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Sorghums Varietal Tests In Utah

R. W. WOODWARD, D. C. TINGEY, and R. J. EVANS

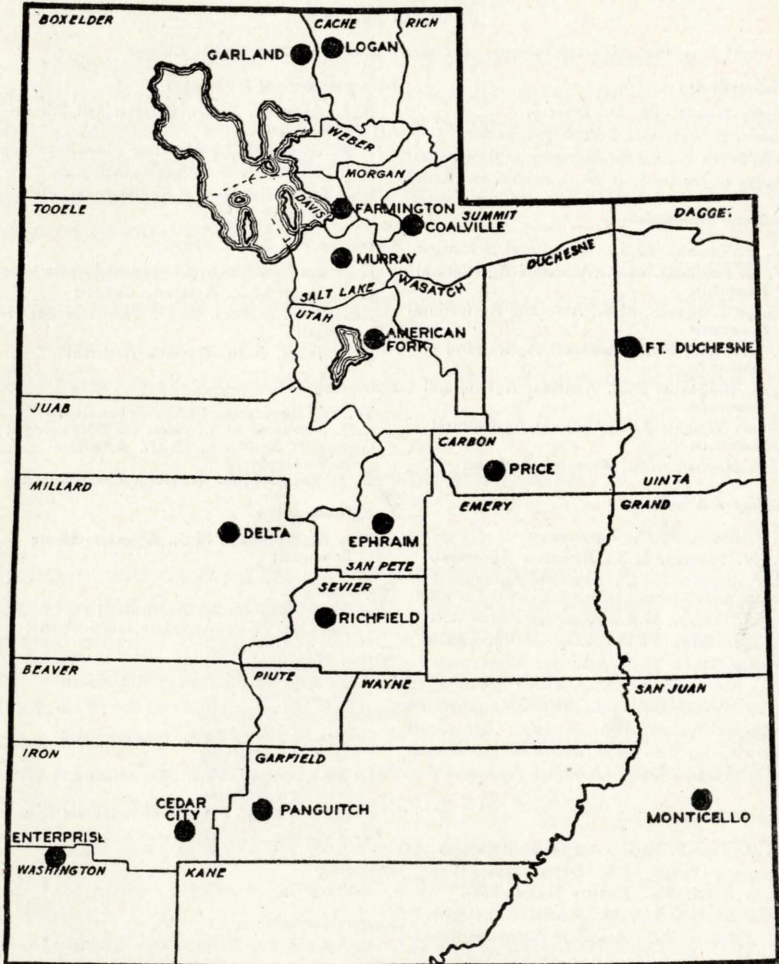


Figure 1. Map of Utah, showing location of sorghums varietal tests.

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UTAH STATE AGRICULTURAL COLLEGE

Logan, Utah

In Cooperation with

United States Department of Agriculture
Bureau of Plant Industry

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Sorghums Varietal Tests In Utah¹

R. W. Woodward, D. C. Tingey, and R. J. Evans²

INTRODUCTION

Sorghums are not grown to any appreciable extent in Utah except in the Virgin River valley in the southwestern portion of the State. No experimental work on sorghum culture had been done prior to 1931 except on the dry land of Juab County near Nephi. Those early tests, discontinued after 1917, indicated that sorghums were poorly adapted to such conditions.

Numerous improved varieties have been produced since that time, some of which are adapted to relatively short growing seasons.

This bulletin will discuss the practicability of growing some of these varieties of sorghum in Utah and their economic value compared to leading crops now grown.

EXPERIMENTAL PROCEDURE

A number of sorghum varieties with varying periods of maturity and representing the principal groups have been tested at the Central Experiment Farm, Logan, Utah. A smaller number of variations chosen on the basis of adaptation to local conditions were grown in 14 counties representing the important agricultural areas of the State for 1 or 2-year periods. The varieties were grown in single-row plots, three feet apart and thirty-seven feet long, randomized and replicated four times. The plants were thinned to either six or twelve inches apart depending upon the tillering ability of the variety.

The sorghums were grown on a wide range of soil types from light gravelly loams to peat and on alkali soils. Two or three light irrigations were applied by the furrow method during the season to most of the nurseries. The crop was harvested immediately following

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the first light frost in autumn. Grain yields were obtained if an appreciable amount of seed matured, and in 1935 and 1936 at Logan silage yields (green weight) were also obtained.

