Yared Assefa, Kraig Roozeboom, and Chuck Rice
Department of Agronomy
Kansas State University, Manhattan, KS 66506

Introduction

Winter wheat, corn (grain), soybeans, and grain sorghum accounts a little more than 85% of the crop harvested area in Kansas.

Obviously, three of these crops (corn, sorghum and soybean) are summer crops and decision by a producer to have one crop in a season comes, usually, in the expense of not having the others.

The decision to plant wheat, a winter crop in Kansas, might also come in the expense of not having the other summer crops, in the previous or following season, due to possible overlap in planting date, harvest date, and other similar reasons.

Therefore, a critical analysis of factors that determine crop selection is essential to properly consult producers. One of the top factors critical for producers decision on cropping is yield.

Objectives

- To evaluate the historical and spatial characteristics of corn, sorghum, soybean, and wheat yields across Kansas in irrigated and dryland systems to help location and management specific cropping decisions, and

- To investigate impacts of environmental changes (in terms of time and location) in crop yield and yield variability

Materials and Methods

Annual record of corn, sorghum, soybean, and wheat yields from Kansas available at the USDA National agricultural Statistics Service (NASS) website was used for this analysis.

The significance of four factors: (i) crop type differences, (ii) cropping system (irrigated, non-irrigated), (iii) time (1970-2011), (iv) location (nine districts, Fig. 1) and their interaction on yield was tested.

Results and Discussion

Between the years from 1960 and 2011, average yields for corn, sorghum, soybean and wheat increased at the rate of 111, 43, 20, and 22 kg ha⁻¹ yr⁻¹ in Kansas. However, our analysis of variance result indicates that the interaction between crop type, cropping system, and district or decade was significant. Which means crop comparison have to be location and management specific and not on state wide average.

Yield trend by cropping system

- Among the four crops, Irrigated yields of corn were superior followed by irrigated sorghum.
- Irrigated yields were by far higher and less variable than dryland yields.
- Wheat in the irrigated system, and dryland corn, in the dryland system, had the highest variability in their yields.
- Crops had highest variability in the most recent decade, i.e., 2000-11.

Crop yield by district and by cropping system

- Dryland yields in eastern Kansas were in the order corn > sorghum > wheat > soybeans.
- Dryland yields in central and western Kansas were in the order corn > sorghum > wheat > soybeans.
- Irrigated yields were in the order corn > sorghum > wheat = soybeans.

Conclusion

Yield is not the only factor that should be considered in cropping decisions, but it is among the major factors. Because yield is a function of the interaction between genetics, environment, and management systems; it should be studied at that scale. This document serves multiple functions: (i) shows how comparison of yield at different scale (just at state level, by cropping system at state level, and at different districts by cropping system) might result different conclusions; (ii) it shows crop yields at different districts of Kansas to help decision making, and (iii) also documented increased yield variability in recent decades and in environments with erratic rainfall.