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Let’s Talk Dirt

“What you see depends on how you view the world. To most people, this is just dirt. To a farmer it’s potential” (Zantamata). Dirt is the foundation of almost everything; we could not live without it. Many take dirt for granted but the farmer protects it and takes care of it. Not all-farming practices use dirt to its full potential. Farmers have been farming conventionally for many years, but farmers are changing their ways. Although many believe the traditional farming practices are the best, new research in no-till farming will protect our environment so the land can be better maintained. The new research shows that no-till will provide economic and environmental benefits. Today saving water, money, and labor is very important and can make a huge impact in a farmer’s life. Switching to a no-tillage, no-till, system will help protect the environment. No-till is like mulching a garden, many gardeners put hay and straw around their plants to prevent weeds and volunteer plants from growing. The farmer uses what is already in the field from past years as mulch to protect it from erosion and much more. Through the years farming has evolved and research capabilities have improved. Research has proven that no-till farming will save water. With the water being saved the economic benefits of no-till shine bright.

Farming is the most important job in the world, without farmers we wouldn’t be able to survive. Farming has thousands of different styles and techniques, the possibilities are endless. Farmers often debate over which tillage systems are the best, but with new water allocations, or water limits, farmers have to adjust in order to follow the rules. In southwest Nebraska there are three common tillage systems: conventional, strip-till and no-till. Conventional tilling requires one, three, or more passes over the field with a cultivator, disk or a farmers preferred cultivating equipment. When farmers till, they are trying to get rid of the weeds and speed up decay in order to improve seedbed quality. While the cultivator mixes the soil the fertilizer or herbicides are incorporated into the soil making it more effective. Residue is very beneficial to crop nutrients; residue is referred to as the materials left over after harvesting including stalks, stubble, seedpods, husks, and leaves. Conventional tilling leaves 15 percent, or less, pounds of residue on top of the soil. Strip till is very similar to no-till, but an extra attachment is added to the back of the planter so it only tills where you have planted. During the strip till process, the slight tilling of soil aerates it, mixes in fertilizers, and creates a looser seedbed. When the seed is planted in a strip till system the soil is broken around it; however, like no-till the seedbed is undisturbed from harvest to planting. During planting in a no-till system the seed is directly planted into an undisturbed seedbed. Often farmers directly inject fertilizers with the seed in both no-till and strip-till; thereby, eliminating the fertilizers from sitting in the residue and not soaking down towards the roots. With the newer equipment you can do so much more when planting than several years ago.

Once a stick was the greatest tool, but now we have self-driving tractors and precision planters. The Incas in South America, Egyptians, and many other cultures used a stick to dig a hole by hand to deposit a seed. Still today, many countries plant by hand without tilling the soil. Once the plow was invented anybody who could afford it would plow. “During the 1950’s alternative primary tillage tools became common, including the chisel plow, disk plow, and stubble mulcher” (No-till Agriculture). Farmers used these tools for several years, but in the 1970’s during the recession farmers couldn’t afford the new tools, consequently many had switched back to no-till. Money and time were two shrinking assets forcing farmers to change. 37 percent of cropland was farmed no-till or strip till in 1997, and 35 percent of cropland continues to be farmed strictly no-till today.

When farming no-till, the crop residue is left behind for many purposes. The residue stops rain and soil erosion by absorbing the energy from the raindrop and slows the speed of runoff. During the winter the residue traps in the moisture from snowfall so it can soak into the soil and reduces evaporation. The residue protects the soil from the sun so it doesn’t crust over and the leaves reflect the sun to act as insulation. This insulation will keep soil cooler during the hot summers and warmer in the cold winters. Often crusting of the soil will occur with conventional tilling, making it difficult for water to soak into the soil. Due to crusting participation can only soak in one-half inch per hour in a conventional tillage system compared to four inches per hour in a no-till system. Research shows that no-till will save three to five inches of water a year and increase water holding capacity by 20 to 40 percent. The more water saved the greater the chances of a higher crop yield. When affected by a water allocation the farmer can save his or her water incase of drought so they can grow better crops.

“The bigger, the better” the bigger the ear of corn the more of a corn crop you will harvest. With new technologies more crops grow in smaller space regardless of the weather. With genetically modified crops, customized crops fit both land and farming style. With the right choice of hybrid the crop will succeed; although, farmer Conrad Nelson has discovered, “…some corn hybrids are not well-suited for no-till” (22). Does this mean go back to conventional farming or try again? Conrad Nelson has been farming no-till for 18 years and has not considered going back. There are always years of doubt, but stick to it for optimal success. A comparison of conventional tillage yields next to no-till yields over one growing season, but comparisons of the differences over several growing seasons proves that no-till stands alone.

