

## **NO-TILL VS MINIMUM-TILL DRY-LAND CROP ROTATIONS**

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A study was initiated in 1999 to evaluate four different dry-land cropping rotations and two tillage systems for their long-term productivity in the panhandle region. Rotations evaluated include Wheat-Sorghum-Fallow (WSF), Wheat-Corn-Fallow (WCF), Wheat-Soybean-Fallow (WBF), and Continuous Sorghum (CS). Soybean and corn were not successful in the first five years of the study; therefore in 2004 cotton replaced soybean and sunflower replaced corn in the rotation, also continuous sorghum was replaced with a grain sorghum-sunflower (SF) rotation. Starting in 2010, the study was changed again and only sorghum was grown. Tillage systems include no-till and minimum tillage. Two maturity classifications were used with all summer crops in the rotations until 2001, at which time all summer crops were planted with single maturity hybrids or varieties. Most dry-land producers in the panhandle region utilize the WSF rotation. Other rotations would allow producers flexibility in planting, weed management, insect management, and marketing.

### **Results**

#### **Climate**

The latest drought started at OPREC in September of 2010. In August of 2010 the station received 5.42 inches of rainfall. In the period from September 1, 2010 through August 31, 2011 the station received only 6.11 inches of precipitation with 2.05 inches of that coming in August of 2011 which was too late for any summer crop production. From September 1, 2011 to August 31, 2012 the station received 14.54 inches of precipitation which is also below the average of 17.89 inches. This two year drought has reduced grain yields on both summer and winter crops below what has been raised in the past at OPREC. This is shown in results for both wheat and grain sorghum (Figures 1 and 2)

Eight of the last thirteen summers have been below average rainfall for the months of June – August (Table 1). The two driest periods were 2001 and 2011 with 16.5% and 35.6% of normal. The two years with the highest grain sorghum yields were 2009 and 2010 which is surprising since 2009 was below average rainfall and 2010 was above average.

Table 1. Summer growing season precipitation at OPREC

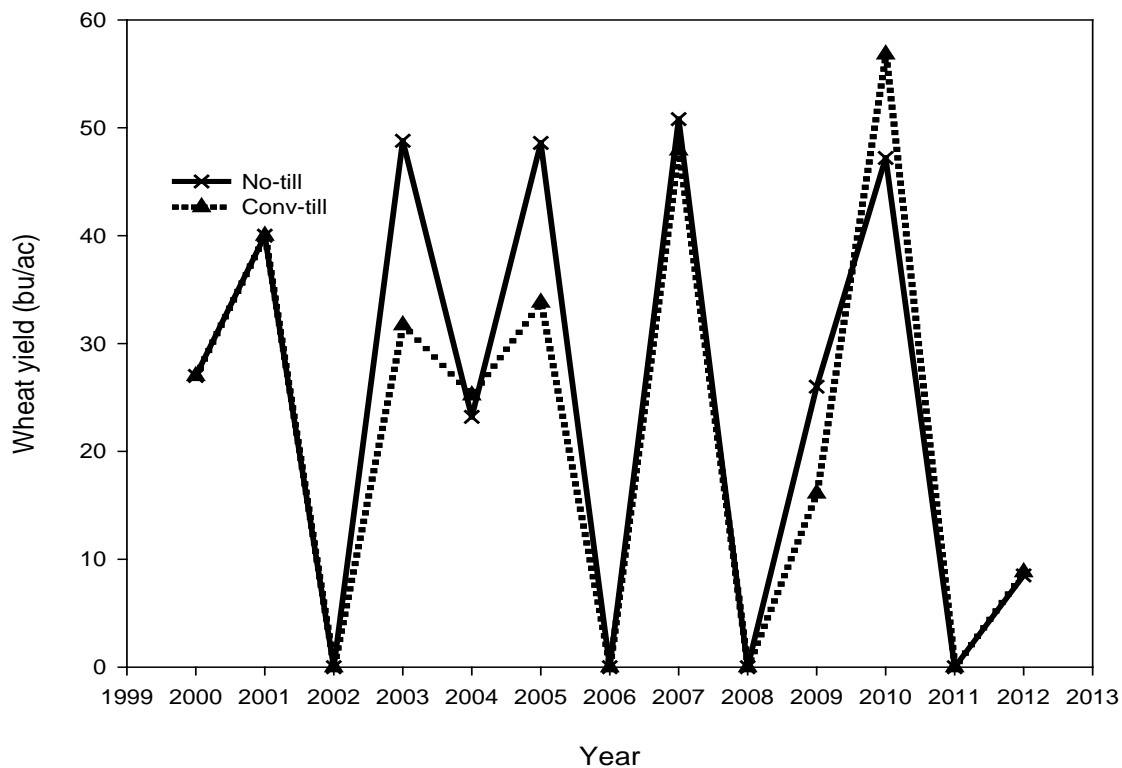
Month	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Long-term mean
June	2.29	0.61	1.32	5.26	3.82	2.01	2.34	1.62	1.51	1.74	3.16	0.53	2.33	2.86
July	0.76	0.00	2.52	1.87	2.43	1.40	2.05	2.00	3.77	2.58	1.22	0.17	1.95	2.58
Aug	1.09	0.66	0.27	1.19	2.87	3.21	4.06	0.26	5.64	1.36	5.42	2.05	0.85	2.28
Total	4.14	1.27	4.11	8.32	9.12	6.62	8.45	3.88	10.7	5.68	9.80	2.75	5.13	7.72

