

# INFOSHEET #19

# FIELD CROP MANAGEMENT

How to address concerns identified in your Environmental Farm Plan Worksheet #19



Based on  
Environmental Farm  
Plan Workbook,  
4th ed. 2013

This infosheet outlines options to address concerns identified in your Environmental Farm Plan (EFP) as they relate to field crop management.

All options are classed as **Actions** or **Compensating Factors**.

- **Actions** address the identified concern, and will change the EFP rating to (3) or Best (4).

- **Compensating Factors** are alternatives that will adequately address the concern, but will not change the rating in the EFP worksheet.

In most cases you'll need more information before choosing and implementing options. Sources for more information are noted at the end of this infosheet.

For help with technical terms, please see the full glossary in your EFP Workbook.



# CROP ROTATIONS

## 19-1. Rotation for soil protection

### BACKGROUND

Exposed soil is at high risk of erosion, especially over winter. The best defence is to provide soil surface cover for as long as possible.



An overwintering cover crop would have helped reduce the impact of water erosion on this Harriston loam soil.

### WHAT CAN YOU DO?

#### OPTION 1 – ACTION

##### Plant more perennial crops (grasses and legumes):

- increase the amount of land in perennial forages, including pastures – the land is covered for a longer time and therefore protected, which is especially important for high-risk situations such as steep slopes or highly erodible soils
- grow perennial crops at least two years out of five
- note that if the perennial forage is not fed on-farm, it will require a market for this to be an acceptable option.

#### OPTION 2 – ACTION

##### Plant overwintering cover crops:

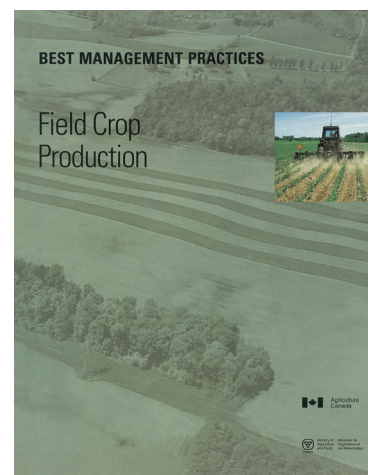
- select cover crops that won't interfere with next year's crop growth
- time planting to allow sufficient growth, but late enough so that the cover crop does not go to seed
- grow overwintering cover crops at least two years out of five
- manage cover crops to use existing equipment as much as possible.

#### OPTION 3 – COMPENSATING FACTOR

##### Use residue management systems (no-till, reduced till) when perennial or cover crops are not a viable option for your type of farming operation:

- aim to leave at least 30% crop residue on the soil surface from the harvest of one crop until after planting the next.

See also OMAFRA's Agronomy Guide for Field Crops, Publication 811.



Field Crop Production covers a range of crop production systems and how to improve long-term sustainability and yields. Whether you're considering a major change or want to fine-tune current practices, this BMP book offers many options, considerations, and tips to help you make the best decisions for your operation.

See pages 22-30 for more information about crop rotation.

## 19-2. Rotation for soil building

### BACKGROUND

Some crops return more organic matter to soil than others. Soil-building crops include perennial forages and crops that produce good root systems and are harvested only for their seed.



**If organic matter is not replaced by adding crop residues or manure, the soil's organic matter and structure will decline.**

### WHAT CAN YOU DO?

#### OPTION 1 – ACTION

**Include soil-building crops in your rotation (on at least 50% of land base):**

- rotate with soil-building crops, e.g. winter cereals and perennial forages – likewise, grain corn and spring cereals with the straw/stover spread will help build soil
- rotate soil-building crops in conjunction with soil-depleting ones to maintain soil structure and organic matter.

#### OPTION 2 – COMPENSATING FACTOR

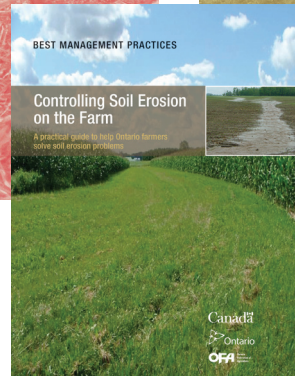
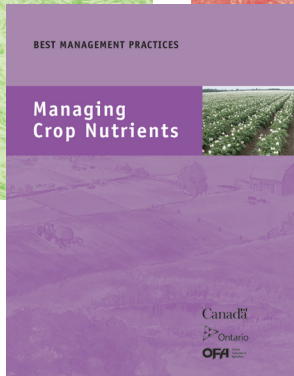
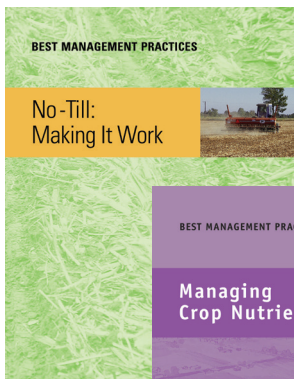
**Return organic matter to the soil:**

- leave residue in the field
- add manure
- grow green manure such as red clover, buckwheat, etc.
- note that if organic matter is not replaced by adding crop residues or manure, the soil's organic matter level and structure will decline.

