

Research Report

Sugarbeet Conference, Fort Collins, Colorado

February 5, 6, 1974

Prepared by F. W. Snyder, Plant Physiologist, January 4, 1974

- A. Location of Project: North Central Region
Lafayette Area
Michigan State University
East Lansing, Michigan 48823
- B. Work Reporting Unit Title: Sugarbeet Production Practices
- C. Work Reporting Unit: 401-3309-10710
- D. SMY's for Past Year at Location: 4 SMY
- E. Names of Scientists in Project at Location:
G. J. Hogaboam, Research Agronomist; C. L. Schneider, Plant Pathologist;
F. W. Snyder; R. C. Zielke, Research Agronomist (resigned 1 July 1973)
- F. Mission of Research:

To develop new knowledge and improved technology in sugarbeet production leading to greater yields and greater net return through (a) breeding cultivars with greater disease resistance, more rapid growth rates, and greater biological efficiency in producing the sucrose; and (b) improved culture and environment to maximize the genetic growth and yield potentials.

To determine the internal (endogenous) and environmental factors which are limiting growth and yield of sugarbeet and to attempt to overcome them by economically feasible means.

- G. Objectives of Physiological Research:
1. To determine and understand germination and emergence behavior of sugarbeet to attain better field emergence.
 2. To categorize, select, and then relate seedling growth patterns to yield of the mature sugarbeet plants.
 3. To detect, isolate, and utilize the superior yielding characteristics of individual plants within breeding lines.
 4. To determine effects of culture and environment on growth, yield, and storage of sugarbeet to optimize their effect on Recoverable White Sugar per Acre.
 5. To develop a technique for producing large numbers of sugarbeet plants having identical genetic constitution.

H. Research Accomplishments:

Research already published is not being cited.

1. Have evidence that the cytokinin plant hormones influence translocation from the sugarbeet leaf.
2. Developed a sand emergence test to evaluate emergence potential of sugarbeet seed and the effect of environmental and cultural factors on emergence.
3. Adapted growth analysis techniques to quantify sugarbeet seedling growth patterns.
4. When comparing paired cultivars in growth chamber and in field studies, the cultivar with more seedling leaf area per plant usually yielded more tonnage in full-season field experiments.

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

The research on germination and emergence has led to improved cultural practices during seed production and more careful seed processing to produce higher quality seed.

Research on quality demonstrated that controlling nitrogen availability is essential for higher quality and this has helped stabilize juice quality in Michigan.

The numbered items in "H" are still being evaluated and too new to predict their impact at this time.

J. Obstacles to Achieving Objectives:

Plant to plant genetic variability has greatly complicated the evaluation of environmental variation in growth.

Plant variability requires greatly increased replication in all experiments.

Until large numbers of sugarbeet plants having identical genetic constitution are available for research, certain definitive genetic, pathological, and physiological experiments cannot be conducted successfully.

The lack of a full-time technician slows progress.

K. Future Plans and Needs:

1. Determine whether the growth-partitioning ratio of Taproot wt/Leaf blade wt in seedling sugarbeet is subject to selection pressure.
2. Determine whether root yield can be increased by selecting seedlings which have 1) large leaf blade weight, and 2) a large growth-partitioning ratio for taproot.
3. Determine whether rate of leaf growth in seedlings is subject to selection pressure.
4. Continue to evaluate sand emergence test and relate sand emergence to field emergence.
5. Continue search for technique to produce large numbers of sugarbeet plants having identical genetic constitution.

A full-time technician is needed.