

SUGAR BEET BREEDING WORK IN CALIFORNIA

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Division of Sugar Plant Investigations

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The objective of the California program is to develop non-bolting, disease-resistant varieties adapted to the Pacific Coast area. The work is closely coordinated with the U.S.D.A. program in Utah and Idaho.

Accomplishments

Improved techniques of selecting for non-bolting and mildew resistance have been developed.

Selections have been made from the curly top resistant variety U.S. 22/3 which is equal in bolting resistance to U.S. 15 and U.S. 56.

Our present varieties and breeding stocks have been found very heterozygous for resistance to downy mildew. A non-bolting strain of U.S. 22 with a marked improvement in mildew resistance is under test.

A large group of F_2 populations from hybrids between curly top resistant varieties and the monogerm inbred have been planted in cooperation with Dr. V. F. Savitsky for the purpose of selecting non-bolting, curly top resistant, monogerm beets.

Inbreds which are resistant to bolting, mildew, and curly top have been developed. Preliminary tests with male sterile hybrids involving these inbreds are underway.

Type O (Nxxxz) genotypes have been selected from U.S. 22 and U.S. 56 for use in the development of inbreds and male sterile parents.

Problems Yet to be Solved

The following types and characteristics are needed:

A non-bolting, disease resistant beet which matures more rapidly than our present varieties.

Increased yield and sugar content.

Varieties with the monogerm character and with improved crown and root morphology.

Resistance to both the sugar beet nematode and the root knot nematode.

Resistance to such diseases as rust, mosaic, and Ramularia leaf spot.

Varieties adapted to peat soils.

Improved germination at low temperatures and greater seedling vigor.

Cold resistance.

Varieties low in sodium.

Immediate Future Objectives

Incorporation of curly top, bolting, and mildew resistance into higher yielding better sugar varieties.

Production of disease resistant, non-bolting inbreds with good combining ability.

Production of monogerm varieties and inbreds.

Breeding Methods Which Have Been and Which Will be Used

Mass selection has been used in obtaining resistance to bolting and downy mildew.

The backcross method is being used to incorporate such characters as monogerm seed into adapted varieties.

Emphasis is being placed on the production of hybrids through the utilization of the self fertility gene and cytoplasmic male sterility.

Polyploidy and interspecific hybrids will be utilized in the future.

Material and Information Which Would Be of Value

Additional information on the physiology of bolting.

A more complete knowledge of the genetics of male sterility, self sterility, self fertility, and species hybrids.

Breeding stocks derived from hybrids with wild species.

Inbred lines unrelated to those which we are now using.

Information on the nature of resistance to mildew, curly top, rust, nematodes, etc.

A diverse source of Type O (Nxxxx) germ plasm.