

## Orthman Research Farm Report – Late December 2010

### *Use of FBSciences Carbon Boost-S<sup>®</sup> product to enhance nutrient uptake in Strip-Till*

As we continue to field research the strip-till system approach, we realize in the Platte River Valley and locations north to the Canadian border, that early root development and plant growth is so important in colder soils that are in conservation tillage acres. For the past four years at Lexington, Nebraska the soils in the spring months of March, April, May and into June have been cooler than normal due to abundant rain and cool, cloudy days. Strip-till with its focus of a narrow band vertically tilled and the remaining 70-75% of the ground surface covered with the previous years crop residues, we have soils remaining in the 40's and 50's (5 to 13°C) longer under the residue mat.

Temperatures that remain this low for very long can affect crop growth and eventually crop maturation. Crop uptake of nutrients and water is also slowed. Sometimes growers and agronomists will see physical effects as purple edging on corn or stunted new trifoliolate leaves in soybeans, which is partially due to colder soil temperatures and slowed uptake of phosphorus. How do we overcome this condition?



The Orthman team obtained from FBSciences their product to use in conjunction with strip-tillage in irrigated corn to see if the effects as reported in other locations across the U.S. that Carbon Boost<sup>®</sup> could have a positive effect to offset slowed P uptake and general lag in crop growth. It was our contention to make observations in root development, monitor growth and finally yield with and without the product added with our fertility application. This report will provide some of that outcome. We at Orthman are not endorsing that this is a cure all, but that this product may have potential in the conservation tillage system – Strip-Till. For more information on their product, we suggest you contact the good folks at FBSciences which

will be on the last page of this report.

#### *Methodology:*

At the time we applied fertility, 21 to 24 days ahead of planting, we also applied in the tank mix the Carbon Boost-S<sup>®</sup> product. It was applied at the two depths of our fertility tubes, at 4 inches below the surface and 9 inches below the surface. We use the same tank mix but split the load of 60% deep (9") and 40% at 4 inches. We use two pumps to apply the fertilizer products. Carbon Boost<sup>®</sup> is a liquid additive mixed in the tank mix.

Our quantity was to apply for the trials with Carbon Boost<sup>®</sup> on the farm 58lbs of N, 38lbs of P, 8lbs K, 5lbs S, 0.5 lbs Zn during the pass with the 1tRIPr strip-till tool. During the spring strip-till application we applied the

suggested 10oz/acre of Boost-S<sup>®</sup>. We did have trials where we applied less total N-P-K to satisfy the soil test and suggested fertility recommendations.

*Seasonal Observations:*

During the course of the year we again experienced deluges of rain like what seem to occur in Bangladesh. The rainfall total from April 1 to September 30, 2010 was near 24 inches. That is more than what annual rainfall is at the official site for Lexington, Nebraska. Soils remained cold and wet far into June which left many growers questioning their fertility losses, the awful yellow color of the corn and were we in for the 120 bushel club. Soil temperatures on June 15-21, time frame when we scheduled root digs remained in the low 50-54°F realm and root growth was near a standstill. In the plots with the Carbon Boost<sup>®</sup> the plants were richer, darker green, with wider leaves but only 21-25 inches tall. Every other plant on the farm was 19-24 inches tall also. I was pale faced myself.

The table below depicts what the differences were observed twice during the growing season in root development.

