Organic Agronomy Training

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Glossary

Organic Agronomy Training

This training was developed and delivered by Martin Entz, PhD, Department of Plant Science, University of Manitoba. It is intended for private and public sector agronomists who want to respond to the growing demand from producers for more information about organic grain production. Grain farmers considering a transition to organic or current organic practitioners who want to learn the theory and latest science will also find the course valuable. The course was designed with the Prairies in mind, however agronomists in other ecoregions will learn universal principles of organic production.

The training consisted of five 75 minute live online sessions over two weeks in January 2023:

- January 5: Designing Cropping Systems with a Focus on Nutrient Management
- January 6: Crop Establishment and Seeding Systems, Tillage and Weed Control
- January 10: Pest Management with a Focus on Disease, Insects (and Weeds)
- January 12: Soil Management for Organic Production: Putting Theory into Practice
- January 13: Question & Answers

All course content (lesson recordings, presentations and notes) can be accessed on pivotandgrow.com.

The Organic Agronomy Training was developed as part of the Prairie Organic Development Fund's Canadian Organic Ingredient Strategy.

The Canadian Organic Ingredient Strategy was funded by:

CANADIAN AGRICULTURAL PARTNERSHIP

PODF PRAIRIE ORGANIC DEVELOPMENT FUND

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Organic Agronomy Training **Glossary**	
Actinomycetes	bacteria that give soil its 'earthy' smell and leave thin filaments which contribute to soil aggregation. Actinomycetes aid in nutrient cycling, help control root disease by inhibiting pathogens, and promote plant growth regulators.
Arbuscular mycorrhizae (AM)	are fungi with symbiotic (mutually beneficial) relationships with the roots of many plant species, other than Brassicas (e.g., canola, cabbage). AM essentially increase the surface area of roots, which improves the ability of plants to extract water and nutrients, particularly phosphorus, from the soil. AM also help protect plants from disease-causing fungi (including Fusarium and Pythium), harmful nematodes and other stresses, such as drought and extreme heat. AM also improve soil structure.
Biofumigation	pest control measure involving using natural gases to inhibit pests and diseases through the cultivation, maceration and incorporation into soil of green manure crops that contain precursors of toxic compounds. Examples of such precursors are glucosinolates, which are commonly produced in members of the Brassicaceae family, including rapeseed and mustard.
Biomass	living matter, including roots and above-ground growth of plants
Blind cultivation (pre-emergent tillage)	tillage for weed control that is conducted after seeding but before or just slightly after the crop emerges.
C:N (Carbon : nitrogen ratio)	the proportion of carbon to nitrogen by weight in an organic substance. Materials that are high in nitrogen have low C:N ratios. For example, raw poultry manure has a C:N ratio of 10:1, and a fresh legume green manure has a C:N ratio in the range of 10:1 to 15:1. As plants mature, their C:N increases. For example, young fall rye has C:N of 14:1, flowering rye has C:N of 20:1; mature rye straw has C:N of 80:1.
Carbon sequestration	a complex, dynamic process in which soil organisms capture and transform carbon. Carbon sequestration can reduce atmospheric levels of greenhouse gases by capturing carbon dioxide and storing it in soil organic matter.
Carbonaceous	Carbonaceous: having a high Carbon-to-Nitrogen ratio, such as straw.
Catch crop	A cover crop planted to take up available soil nutrients, so that they are not lost from the soil through leaching. When the catch crop is terminated, these nutrients are then released back into the soil for the following crop.

