CROP ROTATION

Rotations should include both broadleaf and grass-type crops.

Regardless of the tillage system, rotating crops is always a best management practice. In the absence of tillage, it may become even more important in no-till systems – especially to break insect, disease and weed cycles. Crop rotations can also increase yields, build soil organic matter and enhance nitrogen availability if nitrogen fixing legumes are included. However, there are some challenges in no-till rotations.

CROP ROTATION, PEST MANAGEMENT AND WEED CONTROL

When crops are rotated properly, they can disrupt insect and disease cycles and weed infestations.

Changing crops also means varying the type and timing of management practices. This will further disrupt crop pests, e.g., corn is not a host for the soybean cyst nematode.

Crop rotation allows opportunity for resource building and protection. The inclusion of forage crops in the rotation can improve seedbed structure, add organic matter, and add nitrogen – while their cover protects soil and water resources.

Each crop has particular impacts upon its growth environment, e.g., soybean residue allows seedbed to warm up quickly; legume crops can have dense canopies, yet add nitrogen to soil.

For maximum benefit, rotate grassy crops with broadleaf crops, i.e., corn and soybeans.

Crop Rotation

No-till is an option for some horticultural crops, such as tomatoes.

No-till soils with hay in the rotation rehabilitate sooner.

Crop rotations allow for more opportunities for chemical family rotation and help prevent weed resistance to herbicides.

CROP ROTATION

Continuous cropping can have a greater affect on no-till crops. Continuous corn in clay soils may cause a 10-30% yield reduction.

Corn following wheat in no-till can be a problem because:

- **the cool/wet seedbed reduces corn seedling emergence**
- **phytotoxins released from wheat residue slow seedling growth**
- **slugs may be a problem in a cool wet spring.**

PLANNING A ROTATION

Rotations must be planned to suit each farming operation. Factors affecting crop rotation sequence changes are:

- ▸ livestock feed needs
- ▸ insect pressures
- ▸ equipment available
- ▸ labour and management time
- ▸ cover crops
- ▸ weed control program
- ▸ previous crop (crop sequence and residue)
- ▸ market for crop
- ▸ previous herbicide (chemical) family used
- ▸ disease pressure
- ▸ current seasonal operations
- ▸ available seed
- ▸ soil type/management limitations
- ▸ nutrient management program
- ▸ erosion control/soil quality problems.

SOME TIPS WHEN PLANNING A CROP ROTATION

- ✓ Alternating grass crops with broadleaf crops is the best practice.
- ✓ Continuous cropping is the worst practice: the more crops, the better.
- ✓ Go for added benefits, e.g., red clover grown between cereals and corn can improve the soil.
- ✓ A high residue crop followed by a low residue crop helps maintain sufficient residue cover on the field.

CROP ROTATION

In no-till, crop rotation is very important for weed control. You can plan for and control weeds this year that will affect next year's crop.

Neil Hannah, Northumberland County

In a corn, wheat, white beans, soybeans rotation:

1st = wheat after beans
2nd = beans after corn
3rd = corn after beans or wheat.

Wilf Riddell, Middlesex County

BEST MANAGEMENT PRACTICES

The following table rates crop choices based on the residues and inputs used on the previous crop. To use the table, identify current crop residue and select the highest rated crop (green colour) that can fit into your rotation and crop needs. Those crops in the yellow can be made to work but are more challenging. Crops in the red can be risk-prone. Check the explanation of symbols at the bottom of the table for special conditions and exceptions.

We need forages in our rotation to feed cattle. The added benefit is that hay gets land into shape for no-till.