COUNTY TESTS

Cache County

Results: The most extensive data on sorghum varieties were obtained at North Logan. Twelve or more varieties were grown in five of the six years that the tests were run.

Sorghums were planted on a well drained silty clay loam, apparently well suited for sorghum production. Results of the first year's test offered much encouragement, sorghum yields exceeding those of corn and wheat by a considerable margin. Even rather late maturing varieties developed large well-filled heads. It is interesting to note that the maximum temperatures thus far recorded at the Experiment Farm occurred during this same season of 1931.

Later tests have shown that only a few varieties are dependable for northern and central Utah, while others may produce well one year but fail in other years. In 1931 Dwarf Yellow milo produced 101.4 bushels per acre, outyielding all other varieties but in 1932 it was sixteenth among the seventeen varieties tested with a yield of only 27 bushels per acre. Standard feterita and Dwarf White durra behaved similarly. Such behavior is not entirely dependent upon the length of the frost-free period.

Varieties found dependable at Logan, are Sooner Milo, Red Amber sorgo, Dwarf hegari, Kalo, and Dakota Amber sorgo. Yields of these varieties fluctuate some but compare favorably with other cereals grown under similar conditions. Table 1 shows the results of sorghum tests at North Logan for the period 1931-1936.

Growth habits of sorghums were influenced by soil and other associated factors in addition to temperature. Growth varied from year to year; some years certain varieties headed when only 12 to 15 inches in height while in other seasons a considerably greater height was attained before heading commenced. Greater seasonal variations occurred in the more sensitive sorghum varieties.

TABLE 1

Yields of sorghum varieties grown at Central Experimental Farm, North Logan, Utah, 1931 to 1936.

Yields given in bushels per acre of air-dry grain.

| Variety | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | Average |
|--------------------------------|--------|----------|-------|-------|-------|-------|---------|
| Red Amber sorgho | 100.7 | 83.3 | 95.8 | 117.3 | 92.2 | 53.1 | 90.4 |
| Sooner milo | 99.9 | 65.9 | 87.7 | 116.6 | 96.8 | 74.0 | 90.2 |
| Dwarf hegari | 69.7 | 77.4 | 82.9 | 121.2 | 78.9 | 67.1 | 82.9 |
| Dakota Amber sorgho | 64.6 | 44.5 | 84.2 | 84.9 | 63.2 | 48.1 | 64.9 |
| Greeley ..... | ..... | 64.8 | 67.7 | 71.9 | 58.9 | 63.0 | 65.3† |
| Dwarf Freed | 57.2 | 67.7 | 57.7 | 73.2 | 65.8 | ..... | 64.3† |
| Kalo | 62.0 | 78.0 | 53.8 | 48.6 | 63.9 | ..... | 61.3† |
| Freed | 41.2 | 68.3 | 57.2 | 75.8 | 48.6 | ..... | 58.2† |
| Feterita | 74.7 | 33.1 | 57.5 | 88.8 | 22.7 | ..... | 55.4† |
| Dwarf White durra | 62.7 | 17.4* | 21.7 | 76.5 | 18.8 | ..... | 39.4† |
| Black Amber sorgho | 73.8 | 47.7 | 74.0 | ..... | 67.3 | ..... | ..... |
| Dwarf Yellow milo | 101.4* | 27.3* | 39.0* | ..... | ..... | ..... | ..... |
| Weskan ..... | ..... | 52.3* | 72.2 | 78.4 | 29.2 | ..... | ..... |
| Modoc Pink ..... | ..... | 48.7 | 75.1 | 68.7 | 34.5 | ..... | ..... |
| Early Straight-neck milo ..... | ..... | ..... | 74.7 | 105.0 | 53.5 | ..... | ..... |
| Dawn kafir | 59.3* | 28.8* | ..... | ..... | ..... | ..... | ..... |
| Early kalo ..... | ..... | ..... | 35.5 | 55.7 | ..... | ..... | ..... |
| Wheatland milo ..... | ..... | 42.3* | 62.3* | ..... | ..... | ..... | ..... |
| Pygmy milo ..... | ..... | 53.5 | 60.1 | ..... | ..... | ..... | ..... |
| Western Blackhull kafir | 64.1* | ..... | ..... | ..... | ..... | ..... | ..... |
| Wheatland Backcross ..... | ..... | ..... | 48.8* | ..... | ..... | ..... | ..... |
| Double dwarf milo ..... | ..... | ..... | 41.9* | ..... | ..... | ..... | ..... |
| Fargo milo ..... | ..... | Immature | ..... | ..... | ..... | ..... | ..... |
| Club kafir ..... | ..... | Immature | ..... | ..... | ..... | ..... | ..... |
| Grohoma ..... | ..... | Immature | ..... | ..... | ..... | ..... | ..... |

