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"From the Ground Up"

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News and Information on natural resource management in western North Dakota

Successful No-Till

Part 1 - Crop Rotation

In This Issue:

According to Rebecca McHenry's article "No-Till Farming and the Environment", a successful no-till cropping system should consider five things; crop rotation, weed control, seed placement, fertility, and residue management. In Part 1 of this series we'll look at the importance of crop rotation. More specifically, crop rotation diversity. A diverse crop rotation means growing different types of crops in a sequence where each crop compliments the production of the others.

Types of crops

There are basically four different types of crops to make a diverse rotation; cool-season grasses (cereal grains), cool-season broadleaf's (flax, canola, lentil, pea, lupine, etc.), warm-season grasses (corn, sorghum, millet, etc.), and warm-season broadleaf's (sunflower, safflower, chickpea, beans, alfalfa, etc.).

To reap the benefits of diversity, crops need to be organized into a logical sequence that provides enough of a break between each crop type to prevent the symptoms of weeds, insects, and diseases we often see in a mono-culture of only one crop type.

Diversify to spread risk and workload

Bad weather at the wrong time for one crop can be good weather for another crop. A diverse crop rotation can spread the risk of weather and market fluctuations. It is also possible to plant more acres with smaller planting equipment if the crops being grown don't all have to be planted at the same time. Cool-season crops are planted during one "window" of time and warm-season or fall seeded crops during other "windows" of time. Spreading workload can reduce the need for large equipment and labor throughout the year.

Diversify to create proper conditions to plant and grow each crop

The color and amount of residue determine planting and seedling emergence conditions for each crop, and moisture left from the previous crop. Dark colored residues warm-up faster in the spring, and heavy amounts of residue retain more soil moisture. Long-season crops use more soil water than short-season crops.

The potential yield for each crop can be maximized by arranging crops in a rotation that provide the best seeding and moisture conditions for the each crop. The most moisture is conserved with the soil covered by a thick layer of light-colored, upright residue that traps snow during the winter. The time

interval between the harvest of one crop and the water demand of the next crop will determine the potential for storing-up water in the soil.

Diversify to aid in weed control

When seeding a crop, the soil your drill disturbs also brings weed seed into a zone where it can germinate. Varying seeding dates, using different herbicides from year to year, and planting different types of crops will change the conditions that weeds will be subject to, and put them at a competitive disadvantage with the each crop. A drill or planter that disturbs as little soil as possible will minimize weed seed germination.

