

ANNUAL REPORT (YEAR 1)
ARKANSAS CORN AND GRAIN SORGHUM BOARD PROPOSAL

Title: Increasing Grain Sorghum Productivity by Maximizing Land Use

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Response of 3 sorghum hybrids to varying nitrogen rates

Research plots were established at Cotton Branch Station (CBS), Pine Tree Station (PTS), and Northeast Research and Extension Center (NEREC). A description of the treatments follows:

Sorghum hybrids:

Pioneer 84G62, Terral 1050, and Terral 981.

N rates:

0, 50, 100, 150, 200, and 250 lb N per acre under irrigated conditions

0, 40, 80, 120, 160, and 200 lb N per acre under dryland conditions.

Approach:

Intended plant density was 8 seeds per foot (irrigated, 38" rows); 6 seeds per foot (dryland, 38" rows); 6-7 seeds per foot (irrigated, 30" rows); 4-5 seeds per foot (dryland, 30" rows).

Phosphorus and potash were applied based on soil test recommendations, typically 50-60 lb P and 50-60 lb K per acre. Herbicides were applied based on current U of A recommendations. Irrigated plots were watered between 5 and 6 times during the growing season, rainfall received during the same period was between 12 and 14 inches. Plots were seeded on 4/28, 4/29, and 5/21 at PTS, CBS and NEREC respectively.

Nitrogen rates were applied in equal splits at or near planting and at the 6-8 leaf stage (knee high). Plots consisted of 4 rows, 25 ft long. The two middle rows- 20 ft long - were harvested with a combine, with yields converted to 14% seed moisture content.

Preliminary results:

There was an obvious response to N rates at CBS. Nitrogen fertilizer recommendations called for an application of @ 115 lb N per acre. However, higher yields were obtained at N rates equivalent to 150 lb. Yields from dryland plots were highly variable, with no significant difference due to increasing nitrogen rates. These results underscore the importance of proper nutrition and timely and sufficient irrigation. There was sufficient soil moisture during the initial growth stages (seedling to 6-leaf stage) at CBS (@ 12 inches) to produce a head, but more was needed to fill the grain.

Yield potential at PTS was affected by a carryover effect of the herbicide Flexstar, commonly used in soybean production. Plants eventually recovered, but this stress which was identified at the critical 5-6 leaf stage probably impaired yield potentials. The soil where the Pioneer hybrid was planted apparently received a higher rate of the given herbicide, with visual toxicity symptoms being more pronounced than for the other two hybrids. Irrigated yields followed the same trend as in CBS, with the response to the N-fertilizer "peaking" at 150-200 lb/A rate. Yield differences for the dryland yields were only significant between the check (0 N) and the rest of the treatments.

Yields observed at PTS were maximized at the 150-200 lb N per acre as well. Yields from dryland plots were highly variable, with no statistically differences observed among them.

Assessing the yield potential of grain sorghum at varying planting arrangements.

The Terral 1050 hybrid was seeded under varying planting configurations: single row; double row (2 rows per bed); triple row (three rows per bed); flat (22.5 in apart on flat ground). Significant differences were observed at CBS, none at PTS. If similar results are obtained at CBS in future efforts, it could offer an opportunity to increase yield potentials under dryland production systems.

Estimates of biomass production were obtained from irrigated as well as dryland plots at CBS. There was a significant increase in biomass production with higher nitrogen levels, especially under irrigated conditions. Biomass production for “dryland” plots was constant across nitrogen levels. Having an estimate of the amount of biomass produced under regional conditions could potential help on the development of management practices for deep-cut grounds.

Efforts to estimate the rate of nutrient release from grain sorghum stubble are underway. Stalks were cut to eight-inches-long pieces, immediately placed inside mesh bags (a total of 60) and returned to the field, three bags are collected at 3-weeks intervals. Collected samples will be analyzed for nutrients and dry matter loss.