A Crop Diagnostic School Focused on Organic Production

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Background

A Crop Diagnostic School format using participative training techniques targeted organic field crop farmers and agronomists this July

This clinic focused on 2 major challenges for organic producers – fertility and weed management while sustaining soil health.

Following are some of the key lesson activities:

Fertility Management

Green manure crops supply nitrogen (N) and improve phosphorus (P) availability to following crops

Inventorying the N supplying potential of 6 earlier established green manure crops of black lentil, faba bean, soybean, hairy vetch, pea/soybean/hairy vetch mixture and pea/oat mixture.

Participants assessed nodulation, legume %, then clipped and weighed material and used a plant tissue analysis to estimate N produced compared to 2 thumb rules.

- 25 lb N/1000 lb total dry matter (DM)
- 200 lb DM/ac for every inch of height


Fig. 1-2. Clipping and weighing green manures.

Maintaining phosphorus fertility is a challenge in organic production.

An inventory of P contribution from green manure crops of hairy vetch/barley and peas/oats was assessed similar to N above.

Composted manure is a preferred P source since rock P has been ineffective in previous studies.

Compost and 3 raw manures were analysed for nutrients, C:N ratio, etc and applied at the same P rate to soil trays and weed growth was examined.

Figure 3. Participants observed weed growth was proportional to the NH_4^+-N content of the manure.

Green manure crop termination:

There are several alternatives to the standard practice of tillage for green manure termination.

Participants assessed incorporation and anchoring of vegetation, likelihood of re-growth and power requirements.

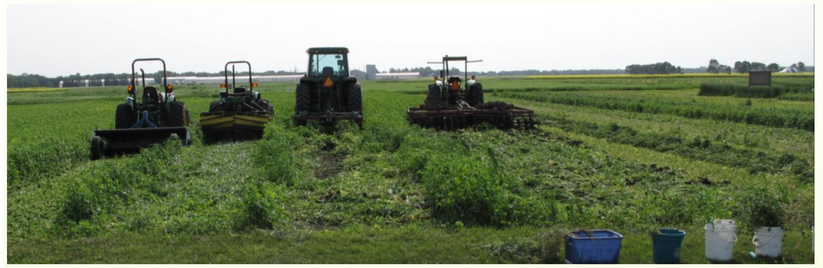

Fig 4. Termination of a pea/oat green manure crop using (from left) flail mower, crimper roller, wide blade cultivator, tandem disk and swathed for livestock forage.

Weed management:

Successful mechanical control of annual weeds is dependent on intensity and timing.

Previously applied control methods and timings were assessed for weed control and crop injury.

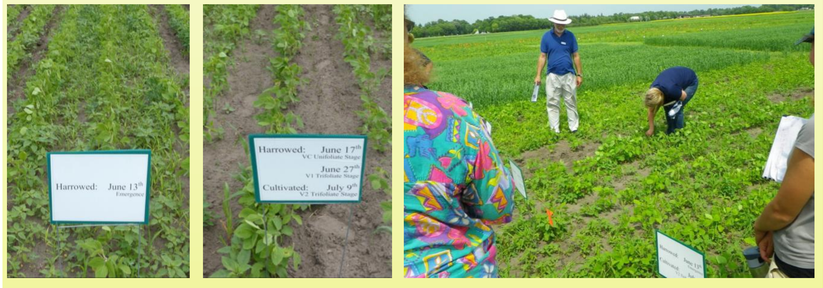

Fig. 5-7. Participants preferred aggressive mechanical weeding methods and frequent timings.

Placing a plexi-glass plate over the soil surface encourages weed seedlings to emerge some 2-3 days early. This targets timing of mechanical weeding when annual weeds are most vulnerable.

Figure 8. Participants examining weed seedling emergence under plexi-glass plate.

Soil Health:

Soil health and structure – avoiding excess tillage which can degrade soil structure

A concern of using tillage and continuous annual crops in organic systems is degradation of soil structure.

Soil previously sampled from long term studies at Glenlea included a conventional annual crop rotation, an organic annual crop rotation and a forage/annual crop rotation. Soil health was assessed according to aggregate strength and slaking.

Participants observed greatest stability in the forage-based rotation.



Fig 9-11. Soil aggregates examined under a digital microscope and the 3 soils evaluated for aggregate stability and the slake test.

Summary:

Many of these organic management principles are hosted on the “Natural Systems Agriculture” website. This was an opportunity to field train growers and agronomists on these assessment techniques.

An exercise booklet is available and can be requested from the lead author. Similar clinics are planned for the future.

References:

Entz, M.H et al. Glenlea Organic Rotation: A Long-Term Systems Analysis. 218-237 *In* Martin, R.C and R. MacCrae (eds.) Canadian Organic Innovation. CRC Press.

For more information on Natural Systems Agriculture, visit: www.umanitoba.ca/outreach/naturalagriculture

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