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Agriculture and Natural Resources | California Institute for Water Resources

Optimizing efficiencies and economics of solid-set subsurface drip and overhead mechanized systems with flat-planted cropping systems

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Project Summary

Results of this experiment indicate that if water stress occurs during the growing season, corn can show dramatic decreases in yield, compared to sorghum which showed greater resilience to water deficits. The numerically higher digestibility of BMR sorghum over conventional corn varieties support the finding that BMR sorghum can substitute conventional corn in dairy rations without a negative impact on milk production. Although a 20% water reduction in water resulted in significantly higher yields of conventional sorghum over BMR sorghum, thought must be given to the lower digestibility of conventional sorghum.

Currently, inclusions of starch-rich grains (such as corn) may be necessary to balance high sorghum forage diets for dairy production. If future genetic improvements were to lead to sorghum cultivars with increased starch content, sorghum might become more widely used. However, it is questionable as to whether high starch sorghums could match that of corn, and if the grain and starch yield of forage sorghum were to be increased, the plant's drought tolerance might decrease.

A third year of this experiment, should lead to more conclusive results. Additionally, if the sections with corn and sorghum were to be fully randomized so as to create a strip- plot configuration, the two species of crop could be compared and a statistical comparison could be made between corn and sorghum.

Further analysis should be done on quantifying the economic profitability of sorghum versus corn in order to provide a better understanding of the potential of sorghum as a substitute for corn in dairy systems. The cost and availability of water should be included in this analysis.

Information Transfer/Outreach Program

Results and findings generated by this project have been and will be in the future widely disseminated. An MS student in Horticulture and Agronomy, Gerardo van den Hoek, at UC Davis was hired by the project and he successfully completed his degree based in part on this work. He has agreed to work with our project team during the 2016 season as we attempt to get a third year of data. The project was presented at annual meetings of the American Society of Agronomy in Long Beach, CA and in Minneapolis, MN in 2014 and 2015, respectively. Several other lesser formal presentations of the work in progress were made over the two years of the study at the field site to various groups.