MANAGEMENT PRACTICE EFFECTS ON CORN GRAIN ETHANOL YIELD AND ETHANOL BYPRODUCT QUALITY

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ABSTRACT

The Renewable Fuel Standard (RFS2) under the Energy Independence and Security Act of 2007 (EISA) currently requires the production and use of 136.08 billion liters of renewable fuels by the year 2022. A significant portion of the requirement will come from the production of corn \( \textit{Zea mays} \) grain ethanol. Currently, two processes are primarily used to produce ethanol from corn, the dry grind process and the wet mill process. With the dramatic increase in corn grain usage for ethanol production, it is important to determine how management practice decisions affect both dry grind and wet mill ethanol yield and ethanol byproduct quality. This study was conducted in Missouri during the 2007 and 2008 growing season to determine whether the management practices of planting date, planting density, or environment (location and year) have a significant affect corn grain yield, ethanol yield and kernel characteristics important in ethanol byproduct quality. Whole kernel samples were tested using a FOSS Infratec 1241 Grain Analyzer to analyze kernel composition with Near-Infrared (NIR) spectroscopy. Starch was not a good predictor of ethanol yield while consistent relationships were observed for protein with positive correlations for dry grind ethanol yield and negative correlations for wet mill ethanol yield. Management practices had the largest affect on grain yield while ethanol yield and kernel composition were affected to a lesser extent. This suggests selecting a planting date and planting density based on achieving the highest grain yield would be most effective practice to help meet the current RFS2 requirements.