**Table 1.** Root Dimensions with Hoegemeyer corn hybrids and Applied Carbon Boost-S<sup>®</sup> products at 25 & 55DAE

| Corn Hybrid  | Tillage Practice | RMD | Fertility Program | Root Profile          |                        |                        | Water Table Depth (in.)@55dae | Vol. 1st 85% of roots- depth | 25DAE Rooting Depth (max.) | 55DAE Rooting Depth (max.) | Total # Roots |
|--|------------------|-----|-------------------|-----------------------|------------------------|------------------------|-------------------------------|------------------------------|----------------------------|----------------------------|---------------|
|  |                  |     |                   | Root Profile Width@5" | Root Profile Width@12" | Root Profile Width@18" |                               |                              |                            |                            |               |
| <b>Studies to Examine Rooting with Carbon Boost Products</b> |                  |     |                   |                       |                        |                        |                               |                              |                            |                            |               |
| Hoegemeyer 7408 w/   | ST               | 105 | PP+CB/IF+pivot    | 20                    | 14                     | 0                      | 24                            | 9                            | 16                         | 14                         | 44            |
| Hoegemeyer 7408 w/o  | ST               | 105 | PP+IF+pivot       | 20                    | 13                     | 0                      | 23                            | 10                           | 13                         | 13                         | 39            |
| Hoegemeyer 7041 w/   | ST               | 101 | PP+CB/IF+pivot    | 21                    | 16                     | 0                      | 23                            | 10                           | 16                         | 14                         | 52            |
| Hoegemeyer 7041 w/o  | ST               | 101 | PP+IF+pivot       | 18                    | 10                     | 0                      | 23                            | 8                            | 14                         | 14                         | 39            |
| Hoegemeyer 7711 w/   | ST               | 109 | PP+IF/CB+pivot    | 15                    | 18                     | 12                     | 28                            | 15                           | 20                         | 24                         | 45            |
| Hoegemeyer 7711 w/o  | ST               | 109 | PP+IF+pivot       | 20                    | 12                     | 3                      | 30                            | 13                           | 15                         | 23                         | 40            |
| Hoegemeyer 5143 w/   | ST               | 108 | PP+IF/CB+pivot    | 18                    | 20                     | 8                      | 30                            | 15                           | 21                         | 24                         | 40            |
| Hoegemeyer 5143 w/o  | ST               | 108 | PP+IF+pivot       | 20                    | 19                     | 2                      | 31                            | 11                           | 15                         | 21                         | 35            |

**Note:** Fertilizer identification - PP+CB/IF+pivot this is pre-plant N-P-K-Zn-S + Carbon Boost with liq 15-15-2 InFurrow@planting with follow up N thru pivot  
 PP+IF/CB+pivot is pre-plant N-P-K-Zn-S with liq 15-15-2 InFurrow w/CarbonBoost + 32% thru pivot

The above table depicts with the Carbon Boost<sup>®</sup> product we generally observed more total roots growing on each plant. The fur Hoegemeyer hybrids selected did consistently show that roots were more prolific with the addition of the Boost.

In the table 2 we will offer you the observations of what occurred at 110 days after emergence. The Boost encouraged deeper root exploration and in most cases wider spread of roots at 12 in., 18 and 24 inches. Accessing more of the soil profile is known to improve plant health, supply more nutrients and then ultimately yield. We will show in another table what the yield differences were for 2010 at the Lexington location. All of our plots are replicated 3 times to give you a better scientific look at the use of these and other products.

**Table 2.** Root Dimensions with Hoegemeyer corn hybrids and Applied Carbon Boost-S® products at 110 days for the profile between the row dimensions to a depth of 36 inches + maximum rooting depth at 110 days.

Profile dimensions are at 110DAE timeframe

| Corn Hybrid  | Tillage Practice | RMD | Fertility Program | Root Profile |           |           |           |           | Vol. 1st 85% of roots- depth@100DAE | Total # Roots | 25DAE Rooting Depth (max.) | 55DAE Rooting Depth (max.) | 100DAE Rooting Depth (in.) |
|--|------------------|-----|-------------------|--------------|-----------|-----------|-----------|-----------|-------------------------------------|---------------|----------------------------|----------------------------|----------------------------|
|  |                  |     |                   | Width@6"     | Width@12" | Width@18" | Width@24" | Width@36" |                                     |               |                            |                            |                            |
| <b>Studies to Examine Rooting with Carbon Boost Products</b> |                  |     |                   |              |           |           |           |           |                                     |               |                            |                            |                            |
| Hoegemeyer 7408 w/   | ST               | 105 | PP+CB/IF+pivot    | 20           | 14        | 12        | 9         | 4         | 26                                  | 44            | 16                         | 14                         | 48                         |
| Hoegemeyer 7408 w/o  | ST               | 105 | PP+IF+pivot       | 20           | 13        | 9         | 6         | 3         | 17                                  | 39            | 13                         | 13                         | 37                         |
| Hoegemeyer 7041 w/   | ST               | 101 | PP+CB/IF+pivot    | 21           | 16        | 11        | 7         | 4         | 26                                  | 52            | 16                         | 14                         | 49                         |
| Hoegemeyer 7041 w/o  | ST               | 101 | PP+IF+pivot       | 18           | 10        | 9         | 4         | 2         | 21                                  | 39            | 14                         | 14                         | 44                         |
| Hoegemeyer 7711 w/   | ST               | 109 | PP+IF/CB+pivot    | 19           | 18        | 12        | 6         | 3         | 23                                  | 45            | 20                         | 24                         | 46                         |
| Hoegemeyer 7711 w/o  | ST               | 109 | PP+IF+pivot       | 20           | 12        | 10        | 5         | 2         | 20                                  | 40            | 15                         | 23                         | 40                         |
| Hoegemeyer 5143 w/   | ST               | 108 | PP+IF/CB+pivot    | 18           | 20        | 11        | 7         | 4         | 24                                  | 40            | 21                         | 24                         | 42                         |
| Hoegemeyer 5143 w/o  | ST               | 108 | PP+IF+pivot       | 20           | 19        | 8         | 4         | 1         | 21                                  | 35            | 15                         | 21                         | 37                         |