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| Percent Lower in No-Till over Conventional Tilling | | | |
|  | Economic Variable | Variable Costs | Fixed Costs |
| Investment for Machines | 75% |  |  |
| Power Requirements | 80% |  |  |
| Working Time | 80% |  |  |
| Fuel Consumption | 84% |  |  |
| Wages |  | 84% |  |
| Fuel |  | 85% |  |
| Repair Costs |  | 65% |  |
| Tractor |  |  | 86% |
| Stubble Cultivation |  |  | 100% |
| Soil Tillage and Sowing |  |  | 27% |

When farmers see how much they can save in money and labor, they often consider the switch to no-till. Some switch because they have to, for example Jay Franklin from Oklahoma had to switch because he would otherwise have to file for bankruptancy. The first few years were rough, but for 28 years he has not been close to bankruptancy. In fact, he is very successful today and Franklin now speaks at Natural Resource District conferences to educate others on the environmental benefits of no-till.

Tearing through the soil creates a currently weed free seedbed, but what about the wind and rain? Conventional tillage leaves soil vulnerable to rain and wind erosion. Rain erosion is not considered a problem until all the rain has run off the field with minimal amounts soaking into the soil. Also, wind erosion is overlooked until it blows away the most valuable topsoil and residue. If all the topsoil is removed, the crop will receive less nutrients. Edward H. Faulkner was the first to write about the soil erosion caused by the plow in 1943, but his work was not recognized until later years. The number of people across the United States switching to no-till is not changing rapidly but the change is slow and steady.

Soil protection is very important and no-till methods protect the soil. After a farmer finishes conventionally tilling the fields, the land may sit a week or so until it is planted, but it will take the crop a few weeks to grow enough to eliminate most wind erosion and decrease rain runoff. Wind erosion is the highest in southwest Nebraska and water erosion is present. When the wind is blowing, it doesn’t take long for the skies over conventional tilled fields to look like old pictures from the dust bowl. Both wind and water have a great effect on soil quality, like lowering the fertility levels and causing the soil to crust causing lower crop yields. The water runs off creating gullies, and ruts. When the field has lower ground, the water will run down and drown out the crop. No-till prevents this from happening. The wind will blow away residue and nutrients. This will affect seed to soil contact as well as if the seeds have been planted. On-going soil and water erosion will affect yields over a long period of time.

Why do farmers still farm using conventional tilling methods if no-till has been proven to protect the soil? Many farmers do not want to risk the quality yields with conventional methods to build up their no-till program. When a farmer switches to no-till, it is like the Nebraska Huskers getting a new football coach. The new coach comes and coaches the way he wants, unlike the past one. The players will have to adjust to the new coaching style and may not perform the first couple games as well as the new coach hopes, but after the players become accustomed to the new strategies and game plans, they perform better than before. Like a new coach, the farmer needs a couple growing seasons to build up the soil profile so the crop can succeed. If a farmer switches to no-till, decides that it has not preformed well enough and switches back to conventional tilling, the soil would take a hit, just like the Nebraska Huskers would if they decided to fire their new coach and rehire the old coach.

Often with no-till, a layer of acid can build up with very fertile soil, just like a football team with several bad attitudes within the team. This acid can sometimes damage the seed so it will not grow or perform as well as the farmer desires. No-till will build up layers of residue like a sponge, and it will hold water and diseases. Many farmers only farm one crop so the diseases build up ruining a crop, this is just like a football coach only recruiting good kickers, without the other offensive and defensive players the team will lose. To avoid this build-up of diseases in no-till, a farmer should rotate a different crop each growing season to kill the diseases. Conventional tilling will kill most diseases so the farmer can use the same crop each year.

To the no-till farmer the off-season is just as important, farmers participate in training, conferences, and building up their soil profile. One of the newest trends is to plant a cover crop during the winter. “Sixty to seventy percent groundcover is generally required to control erosion effectively and conserve moisture” (Buchholz 2). Cover crops include many different crops and farmers can mix crops to create their optimum cover crop. A few examples of cover crops are beets, turnips, radishes, peas, and birdseed is found in a mix, and few different annual grasses. Cover crops provide consistent ground cover; insert natural nitrogen and other important elements, and provide a healthy snack for the farmer. With cover crops, synthetic fertilizers can be cut in half. Nitrogen, potassium, and phosphorus are replaced and recycled by cover crops. Most of the cover crop has decayed by planting time, but farmers may need a boost to speed put the decay. To kill your cover crop you can apply herbicide or graze the cover crop. Grazing benefits the livestock by providing it with new food and nutrients. The land benefits from aeration of the soil and natural fertilizer from the waste of the livestock. When planting cover crops, the farmer is investing in the next year’s soil quality. Saving money on fertilizers is very important but saving water is more valuable to a farmer. With new research and studies on the soil profile, researchers have created top of the line soil monitors, or soil probes. These monitors track the waters movement through the soil. The farmer can use these to understand exactly when and how much water is needed. Technology helps save even more water and utilizing every drop.

Saving water, money, and labor are very important, but protecting dirt is even more vital. By simply changing techniques, farmers can stop erosion from affecting the crop yields and save money. The residue holds in the water until the soil can soak it in saving water, the residue also prevents rain and wind erosion. Economically no-till shines above conventional tillage systems and new technology will greatly benefit the no-till farmer. Although many believe the traditional farming practices are the best, new research proves no-till farming protects the environment so the land can be better maintained. Switching to no-till will benefit resources by using every drop of water to its full potential, saving money and labor. Change can be a good thing; in this case it is the best case.

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