Strip Tillage: The compromise between conventional and no-till in a residue management system

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Often farmers are using conventional tillage before corn due to early planting benefits and yield advantages over no-till. However, there are disadvantages to conventional tillage systems, such as erosion and degradation of soil structure and health. Researchers have indicated that strip tilling the zone around the seed provides an option for farmers with highly erodible land and wet spring soils (Figure 1).

Removal of residue from the seed row provides benefits for early growth of corn seedlings. Yield advantages are often attributed to early season growth so it is critical that the seedlings get off to a good start. Kaspar et al (1990) studied the effects of removing residue from the seed-row and determined there were benefits to manually removing residue from the seed-row in no-till corn (Figure 1). This would be similar to what strip-tillage would do, but without soil disturbance. The researchers investigated how residue influenced soil temperature and noted that corn residue on the seed row reduced the temperature to a depth of 5 cm in the soil by 6.8 ^{o}C (1983) and 4.6 ^{o}C (1984) over the May 25th-June 13th period.

Considering this is the time when the seed is just starting to grow, it is critical that the soil temperature be ideal. Strip-tilling would also help increase soil temperatures in the seed bed by mixing the soil and allowing better air flow. In addition, the researchers measured how the corn in the residue-free band was developing over time and determined that the corn reached 50% emergence 2.5 days earlier and reached 50 % tassel 1.4 days earlier when compared to the residue-on-the-seed row treatments. Plus the residue-free corn had grain moisture levels that were 0.7% lower, reduced bareness by 150 plants/ac and increased grain yields by 4.7 bu/ac. The take-home message from this study was that tillage and residue type were not the most influential factors in determining corn yields. The most important factor was the presence of crop residue in the seed row that was the most influential factor in corn growth and grain yield.

The aforementioned study illustrated that removing residue from the seed row is important. Strip-till can be useful as a conservation tillage method that has the benefits such as removing residue from the seed zone. In general strip tillage gives the advantages of plowing but without the risk of erosion and less alteration to the overall soil profile of the field. Typically conducted in the fall, strip tillage loosens the soil and leaves a ridge of soil for the seedbed that will be warmer and drier than no-till soils in the spring. According to the Agronomy Guide for Field Crops (2009), fall strip till produced higher corn yields than no-till and comparable yields to moldboard plowing on winter wheat stubble on a fine textured soil. This is important since fine-textured soils are both erodible and susceptible to compaction. In addition, the soil moisture in early May was 29.5% for no-till, 25.6% for the fall strip till treatment, and 23.3% for fall moldboard. The researchers added that there are consistent benefits from strip tillage in terms of planting timeliness, emergence uniformity, and early corn growth for those with large acreage, poor drainage, or high surface residues.

With strip tillage you can no-till plant into the strips or use a row crop planter (Figure 2). Also, the application of fertilizer through the strip tiller is an option and results in better fertilizer use and higher yields than a broadcast application in no-till systems, especially fall broadcast. However, one should note that applying fertilizer in the fall through the strip tiller may not be as effective as spring banded fertilizers at planting.

This article presents an option for those with fields that may not work in no-till but are erodible or slow to dry up in the spring. Strip tillage allows for erosion control and the benefits of plowing in the seed bed zone. In general, higher yields for strip till compared to no-till have been presented and the advantages of earlier planting and warmer soil temperatures are just some of the reasons why strip tillage should be given some thought.

Figure 1: Removal of residue from the seed row

Figure 2: Corn planted with row crop unit into fall strips.

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Agronomy guide for fields crops: Publication 811. 2009 Ontario Ministry of Agriculture, Food, and Rural Affairs.

Kaspar, T.C., Erbach, D.C., and Cruse, R.M. 1990. Corn response to seed-row residue removal. Soil Science Society of America Journal. 54: 1112-1117.