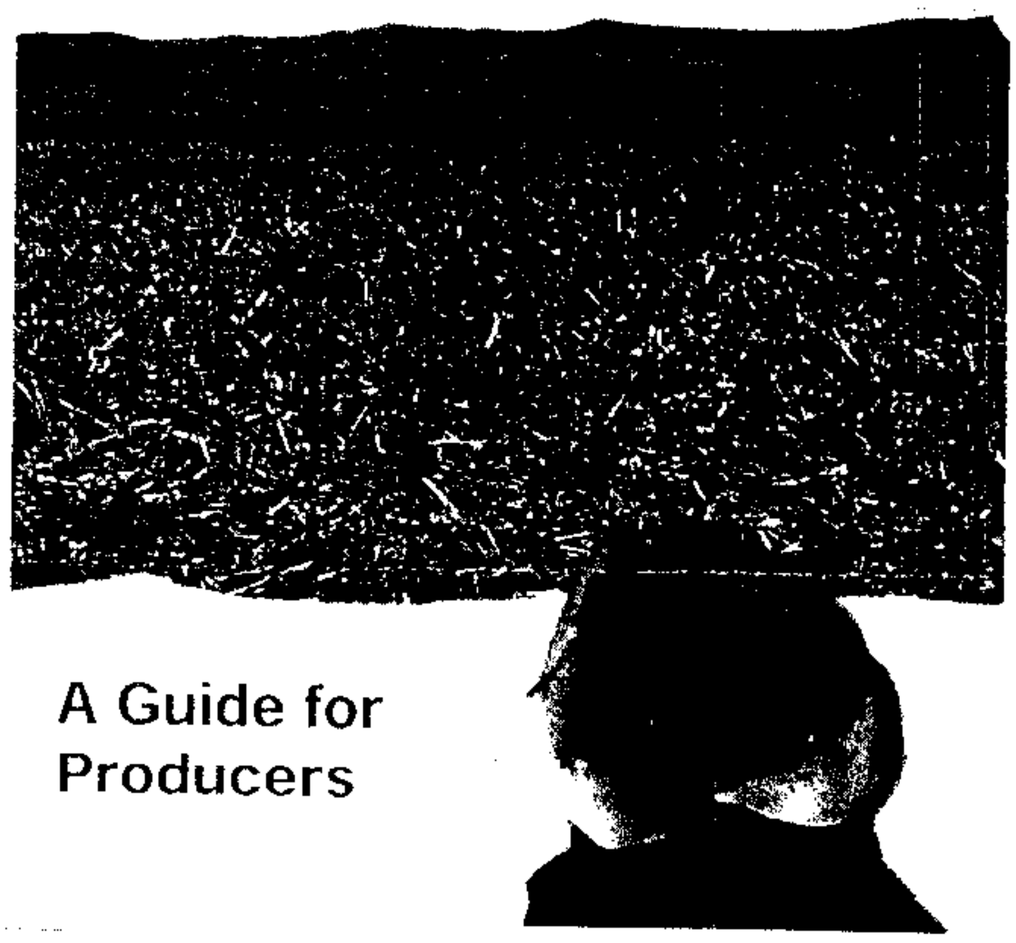
Diversify to aid in disease control

The majority of the diseases that lower crop yield or quality can be reduced significantly by implementing a diverse crop rotation. A cropping pattern that lacks diversity allows disease organisms to increase to levels that insure a high degree of infection when conditions are right. A diverse crop rotation can reduce the population of disease-causing organisms so infection is rare and loss of yield or decline in crop quality is minimal. Given the crop losses to disease in recent years, the need for crop rotation diversity cannot be overstated.

Understanding crop rotation diversity can reduce or prevent many of the symptoms of weeds, diseases, and insects evident in a monoculture situation. Growing differer types of crops in a sequence where eac. crop compliments the production of the others makes both ecologic and economic sense.

For details on how to develop a good diverse crop rotation, download a copy of "The Power Behind Crop Rotations" from the Dakota Lakes Research Farm in Pierre, SD at;
http://www.abs.sdstate.edu/aes/dakotalakes/.
For additional assistance in understanding how to develop diverse crop rotations, particularly in no-till, contact Jon Stika, Area Agronomist, at the Dickinson Area Office.

The Power Behind Crop Rotations



A Guide for Producers

effective mulch throughout the rotation is also important. Growing crops that produce different types and amounts of residue can assure that mulch is maintained on the soil surface as the residue decomposes and feeds the soil. Crop residue (including chaff) should be spread as evenly as possible across the soil surface during the harvest operation to create a uniform seedbed for planting the next crop.

Shielded sprayer in action on a no-till field

Weed control through herbicide chemistry

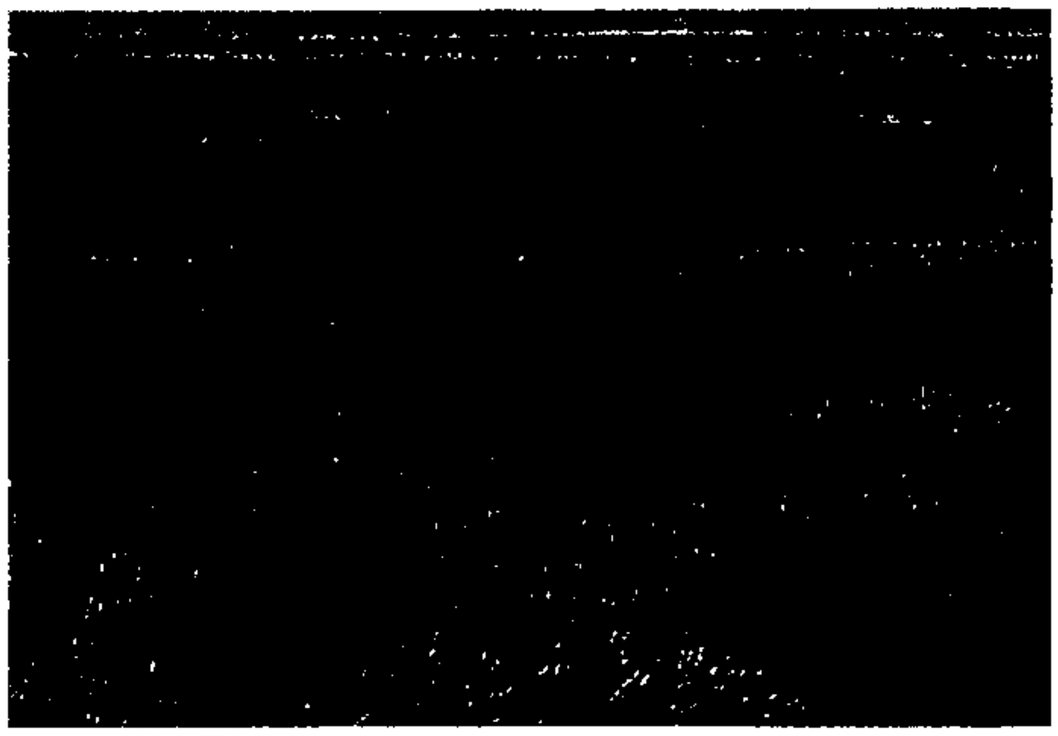
Using different herbicides to control a particular type of weed from year to year will help prevent the eventual selection of a herbicide resistant strain of weed(s). Just as crop rotation prevents the build up of particular weed pressure, rotating herbicide chemistry prevents a build up of herbicide resistant weeds.