#### OPTION 3 – COMPENSATING FACTOR

**Use reduced tillage system, e.g. no-till, reduced till and ridge tillage, to slow the breakdown of crop residue:**

- note that adding organic matter is still important.



**Healthy, fertile soil is productive and resilient. Learning more about your fields' soils and taking measures to protect and improve soil health will be rewarding in the short and long term.**

**Soil Management is a practical guide to help solve everyday cropland soil problems. It covers the basics on soil properties, diagnostics for soil problems, and BMPs to prevent and correct problem soil conditions.**

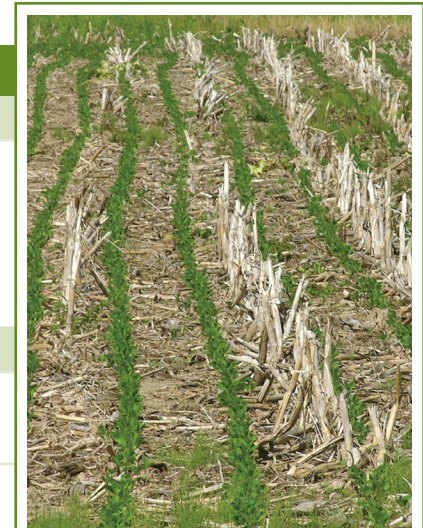
**Controlling Soil Erosion on the Farm is a shorter booklet, designed to help match in-field symptoms with erosion type and BMP options to improve conditions.**

**Several other BMP publications on aspects of crop nutrient management are also available.**



### 19-3. Rotation for pest management (weeds, diseases, insects)

BACKGROUND	WHAT CAN YOU DO?
<p>Pests are reduced when their host crop is not present in the field.</p> <p>Weed populations and vigour can be reduced by rotations with more competitive crops.</p> <p>Weeds are easier to control in fields with crop species that differ from the weed type (grass vs. broadleaf).</p>	<p><b>OPTION 1 – ACTION</b></p> <p><b>Rotate the crop species planted:</b></p> <ul style="list-style-type: none"> <li>• for every four times the field is planted, select different crop types at least three of the times, e.g., corn, beans, small grains, forages</li> <li>• adopt a crop rotation that reduces the chance that the same crop species will be planted consecutively.</li> </ul>
<div style="border: 1px solid #4F8127; padding: 5px;"> <p><b>OMAFRA's Agronomy Guide, Publication 811, offers the latest recommendation for growing field crops. Diagnostic guides and scouting calendars are included.</b></p> </div>	<p><b>OPTION 2 – COMPENSATING FACTOR FOR PERENNIAL FORAGES</b></p> <p><b>Change the crop environment to keep weeds, insects and diseases in check:</b></p> <ul style="list-style-type: none"> <li>• include timely harvest, clipping and pest monitoring.</li> </ul>



Rotating crop species is one component in a pest management strategy.

