

## Crop Rotation- Part 3

Have you ever wondered what the effect of crop rotations has on wheat yields?

An on-going study at the Harvey County Experiment Field near Hesston helps answer this question. In this elaborate crop sequence study, crop rotations were combined with tillage treatments. The rotation treatments were wheat-corn, wheat-sorghum, wheat-soybean, continuous wheat, and continuous sorghum. The two tillage treatments, V-blade (V-blade, sweep-treader, and mulch-treader) and no-till, were imposed on the row crops and wheat was planted no-till after row crop harvest. Continuous wheat had three tillage treatments, burn (burn, disk, and field cultivator), chisel (chisel, disk, and field cultivator), and no-till; and continuous sorghum had chisel (chisel, sweep-treader, and mulch-treader) and no-till treatments.

Averaged over tillage treatments, wheat in the wheat-soybean rotation (60.3 bu/a) had the greatest yield, followed by the wheat-corn rotation (56.5 bu/a), continuous wheat (46.3 bu/a), and the wheat-sorghum rotation (39.6 bu/a). Obviously, there is a rotation effect for wheat after corn and soybeans. Although there is no mention in this study why no-till wheat performed so poorly after grain sorghum, other studies have shown similar yield declines when wheat is no-till planted into grain sorghum stalks compared to tilling the sorghum stalks prior to wheat planting. This decline in wheat yields is often attributed to soil moisture differences after sorghum, soil residual nitrogen differences, and allelopathic chemicals in sorghum stalks.

Within the wheat-corn and wheat-sorghum rotations, the tillage treatments on the row crops had little effect on wheat yields. But, interestingly, in the wheat-soybean rotation the 4-year average wheat yield for the V-blade tillage treatment was 6.7 bu/a lower than the no-till wheat yield (remember the V-blade treatment was prior to soybean planting).

In continuous wheat, the 4-year yield for the burn treatment (burn, disk, and field cultivator) was 49 bu/a, while the chisel (chisel, disk, and field cultivator) treatment (43.7 bu/a) and no-till treatment (44 bu/a) were similar. Cheat became a problem in the no-till wheat and was corrected by using the currently non-labeled herbicide, Olympus.

By the way, sorghum in the sorghum-wheat rotation (107 bu/a) yielded 22 bu/a better than the continuous sorghum (85 bu/a).

What's the bottom line?

Sometimes wheat is thought to be in a rotation only because row crops can be planted no-till into wheat stubble so easily. We don't generally think wheat will benefit from being in a rotation. But, indeed, wheat benefits from being in a rotation with row crops compared to continuous wheat. The one exception is when wheat is planted no-till after grain sorghum harvest. Based on other research, it is not unusual to see depressed wheat yields when wheat is planted no-till into grain sorghum stalks immediately after sorghum harvest. Other research at Hesston indicates the negative effects of sorghum on wheat can be minimized by keeping seeding rates and N rates high (90 to 120 lb/a for seeding rates and N). As with any monoculture, such as continuous wheat, pests become problems. In this study, cheat became a serious weed problem. Although we don't recommend continuous no-till wheat, this research indicates that stacking no-till wheat for two years in a rotation may be successful if a wheat variety with tan spot resistance is used.

For more details see: Field Research 2001. P. 28-33. K-State Research and Extension Report of Progress 876.

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