John Miller, Lanark County

CROP ROTATION

CROP CHOICES, BASED ON RESIDUES AND INPUTS

CROP RESIDUE	CROP TO BE PLANTED					
CEREAL	Edible Beans S, B	Soybeans S, C5, m*, W	Canola S, M	Hay P	Corn D1, S, a*, M	Cereals D1, R
CORN	Soybeans S	Edible Beans	Canola S, H	Hay P	Corn R, C1, I2	Cereals D1, H
SOYBEANS	Corn	Cereals	Hay	Soybeans D2, N, R, D5	Edible Beans D2, D5	Canola D2
EDIBLE BEANS	Corn	Cereals	Hay	Soybeans D2, D5	Canola D2	Edible Beans D2, D5, R
CANOLA	Cereals	Hay	Canola R, D2	Soybeans D2, A	Edible Beans D2, A	Corn A
HAY & PASTURE	Corn S, C3, C4	Edible Beans S, B	Soybeans S,W,B	Canola S	Cereals W	Hay R, D3

*** a lower-case letter indicates it may be a minor concern**

P Heavy residue may make it difficult to achieve good seed placement
H Crop may not be harvested in time for fall seeding
A Adversely affects crop growth
N Soybean cyst nematode may develop and reduce yields
S Slugs may be a problem (especially when red clover is underseeded in a cereal)
M Cereal residue may slow soil warming in the spring and delay planting – winter cereals may be worse than spring cereals
R Yields are usually depressed when a crop follows itself – often more so in no-till
W Weed escapes from red clover underseeding or hay may be difficult to control

C1 Corn rootworm will likely be a problem
C2 European Corn Borer could be a problem
C3 Cutworm could be a problem
C4 Armyworm could be a problem
C5 Spider mites could be a problem following red clover
D1 Potential disease problem such as fusarium head blight
D2 Potential disease problem – white mould, etc.
D3 Forage diseases could increase
D4 Potential development of ear moulds
D5 Root rots may be a problem
B Burndown in the fall is very important for clover and alfalfa control

In a corn, soybean, wheat, and red clover rotation:

1st = wheat after soybeans
2nd = soybeans after corn
3rd = corn after clover
4th = clover after wheat.

Laurence Taylor, Huron County

CROP ROTATION

Frost seeding of alfalfa with a no-till drill on one of the last frosts 1/4"-3/8" deep worked well for us in 1996.

Tom Verkley, Middlesex County

To overcome corn into wheat problems, I lightly disc the wheat stubble right after harvest. It's also a great way to fit manure into the system.

Charlie Bolton, Middlesex County

TIPS FOR MAKING IT WORK

NO-TILL ALFALFA

Forages can be difficult to establish in no-till and difficult to kill. Here are some tips from no-till producers.

It took us three tries to get it right with alfalfa. Since 1990 we insist on excellent burndown, plant into soybean residue, and plant shallow with seed dropping just ahead of the press wheel. A nurse crop is used.

Sam Langman, Simcoe County

I've no-tilled forages since 1991. I direct seed alfalfa into sands and clay with the no-till drill after corn or soybeans using 10% timothy in the mix at 16-18 lbs/ac. But to make it work, soil moisture must be just right and the previous residue spread evenly.

Robert McKinnon, Bruce County

CORN FOLLOWING WHEAT

Corn into wheat often does poorly, whether from cool moist conditions or the adverse effect (allelopathy) that wheat residue has on corn. Some producers, though, are making it work.

MANAGEMENT OF CEREAL RESIDUE ON CLAY SOIL

EFFECTS OF INCREASED RESIDUE	SOLUTIONS
Nitrogen can be tied up in the breakdown of the straw and may not be available to the crop.	• apply more nitrogen or manure
Leaf and stem diseases may become more of a problem.	• plant broadleaf crops, i.e., soybeans • select tolerant crop varieties • remove straw
The soil will be wetter in the spring resulting in: • the potential for increased root diseases	• use appropriate seed treatment • select tolerant crop varieties • remove straw • light tillage (cultivate or disc) or strip tillage
• the potential for increased slug damage	• clear residue from the row • increase seeding rate slightly • remove straw
• cool soils and poor growth.	• clear residue from the row • increase seeding rate slightly • remove straw • light tillage (cultivate or disc) or strip tillage