

## SEARCH FOR EXCELLENCE IN CROP PRODUCTION - LONG TERM NO-TILL VS. CONVENTIONAL TILL PLOT AND COVER CROP PLOT

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### **Educational Objectives:**

1. To increase the awareness of no-till crop production in Lyon County.
2. To determine if there is an economic advantage to no-till or conventional till crop production.
3. To determine if there is any yield variation between no-till and conventional till crop production.
4. To compare long term soil nutrient levels between no-till and conventional till crop production.
5. To demonstrate the use of cover crops in the crop rotation system.

### **Program Activities:**

#### **No-Till vs. Conventional Till Plot -**

In the fall of 2000, I was approached by a producer who had switched the majority of his crop acres to 100% no-till crop production. He was wanting to make sure that he had made an economically feasible decision for his operation. He had a 21 acre field that according to the Soil Survey Map was fairly uniform in soil type. We have two plots of no-till crop production and two of conventional till crop production. The plot receives no special treatment, it is treated like he would treat any of his other fields. His actual crop production costs are utilized to figure the economics on the plot. A weigh wagon is used at harvest with each plot weighed separately. Yields are adjusted for standard moisture and test weight. Soil nutrient levels were tested in 2001 prior to planting to establish our baseline nutrient levels and retested in January of 2003.

## **Cover Crop Plot -**

In 2002 another plot that was established was a cover crop plot. Producers who attended the 2002 “No-Till on the Plains Conference” heard several presentations on utilizing cover crops on their fields to help produce biomass (organic matter), help with weed suppression and in some cases add nutrients to the soil. I was contacted by a producer and an agribusiness about establishing a cover crop plot. We included 10 different crops in the plot that was planted July 18, 2002. Crops included alfalfa, corn, red clover, yellow clover, lespedeza, soybeans, sunflowers, sudan, cowpeas and Sunn hemp. Sunn hemp is a tropical legume that is used as a cover crop in other parts of the world and research on utilizing Sunn hemp has been conducted by several universities in the United States.

We received 1 ½ inches of rain the night the plot was planted. Part of the field had chemical and fertilizer applied earlier in the spring in preparation for a corn plot that was scraped due to the weather. Most of the cover crops established well on this part of the field while they struggled on the part of the field with no chemical or fertilizer due to weed competition and low nitrogen levels. The clovers and alfalfa didn’t establish on either end of the field due to heat.

Plant samples were collected on the cow peas and Sunn hemp to determine the plant residue nutrient content. Likewise, soil samples were pulled in November 2002 and were pulled again in April 2003 to see if we accumulated any residual nitrogen from the cowpeas or Sunn hemp.

This past spring, we planted corn into last years cover crop residue to see what challenges the standing residue might create and if we achieved any yield benefit from nitrogen fixed by the legumes or nutrients produced by the residue. We had no trouble planting through any of the residue. The corn was fertilized at five different nitrogen rates and hand harvested with each sample weighed individually. The results didn’t show any advantage to having cover crops planted prior to corn. However, we were extremely dry during the summer of 2003 and this could have affected our results.

Another cover plot was planted in 2003. To give the clovers a chance to establish better this time they were broadcast seeded into standing wheat at the end of February. The remaining cover crops were drilled following wheat harvest. Due to extreme drought conditions, none of the crops produced any significant growth. Plans are to plant another cover crop plot in 2004.

We received a SARE mini-grant to offset seed and soil testing costs in 2002 and 2003. We are hopeful to receive another grant in 2004.

### **Teaching Methods:**

Teaching methods used on both of these plots included the announcement of plot locations so producers could watch them progress through the summer, fall plot tours, presentation of plot results at county, state and multi-state producer and Extension Agent meetings, publishing results in the Lyon County Extension newsletter, and producer consultations.

### **Results:**

The plots have created a lot of discussion among producers in Lyon County. We have also been able to accumulate data that over time should prove beneficial to producers who are considering adopting no-till production on their operations and for those that may be interested in using cover crops in their crop rotations. The results aren't complete at this time as we plan to continue both plots for several years to come. However, a summary of our work to date has been included with this application.

Plans for 2004 include intensifying the crop rotations in the no-till vs. conventional till plot. We have been in a corn-soybean rotation. We are planning to move into a more intensive cropping rotation system by "stacking" crops. In this type of system, we plan to plant two years of corn or grain sorghum, followed by two years of soybeans then a year of wheat and then back to corn.

It doesn't appear that we produced any measurable residual nitrogen from the legumes that were included in the 2002 cover crop plot. However, after talking to some other producers we think we have identified the cause. It appears that everyone who got their Sunn hemp and inoculant from the same source all reported little if any root nodulation and subsequent nitrogen production. A possible cause of this was the manner in which the inoculant was stored in the warehouse. Due to this fact, we plan to plant Sunn hemp again this summer, ensuring that we have viable inoculant.

### **Impact Statements:**

1. No-till crop production appears to have a slight production cost advantage over conventional till while producing comparable yields.
2. Cover crops can produce a lot of biomass (organic matter), aid in weed suppression and may provide some residual nutrients allowing producers to lower fertilizer costs.

**Evaluation:**

Both plots have been received very positively by Lyon County producers and have stimulated a lot of discussion among producers. I have had several producers who utilize conventional till crop production contact me to discuss the results of the no-till vs. conventional plot to see if we have determined a concrete economic advantage to no-till crop production. It appears me that the plot has opened the doors to a potential increase in the utilization of no-till crop production in Lyon County.

The cover crop plot has demonstrated that eastern Kansas producers may have the opportunity to intensify their cropping rotations by utilizing cover crops while possibly increasing profits by producing a marketable crop or by lowering fertilizer and herbicide costs.