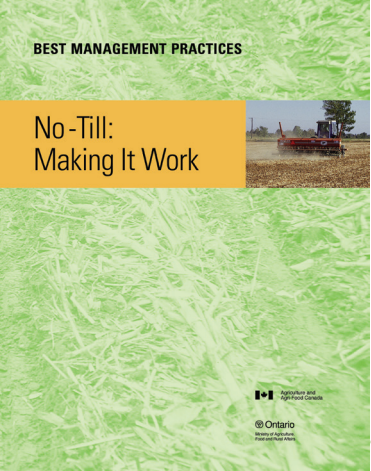

## RESIDUE CROP MANAGEMENT

### 19-4. Planting and tillage equipment

BACKGROUND	WHAT CAN YOU DO?
<p>Residue acts as a blanket and must be spread evenly to prevent problems during seeding. At least 30% residue cover is required for a conservation tillage program.</p>	<div style="border: 1px solid #4F8127; padding: 5px; margin-bottom: 10px;"> <p>For more information about equipment modifications, see <b>BMP No-Till: Making it Work, pages 19-40.</b></p> </div> <p><b>OPTION 1 – ACTION</b></p> <p><b>Modify equipment to handle increased residue levels:</b></p> <ul style="list-style-type: none"> <li>• note that existing planters and drills can handle 20–30% residue levels with very little modification</li> <li>• examine the equipment's ability to allow residue to flow through tillage discs/tines, seed/fertilizer openers or implement frame and wheels, and improve the spacing where required.</li> </ul>
	<p><b>OPTION 2 – ACTION</b></p> <p><b>Purchase new equipment that can handle residue situations:</b></p> <ul style="list-style-type: none"> <li>• when buying replacement equipment, consider its ability to handle residue levels of 20% or higher.</li> </ul>
<div style="border: 1px solid #4F8127; padding: 5px;"> <p><b>An effective residue management program leaves 30–70% of the soil surface covered with residue after planting throughout the rotation cycle.</b></p> </div>	<p><b>OPTION 3 – COMPENSATING FACTOR</b></p> <p><b>Reduce the number of times the field is worked prior to planting:</b></p> <ul style="list-style-type: none"> <li>• with each tillage pass, more crop residue is incorporated into the soil, leaving more of the surface exposed to erosive forces. Reducing the number of passes helps leave the protective residue cover in place.</li> </ul>
	<p><b>OPTION 4 – COMPENSATING FACTOR</b></p> <p><b>Change to a rotation that protects the soil:</b></p> <ul style="list-style-type: none"> <li>• grow perennial or winter cover crops at least two years out of five.</li> </ul>




## 19-5. Residue management at harvest

BACKGROUND	WHAT CAN YOU DO?	
<p>Harvesting is the first step in a crop residue management system. Harvesting equipment should be adjusted to leave a uniform layer of residue cover.</p>  <p><b>BEST MANAGEMENT PRACTICES</b></p> <p><b>No-Till: Making It Work</b></p> <p>No-Till: Making it Work is an excellent manual for all facets of reduced-tillage systems.</p> <p>For more information about residue management, see pages 13-18.</p> <p><small>Ontario Ministry of Agriculture, Food and Rural Affairs</small></p>	<p><b>WHAT CAN YOU DO?</b></p> <p><b>OPTION 1 – ACTION</b></p> <p><b>Spread crop residue evenly at harvest time:</b></p> <ul style="list-style-type: none"> <li>ensure that harvest operations spread the crop residue and chaff uniformly across a width equal to that of the combine header</li> <li>look into factory or after-market straw and chaff spreader options – available for most combines.</li> </ul> <p><b>OPTION 2 – ACTION</b></p> <p><b>Bale and remove crop residue no more than once every three years.</b></p> <p><b>OPTION 3 – COMPENSATING FACTOR</b></p> <p><b>When residue is removed more than once in three years, incorporate a rotation that builds the soil organic matter.</b></p> <p><b>OPTION 4 – COMPENSATING FACTOR</b></p> <p><b>Change to a crop rotation that protects the soil:</b></p> <ul style="list-style-type: none"> <li>grow perennial or winter cover crops at least two years out of five.</li> </ul>	 <p>Ensure that harvest operations spread the straw and chaff uniformly across a width equal to that of the combine header.</p>

## CONSERVATION CROPPING

### 19-6. Soil surface disturbance during no-till planting and/or fertilizer application

BACKGROUND	WHAT CAN YOU DO?	
<p>Disturbance of the soil surface can increase the potential for water and wind erosion, moisture loss, weed seed germination, and fuel consumption.</p> <p>In a no-till system, planting and fertilizer applications are the only operations that disturb the soil. To reduce soil and residue disturbance, minimize the band width of original soil surface that is physically worked up.</p>	<p><b>WHAT CAN YOU DO?</b></p> <p><b>OPTION 1 – ACTION</b></p> <p><b>Modify equipment to minimize the band width of original soil surface physically worked up by the soil openers to less than 20% of row width:</b></p> <ul style="list-style-type: none"> <li>use ripple or narrow-fluted coulters, which do a better job of cutting through the trash, and generally do not throw as much soil out of the seed slot as the wider versions</li> <li>offset the tillage coulters to allow them to be set closer together</li> <li>use a single-disk opener with a narrow angle of soil opening</li> <li>use a narrow-shank hoe opener</li> <li>use a straight-blade coulters of sufficient diameter to cut residue in front of the fertilizer applicator knife.</li> </ul>	 <p>Modify equipment to minimize the band width of original soil surface worked up by the soil openers. Measures that reduce soil and residue disturbance will protect your fields from erosion, moisture loss and weeds – and save on fuel.</p>

## 19-7. Cropping on long sloping fields

### BACKGROUND

Water erosion can be reduced by alternating less erosion-prone crops with more erosion-prone ones in strips across the slope, or on contour. Up-and-down slope systems increase erosion. Cross-slope systems allow water to move downslope safely with minimal erosion.



Strip cropping breaks up the slope length of a field, reducing the erosive action of water.

### WHAT CAN YOU DO?

#### OPTION 1 – ACTION

##### Change cropping practices to a strip cropping system:

- modify cropping by alternating strips of a row crop with a cereal crop or forage
- alternate forage crop with row crops to reduce the length of the slope of more erosion-prone row cropland
- plan strip widths to be multiples of your equipment widths.

