

# Does Precise Placement of Fertility and Seed Play an Important Role?

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**Spring** has come and nearly gone, throughout the Great Plains our crops are showing some stress with this heat of June. But there is much promise that the finish will be good with those of you irrigating. Strip-till fields, whether they are sugar beets, corn, grain sorghum, sunflowers, soybeans or dry edibles this 2006 season are pushing the barriers. Coming from an outstanding start with the top pre-plant tillage system, it is our hope your strip-tilled crops are as good or even better than you hoped.



## *Getting the right start ---*

Orthman Manufacturing is deeply involved with a new study at the Irrigation Research Foundation (IRF) farm near Yuma, Colorado to evaluate continuous irrigated corn with highly accurate Global Positioning System (GPS) technologies placement of seed and dual placed fertility with the 1tRIPr strip-tillage system. In partnership with John Deere, Monsanto, and the IRF we are looking at the crop physiologic effects and agronomic benefits of this tillage system.

Our approach: on March 20<sup>th</sup> in the loam and sandy clay loam textured soils of the IRF plots we pulled the new 8 row-30 inch 1tRIPr into the field with a new 8420 John Deere fully rigged with Real Time Kinematics (RTK) guidance system. Our co-investigator Yancy Wright, Crop Systems Specialist with John Deere put all of us at ease as he completed the tilling and seedbed preparation just as we needed to the 10.5 inch depth and dual placed liquid fertilizer in the till zone. The 1tRIPr was all set up with Agri-Inject Inc. (Yuma, Colorado) newest micro-tubing, tank, and pump to meter out what we planned for.

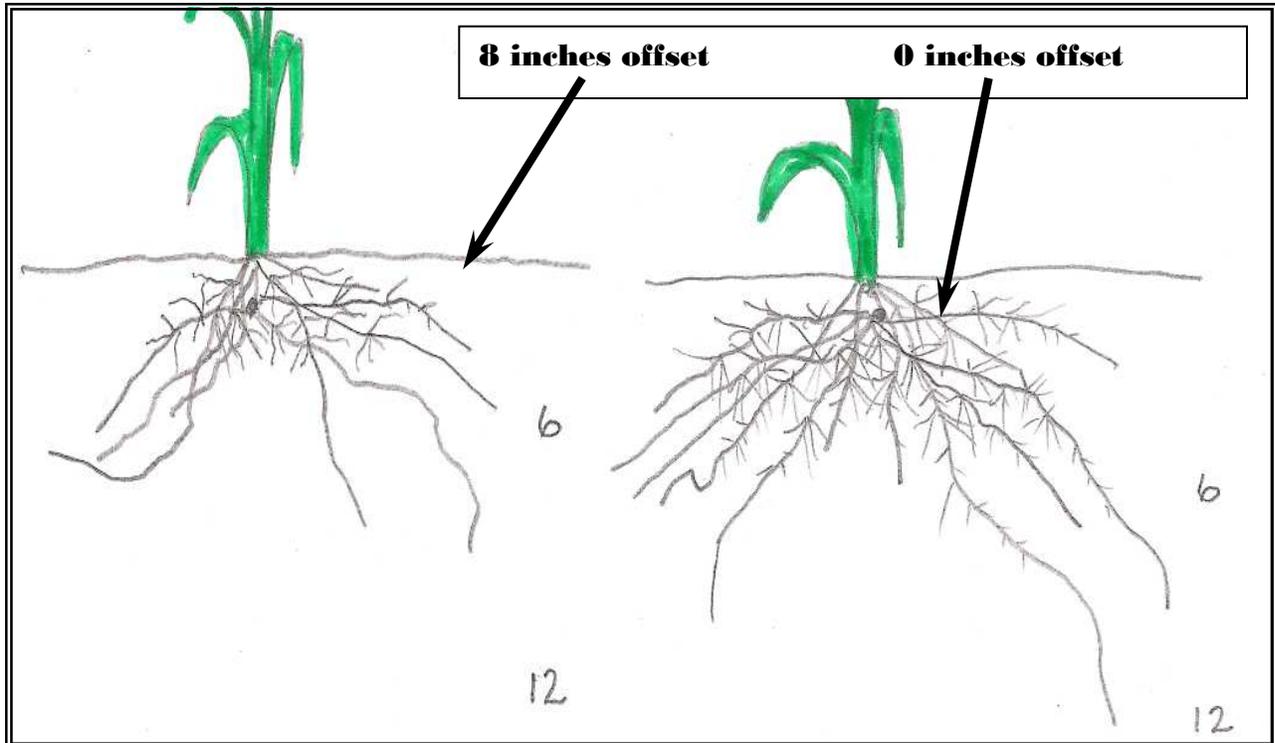
The reason why this study is in place is provide information for growers to have a better understanding of the effectiveness of fertilizer placement when reducing total Nitrogen and Phosphorus applied as it is to be placed right in the path of the roots. We are lowering the N rate to 0.8 lb per bushel and the phosphorus to 50-75% of soil test suggested rate. Another reason, farmers are reading and hearing that GPS systems will offer big benefits and dividends. It is our intention in this study to find what those may be. Are we expecting higher yields, better germination/emergence, deeper root systems, more tolerance to heat stress, better weed control, control traffic issues with compaction, and nutrient use? Yes to all we hope. Our study is to observe life below the soil surface three times during the growing season, selected by three dates: 20 days after emergence, 50-55 days after emergence and 100 days after. This will provide a full picture of the underground root development and above ground biomass growth.

