

GENERAL CONSIDERATIONS FOR THE YEAR

PROJECT LEADERS

G. R. Coons - Principal Pathologist - Division of Sugar Plant Investigations.
G. W. Deming - Assistant Agronomist - Division of Sugar Plant Investigations.
Keith M. Hemphill - Agent - Division of Sugar Plant Investigations.

COOPERATORS

U. S. Department of Agriculture.

Bureau of Plant Industry.

John O. Gaskill - Assistance at Fort Collins Headquarters and
at Fort Morgan.

Ralph R. Wood - Assistance at Fort Collins Headquarters and at
at Fort Morgan.

Harold W. Bockstahler - Assistance at Rocky Ford.

Ralph F. Seawans - Assistance at Rocky Ford.

Colorado State College and Experiment Station.

Dr. R. P. Sandsten ^{1/}, Director of the Experiment Station.

Dr. Charles H. Kick ^{2/}, Director of the Experiment Station.

Dr. I. E. Newson, Director of the Experiment Station.

Alvin Kexer and staff of the Agronomy Department, Colorado
State College.

W. P. Kintzley, Manager College Farm.

Great Western Sugar Company.

Holly Sugar Corporation.

Growers.

B. G. D. Bishopp, Virginia Dale - Cooperation in seed production.

The many householders, particularly in Greeley and Denver, who
cooperated in the care of isolation plantings of beet roots for
seed production.

^{1/} Retired June 30, 1939.

^{2/} Deceased August 27, 1939.

OUTSTANDING ACCOMPLISHMENTS

Leaf Spot Resistant Varieties:

Tests of the new leaf spot resistant varieties in 1939 indicated that U. S. 200 x 215 can be grown here with the expectation that it will approximately equal commercial brands under non leaf spot conditions and that it may prove superior in years of severe leaf spot epidemic.

Spacing and Stand Studies:

Three years work with full and partial stands with basic spacings of 8, 12 and 16 inches are summarized. These tests as summarized indicate that, under the conditions of the test, combinations of spacing and stand that resulted in plant populations from about 70 to about 140 plants per 100 feet of row were approximately equal in yielding ability as measured by tons of roots and pounds of gross sugar per acre. As stands were reduced from about 70 to about 30 plants per 100 feet of row the yield declined. The yield from about 30 plants per 100 feet of row was approximately two thirds the yield from the optimum populations. Differences in percent sucrose for these populations were very small for all populations in excess of 50 plants per 100 feet of row. Percent sucrose in the beets from the lowest population was approximately 0.5% less than that of the beets from denser stands. This difference is statistically highly significant.

As was the case in 1938, the yield of beets spaced singly in a 10 x 20 inch pattern exceeded the yield from an equal population spaced as two plant hills in a 20 x 20 inch pattern. Beets spaced singly in a 20 x 20 inch pattern equalled the yield from two plant hills of the same pattern.

Date of Planting:

Stands of March 20 planted beets were slightly reduced by a freeze in April. Yields were slightly greater from April 21 plantings than from March 20 plantings. The difference was not statistically significant. Late planting (May 17) resulted in a serious loss in yield. The yield from beets planted May 17 in 1938 and 1939 is approximately the same as the yield from the lowest population in the adjacent stand and spacing test which was planted April 20 in both of these years. On the basis of these test it would be better to save 40 to 50 beets per 100 feet of row of a timely planting than to replant as late as the middle of May.

Advanced Generations of Hybrid Strain of Beets:

Tests of selected and non selected fourth and fifth generations of the sugar beet-garden red beet hybrid in comparison with the selected third

generation showed no differences in yield which were statistically significant. Trends in this test strongly indicated that quality in this hybrid could be improved by selection beyond the third generation without accompanying loss in yield of roots.

Hybridizing of Inbred Lines:

Tests of the progeny of mixed plantings of roots of more or less inbred lines of sugar beets indicated that the best of these hybrids were not statistically poorer than an excellent commercial variety which was used as the check.

Inbred Strains:

Tests of a number of strains which had been at least once inbred showed none of those tested to be equal in yield to a good commercial variety.

Beet Breeding:

A considerable number of inbred lines have now reached the third to fifth generation of inbreeding. Many of these lines appear to be approaching homozygosity for various characters and have a very uniform general appearance. A start was made in the adaptation of a form of top cross test that will be applicable to beets and by means of which the combining ability of the inbred lines can be measured. Top crossed seed was obtained from over 100 of such inbred roots. Seed was obtained from a number of crosses involving characters the genetic segregation of which is to be studied.

MEETINGS AND ARTICLES

Inspection of the agronomic work of this station was included in the program of the Sugar Beet Field Day September 8, 1939. This field day was sponsored by the Colorado Agricultural Extension Service. Over 300 persons visited the agronomy field tests.

The following papers were prepared and presented at the biennial meeting of the American Society of Sugar Beet Technologists in Denver, January 4 to 6, 1940:

Comparative Yields of Equal Plant Populations of Sugar Beets with different Spacing Relations.

