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What our ancestors began for us in the 1800’s was no different than what we are attempting to accomplish today-produce a crop and save the soil. The difference lies only in now we compete in a world market versus a local marketplace.

My centennial farm was homesteaded by my great grandfather in 1881; he planted timber and prepared the ground for the production of wheat thus beginning the heritage I grew accustomed to. When I began my farming career in 1974, the change from horses to tractors was already established; however the competition to produce commodities had become a race for more efficiency, better quality and more quantity per acre.

Conservation has always been a part of our farming operation, my father adopted new methods such as changing from a moldboard plow in the 1960’s to using a chisel plow. He would also speak of the production qualities of the different grounds he farmed and began putting grass waterways in, to prevent erosion. He knew this practice would control the deep ditches in the concentrated flow areas and subsequently the land became protected and utilized for haying. I continued in my father’s footsteps of protecting the land and utilizing the different government programs of CPR and EQUIP.

I began my involvement in the Pine Creek Conservation District in the early 1980’s. The meetings gave me the opportunity to hear what others were doing about and the importance of conservation, maintaining quality soil, and improving production as well as saving the soil from farm-caused erosion. With the introduction of the Pioneer Drill in the 70’s, farmers watched intently as those brave souls attempted to no-till the ground. In addition to the Pioneer, the Melrow, Haybuster, and other mass-produced direct seeding drills were the early beginnings for the farmers who dared to take on this challenge.

Through the work of conservation districts and NRCS in establishing conservation with production systems, farmers have been challenged to maintain their conservation program to be eligible for government payments. With the government involvement in the protection of our environment, we are now accountable, mandated and regulated for water, soil and air quality. This environmental quality encompasses dust and smoke emissions, plus soil and water qualities in the environment. With these regulations being enforced, farmers are faced with decisions of how these compliances can be met and with each new year the regulations become more defined.

I produced my personal conservation drill in the mid 80’s. The intent was to incorporate more operations into one pass using a back-packer (a tank mounted on wheels and towed between a tractor and implement) hitched to a narrow-framed cultivator-shanked implement that pulled conventional drills to complete the unit. It had considerable length but was the way I could monetarily justify the change. It was more of a minimum till drill versus a direct seed drill and it worked fine however it was not the end product I wanted.

Through the rental of direct seed equipment for a couple of years, by 1998 I felt my farm was at the point of updating the convention drill; this is when the decision came of changing to an air seeder. With this move I really began evaluating how much time I spent in the field. The question came, production versus tillage versus cost? Through the efforts of university research focusing on direct seed systems, conservation districts, NRCS and their interaction and the Direct Seed Association for farmer to farmer support led me
to evaluate my operation. How much was fuel and equipment wear costing me? Some money and time could be saved by using a direct seed system; not to mention moisture savings, soil building and nutrient recycling from the decreased soil disturbance it offered.

Direct seed really is a system. This practice provides opportunities and challenges. It first begins by believing in the system because there is a transition period. This involves going from a depleted microbial earthworm environment to an abundance of nature’s helpers in the soil. This takes a while to fully develop, but still appears to begin immediately when the soil is not disturbed.

Direct Seed provides the opportunity for challenge and change. One of the big challenges is managing residue and this must begin at harvest. Harvesting leaves residue in two ways, that which goes through the combine and the straw which remains uncut. To implement faster decomposition of residue it needs to be close to and evenly distributed over the ground. I do this in two ways. The residue going through the combine is spread evenly across the width of the header with the use of a spreader. The straw not normally cut while combining a crop is then snipped off at a 6” height by a second cutter bar attached behind the header and in front of the combine wheels. This leaves short evenly distributed straw and chaff on the field which creates an excellent moisture retaining barrier.

High standing stubble is the reason I chose to manufacture a second cutter bar that mounts in front of the combine wheels and behind the header. This patented independent cutter bar snips off the stubble to six inches and follows ground contours independent of header height. One can realize it also decreases the chance of a hot muffler causing a fire on the dry stubble during harvest. A financial and time efficiency has thus evolved by using one trip to accomplish two jobs. But it does more than that; the stubble is spread more evenly across the field. The standing stubble is tall enough to catch the snow, decrease wind velocity and hold snow on the field during winter and the useful clipped straw is composted into the field faster because it is spread uniformly and provides a moisture-conserving surface and microbe friendly environment. The outer part of the straw protects the soil while the inner part of the straw, containing the building blocks of life, amino acids, is making nutrient cycling possible and building new top soil. The use of mowers and flailers are practices that achieve similar objectives however I chose a different route for the time savings of two jobs in one trip and the cutter bar eliminates long flattened straw from beneath the tires.

Spraying becomes the ‘non-tillage’ challenge. It has the challenge of cost, timing and selection of herbicides. With direct seed I now spray as required, depending on the amount and kind of weeds present. I deal with the ‘green bridge’ problem by spraying a minimum of 14 to 20 days prior to seeding, (in the spring I begin seeding when the ground temperature, at 2 inches, is 50 degrees). Weeds, grasses and volunteer plants are a chronic ‘pest’ for direct seed farmers. Our only hope is that science will be able to keep up with the environmental impacts of these chemistries on our soils and the constant changes weeds make to become resistant to them. The weed pressure is a constant battle for me but one that returning to tillage would not eliminate. Tillage basically turns and damages the soil structure and is only a temporary solution until germination of the weed seed begins again. Because the soil is not turned over I deal only with the surface weed seeds that grow.