Planting was accomplished April 20<sup>th</sup>. With all of us working together we used the same 8420 Deere tractor to pull the three-point John Deere Max-Emerge 7100 8 row planter at designated offset dimensions of 0 inches, 4 inches, and 8 inches off the center line of the earlier strip-tilled zone. We waited the 30 days to get the soil temperatures above 53 degrees, the soil to settle a bit, one rain and then planted a Dekalb 110 day YieldGard/RoundUp Ready variety to 32,000 seeds per

acre.

*Look at some early results, then consider yours...*

At 20 days and 50 days after emergence our research has revealed some striking differences in both root extension and total root length. Early plant growth is important, but consider how much you want to get your corn roots off and growing deep as possible and quickly as possible when soils are cool.



**Figure 1.** Diagram of root length/architecture we observed in the offset plots at IRF, May 22 & 23, 2006 20 days after emergence

**Table 1.** Linear dimension of averages of three corn plants per offset plot in twice replicated plots at Irrigation Research Foundation, May 22-23 and June 26-28, 2006

Offset Dimension	Linear root inches 20 days after emergence	Linear root inches 50-55 days after emergence
0 inches	479 inches	25,918 inches
4 inches	404 inches	17,126 inches
8 inches	189 inches	15,885 inches

As you may have seen in figure 1 and table 1, the more accurate the placement of the seed as to simulate what would happen when the grower misses the strip-till zone and band of fertilizer, there

is a significant reduction in root development from 8 inches off the zone, a 58% reduction and only a 16% reduction in total root length at 4 inches offset. Another way to put that is being “dead-on” with the seed placement (0 in. Offset) is 2.1X longer roots than being 8 inches offset, 20 days after emergence.



Figure 2. Root zone profile being exposed for root measurement in Strip-Tilled field near Yuma, Colorado in RTK plots. June 2006

Then after 50-55 days we excavated deeper soil pits, picked, separated, and washed roots to count hundreds of roots, see Table 1. The 0 inch offset has 61% more length to its root system than the 8 inch offset and 51% more length than the 4 inch offset corn. These corn plants were planted the most accurate (0 inch offset) with the RTK clearly depict the more full expansion of roots, ease of feeding the entire root system and a fast development to extend deeper in the soil profile.

We can draw an inference that early in the corn plants life; close proximity of the plants root system to the reduced quantity of fertility in the tilled zone has impact to the health of the plant and to its potential. With confidence we can say planting 8 inches off is aiming the plant for a loss in vitality and potential yield of grain.

In table 2 we measured the leaf area of the corn plants at the 50 day time period to have a physical dimension to the plants growth above ground and then determined the ratio of leaf area to linear inches of roots – leaf area index (LAI).

**Table 2.** Observed above ground corn physical stature compared to below ground roots at 50-55 days after emergence.

Offset Dimension	Depth to bottom of root zone	Linear root length @ 50 days	Leaf Area (sq.in.) average for 3 plants - # of leaves	Leaf Area Index ratio
0 inch offset	57 in.	25,918 inches	838 sq. in. -- 13 leaves	30.9:1
4 inches offset	49 in.	17,126 inches	686 sq. in. ---12 leaves	24.9:1
8 inches offset	51 in.	15,885 inches	730 sq. in. ---13 leaves	21.5:1

We would like you to note, with higher expected yields each year, growers must look for varieties that produce a solid, large rooting profile to gain wise and top yields. Contact your preferred seed company and look into what are the numbers that can “grow” roots for you.

Watch for the results as this 2006 growing season, we will have the full results package of how the 2006 season came together. We will offer some conclusions and yield data for you to consider in the root development and how the plants responded with lower fertilizer application and the offset from that material applied in the till zone back in March.

So look for the next installment of this on-going 3 year project at the Irrigation Research Foundation farm north of Yuma, Colorado.