**Note :** Fertilizer identification - PP+CB/IF+pivot this is pre-plant N-P-K-Zn-S + Carbon Boost with liq 15-15-2 InFurrow@planting with follow up N thru pivot  
 PP+IF/CB+pivot is pre-plant N-P-K-Zn-S with liq 15-15-2 InFurrow w/CarbonBoost + 32% thru pivot

**Table 3.** Yields for the hybrids selected with and without Carbon Boost-S, 2010 – Lexington, NE

Hoegemeyer 107-109 RMD Hybrids in Carbon Boost Studies - Applied InFurrow at planting and PrePlant with Strip-Till

| Plot              | Moisture | Tstwgth | Weight | Plot Width(in) | Plot Len(ft) | Avg Yield(bpa) |   |
|-------------------|----------|---------|--------|----------------|--------------|----------------|---|
| Hoeg7041 w/Cboost |          |         |        |                |              |                |   |
| IF                | 8.85     | 62.49   | 522.21 | 120            | 300          | 145.2          |   |
| Hoeg7041 w/o      |          |         |        |                |              |                |   |
| Cboost IF         | 9.06     | 62.37   | 430.79 | 120            | 275          | 130.4          |   |
| Hoeg7041 w/Cboost |          |         |        |                |              |                |   |
| IF                | 8.44     | 62.72   | 336.63 | 120            | 300          | 94.0           | ** Note - plot that was under water for 10 days |
| Hoeg7041 w/o      |          |         |        |                |              |                |   |
| Cboost IF         | 8.74     | 62.55   | 427.54 | 120            | 300          | 119.0          | ** Note - plot that was under water for 10 days |
| Hoeg7711 w/CBoost |          |         |        |                |              |                |   |
| PP                | 15.57    | 59.09   | 680.36 | 120            | 305          | 172.4          |   |
| Hoeg7711 w/o      |          |         |        |                |              |                |   |
| CBoost PP         | 17.3     | 58.47   | 564.69 | 120            | 300          | 142.5          |   |
| Hoeg5143 w/CBoost |          |         |        |                |              |                |   |
| PP                | 11.9     | 60.72   | 641.22 | 120            | 310          | 166.8          |   |
| Hoeg5143 w/o      |          |         |        |                |              |                |   |
| CBoost PP         | 11.64    | 61.02   | 504.92 | 120            | 295          | 138.4          |   |

Abbreviations: IF - IN Furrow application of Boost w/KQ1515 starter @6oz/ac rate/ @ planting time  
 PP - applied C.Boost via 1tRIPr at 10oz/ac with KQ613 fertilizer 15 days ahead of planting

**Concluding Remarks:**

The root systems with the adding of Carbon Boost® prior to the corn was planted had the most effect in root production and the kick in the end with corn harvest. All three tables point out to me, that Boost® gave these plants a better chance early when the conditions were moist but not saturated. The early start allowed the plant when the water table dropped and the heat of summer began the plants were advanced and took off. With the wet conditions and our soil pH for the majority of the farm range from 7.6 to 8.2, FB Sciences have told us that their product performs well in keeping the photosynthetic abilities to function well. I believe that did occur during the days from May 8 to June 21<sup>st</sup> with the not normal rainfall (>15”) we had. Days of very cool (48 to 65°F air temperatures) and cloudy to totally overcast kept growth to a minimum.

It is our desire and FBSciences to carry this research out again in 2011. We have plans to make some modifications in amounts per acre but to make same observations and better yields with a near normal year. My fingers are crossed.

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