Why EVERY row crop farmer should Strip-Till
by: Michael Petersen, Precision Tillage Agronomist

Since the late 1990's strip-tillage has changed the way many farmers carry out their pre-plant tillage, an operation which is truly a top-notch Conservation Tillage System. Growers from California to Delaware, and Montana to the Coastal Plains of Texas have seen advantages in economics, soil quality improvements, fewer passes before they plant, erosion protection, water savings, time savings, fertilizer placement and maybe half a dozen more good things when they strip-till. We at Orthman have been developing and building the 1tRIPr Pre-plant Tillage and Precision Nutrient Placement System tool well over a decade. We are confident that no other manufacturer has more strip-till acres under their belts than do we. Let us illuminate three primary advantages of the 1tRIPr strip-till system.

**CREATING A SEEDBED QUICKLYTurns the Seed into a Thriving, Robust Plant.**
Take a good look at seed - it's relatively small and has little energy, it needs all the help it can get to grow. Even with a fairly large seed like corn, compared to smaller ones like lettuce, carrots, grain sorghum, and mustards, we must consider how big a job it is to become a robust row crop. There are so many factors to consider, including chemical changes, carbohydrates stored, depth of seed, sunlight exposure, and more – bottom line is, all of these factors are assisted when you provide a proper seedbed.

**CREATE A RESIDUE-FREE, LOW DENSITY SEEDBED FOR MAXIMUM ROOT DEVELOPMENT.**
It is very important that a warm seedbed be nearly free of residue, not just pushed aside. Other factors that impede roots are hard clods in the tilled zone (Konopka et al, 2008), hard remnant residues like old corn cobs and hard root crowns, and remnants of subsoil units brought up from deep subsoiling/ripping. As you know, seed-to-soil contact is vital to the start of any row crop.

**CREATE A COMPACTION-FREE ZONE FOR THE YOUNG ROOT SYSTEM**
Alleviating compaction below the seed while minimizing hard clods the till zone are of great importance. Tilling just below soil compaction (the 1tRIPr can run up to a 12“ depth), and precisely placing nutrients in the center of the strip at two specific depths is important to root development and subsequent leaf and shoot development.

Remember, most seedling roots can exert about 80-100psi of force to grow downward, and compaction above those levels can severely limit growth. In other readings I found that Taylor and Brar (1991) and (Bengough et al, 2011) reported that soil compaction can also change the plant root systems chemically and biologically as well. How important is compaction? These two studies principally considered it the most relevant factor influencing root growth for today's farmer!

**AT THE ORTHMAN RESEARCH FARM.............**
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ORTHMAN RESEARCH

At the Orthman Research Farm near Lexington, Nebraska, we have conducted numerous Strip-Till vs. No-Till trials. In our area, the No-Till (Direct Seeded) clay loam soils have soil densities of 1.50 to 1.62 g/cm³, and have exhibited very slow root penetration. Compaction increases “bulk density” (think of bulk density as the ‘strength’ of the soil) and higher bulk density obviously impedes plant growth. Compaction also affects conductivity, permeability, and diffusivity to water and air (Greenland 1977). Penetrometer readings have told us that it requires 265 to 315 pounds of downward force to steadily push the probe below a zone of compaction (7.5 to 8.5 inches in depth) in the No-Till trial areas. Moving several rows over into the 1tRIPr strip-tilled zone, we find a soil density of 1.29 – 1.34 g/cm³ after fall strip-till. This spring we observed soil densities of 1.05 to 1.16 g/cm³ after strip-tiling in the very first few days of April. Simply put, Strip-Till ground is less dense than the No-Till ground which is good for the crop.

SOME LAST THOUGHTS....... The corn we planted this spring will be rooting into in an environment that can extend further into the soil profile. Less soil density with strip-till allows the roots to obtain nutrients and moisture for photosynthetic growth, last year’s macro-pores and channels (Passioura, 1991) from the deterioration of old root crowns. Recent research (Bengough et al., 2011) agrees that improved root numbers can occur when soil resistance is lowered for root penetration. Earthworm burrows under old root crowns will allow rapid root growth due to little resistance, providing readily-accessible nutrients and an easy flow of water from above. I have personally observed a gathering of 5 to 7 corn roots growing in an old worm channel adhered right to the walls and I admit that particular plant was doing quite well.

I have seen (and dug!) thousands of root pits of the last 38 years, and think it is so vital for all growers to really consider root responses to soil strength. Harsh soil conditions limit root growth and proper development, and in turn negatively impact yield. Strip-tilling addresses these soils conditions and offers an environment for the crop to reach its potential, which is obviously any grower’s goal.

REFERENCES: