

Research Report

Sugarbeet Conference, Fort Collins, Colorado

February 5, 6, 1974

Prepared by James C. Read, January 11, 1974

- A. Location of Project: Western Region  
Northern California-Nevada Area  
U. S. Agricultural Research Station  
Salinas, California
- B. Work Reporting Unit Title: Improved Sugarbeet Varieties and  
Production Practices
- C. Work Reporting Unit: 10710
- D. SMY's for Past Year at Location: 1 SMY
- E. Names of Scientists in Project at Location: James C. Read
- F. Mission of Research:

To conduct genetical and cytological research of sugarbeets. Emphasis is placed on interspecific hybridization of sugarbeets with the various species of Beta and the genetical and cytological procedures required for the transfer of desirable genes from exotic forms of Beta to cultivars of sugarbeet. Genotypes of various ploidy levels are produced and their use investigated.

- G. Objectives of Research:

To transfer disease resistance, monogerm, method of reproduction, and other desirable characters from wild Beta species to cultivars of sugarbeet through interspecific hybridization. Investigate the taxonomic relationship of the various Beta species to sugarbeet and to each other to facilitate the transfer of characters. Investigate the cause of sterility, instability, abnormalities, and unthrifty growth of some interspecific hybrids. Investigate the use and effect of chemical mutagens and radiation treatments on the production of polyploids and on the transfer of characters from the wild species. Investigate the production and utilization of haploids.

- H. Research Accomplishments:

Major emphasis has been on the transfer of sugarbeet nematode (Heterodera schachtii) resistance from the Patellaris group and curly top virus resistance from the Corollinae group. Nematode resistant plants with 19 chromosomes have been obtained by back-

crossing B. vulgaris x B. procumbens F<sub>1</sub> hybrids to sugarbeet. A small number of 18 chromosome nematode resistant plants have been obtained but the transmission of resistance is as low or lower than with the trisomics. Curly top resistant plants with the normal chromosome complement has been obtained from the B. vulgaris x B. corolliflora hybrids but transmission is not stabilized. Much of this work has been accomplished by Dr. H. Savitsky.

New F<sub>1</sub> hybrids between sugarbeet and B. procumbens, B. webbiana, B. patellaris, and B. trigyne have been obtained and are being evaluated.

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

The development of techniques for transferring characters from the various Beta species to sugarbeet will allow the development of varieties with characters that are not present in B. vulgaris. Curly top virus and sugarbeet nematodes have caused tremendous economic losses to the sugarbeet industry through decreased yields and through the various practices to control these diseases. Development of resistant varieties would be a tremendous savings to the sugarbeet industry.

J. Obstacles to Achieving Objectives:

Considerable progress has been made toward the transfer of sugarbeet nematode and curly top virus resistance. Because of the low degree of homology between the sugarbeet genome and the chromosomes carrying the particular genes for resistance, many generations are needed to obtain the desired translocation.

K. Future Plans and Needs:

The present program of interspecific hybridization and production of new tetraploids as stated in the objectives will be continued. There is a need for additional greenhouse space to facilitate the testing for various pathogens and maintaining the different wild species and F<sub>1</sub> hybrids.

Efforts to produce haploids from pollen grains are still being pursued but at present there is a need for additional equipment to be used in the handling of tissue cultures.