



2006 Growing Season ... *Determine the Effectiveness of RTK Placement of Fertilizer and Seeding with Irrigated Corn --- Yield Results*

**Introduction:**

This project was instigated from the growers communicating to the board at the Irrigation Research Foundation (IRF) in Yuma, Colorado and to the Sales staff with Orthman Manufacturing. Their questions are to evaluate what is the real sense of how important is placement of fertilizer and subsequent seeded crop. More specifically, in regards to where the seed is placed then right directly over the deep placed fertility, four inches off to one side to replicate the potential of what a DGPS signal might provide, and third eight inches off to one side to replicate a WAAS signal with today's guidance on tractors.

**Methods of our Study:**

Some research in the Corn Belt states have made some cursory looks at what is happening beyond yield comparisons as to how far offset the seed is compared to fertility placement and very little with the precision tillage system of Strip-Till. The corn plots will be strip-tilled 30 days prior to planting and fertilized during the strip-till operation. This is a duplicated study for three growing seasons with 110 day length corn, fertilized same across all three treatments and compared against conventionally tilled corn that is fertilized with same amounts, but using broadcast application methodology and remainder of nitrogen through the pivot.

Our approach: 1) Very early stages (emergence to 3 leaf stage) get a standard count of emergence in 0" offset, 4" offset, and 8" offset; 2) At 20 days after emergence to excavate plants, map root system, and determine linear inches of root growth; 3) At 55 days after emergence to excavate plants, map root system and determine linear inches of root growth; 4) At 55 days measure total leaf area and leaf area index; 5) At 100 days after emergence to excavate plants, map root system, and determine linear inches of root growth; and 6) Collect harvest data in duplicated plots 8 row by 600 ft.

The following table depicts agronomically what our observations were to have a better idea why precision placement of fertility and seed placement makes a difference.

<b>Table 1. Root dimensions at three dates during 2006 corn growing season, 111 day corn hybrid</b>								
<b>20 days after Total Root Length/plant</b>			<b>55 days after Total Root Length/plant</b>			<b>100 days after Total Length/plant</b>		
(linear inches)			(linear inches)			(linear inches)		
0 inch offset	4 inch offset	8 inch offset	0 inch offset	4 inch offset	8 inch offset	0 inch offset	4 inch offset	8 inch offset
480	400	190	25920	17125	15885	38210	24020	20800
<b>Depth of Roots (extension at this date)</b>			<b>Depth of Roots (extension at this date)</b>			<b>Depth of Roots (extension at this date)</b>		
22in.	18in.	13in.	63in.	56in.	50in.	68in.	61in.	57in.

Always though yield is a telling marker in ascertaining how comparison trials rate in the eyes of the grower. Not always will this be the full story of the study which we will explain.

<b>Table 2. 2006 harvest, corn for grain at 15.5% moisture - Yuma, CO</b>			Note: Yields are median values of replicated plots
0 inch offset	4 inch offset	8 inch offset	
214 bu/ac	208 bu/ac	204bu/ac	

***Discussion:***

Our goals for this study was to provide full irrigation and observe with dual placed fertility (5 inch depth below soil surface and 9 inches below surface) a blend of nutrition N-P-K-S & Zn with an emphasis on 60 lbs of actual phosphate (P) product. Our aim, utilize the soil tests results and previous years removal of fertility. We applied fertilizer with the strip-till tool 30 days prior to planting (March 20, 2006). It was also our intent to maintain a lowered level of nitrogen (N) by following a prescription of 0.7 lbs N for every expected bushel of grain. Our goal was 250 bushels/acre yield. We applied a total of 135 lbs of N instead of the 175 lbs/acre at 0.7lb/bushel necessary. Early in season we were being conservative and held off irrigating in May and we inadvertently missed a fertigation of 30lbs of liquid N through the pivot, that miss dropped us back to 0.56 lb N per bushel. Our 2006 crop just ran out of nitrogen to be the great crop we anticipated.

In 2005 at the IRF long term strip-till plots yielded 271 bu/acre, an outstanding crop. The previous year in 2004 the crop was hailed four times, limiting yields significantly. Nitrogen uptake was much less in the hailed out year. 2005 the crop was fertilized for 220-230 bushels/acre and had the residual fertility from 2004 to access. A 271 bu/acre corn crop undoubtedly used a great deal of residual N and with medium cation exchange capacity soils on the IRF farm of 13 meq/L top yields require a good package of nutrients.

***Conclusion:***

Recent findings and field studies across the greater Corn Belt states are offering growers the chance to reduce nitrogen rates from the conventional wisdom of 1.3 to 1.5 lbs N for every bushel sought. The researchers are not in full agreement with recommendations on "how low can you go." Several well known researchers are still seeing good yields at 0.7 to 0.8 lbs N. Others are not so adventuresome and say 1.0 lb is their suggested lowest rate.

Our results suggest that 0.56 lb N/bushel with strip-till for expected yield is not enough. The 0.7-0.75lb lb N/bushel appears to have a better chance to obtain the desired yield goal. Our results from 0.56 lb of N yielded 1.6 bushels or an investment of \$33.20 for the P-K-S-Zn fertilizer/acre, and \$56.70 for the N fertilizer/acre. At 213 bu/acre for the most accurate placement of no offset and the investment of fertilizer products yielded \$568.70 gross - our corn crop was still very reasonable.

The increase in yield from 0 inch offset to 4 inches offset was 5 bu/ac, an improvement is 2.3% and the 0 inch offset to 8 inches offset is 4.3% improvement even at 0.56 lb N per acre. Still a lesson well learned that placement does have value and our continued study for '07 and '08 will be years with hope and expectations.