### Wheat

No wheat was harvested in 2002, 2008, and 2011 due to drought, and 2006 due to a hail storm.

This report will focus on wheat yields following grain sorghum, because in some years other crops never emerged or were lost to other factors.

Fig. 1. Wheat grain yields (bu/ac) from WSF in dry-land tillage and crop rotation study at OPREC.

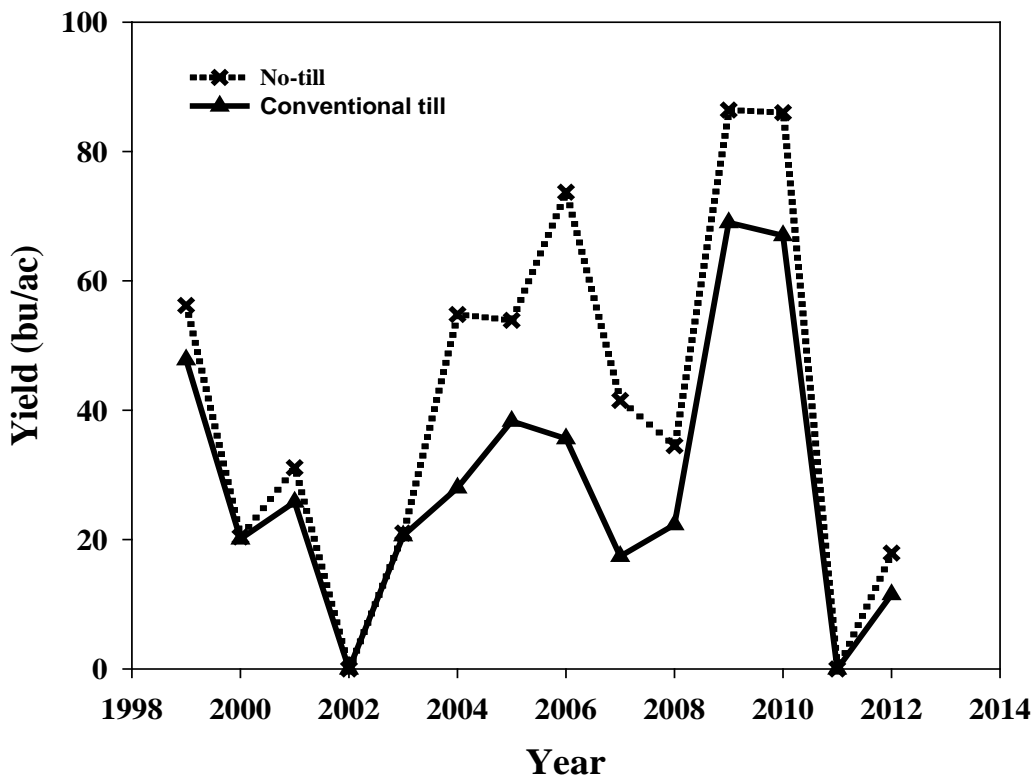


Neither tillage system produced, or will produce grain when drought occurs and no crops are harvested as in 2002, 2008, and 2011 (Figure 1). In three of the seven years that wheat was harvested, grain yields were significantly higher for no-till (Fig. 1) with an average increase of 14 bu/ac. In 2010, yields for conventional tillage were significantly higher than for no-till. Research conducted by Kansas State University at Tribune, they have shown a consistent increase in grain yield for no-till that hasn't yet been observed in this study.

### Grain Sorghum

As with wheat, when no precipitation is received the tillage system makes no difference since no sorghum was harvested (see 2002 and 2001 fig. 2).

Figure 2. Grain yields of grain sorghum (bu/ac) for dry-land tillage and crop rotation study at OPREC.



Since 2004, grain sorghum yields have been significantly higher for no-till than conventional tillage. This increase in sorghum grain yields was in year 6 or the third time through the rotation. This yield difference was also observed and reported by researchers at Kansas State University at the Tribune location. In 2004, 2006, and 2007 no-till grain yields were double those for minimum tillage.