Weed control through sanitation

Weeds can also invade a crop field from field margins, unclean equipment, or seed. Weeds that are not controlled along field margins can go to seed and fall into the cropped field or be cut by harvest equipment and spread with the chaff behind the combine. Weed seed can also travel along on farm equipment that is not cleaned-off from one field to the next and drop off anywhere into a different field. Bin-run seed can contain weed seed that will be planted along with the crop. Seed should always be cleaned of weed seed before planting.

Weed control through adequate fertility

It has been said that the best herbicide is a thick stand of healthy crop. Seeding to achieve an adequate plant population ar providing it with sufficient fertility to compete with weeds and achieve the desired yield goal is the most economical approach to weed control. Weeds typically grow better than crop when fertility is lacking. Soil testing on a regular basis can provide the information necessary to properly fertilize each crop.



No-Till winter wheat competes with weeds

Weed control through adequate seeding rate

Plant to achieve a heavy stand of crop that can compete effectively with any weeds that germinate with the crop. Plant only large, properly conditioned, clean, germination-tested seed. This may be the most cost-effective form of weed control a farmer can practice.

Successful weed control in no-till crop production is dependant upon: a diverse crop rotation, no soil disturbance, ample soil cover, diverse herbicide chemistry, attention to sanitation, adequate fertility, and a generous seeding rate. All of these aspects must be applied consistently to be successful in no-till crop production.

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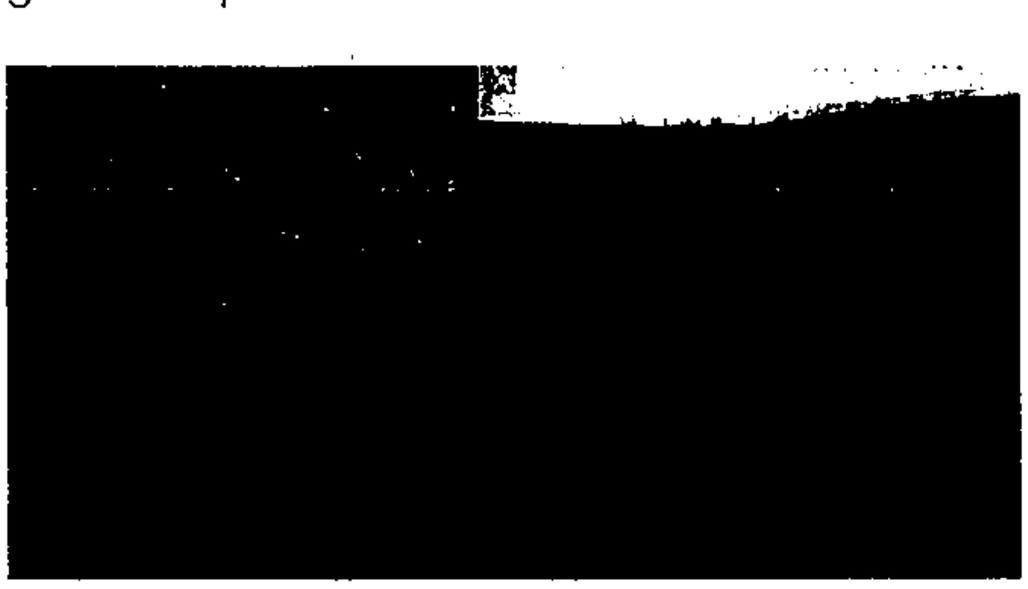
Successful No-Till
Part 2 – Weed Control

According to Rebecca McHenry's article "No-Till Farming and the Environment", a successful no-till cropping system should consider five elements; crop rotation, weed control, seed placement, fertility, and residue management. Part 1 of this series focused on the importance of crop rotation. In this installment we'll look at weed control.