Compost tea	liquid soil amendment or foliar feed used to promote beneficial bacterial growth that is created by steeping mature compost in water.
Cover crop	A crop that is grown primarily for the benefits it can provide to the soil and to the environment, rather than for harvest. Cover crops are grown to reduce soil erosion, improve soils, smother weeds, capture or supply nutrients, and break pest cycles.
Digestate	fertilizer made from material left over from anaerobically digesting household compost.
Disease vectors	organisms that carry disease, such as aphids.
Dockage	weed seeds, chaff, volunteer grains and other 'waste' material in a grain shipment; payment for grain is docked for this fraction.
Dissolved Organic Matter (DOM)	dissolved organic matter: This represents a tiny fraction of the soil C but is important in controlling the formation of MAOM.
Double cropping	planting a second crop or cover crop after the harvest of a cash crop, often a winter cereal.
Exudate	see root exudate.
Frass	insect droppings. Commercial frass production exists in Canada, where Black soldier fly larvae are fed food waste. The larvae become a high protein livestock feed, while their manure (droppings) becomes an organic fertilizer.
Green manure	A cover crop that is grown specifically to improve soil fertility, usually a legume or mix of a legume and non-legumes.
Inoculant (rhizobial)	a commercial mix of N-fixing bacteria (rhizobia) added to legume seed so that the legumes (and bacteria) will fix nitrogen.
Intercropping	planting different crops together, in alternating rows or by overseeding.
Leaching	the downward movement through the soil of chemical substances (e.g. nutrients) dissolved in water.
Legume	a member of the plant family that includes clover, alfalfa, beans and peas, whose roots host nitrogen-fixing bacteria in a symbiotic relationship.
Living mulch	a cover crop grown with cash crops to smother weeds.
Lodging	cereal crop blown down by strong winds, particularly in high-fertility soils.
Macronutrient	a plant nutrient needed in substantial quantities, such as carbon, nitrogen, phosphorus, sulphur, calcium, magnesium and potassium.
Mineral Associated	made mostly from dead microbes. MAOM's greater persistence arises from the fact that the C is embedded in silt and clay particles. MAOM persists longer in the soil than POM and has a lower C:N.

Organic Matter (MAOM)	
Micronutrient	a plant nutrient needed in very small quantities including copper, zinc, iron, manganese, boron and molybdenum (also called trace elements).
Microorganisms	living organisms that are not easily seen by the naked eye, including bacteria, fungi, protozoa and viruses.
Mineralization	the release of soluble minerals and simple organic compounds from organic matter or rock particles by the action of enzymes and other substances produced by microorganisms.
Minimal tillage	Also called conservation tillage or min-till, this practice protects soil from the damage of excessive tillage. It involves using as little tillage (or soil disruption) as possible. When tillage is used, it is shallow and does not invert the soil (as plowing does). Non-organic minimal tillage often relies on herbicides for weed control.
Mixed-crop green manure or intercrop	Growing two or more species, often a legume and a cereal, in the same field at the same time. Intercrops can include cereals and legumes that are planted together, such as peas and oats, or cereals and legumes that are relay cropped or undersown.
Mulching	covering the soil with an organic or inorganic substance to protect the soil, control weeds and (depending on the type of mulch) possibly increase soil organic matter and moderate soil temperature.
Mycorrhizal association	a symbiotic relationship between mycorrhizal fungi and plant roots, in which soil phosphorus is made more available to plants.
N mineralization	The process N in which the organic soil N (contained in soil organic matter, crop residues, manure and other organic amendments) is converted to the inorganic (mineral) forms of ammonium and nitrate, which are available for plants.
Necromass	dead microbes; this forms MAOM.
Nitrate (NO3-)	a form of nitrogen which is readily available to plants.
Nitrogen (inorganic)	also referred to as plant-available
Nitrogen (N)	one of the most important nutrients for plant growth. It will usually limit plant growth before any other nutrient will.
Nitrogen (organic)	nitrogen that is bound into the tissues of organisms, where nitrogen is used to form proteins and DNA. Organic nitrogen is strongly bound into these structures and is not readily available for plants to use.
Nitrogen cycle	the process by which nitrogen passes from a gaseous state, through living tissue in various organisms, and back into the atmosphere. Carbon and sulphur undergo similar cycles.

Nitrogen-fixation (N-fixation)	the conversion of nitrogen gas to a useable form of nitrogen; this is accomplished by strains of bacteria (Rhizobia) living in the nodules of legumes.
No-till	a farming technique chosen to reduce erosion and maintain high levels of soil organic matter. No-till is practiced by some non-organic regenerative farmers and often relies on heavy use of herbicides for weed control. Organic no-till is being explored by the Rodale Institute and others - it often involves the use of roller-crimper devices to kill cover crops without the use of chemicals.
Nodules	growths on the roots of legumes where N-fixation occurs.
Nurse crop	a cover crop planted to control weeds while another plant is becoming established (eg. oats are often used as a nurse crop for clover).
Nutrient budget	this calculation estimates the nutrients added to the field (e.g., in fertilizer, manure or N-fixation), the amount of nutrients removed by the crops, and the nutrients left after harvest for future crops.
Nutrient cycling	nutrients being continually recycled through the ecosystem; from the soil into the plants and animals and then returned to the soil by the decomposition of organic matter.
Organic matter	the living bodies, remains and waste products of living organisms. Organic matter includes the living organisms, active organic matter and humus.
Overseeding	planting seed into an existing crop or into a field that has just been planted (e.g. clover into cereal stands). Also called underseeding.
Planting green	no-till planting of cash crops into actively growing cover crops.
Plow-down (ploughdown, plowdown)	incorporation into the soil of a green manure crop or the green manure crop itself. The term is still used although the plow is no longer considered the appropriate tool to use.
Particulate Organic Matter (POM)	POM is made up of partially decomposed crop residues, stubble and other non-living C which enters the soil system. POM is less stable than MAOM. POM is mainly stored within soil aggregates (both macro-aggregates, such as soil clumps, and micro-aggregates, clusters of soil particles).
Pre-emergent tillage (blind cultivation)	tillage for weed control that is conducted after seeding but before or just slightly after the crop emerges.
Relay crop	A green manure that is planted into an established cash crop, and can continue growing after cash crop harvest. Often also referred to as underseeding. Examples include planting sweetclover, red clover or alfalfa into an established cereal crop.

