

CORN GRAIN YIELD RESPONSE TO CROP ROTATION AND CONSERVATION TILLAGE

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SUMMARY

The need for an alternative crop for soybeans and an increased demand for corn as a livestock feed have caused an increase in corn acreage. The Blackland Prairie Region is an area that has seen an increase in corn production. The soil type associated with this production is a soil with a high clay content which creates special problems for crop production. The soils of the Blackland Prairie are predominately heavy expanding clays and are highly erodible when tilled. Crop rotation is a method for improved productivity and sustainability. A field study (1994-2000) was conducted to investigate the effect of selected tillage and crop rotation/tillage systems on soils in the Blackland Prairie Region. Two soil types in the Blackland Prairie Region were selected for test sites. The soil types were a Vaiden Silty Clay (very-fine, montmorillonitic, thermic, Vertic Hapladalfs) and a Houston Clay (very-fine, montmorillonitic, thermic, Typic Chromuderts).

Tillage treatments were: 1) no-tillage (NT); 2) ridge-tillage (RT) corn, planted no-till and cultivated once with a high clearance cultivator equipped with ridgers; 3) turf aerator (TA) corn, with turf aerator knives operated one month prior to planting at 10% angle from vertical and at a 6 to 8 inch depth; 4) conventional raised-bed tillage (CTB) corn chisel, disked, bedded, do-alld before planting, and cultivated once; and 5) fall para-tilled bed (FPTB) corn. Tillage/crop rotations were: 1) RT soybean fb RT corn; 2) FPTB soybean fb FPTB corn; and 3) soybean fbNT corn.

Environmental conditions during the corn production season had an influence on emergence, growth and yield. Rainfall distribution had an influence on corn yield. Summary of results being reported are for years 1994-1999 for both soil types. Results for 2000 were below normal due to extremely dry conditions. Grain yield for the Vaiden silty clay was not significantly different for three of the six years, 1994, 1996, and 1998. There was no tillage/rotation interaction for these three years. The 1995 yields were not significantly different between FPTBSbfbFPTBC, CTB and RT. NT was significantly lower but not significantly lower than RT. There was no significant difference between RTCfbRTSb, FPTB and soybean fb corn in yield for 1998. NT was not significantly lower than RT, FPTB and CTB. The 1999 yields were significantly lower for soybean fb corn and TA than for other treatments. The trend for corn is to be higher yielding in rotation with soybeans.

Grain yields for Houston clay for 1996 and 1999 were not significantly different for tillage/rotation. The 1994 grain yield for RTCfbRTSb was significantly higher than NT, although not different from other treatments. 1995 FPTB was significantly higher than other treatments, with TA yields significantly different from other treatments. 1997 corn yields RTCfbRTSb and FPTB were significantly higher than other treatments. CTB, TA and NT were not different but significantly lower than other treatments. 1998 yields were low due to extreme

dry weather. FPTB corn yields were highest but not different from other treatments. RTCfbRTSb corn yields were significantly lower than other treatments.