Comparison of Some Advanced Generations of a Hybrid Strain of Sugar Beet with the Original Third Generation Selection.

These will be published in the proceedings of the society.

CLIMATE IN 1939

The fall, winter and early spring of 1938 - 1939 was not particularly unusual in any way except that in general the winter was somewhat warmer than the average. However beginning in April the year 1939 was characterized by unusual lack of precipitation. The heavy rains of late August and early September 1938 (see report for 1938) had resulted in more than the usual amount of fall storage of irrigation water and in spite of the lack of precipitation in 1939 the supply of irrigation water was fairly good and no serious shortage developed till quite late in the season. It is possible that one additional application of water would have slightly increased the yields of the experimental beets, but water was not particularly limiting factor in the work for the year.

The following table presents the precipitation data by months, as recorded at the Weather Bureau Station at Fort Collins, for 1939, 1893 (the driest year on record) and the 50 year average.

Precipitation at Fort Collins, Colorado:

| <u>Month</u> | <u>1939</u> | <u>1893</u> | <u>50 yr. Avg.</u> |
|--------------|-------------|-------------|--------------------|
| January | .41 | .02 | .32 |
| February | .60 | .54 | .61 |
| March | 1.60 | .14 | 1.02 |
| April | 1.42 | 1.66 | 2.00 |
| May | 1.56 | 1.92 | 2.86 |
| June | .43 | .26 | 1.53 |
| July | Trace | .64 | 1.66 |
| August | 1.01 | .92 | 1.40 |
| September | .15 | .18 | 1.27 |
| October | .40 | .16 | 1.10 |
| November | .03 | .55 | .47 |
| December | .24 | .12 | .46 |
| Totals | 7.85 | 7.11 | 14.70 |

From this table it is evident that 1939 was particularly characterized by a lack of precipitation during the growing season. It should also be noted that even the small precipitation which did occur was largely ineffective as shown in the following table:

Dates on Which Precipitation was Recorded at Fort Collins, Colorado April to September, 1939.

| <u>Day</u> | <u>April</u> | <u>May</u> | <u>June</u> | <u>July</u> | <u>August</u> | <u>September</u> |
|------------|--------------|------------|-------------|-------------|---------------|------------------|
| 1. | -- | -- | .06 | -- | -- | .01 |
| 2. | -- | -- | -- | -- | .01 | -- |
| 3. | .09 | .04 | -- | -- | .49 | -- |

Precipitation table continued:

| Day | April | May | June | July | August | September |
|--------|-------|------|------|------|--------|-----------|
| 4. | -- | -- | -- | -- | -- | -- |
| 5. | .30 | -- | -- | -- | -- | -- |
| 6. | .11 | .24 | -- | -- | .17 | -- |
| 7. | -- | -- | -- | -- | .03 | .02 |
| 8. | -- | .04 | -- | -- | -- | .05 |
| 9. | -- | -- | -- | -- | -- | -- |
| 10. | .09 | -- | -- | -- | -- | -- |
| 11. | .01 | -- | -- | -- | -- | -- |
| 12. | -- | .30 | .09 | -- | -- | -- |
| 13. | -- | -- | -- | -- | -- | -- |
| 14. | .10 | -- | -- | -- | -- | -- |
| 15. | .40 | -- | .28 | -- | -- | -- |
| 16. | .18 | -- | -- | -- | -- | -- |
| 17. | -- | -- | -- | -- | -- | -- |
| 18. | -- | -- | -- | -- | -- | -- |
| 19. | -- | .01 | -- | -- | -- | -- |
| 20. | .14 | -- | -- | -- | -- | -- |
| 21. | -- | -- | -- | -- | -- | -- |
| 22. | -- | -- | -- | -- | -- | -- |
| 23. | -- | -- | -- | -- | -- | -- |
| 24. | -- | -- | -- | -- | -- | -- |
| 25. | -- | .45 | -- | -- | -- | -- |
| 26. | -- | .36 | -- | -- | -- | -- |
| 27. | -- | .11 | -- | -- | -- | -- |
| 28. | -- | -- | -- | -- | -- | .07 |
| 29. | -- | -- | .05 | -- | .30 | -- |
| 30. | -- | -- | .05 | -- | -- | -- |
| 31. | -- | .01 | -- | -- | -- | -- |
| Totals | 1.42 | 1.56 | .43 | -- | 1.01 | .15 |

Observation indicates that no effective rain fell after April 16 during the growing season of 1939 with the possible exception of the fall of .92 inch on May 25-27. On the experimental beets the excellent stands of the May 17 plantings was directly due to the precipitation of May 25-27 which transformed what promised to be a very poor germination stand into a good one.

Harvest was more difficult than usual due to the total lack of any precipitation of consequence during the fall. Extra power was needed to operate the beet pullers in the hard ground. There was some breakage of beets and a few beets were lost when pulled under among the large clods brought up by the pullers.