

Conservation Tillage: Tillage Practices that Lower Soil Erosion

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Abstract:

Farmers are losing soil faster than it can be regenerated from intensive agriculture practices such as moldboard plowing and chisel plowing. The loss of soil has negative effects on both the farmer and the environment. The farmer can experience a crop yield loss from losing topsoil and aquatic environments can be altered from sedimentation. A way farmers can decrease the rate of soil erosion is through conservation tillage practices such as no-till, ridge-till, and strip-till. Conservation tillage practices leave 30% or more crop residue in the field. To determine what conservation tillage practice is the best option in Minnesota for decreasing soil erosion I looked at different factors that include: soil erosion, fuel usage, labor, weed control, and moisture in spring. Conservation tillage practices are a more sustainable way for farmers to till their fields because they offer benefits such as reductions in the five factors listed above. Protecting soil for farmers is important because soil is their livelihood.

Methods:

To answer my research question I used many different sources to come to a conclusion. Literature reviews such as University of Minnesota extension, United States Department of Agriculture, Conservation Information Technology Center, books, academic journals, magazines, and periodicals helped me answer this question. They did this by providing me information on conventional tillage practices and conservation tillage practices. I also conducted interviews with a University of Minnesota extension educator and a no-till farmer. The interviews I conducted helped me focus my thesis more on Minnesota because they had personal experience on how tillage practices perform in Minnesota that lacked from literature reviews.

| Tillage Practices | Climate |
|-------------------|--|
| Moldboard Plowing | Performs well in wet or dry climates. Leaves very little crop residue on field so soil warms up faster and does not delay planting. |
| Chisel Plowing | Performs well in wet and dry climates. Leaves some crop residue on the field, but soil still warms up faster and does not delay planting. |
| No-Till | Performs better in dry southern climates. Hard for it to perform well in wet climates because all the crop residue is left on the field and it can delay planting. |
| Ridge-Till | Performs well in wet northern climates. Ridges created from ridge-till dries the soil where the seed is going to be planted, which does not delay planting. |
| Strip-Till | Performs well in wet northern climates. In fall, strips in the soil is tilled so that in spring the exposed soil warms up faster, which does not delay planting. |

Table 1: Describes what tillage practice performs best in a certain climate. It is important for a farmer to know what tillage practice works best in their climate.

Conventional Tillage Practices



Moldboard plowing

<http://32.tnypic.com/bbht9.jpg>



Chisel Plowing

<http://52.tnypic.com/2mcd6pd.jpg>

Conservation Tillage Practices



No-till

<http://the-back-40.com/wp-content/uploads/2012/10/no-till3.jpg>



Strip-till

http://blog.lib.umn.edu/efans/cropnews/IMG_1366.JPG



Ridge-till

<http://www.tracepaeker.com/images/TP%20HHD%20Field%20shots%20008.jpg>

| Tillage Practices | Soil Erosion Rate | Fuel Usage | Need for Labor | Weed Control | Moisture in Spring |
|-------------------|--|-------------------|--|--|--------------------------|
| Moldboard Plow | Little crop residue, high soil erosion rate | High fuel usage | More labor | Good weed control, some use of herbicide | Low |
| Chisel Plow | Some crop residue, high soil erosion rate | High fuel usage | More labor | Good weed control, some use of herbicide | Low |
| No-Till | Crop residue left on field, lowest soil erosion rate | Low fuel usage | Less labor | Bad weed control, high use of herbicide | High, can delay planting |
| Ridge-Till | Crop residue left on field, low erosion rate | Medium fuel usage | Medium amount of labor | Good weed control, some use of herbicide | Low in seedbed |
| Strip-Till | Crop residue left on field, low erosion rate | Medium fuel usage | Medium amount of labor, but more specialized | Bad weed control, high use of herbicide | Low in seedbed |

Table 2: The table looks at five different factors that are involved with tillage practices. It is important for a farmer to know the factors that are involved with each tillage practice so they can choose the one that best fits what they are trying to do on their farm.

Conclusion:

Conservation tillage practices reduce soil erosion compared to conventional tillage practices. This is due to the increase in crop residue left on the field. After looking at the climate and all the other benefits and negatives of each conservation tillage practice my recommendation was not just a single conservation practice, but actually a rotation between two practices. My recommendation in a corn-soybean rotation would be to do strip-till for corn and no-till for beans. This is because beans are planted later so the soil can be dried out by the time they need to be planted which makes no-till a good option. Since corn is planted earlier, strip-till works the best because part of the soil is exposed warming and drying the soil. I also recommend ridge-till because of the benefits of weed control and moisture in spring. Conservation tillage practices are important because they conserve soil and soil is a farmer's livelihood.



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