Regional Feedstock Partnership Highlights—Sorghum

Sorghum was identified as a key species for use as a dedicated bioenergy feedstock. Of the herbaceous bioenergy crops, sorghum is unique as it is a drought tolerant, annual crop established from seed that is readily tractable to genetic improvement. The purpose of this study was to assess the yield potential and stability of sorghums grown across diverse production environments in the USA.

For this study, six sorghum genotypes (one cultivar, five hybrids) were grown in yield trials in seven locations in six states for five years (2008-2012). No other previous study had encompassed such range and duration for biomass yield and compositional analysis.

Across all genotypes, the average sorghum yield ranged from 3.1 to 7.6 dry tons/acre across all locations and years. For the highest yielding hybrid, biomass yields ranged from 3.1 to 15.4 dry tons/acre across all environments. The majority of variation in dry and fresh yield was attributable to the environmental effects and highest yields were observed in environments with higher rainfall. The optimum regions for production appear to be in the Southeastern U.S., where consistent moisture and long growing seasons maximized yields.

Genotypes varied significantly for yield with hybrids developed specifically for bioenergy production ranking the highest in biomass yield and lowest in moisture content. Based on sorghum development and the data collected from these trials, it is our conclusion that current biomass sorghums will be primarily harvested at high moisture concentration; thus breeding hybrids with inherently better drying capabilities may be advantageous. Given the annual nature of the crop, hybrids can be developed that improve yield in a relatively short time period. Furthermore, there are opportunities to quickly improve the yield potential in bioenergy sorghum as well.

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