†Five year averages.

* Less than 95% mature

TABLE 2

Silage yields of some of the better adapted sorghums compared with leading corn varieties

North Logan, Utah, 1935-1936

(Green weights in tons per acre)

| Sorghum | | | | Corn | | | |
|------------------------|------|------|------|---------------------|-------|------|-------|
| Variety | 1935 | 1936 | Av. | Variety | 1935 | 1936 | Av. |
| Red Amber sorgho | 18.3 | 15.6 | 17.0 | Sam Ford | 13.3 | 17.3 | 15.3 |
| Dwarf hegari | 14.5 | 13.4 | 14.0 | Minn. 13 | 14.5 | 13.4 | 14.0 |
| Dakota Amber sorgho .. | 11.8 | 11.5 | 11.7 | Isaac Parry | 12.6 | 17.7 | 15.2 |
| Sooner milo | 13.8 | 12.9 | 13.4 | Ohio D. C. W. 63 .. | ..... | 21.4 | ..... |
| Greeley | 9.7 | 11.7 | 10.7 | Imp. Leaming | 16.4 | 15.8 | 16.1 |

Table 2 shows comparative yields of some sorghum varieties and corn varieties in total green silage. The better sorghums compare favorably with standard corn varieties at Logan. Adapted corn double crosses usually give higher yields than sorghums. Light autumn frosts do more damage to immature sorghum than to corn in a corresponding state of maturity. Where sorghums are grown for grain they show greater injury than corn, when subjected to frost. In 1932 after all development in sorghums was retarded by frost, corn varieties, then in the dough stage, matured well developed ears some three weeks later.

It must be admitted that from the Logan tests alone sorghums might be considered a promising crop for Utah. Uniform county varietal tests in other counties tended to modify the results obtained from the Logan tests.

Box Elder County: Sorghums were tested at Riverside, approximately 22 miles west of Logan, on heavy, fertile soil. In 1932 only a few kernels of grain developed in rather stunted plants while in 1933 fair yields were obtained as shown in table 3. A number of varieties in duplicate row plantings made in 1934 showed favorable growth for Red Amber sorgo, Dwarf hegari and Sooner milo. Results showed that on land similar to that where the tests were made it would be less profitable to grow sorghums than small grains, beets, or peas.

TABLE 3
Results of county sorghum tests, 1932-1933

| Variety | Willard | Carbon | | Utah | Wash- ington | Box Elder |
|------------------------------|------------|--------|-------|-------|-----------------|--------------|
| | 1932 | 1932 | 1933 | 1932 | 1932 | 1933 |
| Standard feterita | 28.5 | 17.5 | 56.0 | 48.9 | 56.1 | 23.3 |
| Sooner milo | 16.2 | 21.7 | 35.0 | 57.5 | ..... | 80.3 |
| Dwarf Yellow milo | 14.5 | 17.9 | ..... | 64.3 | 53.6 | ..... |
| Red Amber sorgo | 72.0 | ..... | 69.1 | 57.8 | ..... | 73.6 |
| Dakota Amber sorgo | 84.0 | 55.1 | ..... | 46.8 | ..... | ..... |
| Dwarf White durra ..... | ..... | 15.9 | ..... | 42.9 | 38.6 | ..... |
| Dwarf hegari ..... | ..... | ..... | 44.1 | ..... | 59.2 | ..... |
| Early Kalo ..... | ..... | ..... | 49.0 | ..... | ..... | 51.0 |
| Fargo Straight-neck milo ... | ..... | ..... | 27.3 | ..... | 58.7 | ..... |
| Double Dwarf milo ..... | ..... | ..... | ..... | ..... | 46.1 | ..... |
| Dawn kafir | not mature | ..... | ..... | 43.5 | ..... | ..... |
| Kalo ..... | ..... | ..... | 40.2 | ..... | ..... | ..... |
| Dwarf Freed ..... | ..... | 27.6 | ..... | ..... | ..... | ..... |

