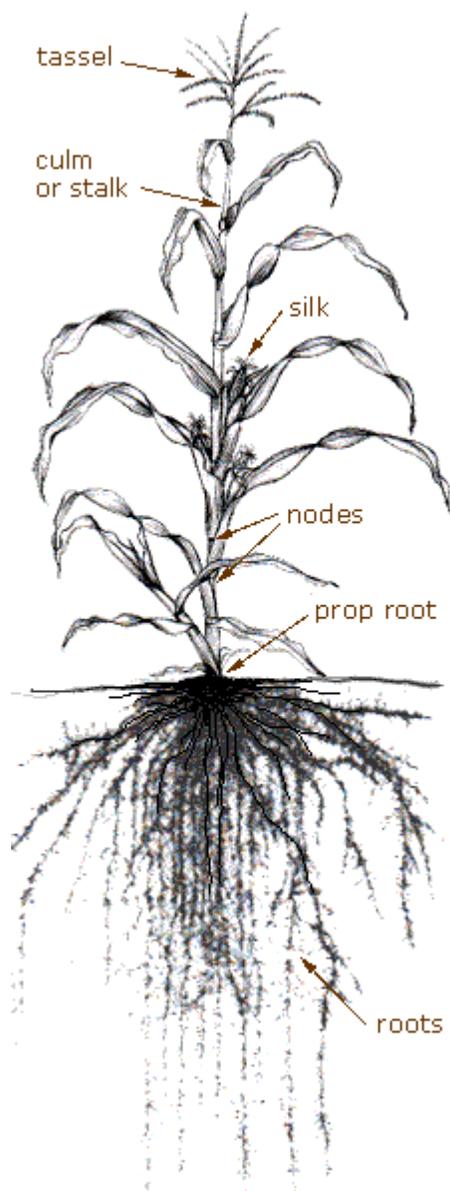


Roots Access Precision Placed Fertilizer Best

By: Michael Petersen, Precision Tillage Agronomist – Orthman Mfg.

Adoption of conservation tillage systems have helped American farmers tremendously over the last 30 years reduce soil and water erosion, reducing the impact of too many tillage passes, reduced fuel consumption and overall time in the field. Through all of these good things, farmers' concerns still rise – how to properly fertilize in the Conservation tillage environment for best results. From the Coastal Plains of the South to California's Central Valley to the Thumb of Michigan, farmers of solid seeded grains to nearly any row crop; the idea of how, the quantity, and where to place fertility to raise a profitable crop are all money making or limiting questions?

These topics have proponents that say placing fertility is not important because the roots will find it,



injecting it near the seed and below will give the biggest bang, banding it will be a top-notch approach, a combination approach of some surface application and some incorporation, and then there are those of us who approve of placing it with pre-plant tillage below the seed in two or more bands at specific depths.

We at Orthman Manufacturing, Inc are continuing to study the effects of dual placing the majors (N-P-K) in the tilled zone with the 1-tRIPr strip-till tool in several geographic locations across the U.S. We have joined forces with University of Minnesota, Texas A&M, Irrigation Research Foundation – Yuma, Colorado, Agri-Inject, Monsanto, Garst, NC+, Mycogen, Trimble, AutoFarm, Case-IH, and John Deere to study this issue. It is our intent to evaluate the foundational idea of getting fertility into the pathway of the roots; so far our observations are, corn has a very positive response. So why is a tillage tool manufacturer studying this issue? In order to experience the potential of that high powered corn seed in a sack of 80,000 kernels, we know testing is asked for by the customer; an important part of our mission is to join hands with progressive ag industry leaders to focus on the success of the conservation efforts of the various seed traits, crop physiology, insect

Fig. 1. Artist drawing of mature corn plant and root system

controls, advanced agronomics, fertility more than just N, and the tillage industries.

Where is the best position in the soil to place fertility?

Because corn, the crop we want to concentrate on in this article; has certain root phases (if you will) it goes through until maturity, it is our belief that corn best uses fertilizers where the corn roots are actively growing with available moisture and soil temperatures. For instance, early in the corn plants life the soil temperatures are cool (<56°F.) and the rooting profile is shallow (<12 inches). The demand for N-P-K is not quite at its peak as that begins later about the 8th leaf stage. Nutrients are generally absorbed in the upper 10 inches of the soil profile. In



the stage following the 8th leaf/collar, the soils temperatures are warming continually and deeper into the soil profile even through the nighttime hours – corn roots are extending vertically and growing downward. At this time on the calendar in most soils in the Corn Belt region of the United States, latitude 39°N to approximately 42°30'N, (shown above) corn is 13 to 20 inches high and the plant is ready to set and determine the physiological stage for ear size. The demand for N-P-K is about to be high. Root systems are absorbing nutrients from depths 5 to 24 inches due to the soil temperature being more conducive for uptake, subsoils that have higher cation exchange capacities release the nutrients a little more slowly, and the plant is essentially pulling hard in that zone.

As that can lead one to consider if I place N-P-K and maybe Sulfur deeper than 4 inches downwards to 12 inches, then I will have nutrients ‘parked’ in the right spot for uptake. It is our observations over the last four years (2002-2006). Last year at the Irrigation Research Foundation (IRF) – Yuma, Colorado, we examined root dimension with a co-sponsored study by John Deere Real Time Kinematic (RTK) guidance to observe what happens when seed is offset from the fertilizer zone by 4 inches and then 8 inches. Reference to article written on PrecisionTillage.com – Article Section dated 11/20/2006 “**2006 Strip-Till RTK Placement Study Results**”. I call your attention to the root length dimensions at the three dates after emergence (DAE): 25 DAE, 55 DAE and 100 DAE. Example; at 55 DAE – the 0 inch offset or directly in-line with the fertility placed and seed placement we measured 25920 linear inches per plant, 4 inches offset measured 17,125 inches and the 8 inches offset was 15885 inches. Corn yields depicted some gain 214 bu/acre at no offset, 208 bu/acre at 4 inches offset

plots and 204 bu/acre at 8 inches offset plots, this trial was replicated. That study is being continued in 2007.

What might be concluded from what we have observed so far?

Knowing from the root studies I have conducted in Western Nebraska, Western Kansas and all over Colorado in corn, grain sorghum, soybeans, dry edible beans, small grain fields and alfalfa over a 26 year period – properly and precise placed fertilizer has beneficial effects for all crops and helps growers profits considerably. Keep in mind that certain nitrogen formulations too close to the young seedling can have damaging effect to the new root system. There are numerous studies and research results across the nation that has looked at the placement issue. Getting fertilizer in close proximity to the growing root system will feed the plant and give it the advantage that growers are looking for when they spend the dollars for fertility. Spacing it approximately 4 inches below the seed depth and then at a 10-11 inch depth as we have done with our joint studies at the IRF has brought increased corn yields and larger profit margins.