

Research Report

Sugarbeet Conference, Fort Collins, Colorado

February 5, 6, 7, 1974

Prepared by Gerald E. Coe, January 15, 1974

- A. Location of Project: Northeastern Region  
Beltsville Area  
Agricultural Research Center-West  
Beltsville, Maryland
- B. Work Reporting Unit Title: Sugarbeet Production Practices  
(Sugarbeet Germplasm Improvement)
- C. Work Reporting Unit: No. 401-1108-10710
- D. SMY's for Past Year at Location: 1 SMY
- E. Name of Scientists in Project at Location: G. E. Coe
- F. Mission of Research:

To develop sugarbeet germplasm from which commercial varieties can be developed (1) that will give greater and more economical sugar production per acre; (2) that require no hand labor and almost no machine labor to grow; (3) that will yield more sugar per ton of roots processed; (4) that can be harvested easily with almost no mechanical damage; (5) that can be harvested earlier in the Fall, reducing the storage period; and (6) that will store well for long periods while awaiting processing.

- G. Objectives of Research:

To develop sugarbeet germplasm (1) with combined resistance to Cercospora leaf spot and Aphanomyces black root; (2) with roots having globe-shape, devoid of branches and root hairs; (3) with high sugar content and high purity; (4) with satisfactory yields at closer spacing to increase competing ability against weeds; and (5) with ability to accumulate sugar in the root at higher growing temperatures.

- H. Research Accomplishments:

Breeding lines have been developed with good field resistance to leaf spot and with moderate field resistance to black root. Improvements in sucrose percent and in quality have been only by small increments and are not very spectacular. Desirable root shape, branching, and root hair characteristics have not yet been established in acceptable sugarbeet breeding lines. Sucrose percentage in these new-type beets has been too low, but has been increasing slowly. New sources of male-sterile cytoplasm are being incorporated into sugarbeet breeding lines to give insurance against disease attacks.

I. Impact of Research Accomplishments on Science and General Public:

Until relatively recently, the price of sugar remained stable as almost all other prices increased. This stable price was possible because producers either increased their operation efficiency and/or reduced their margin of profit. Beet sugar producers did both. Beet sugar production in the U.S. would have ceased without improvements in the varieties grown. (The same can be said with regard to the agronomic and other practices employed by the growers.) Unless additional variety improvements are achieved in sugarbeets, beet sugar may not be able to compete against cane sugar within a few years, and that portion of consumers' incomes spent on sugar could begin to increase rather than decrease.

J. Obstacles to Achieving Objectives:

Only small improvement has been possible in each generation of selection. With sugarbeets it is possible to test and make selections only once a year, and the selected plants will only produce seed the following year after it is too late to plant for another cycle of selection. Thus, for many characteristics consecutive selections can be made only every 2 years.

In selecting for quality improvement, soil variation renders selections somewhat ineffective.

The method of inheritance of several root characteristics is unknown, thus we are having difficulties attempting to stabilize these.

K. Future Plans and Needs:

The breeding program to improve all the characteristics mentioned will be continued with increased emphasis placed on root characteristics, and slightly less emphasis placed on improving leaf spot resistance.

The selection cycle could be reduced from 2 years to 1 year at Beltsville if greenhouse ground-bed space were available with filtered air control to prevent pollen contamination. An estimated 15,000 square feet (properly compartmented) would serve most of the immediate need. One additional full-time employee would be needed; and, of course, it would be expensive to operate these units. However, about six field seed production isolation plots could be eliminated. A gravel culture bed is needed to experiment on selecting for improved quality. Suggestions concerning the gravel bed have been submitted to supervisors.