

# **CROP EMERGENCE UNDER DIFFERENT TILLAGE SYSTEMS**

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## **PROJECT OBJECTIVE**

To compare the establishment and the rate of crop development under three stubble management treatments. These treatments were:

- 1) direct seeding into standing stubble (ZT);
- 2) seeding into tilled stubble (CT);
- 3) direct seeding where the crop residue was mowed and removed (ZTRR).

## **METHODS**

Seven cooperators in the Black and Moist Black Soil Climatic Zone conducted the project from 1994 to 1998. An additional location was established at Wilkie in 1998 (Dark Brown Soil Climatic Zone).

Each cooperator was asked to select a field where spring wheat was to be sown into standing wheat or canola stubble. The farmers cultivated an area in the field prior to seeding. Also, an area 40 feet by 40 feet was mowed and all crop residue was raked and removed from the field (ZTRR). The cooperator then direct seeded the entire field to spring wheat.

Data collected from the sites included soil temperature, seeding depth, plant emergence, and crop development (assessed using the Haun growth staging system).

The statistical analysis includes 18 site years.

Fields were observed as the crop approached maturity to detect any visual differences between treatments.

## RESULTS

### Soil Temperatures

Soil temperatures were taken on a regular basis during early crop development in 1996 only. Soil temperature differences between the three treatments were small at both the 2" and 4" depth. At the 2" depth ZT treatments averaged 1.4" C and 0.8" C lower than the ZTRR and CT treatments, respectively. At the 4 inch depth, the ZT averaged 0.9" C and 0.5" C lower than the ZTRR and CT, respectively.

### Crop Emergence

The treatments that did not involve tillage had slightly higher plant numbers than the CT treatment (Table 1). Therefore, the presence of drop residues on the soil surface did not have a negative impact on the number of plants that established.

Table 1: Plant emergence (plants/m<sup>2</sup>) under 3 different crop residue management treatments

	Pre-Till	Mowed	Direct Seed
1994	151	171	163
1995	173	176	194
1996	229	230	235
3 year avg.	164	192	197

### Seeding Depth

When average over all site years, the ZT and ZTRR treatments tended to be seeded shallower than the CT treatments. Average depth of seeding was 40 mm, 39 mm, and 46 mm for ZT, ZTRR, and CT treatments, respectively (Figure 1).

The variability of seed depth was slightly greater for the CT treatments than the ZT or ZTRR (Figure 1).

## **Crop Development**

Differences in the rate of crop development between treatments were not statistically significant when average over the 18 site years. Mean Haun stage for the ZT, ZTRR, and CT treatments were 4.1, 4.2, and 4.1, respectively.

## **Relationship between Seed Depth and Growth Stage**

The data was separated into sites where:

- 1) ZT seeded deeper than CT (>10mm)
- 2) ZT seeded at same depth as CT (with 10 mm)
- 3) ZT seeded shallower than CT (>10mm).

There was a trend where ZT treatments were slightly behind in development when seeded deeper or equal to the other treatments. The opposite trend occurred when ZT treatments were seeded shallower than other treatments with ZT being slightly advanced (Figure 2). However, these differences in crop development were not statistically significant.

## **Crop Maturity**

Observations were made near swathing to assess drop maturity. In a few locations, the ZTRR treatment was 2 to 3 days more advanced in maturity than the ZT treatments. However, in these situations the ZTRR drop was shorter and thinner. The advancement in maturity in the ZTRR plots may have been caused by environmental stress due to evaporation loss on plots that contained no surface residue.