Rhizobia	nitrogen-fixing bacteria that live in symbiosis with legumes and fix nitrogen from the air, which becomes available to other plants after nodules are shed from the roots of living legumes or when legumes are incorporated into the soil.
Rhizome	a long underground stem, usually growing horizontally, that can produce new shoots and roots along the length (e.g., as found in quackgrass and Canada thistle).
Rhizosphere	the area immediately surrounding plant roots, where the highest level of soil biological activity exists.
Root exudate	a substance released from the roots of plants. The carbon-containing exudates provide food for symbiotic microorganisms, and send signals to microbes, which then alter the surrounding environment to improve nutrient uptake and/or suppress pathogenic microbes. Exudates also improve soil aggregation.
Solarization	laying clear plastic over a weedy to raise soil temperatures and kill all roots or seeds in the upper layer of soil.
Struvite	a mineral consisting of magnesium, phosphate, ammonium, and water, held together in a crystalline structure that precipitates naturally under the right conditions. Struvite can be recycled from urine. The 2020 COS permits the use of struvite from livestock urine as a soil amendment. Struvite is a 'slow-release' fertilizer that is more soluble in soil than rock phosphate, especially in alkaline soils. It has an N-P-K content of 5-28-0.
Swathing	mowing or cutting the crop that is then left to dry on the ground.
Symbiosis	a mutually-beneficial relationship between two living organisms, such as legume roots and Rhizobia.
Tillage	mechanical disturbance of the soil to prepare the seedbed, control weeds, incorporate soil amendments and loosen the soil.
Tiller	side shoot (of cereal crops) arising at ground level.
Tilth	the physical quality or condition of soil, similar to the health of a living organism. Used by farmers to describe how easy it is to till the soil.
Transpiration	loss of water vapor from plants mainly through stomata (pores) in the leaves.
Underseeding	planting seed into an existing crop or into a field that has just been planted (e.g. clover into cereal stands). Also called overseeding.
Vesicular arbuscular mycorrhiza (VAM)	See Arbuscular
Volunteers	individual crop plants that are growing in unexpected places. Volunteers can result from a crop setting seed in the previous year,

	from seed that remained dormant during the year it was planted, or from sowing seed contaminated with seed from other crops.
Windrow	a long row in which mown hay or crop is laid, before being made into bales or picked up by the combine (i.e. a row to be dried by the wind). Also used to describe the way in which compost piles are laid out.
Winter annual	a crop which begins growing in the fall, lies dormant over the winter and flowers the following spring.
Winter cereal (winter grain)	a grain that is planted and grows in the fall and is harvested the following summer.

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The Prairie Organic Development Fund (PODF) is an investment platform established to develop organic agriculture and marketing in the Canadian Prairies. PODF builds resilience by investing in organic provincial associations (Capacity Fund) and high impact programs (Innovation Fund) related to marketing, research, policy, education and capacity development that have broad public benefit to the organic sector. The fund is directed by a board made up of organic producers, grain buyers, organic brands, researchers and provincial organizations.

The **Canadian Organic Ingredient Strategy (COIS)** provides farmers with tools and support to incorporate organic farming practices that help meet the growing demand for organic foods in Canada. The tools developed as part of this project will help Canadian farmers benefit from increased knowledge and skills in organic farming methods, which can improve soil health and boost farm resilience in the face of changing markets and climate change.

Visit www.pivotandgrow.com to learn more about the tools created as part of COIS.