

## FIELD OPERATIONS AND CONDITIONS

### General.

The land assigned for the 1940 beet experiments consisted of two tracts. One of about 2 acres was used for the two beet variety tests. This tract had been in a mixed stand of alfalfa and orchard grass for several years prior to 1939 and grew a uniform crop of spring wheat which received one irrigation in June in 1939. The stand of orchard grass varied from practically none on parts of the tract to a fairly heavy sod on other parts; this condition probably increased the soil variability of the tract. The other tract of approximately 10 acres was occupied by the following crops in 1939: one series, and a part of another, red row winter wheat plots; part of a series  $F_3$  barley, genetic material in 8 foot rows and with extremely variable stands; part of a series in sorghum and sudan grass in 30 inch rows; several small areas planted to odds and ends of crop plants for observation and the balance in a bulk crop of oats. It is of interest to note that the roots of a small planting of Johnson grass survived the winter in perfect condition and greatly injured the stand and early growth of beets on a few feet of several border rows. The winter wheat on this tract was not irrigated in 1939; spring grain received one irrigation in June and the sudan grass and sorghum plots had three irrigations; the last in September. It is probable that the sorghums had not greatly depleted the subsoil moisture when they were harvested in mid-September. All the grain stubble was so dry that no weed growth or germination of volunteer grain occurred in the late summer or fall of 1939.

Some observations of the effects of the previous crops and treatments on the 1940 beet crop appear to be worthy of mention. On the full series which was in winter wheat in 1939 the beet rows crossed the wheat rows and ran in the same direction as the 3 foot alleys which has separated the series of wheat plots. By late August the series of alternating wheat plots and alleys could be located by the appearance of the beet foliage. It is probable that the lighter and somewhat scantier foliage of the beets immediately following the winter wheat as compared to the row of beets which occupied the 1939 three foot alley indicates that available nitrates were exhausted earlier on the soil which had grown the wheat crop in 1939. Several beet samples were taken at harvest which were believed representative of this condition. Differences in root weight and percent sucrose were not as great as the apparent differences in top growth. The yield of the beets from the alleys was slightly, but not uniformly or conclusively, higher than the yield of the beets which followed wheat.

As previously mentioned, it is probable that the supply of subsoil moisture was good on the sudan grass land. When this field was planted there was barely sufficient moisture in the surface soil for germination of the beet seed and soon after emergence the beet seedlings on the grain stubble land appeared to be affected by drouth; growth was slow, the seedlings were dark in color and usually were wilted during a part of the day. The germination stand of the beets on the sudan grass land appeared

slightly better and more uniform, and there was little, if any, evidence of drouth and at thinning (after an irrigation) these beets were larger than the beets on the grain land. This advantage in top growth, of the beets following sudan grass, was maintained throughout the season. No very definite measure of the yields of the beets on the sudan grass and grain stubble land could be secured. Tops on the sudan grass land were much bigger than on most of the grain stubble portions of the tract; and root yields also appeared to be slightly greater. Percent sucrose was probably lower for the sudan grass beets.

A small area of the 1939 sudan grass plots had received a very heavy application of commercial nitrate fertilizer. There was no evidence of a residual effect apparent in the appearance of the beets till about mid-September when top growth appeared to have slowed down in the beets surrounding this area while the beets on the fertilized spot continued a very luxuriant growth. It should be noted that in all this part of the field the beets made an unusually heavy top growth which probably indicates an abundant supply of nitrates even on the unfertilized area.

#### Seed Bed Preparation

The land for beet plots in 1940 was manured at the rate of approximately 10 tons per acre and disced in August of 1939 with the exception of the sudan grass land which was manured and disced in late September. Water was not available for fall irrigation and this land was too dry to fall plow. Early spring moisture had germinated a great deal of volunteer

grain by the middle of March 1940, and this land was again double disced on March 20. It was plowed with a two bottom tractor plow April 12 and 13. Surface soil moisture at this time was just sufficient for a good job of plowing. The plow was followed closely by a harrow and sub-surface packer; after which the seed bed was finished with the harrow and float. The variety tests <sup>and</sup> at the portion of the larger field used for the thinning test were planted April 20. The balance of bulk planting of this field was finished April 25. The top cross test and breeding strains were hand planted during the last few days of April. Moisture for germination of the drill planted seed was barely adequate to secure fair initial stands. The hand planted seed did not germinate till after the first irrigation, May 13 to 15. Germination following this irrigation also filled some gaps and thickened stands in parts of the drilled rows.

Considerable grass (*Setaria* sp.) appeared on the 2 acre variety test field, and it was cultivated May 15 after a light irrigation on May 13. This cultivation, with extra care in the thinning, adequately controlled this weed situation. Stands may have been slightly injured in a few plots, but damage to the crop was probably negligible. All plots were cultivated May 31, and thinning finished the first week of June. In late June, the crop was hoed, cultivated, and reditched. The beets made a rapid and luxuriant growth of tops, and no more cultivation or hoeing was required for weed control.

An attempt was made to make the irrigation on May 13 to 15 a light one, but the subsequent growth of the beets indicated that in some places

in the fields nitrates had been carried down beyond the reach of the young beet plants. Parts of the breeding strain planting, and the first and sixth replications of the top cross test were particularly affected in this way, and top growth throughout the season was less and much lighter in color than for most of the fields. Subsequent irrigations were applied on the following dates: June 8 to 9, July 3 to 4, July 28 to 29 (part of one field finished Aug. 1) and September 1 to 2. From thinning to harvest, the crop appeared at all times to be in good condition and making excellent growth.

#### Insects and Diseases.

No insect damage was observed during the season. There was much less than the usual amount of "Blackroot" in evidence at thinning and stand losses from root rots during the season were negligible. A very light epidemic of leaf spot developed during September which did not reach the leaf burning stage to any appreciable degree.