Utah County: Sorghums grown on light, well drained soils on the bench lands east of American Fork showed favorable yields (table 3). Another test conducted west of Springville on heavy soil was not

so encouraging although the length of the growing season in this county is favorable for sorghums.

Carbon County: In 1932 and 1933 some of the early varieties of sorghums planted in this county matured. They produced a thrifty vegetative growth in comparison with their grain yields. Although small grains have been superior to sorghums in bushel yield of grain for silage, sorghums are relatively more productive. Yet it is doubtful if they could replace corn under present conditions in Carbon County.

Uintah County: Sorghums tested on especially fertile soil, on the Experiment farm at Fort Duchesne, made thrifty vegetative growth but even early maturing varieties failed to ripen much seed. None of the sorghums tested would appear to have any place in the agriculture of the Uintah Basin except possibly on the higher lands or along the Green River Basin.

Millard County: Sorghum tests made in 1932 indicate that a few varieties, especially the sorgos, are well adapted to the alkali soil conditions found in this county. Red Amber and Dakota Amber sorgos made an exceptionally good vegetative growth even superior to the corn varieties tested. The growing season of 1932 was one of the poorer seasons in general for sorghums in the State. It is, however, quite possible that the Ambers could be grown for silage to some extent inasmuch as corn has been badly infected with smut and worms. Sorghum of the grain types did not give encouraging yields as will be noted in table 3, although the plants made a good growth.

Washington County: Sorghums respond well to the environment of the Virgin River valley. Failures to get yield data could not be attributed to climatic conditions but primarily to bird injury. Commercial sorghum fields are usually seeded in early July following a barley crop. Experimental nurseries were seeded about one month earlier thus offering the first ripened seed in that area to the many birds. Dwarf Yellow milo and Dwarf hegari are favored in this area as leading grain sorghums. Sumac, Honey or Orange appear to lead the sorgos.

Occasional farmers grow a sorgo and Dwarf hegari to be mixed for silage. Sorghums in Utah's "Dixie" have little competition from corn because of low corn yields as the hot summer winds prevent proper pollination and seed development.

Other Counties: Sorghums did not mature in Sanpete, Garfield, or Piute counties. Neither could they be expected to mature satisfac-

torily in Summit, Rich, Wasatch, or parts of Beaver counties. A few small areas in these counties may have favorable air drainage and furnish exceptions to the general recommendations made.

Dry Farm Tests: The few varieties of sorghums grown on dry farms in northern Utah did not produce successful yields. Possibly in the southern half of Utah where summer rainfall is more dependable, results might be more encouraging.

CONCLUSIONS AND SUMMARY

Many of the earlier maturing sorghums are adapted to cultivation under irrigation over a wide area of the state. Red Amber sorgo is possibly the most widely adapted variety but is grown primarily for silage or for making molasses. Sooner milo is possibly the best grain sorghum for Utah except for the Virgin valley where Dwarf Yellow milo is superior. Dwarf hegari also is well adapted and may be grown for seed or silage.

Sorghums must compete either with barley or oats for grain or with corn for silage, which limits their importance as a crop for Utah. Barley and oats can be seeded early and are generally sure crops, seldom if ever injured by frosts. Grain sorghums ripen in September near the time for fall frosts and in addition are hard to dry sufficiently for threshing. The cost of production is also greater. Sorghums are much more sensitive to cool weather than is corn.

Leading sorghum varieties produce as large a tonnage of silage as does corn under similar conditions. When grown as a grain on adapted soils under irrigation, they compare favorably in yield with other cereals. They have been free from disease in Utah while corn is often seriously injured by smut as well as by worms.

Except in limited areas where corn is not grown successfully, as the St. George area and parts of Millard County, sorghums can hardly be recommended to replace small grain for seed, or replace corn for either silage or grain production.