Weed control through crop rotation

As mentioned in Part 1, a good diverse crop rotation can go a long way to reducing weed pressure. Planting different types of crops each year changes the conditions that weeds will be subject to. This puts weeds at a competitive disadvantage with each crop because the time of planting and growth of each crop will differ from that of the weeds that may have been a problem in a previous crop. A warm-season broadleaf weed will struggle to establish itself under the competition of an early growing cool-season grass crop.

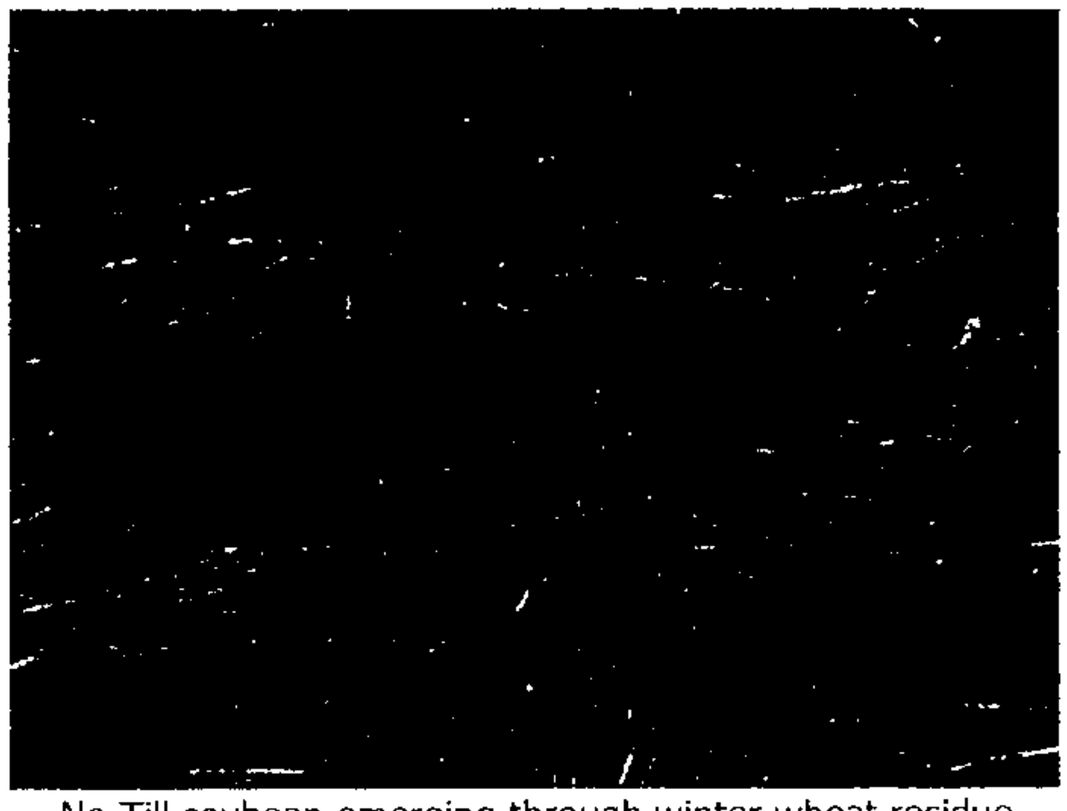


No-Till corn, wheat, and sunflowers in rotation

A diverse rotation also makes it much easier to control weeds with herbicides. Killing grassy weeds in a broadleaf crop or killing broadleaf weeds in a grassy crop is usually more effective and less expensive than trying to kill weeds that are the same type of plant as the crop they have invaded.

Weed control through no soil disturbance

When seeding a crop, the soil your drill disturbs brings weed seed into a zone where it can germinate along with your crop. True **no**-till leaves weed seeds in place. The weed seeds that are deep in the soil do not germinate and eventually rot, and those that are shallow germinate and (hopefully) are controlled before producing more seed. That being said, a true no-till system will gradually require less use of herbicide as weed pressure decreases. A planting method that causes soil disturbance (either pre-plant tillage or one-pass seeding equipment that causes significant soil disturbance) will continue to plant weed seed along with the crop each year.



No-Till soybean emerging through winter wheat residue

Weed control through soil cover

Obviously accumulated crop residue on the soil surface acts as mulch to prevent weeds from sprouting in the soil underneath. The less the residue cover is disturbed the better it can perform as a mulch. Selecting crops that produce enough residues to maintain