Another necessary task is controlling plant diseases and residue management with the use of crop rotation along with correlating the benefits of alternating high and low residue plant matter. I have maintained a three-year rotation of legumes, winter wheat and barley. I have experimented with corn in place of legumes, to investigate a warm season grass prior to my winter wheat crop and oats because of its massive root structure. The corn has been a good crop, but the high risk of frost, the very late maturing times along with necessary drying for storage and the difficulty using my small grain header have decreased my
profits on this crop. However, what corn does for the soil does benefit my wheat yield the following year. Since I planted oats this past spring, I do not have a yield to compare following this crop. My hope is that because of oats massive root structure, it will have placed beneficial organic material back in the soil, as the corn roots did.

The next challenge is placement of the seed in the ground. I use a 1998 Concord shank style air seeder which I have modified. The hills of the Palouse require drill modifications because of the steep contours. Modifications to the drill include shortening to the length of the body of the drill to reduce side hill draft. Regardless of the type of drill one has the placement of seed, fertilizer, and soil disturbance are the ultimate challenges and most critical influences that directly relate to crop production.

Placing fertilizer in a root-intercepting zone, while placing seed on a non-fractured seed bed (a shelf which the seed lays on that has not been disturbed) with sufficient soil covering the seed, is important. My drill came equipped with an Anderson opener. This opener with a shotgun seeding approach made the seed scatter instead of being placed and it allowed deep fractures within the seeding zone so the seed fell at different levels and was spread sporadically. This did not allow for even emergence. This led me to develop a less aggressive but better seed and fertilizer placement opener.

My patent pending wing-style, paired-row, sub-surface delivery system allows the seed to travel rearward and to the side for a paired row, instead of down as in other openers. It actually will place the seed on the seed shelf (the area created which is firm and level with which to place the seed) and distributes the fertilizers at the optimal relationship to the seed. The narrow point is forward-mounted allowing for a flatter entry angle where the dirt is lifted and separated rather than pushed and allows for the residue to flow around the narrow knife rather than being shoved to the side. The fertilizer is emitted from behind the point and is placed two inches below the seed for optimal root interception. This point allows for some blackening of the soil for faster warm-up and quicker emergence.

My new challenge is dealing with soil compaction. An implement dealer questioned if I had soil compaction, and my response was the research I have read from direct seed says we don’t have the problem or the problem will go away with the worm channeling. So I probed my soil and found a compaction layer beginning at 9” and terminating at 12”. The implement he was talking about was not for sub-soiling but would work within the compacted area only. I visited with other farmers who have experience using this implement and they declared noticeable yield improvement and better drainage. Being as it would be working in the compacted area and not at a deep level I felt I should also be trying this implement. I realize I do not have 20 years of cropping by direct seeding, and possibly over time the worm and root channeling would eliminate this hard pan, but I felt this might be a way to speed up the process of dealing with it and a faster way of transitioning from conventional to a direct seed farm system. This fall I purchased a Case IH Ecolo Till implement. Because it has only a 6.5% soil surface disturbance and I felt the hard pan could be inhibiting the root penetration of my soil, especially for spring crops. As I pull the machine around, I do notice some areas being harder to pull than others, but I have no crop results to relate to you at this time. But this tillage is something that I don’t believe I will have to do on an annual basis and I am anxious to see the results.

During the period of time that I have implemented direct seeding and maintained stubble surface I know my farm ground is healthier now than when I began farming. I have monitored earthworm population and seen a trend in their migration from highly organic bottom soils toward the poorer soils on the hilltops. The worms are moving because of more organic matter for them to feed on in the upper slopes. I have also noticed a quicker decomposition of straw both in quantity and quality. The lack of tillage has assisted the natural order of nature to build organic matter. My moisture retention is better because I am not
disturbing the ground which creates more uncovered surface soil for evaporation to occur and because of the high amount of residue the surface run-off, if any, is clean and minimal. Keeping earthworm burrow paths intact allows for moisture to go deeper. With the proper placement of seed and fertilizer, the root structure is better developed and my plants maintain a healthier look as well as enhancing more soil aggregates and fewer fines (small particles of non-aggregated soil).

The problems I have had to overcome have been primarily dealing with residue, but feel my cutting system is my best assistant here. One always has to be aware of the ‘green bridge’, that unknown enemy that snuck up on the early no-tillers. I have found certain weed species to be a challenge; this will probably be an ongoing fight of finding chemicals to deal with the stubborn weeds. With my seed opener I am placing the seed on a good seed shelf and have proper fertilizer placement. The compaction layer in the soil needs to be evaluated and addressed no matter what farming technique is being used. Farming remains a game of efficiency and I continue to look for ways to play the game more effectively. I accept the challenge and will change, as needed, for the opportunities that are there for each of us.