

Rotation with roots

by Hugh Maynard

Ulrik Hack believes that too much attention has been paid to making farm land suit the crop. Now is the time, he says, to "shift priorities" and match the crops - with an emphasis on the plural - to the land.

Hack, who operates a mixed bio-dynamic farm of 532 acres with his brother near Kincardine, Ontario, was speaking on the benefits of crop rotation at the Organic Agriculture Conference, held at the University of Guelph during the past winter. His philosophy is that variety is the spice of life, with the soil being no exception.

Hack's crop rotation is a cycle of 13 years that comprises nine different field crops interspersed with forage (see table). The length and complexity of the rotation is necessary, he says, to break weed and disease cycles, to provide different soil residues, and to utilize crops which have different nutrient demands on the soil. The results can be higher humus levels, better water holding capacity, less weed pressure, lower instances of disease and, eventually, higher yields from lower inputs.

Understanding

Hack cites the different quantities of root mass that crops leave behind in the soil after harvesting as an example of why a variety of crops are beneficial in a rotation plan.

"If all the little pieces of roots are put end-to-end, corn provides 7 kms of root mass per acre, wheat 300 kms, and rye 600 kms," he said. With root mass making the largest contribution to organic matter accumulation, the inclusion of rye in a rotation off-sets the deficiencies of corn.

Hack also makes it a general practice to underseed cereal grains with red clover at the rate of five pounds per acre as a preventative measure against weed proliferation, as well as alternating between winter and spring cereals for the same reason.

He notes that there are numerous variations to underseeding that can be employed for weed control, such as underseeding barley with alfalfa as a forage crop, and then followed by wheat to combat quackgrass.

In addition, Hack underlined the importance of keeping fields clean of weeds for crops that are slow to establish, such as flax, by properly composting manure: "'Sour manure' makes weeds such as lamb's quarters grow like crazy," he said.

Main ingredients

Hack was joined in his presentation by Harro Wehrmann, an organic cash crop and beef farmer from Ripley, Ontario, who also implements a similar strategy in his crop planning.

Wehrmann has identified three "essential" components that provide a balance in any crop rotation - crucifers, legumes and grains - respectively negative, positive and neutral with regard to their consumption of soil nutrients.

The rotation plan has a shorter cycle (six years) but alternates winter and spring crops as well as the three essential components. The final year can be a rye/vetch mix harvested for seed, or a perennial ryegrass/clover mix that is cut once for forage and then used as plowdown; the clover is chisel plowed three times, approximately a week apart, in September in order to kill it off and prepare the soil for seeding winter canola.

"The root mass from a decent crop of winter canola is better than an application of compost, and it protects the soil," Wehrmann emphasized, adding that he leaves the straw from the different crops as an on-field mulch.

Wehrmann also doesn't like to be dogmatic about the methods of tillage that are used on the fields, noting that different soils and different crops demand different solutions.

"We use all types of tillage - moldboard, chisel plow, etc. If you use only a chisel plow, for example, the weed pressure can become too high," he said.

Wehrmann's Six-year Rotation Plan

Year 1 Winter Canola

Year 2 Winter Wheat

Year 3 Soybeans

Year 4 Spelt grain

Year 5 Beans (edible)

Year 6 Rye/vetch mix (for seed), or

Perennial ryegrass/clover mix

Hack's Single Year Crop Rotation

Wheat - likes to be after a legume, canola, or oats (that follow a legume plowdown;

- dislikes being after barley, wheat or the low end of the fertility scale.

Spelt - same as wheat but is more tolerant of low fertility; best in medium fertility.

Oats - should be a minimum of four years between oat crops in same field (same applies to mixed grain crops), needs medium to good fertility.

Barley - good after anything and can tolerate low fertility; best in low to medium fertility.

Flax - needs a weed-free field; low fertility.

Corn - dislikes following canola or oil radish; needs high fertility.

Beans - should not follow red clover, even as a green manure; low fertility, good soil structure.

Rye - a wonderful crop after anything hard to sell (??); low to medium fertility.

Potatoes - likes to follow oil radish or red clover green manure; don't apply fresh livestock manure and only a little quantity of compost.

Hay fields - should be included in rotation, never left as an extra outside of the rotation plan (unless conditions, such as flooding, wet fields, excessive erosion, etc. do not allow it); hay fields should be underseeded after (in) barley in low fertility level as it brings up the fertility level and is therefore best starting point for a crop rotation cycle.

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