Sorgo Spacing Experiments in Mississippi

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EXPERIMENTS to determine the optimum spacing and arrangement of sorgo (Sorghum vulgare Pers.) plants in the row for the production of sirup and sugar were conducted in Mississippi during 1943–45 and 1950–59.

EXPERIMENTAL PROCEDURE

Six spacing experiments involving 6 treatments were conducted at the U. S. Sugar Crops Field Station, Meridian, Miss., 1943–45, on Ochlockonee fine sandy loam with 2 varieties, Hodo and Rex. Since the 1944 experiment with Hodo was lost, only 2 years' data were available for this variety. The 6 treatments were single plants spaced 1, 4, 8, 12, 16, and 20 inches apart in the row.

A split-plot design with 6 replications was used in 1943. Main plots were spacing treatments and subplots were varieties.

In 1944 and 1945 the design for spacings was a Latin square with 6 replications. Each variety was planted in a separate experiment. Plot sizes were 1/638 acre in 1943, 1/169 acre in 1944, and 1/200 acre in 1945.

Fertilization was uniform and adequate for sorgo production. The stand was thinned to the proper spacing when the plants were 2 to 3 inches high.

Usually each experiment was harvested when the seed were in the dough stage of maturity. A 10- to 20-stalk sample from each plot was collected at random and weighed. The leaves and heads were removed from the sample and the stripped stalks weighed. These weights were used as a basis for calculating stripping percentage and stalk weights. Stripping percentage was used to convert the total weight of each plot to stripped-stalk weight. Each sample was crushed in a 3-roller mill for juice analyses (Table 1). Sirup yields per ton of stalks from Hodo in 1945 were determined experimentally by processing a juice sample composited from samples of each replication. All other sirup yields were calculated by using the following formula:

$$ ST = EB \times (2000) \times 0.90 / (11.25) \times 0.75 $$

where $ ST = $ gallons of sirup per ton of stalks, $ E = $ percent juice extraction, $ B = $ Brix (% total soluble solids in pounds of stalks, $ 0.90 = $ factor for 10% skimming loss, $ 11.25 = $ pounds per gallon of sirup, and $ 0.75 = $ % soluble solids in sirup (Brix).

Forty experiments to determine the feasibility of reducing labor costs of hand thinning in commercial sorgo sirup production and to evaluate the interaction of plant arrangement with fertilizer treatments were conducted during 1950–55. These experiments involved 4 plants and 4 fertilizer treatments with Tracy at Meridian, 1950–55, with Hodo at Meridian 1950–55, and with Sart at Meridian, State College, and Holly Springs 1950–55. Five experiments were destroyed, but sufficient data with White African and Sart at all 3 locations were obtained to estimate the interaction of arrangements X fertilizers. Soil types were Ochlockonee sandy loam at Meridian, Kaufman silt loam at State College, and Grenada silt loam at Holly Springs.

All experiments were laid out in split-plot designs. Main plots of 1/130 acre consisted of 4 fertilizer treatments as follows:

1. 300 pounds of 6–8–4 (N, P₂O₅, K₂O)
2. 300 pounds of 6–8–4 + 18 pounds of N as side dressing
3. 300 pounds of 6–8–4 + 36 pounds of N as side dressing
4. 36 pounds of N.

Four plant arrangements, 1 plant every 8 inches, 3 every 16 inches, 9 every 24 inches, and 1 every 32 inches were imposed at random on each of the fertilizer plots. Field samples were selected and processed as previously described. Laboratory scale sirup tests were conducted for a sufficient number of the experiments to determine the effect of treatments. Fortytwo experiments with Wiley and 4 with Tracy were conducted 1956–59. Experiments with Wiley were conducted at Meridian, State College, and Holly Springs and those with Tracy at Meridian. Experiments at Meridian were destroyed by heavy rainfall in 1959. All experiments were planted in a randomized block design with 4 replications and 1/200-acre plots. The treatments included single plants spaced 1, 3, 6, 9, and 12 inches apart.