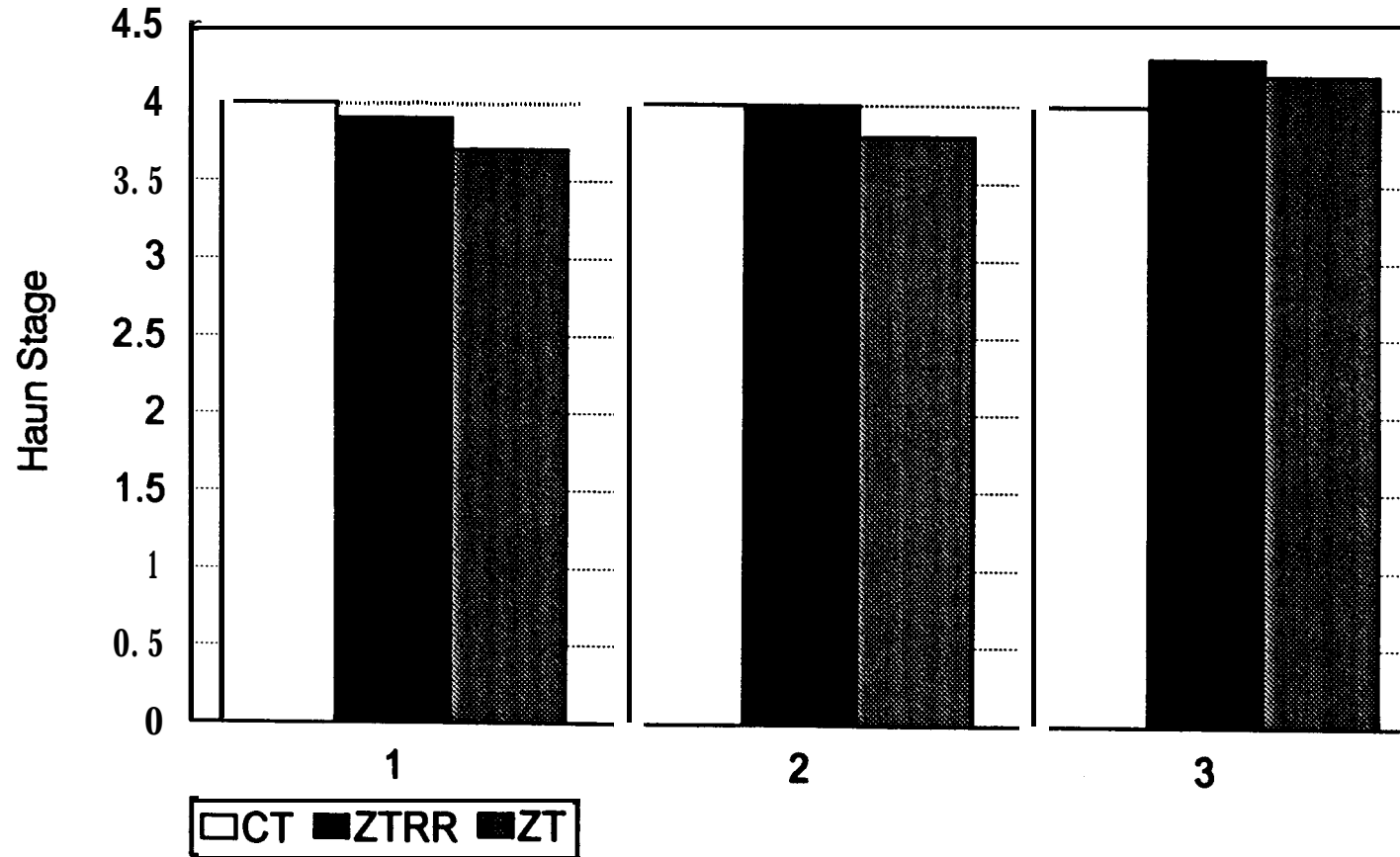
## **CONCLUSION**

wheat establishment was not affected by the presence of drop residues. There was no difference in wheat development between CT, ZT, and ZTRR when the ZT seed was placed at a uniform, shallow depth.

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Figure 2: Relationship between Crop Development To Seed Depth Under Different Stubble Management Treatments



1- ZT seeded deeper than CT  
2 ZT same depth as CT  
3 ZT seeded shallower than CT

# Figure 1: Variability in Seed Depth Between 3 Stubble Management Treatments

