

Soil Health



The Environmental Questionnaire (EN2) in the Environment module of proAction® is designed to help farms take note of the positive actions they already take with respect to the environment and will provide an overview of performance on soil health, greenhouse gases, biodiversity, and other topics. This will help identify potential areas that could further benefit your farm and mitigate impacts on the environment.

Soil health has an important effect on crops, forages and ultimately feeding a growing human population. Managing soil health is important to success of farms and its ecosystems. Healthy soil is able to support plant growth without becoming degraded or otherwise harming the environment. Many at-risk soils can be improved through practices that improve soil health. The questionnaire helps evaluate actions to reduce compaction and erosion, to increase soil carbon, and to manage soils with high salinity or low productivity.

Compaction

Soil compaction limits the ability of a plant's roots to grow, leading to poor nutrient and water uptake, which in turn leads to stunted growth and lower yields. Compaction also reduces water infiltration into the soil and increases risk of surface runoff of water and nutrients.

Risk of compaction can be managed/reduced by:



Controlling traffic in the fields, reducing its frequency and limiting it to specific areas



Limiting traffic in fields when soil conditions are not suitable, such as when they are very wet



Reducing tire inflation and ensuring that tractor is properly ballasted or weight is balanced



Using large width tires, dual or triple wheels, or tracks



Applying manure with a dragline, instead of with tankers

Erosion

The best soil for growing crops is the topsoil. Loss of topsoil works against farms trying to grow a productive crop, and can add to sediment and nutrients in watercourses. This loss, otherwise known as erosion, can occur because of wind, water, tillage, or certain other practices on a farm.

Evidence of soil erosion may include any of the following:

- Exposed subsoil on knolls
- Knolls are different colour than rest of field
- Inconsistent growth throughout the field
- Existence of rills or gullies
- Accumulation of soil in low areas of the field after heavy rain
- Dirty snow observed
- Springtime evidence of soil being carried to ditches
- Blowing soil observed during windy conditions



Soil carbon

Building soil carbon brings a host of benefits, including better nutrient and water retention, and better soil structure. These benefits result in better crop health, grasslands and productivity. Cropping activities can deplete soil carbon, when practices increase the breakdown of organic matter or when more carbon is removed via plant matter than is added to the soil. Conversely, some practices can lead to the sequestration (addition) of carbon to the soil.

Beneficial practices include:



Zero or minimum tillage, as this prevents soil disturbance which leads to increased breakdown of the organic materials in the soil, and leaves more crop residue in the field.



Inclusion of deep-rooted or long-term perennials (at least 2 or more years in a row) in crop rotations (that are a minimum of 3 years), as perennials develop deep roots that add carbon to the soil.



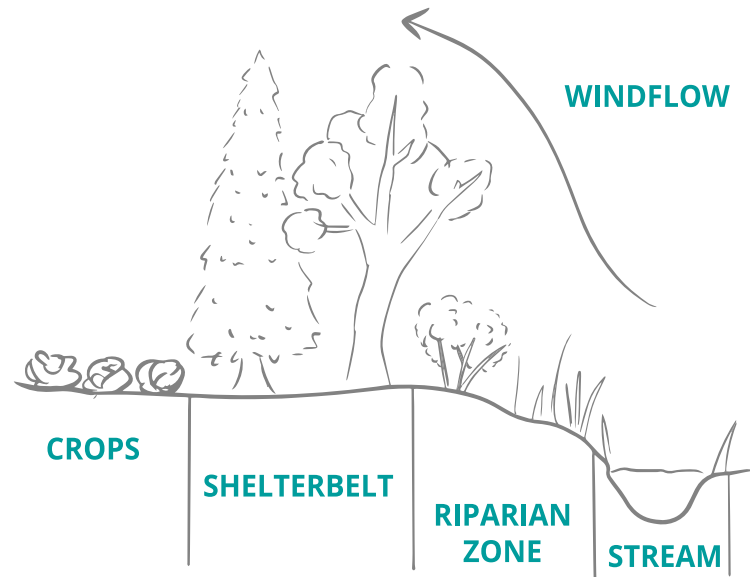
Addition of manure at a rate that meets crop requirements, as soils have been shown to sequester carbon at significantly higher rates following manure application than when synthetic fertilizer is applied.



Intercropping, where two crops are grown together to prevent bare soil during the growing season, making soil and fields less vulnerable to wind and water erosion risk. It can build soil health and reduce pressure from annual weeds. For more information on inter-seeding cover crops: <http://www.omafr.gov.on.ca/english/environment/bmp/AF169.pdf>



In pastures, use of rotational grazing can build soil carbon by re-generating grass and forbs for optimal growth and productivity. These plants source carbon dioxide from the air into the soil for plant and microbe use, then release oxygen.



Practices to reduce erosion include, but are not limited to:

- Zero or minimum tillage
- Grassed waterways or permanent cover in areas prone to erosion
- Shelterbelts or tree windbreaks around fields
- Riparian zones or buffer strips to prevent soil loss to surface water
- Landscape restoration to replace eroded soil to hilltops
- Cover crops are planted in shoulder seasons or inter-seeded in long season row crops
- Cross-slope or contour cropping
- Tile outlet protection (e.g. rock chutes)
- Water and sediment control basin



Note: The best practices for managing erosion will differ by region and geography. Soil type, cause of erosion (wind, water or tillage), topography and other conditions will factor into which erosion control measures are the most appropriate. Resource Soil Health factsheets at <http://www.omafr.gov.on.ca/english/environment/bmp/soil-health.htm#AF151>



A note on low productivity:

Some soil or field areas are not suitable for cropping. Recognizing soils on the farm which are not productive, and which will not respond positively to more efforts or investments (e.g., in fertilizer costs) with a profitable yield and retiring these soils from production is key.

Low productivity lands may include:

- Marginal lands which are naturally too stony, shallow to bedrock, too wet, too steep, or too heavy for cropping
- Fragile lands which are prone to severe erosion, at high risk of compaction, or in locations that are prone to flooding

Remote sensing data is increasingly being used to identify these areas, which may be a section or the whole of a field, where crop yields are consistently lower and expenses are consistently higher. It may be beneficial to consider alternative uses for these soils, such as maintaining them as perennial crops, or using them for pasturing cattle.

Salinity

Certain parts of the country have to contend with soil salinity, which, if left unmanaged, can degrade soil health, local water bodies, and/or lower crop productivity. Saline areas are a result of water moving up in the soil profile and bringing dissolved salts along with it. One of the ways to manage the salinity is to manage the water using practices such as continuous cropping to reduce the amount of water movement. If areas of salinity are not addressed, they may expand and lead to increased areas of unproductive soils, which could result in more complicated soil management to enable plant growth. The use of salt-tolerant crops and perennials may help.

