

Workshop Title: Organic Principles for Tillage

Speaker(s) & their titles: Roger Henry, Agriculture & Agri-Food Canada

Executive Summary:

Roger Henry explains how no-tillage preserves soil, green manure crops incorporated will increase organic matter, and in turn save your soil.

Definition of Soil:

- sand, silt and clay are the inert portion of soil
- water, air, organic matter are the other aspects
- for types of soil look at the soil chart and determine what mix of soil you have: tillable land is in the center of pyramid; ideal mix is loam
- 7 different classes of soil (Class 1 is loam, Class 11 is rocky mountain)
- need a combination to make growing conditions possible and to support life
- different types of soil will hold different amounts of water: loam=32%, peat=50%, sandy loam 20%
- you need to pay attention to the subsoil: e.g. sandy loam on top then clay will have no drainage

Dealing with Soil:

- you cannot change the inert portion, but you can change organic matter content and soil pH
- eastern PEI is in sandy loam, so have to plant earlier in order survive a dry season
- adding organic matter is the answer; allows to till clay when wetter, and allows sand to hold more water
- humankind has been tilling the soil for centuries: tillage can build soil or destroy soil
- a farm that is building organic matter can reduce greenhouse gases by storing carbon in the soil
- organic component is the glue - it will form as aggregates
- the size of the aggregates is very important as it indicates how much water the soil will hold
- smaller aggregates mean less tilling and more compaction

Tillage:

- positive aspects: prepare a seedbed, loosen the soil, incorporate plant residue/manure, kill weed seeds, break-up hardpan
- negative aspects: destroys soil structure, burns up organic matter, kills soil life, compacts the soil

Tillage Systems

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- traditional, reduced tillage (res-till, roller-harrow, one pass cultivators), no-till (with roundup in the prairies) and permaculture
- rise and fall of the mouldboard plow: opened up the prairies, 100 years later dust storms had wiped them out (another example would be the dust storms in PEI at the height of the potato production)

Primary Tillage:

1. Mouldboard Plow: there are good ones and bad ones, 4-5 inches deep, longer and twisted is better to roll over the sod
2. Res-till: eliminates the plow in a lot of situations, can go over a couple of times and have a seed bed
3. Soil Ripper: 18 inches deep, breaks up hardpan

Secondary Tillage: Disking

Green Manures

- Disking in brown mustard and buckwheat will reduce the instances of wireworm
- mustard has cyanide in the plant that kills the wireworm
- you can have issues with mustard killing plant growth in the following crop (some farmers think that you should cover the plant material completely so the mustard dies)
- all brassicas have cyanide
- oil radish, crimson clover and a grass plant are recommended for potato growers
- oil radish will winter kill, may overwinter to -10, and will release nitrogen much faster than winter rye
- winter rye great at building organic matter, not great at releasing nitrogen in the spring
- if you need fertility grow radish and spread manure in September

Buckwheat

- offers wireworm suppression as well
- extremely fast growing
- killed twitch and cootch grass because it grows so fast (double seeding)
- good P gatherer, more available
- wait til killing frost is over, disk down when starts to form seed heads
- cultivate in spring to stir up the buckwheat seed then till over

Oats

- Hessian Fly- on barley fields- larvae of the fly sucks the juice out right at the base of the plant
- doesn't like oats, so plant before barley or after seeing the sign of hessian fly

Sweeping cereal fields after harvest - 18" sweep on about 2" down offers good control of weeds

- can be primary tillage, remaining seed comes up and then winter kills
- prevents weed seed from germinating
- in spring disk for seed

No-till:

Soybeans

- \$11000/ton for organic soybeans (Price for organic soy is high.)
- winter rye can't be incorporated until heads up
- Jun 6th: rolled and then plant with no-till drill
- soybean plants come through rolled winter rye
- rye will all be gone and soybeans ready at Thanksgiving
- you have to have flat ground otherwise you will have rye coming back up
- crimper roller the best
- rolled rye doesn't suppress legumes, but does suppress oats and brassicas

In-Row Soybean Cultivation

- finger weeding, 20" rows apart

Rototiller

- desperately hard on earthworms, hard on organic matter, hard on micro-organisms