No-Till

No-till is the most conservational tillage system there is, with no tillage being done prior to spring planting. The previous crop residue is left on the ground after harvest and the following spring, the following crop is planted directly into the residue. Implementing a no-till system reduces erosion rates and increases organic matter and water infiltration along with cutting down on fuel and labor costs with less time being spent in the field. Herbicide rates may have to be increased in order to control weeds since there isn't any mechanical weed control being done. Typically fertilizer is applied during planting because there is not really another way to incorporate fertilizers without creating strips.

There are numerous benefits of making a tillage change to a no-till system. A brief summary of the advantages are:

- Lower labor and time requirements
- Reduced fuel and machinery costs
- Improved long-term productivity
- Significantly lower erosion rates
- Increased water infiltration and moisture retention
- Decreased soil compaction
- Improved water quality
- Increased organic matter

Not only does the no-till system have advantages, but it has a few disadvantages. A main one is with the increased amount of residue left on the soil; then the soil does not dry out and warm as quickly as conventional tillage, creating problems with germination. Another disadvantage is the increased use of herbicides because weeds cannot be controlled with tillage. With the cost of herbicides increasing, it causes production costs to increase. Additionally, increased soil moisture can lead to diseases; a common disease prevalent in no-till soybeans is soybean root rot when there is additional moisture.

When practicing no-till, there is increased soil residue on the surface. There are a couple different ways to manage crop residue on soil. The first is stalk chopping and the second is to adjust the combine during harvest to provide uniform distribution. Stalk chopping is a common procedure done by numerous farmers in order to make sure the stalks are evenly dispersed and uniform height; however, this can actually increase the risk of soil erosion. When the stalk is cut or chopped, erosion can increase because the stalk isn't in the ground providing protection, therefore, the soil is going to be washed away with the residue. Besides erosion chopping the stalks can also lead to low soil temperature in the spring and poor germination rates and soil diseases. Adjusting the combine during harvest can make residue distribution more even without making additional trips across the field. When the combine is set higher to leave more residue it will reduce incidences of damage to equipment, either tires or planting, where shorter stubble can cause plugs. With the taller stalks it protects the soil surface better throughout the year from wind and rain erosion; however, it can also catch snow during the winter and slow the drifting.

Fertility in no-till crops can become a worry because fertilizers cannot be incorporated into the soil. Many producers are applying fertilizer at planting as a starter because it is the easiest way to go about it. The highest fertility in no-till is in the top three inches of the top soil due to there being no tillage to incorporate it any deeper. Broadcasted fertilizer is going to stay in the top three inches of the soil because it is not getting incorporated. It is recommended to subsurface band phosphorus in order to allow the deeper roots to take it up and to have it closer to the root zone. Along with being closer to the roots it will have a higher affect on yield and should bump them up and will have a decreased chance of water pollution because there will be less accumulation on the surface. Potassium should be incorporated into the soil to be the most efficient for the plant roots uptake. Before starting a no-till system it is recommended that the potassium in the soil has been built up so there is an adequate amount, being it needs to be incorporated. Nitrogen is the fertilizer that is the least worried about. The reasoning being anhydrous ammonia can be knifed into the ground without disturbing too much of the residue; this is the preferred way of nitrogen application. If nitrogen is surface applied volatilization occurs and nitrogen is lost. When there is a nutrient deficiency problem in no-till crops occasionally the best thing to do is to till in nutrients that are broadcasted in higher amounts to build them up in the soil again.

Equipment for no-till producers is going to need to be heavy duty to plant in fields with a high amount of residue. Without this equipment the seed will have improper placement and could be germination rate problems. It is recommended to custom hire the first couple years of trying a new tillage system, that way you do not spend a lot of money on new equipment and a few years down the road want to change again because the system wasn't for you or what you expected. This way you can try different machinery and see what you like and if it works into your production system. Another recommendation is to not put all of your land in at once in case something would go wrong, and you would still have crop left. Most important in the transition is going to make sure that you are happy with your decision and to think of the benefits to you after the initial transition period.

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