METHOD TO SUGAR BEET
LEAF-SPOT-RESISTANCE BREEDING¹

John O. Gaskill²

Summary

A highly resistant, relatively low-producing inbred strain of sugar beet was crossed with a productive inbred strain having only moderate resistance to the leaf-spot disease. The F₁ hybrid was next mated with the productive parent to obtain seed of the backcross generation, BC-F₁. Then with the backcross population as a starting point, two successive mass increases (BC-F₂ and BC-F₃) were made by means of resistant plants selected under leaf-spot conditions.

Leaf-spot resistance of the backcross generation was intermediate between that of the two inbred parents. In subsequent generations progressive improvement was shown, as a result of selection, with resistance of the BC-F₃ being approximately equivalent to that of the more resistant, non-recurring parent.

In 2 years' replicated field tests at Ault, Colorado, where leaf spot was not a factor, the BC-F₂ generation was only slightly below the recurring parent in average acre yield of gross sucrose, the difference being far from significant. On the other hand, in companion tests at Fort Collins, under moderate leaf-spot exposure, the BC-F₂ exceeded the recurring parent in gross sucrose production by 486 pounds per acre, a difference approximately equivalent to the 1-percent level of significance. In two replicated tests in 1946 the average production of gross sucrose by the BC-F₂ and BC-F₃ generations, respectively, was practically identical.

The results obtained thus far in this partially completed study seem to justify the tentative conclusion that the backcross method can be used to advantage in sugar-beet leaf-spot resistance breeding.

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² Plant Breeder, U. S. Department of Agriculture. The writer is indebted to associates, G. W. Deming and J. A. Elder, and to D. W. Robertson of the Colorado Agricultural Experiment Station for helpful advice and assistance in connection with the preparation of the manuscript.