#### OPTION 2 – ACTION

##### Change cropping practices to a contour cropping and tillage system:

- practise contour cropping on slopes (1–8%) for good erosion protection
  - tillage and planting across the natural slope creates a series of mini-dams that hold back water until it can soak into the ground
- note that point rows can be a problem
- consider using less erosion-prone crops.

#### OPTION 3 – COMPENSATING FACTOR

##### Select less erosive-prone crops:

- limit the field rotation to those crops that provide sufficient surface coverage to reduce the potential for erosion over the growing season
- move toward narrow-spaced crops.

#### OPTION 4 – COMPENSATING FACTOR

##### Change to a reduced or no-till cropping system:

- aim to leave at least 30% crop residue on the soil surface after planting.

Consult Ontario Soil Survey Reports for your area. They include a listing of soil erodibility for crops.

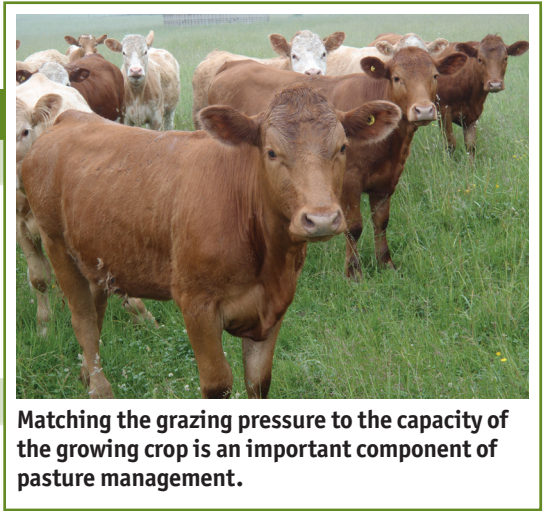
- [www.omafra.gov.on.ca/english/products/soilandwater.html#soilmaps](http://www.omafra.gov.on.ca/english/products/soilandwater.html#soilmaps)



# PASTURE MANAGEMENT

## 19–8. Pasture grazing

BACKGROUND	WHAT CAN YOU DO?
<p>Pasture is a very important crop. Forage plants that have been grazed too close are weakened and may die, leaving bare areas that are more susceptible to erosion.</p> <div data-bbox="142 532 693 662" style="border: 1px solid green; padding: 5px; margin-top: 20px;"> <p><b>For in-depth information on pasture improvement, see OMAFRA’s Pasture Production, Publication 19.</b></p> </div>	<p><b>OPTION 1 – ACTION</b></p> <p><b>Establish a well-managed or rotational grazing system, especially for highly erodible areas:</b></p> <ul style="list-style-type: none"> <li>• note that a rotational grazing allows the forage time to re-grow</li> <li>• maintain a minimum forage height of 5 cm (2 in.)</li> <li>• reseed bare spots.</li> </ul> <p><b>OPTION 2 – ACTION</b></p> <p><b>Reduce field grazing pressure:</b></p> <ul style="list-style-type: none"> <li>• clip as necessary to reduce selective grazing</li> <li>• maintain a minimum forage height of 5 cm (2 in.)</li> <li>• supply supplemental feed if necessary to prevent overgrazing</li> <li>• reduce the number of animals per acre, to a level the pasture can support.</li> </ul>



# WEED MANAGEMENT

## 19–9. Seed used

BACKGROUND	WHAT CAN YOU DO?
<p>Crop seed supplies are a potential source of weed seeds. Certified and Canada #1 seeds have standards to reduce the number of weed seeds in the crop.</p> <p>The Seeds Act and Regulations outline the specifications for inspected seed sources and pedigreed seed sample. The Weed Control Act (R.S.O. 1990, Chapter W.5) outlines the requirements to control noxious weeds. Both of these regulations play an important role in weed management.</p>	<p><b>OPTION 1 – ACTION:</b></p> <p><b>Reduce the opportunity for weed seed to come onto the farm:</b></p> <ul style="list-style-type: none"> <li>• use weed-free seeds and transplants to reduce potential concerns regarding weed control</li> <li>• use certified seed wherever possible</li> <li>• otherwise, use seed that has been tested and cleaned to Canada #1 standard – unless the use of the seed is not legal because seed use is restricted by a technology use agreement or other legal restriction.</li> </ul>

**Consult OMAFRA’s comprehensive Guide to Weed Control, Publication 75.**



## FOR MORE INFORMATION

### Ontario Ministry of Agriculture, Food and Rural Affairs

Many sources of supplementary information are available. Below are some suggestions to get you started. Most can be found online at [www.ontario.ca/omafra](http://www.ontario.ca/omafra) or ordered through ServiceOntario.

Agronomy Guide for Field Crops, Publication 811

Guide to Weed Control, Publication 75

Pasture Production, Publication 19

Ontario Soil Survey Reports (listing of soil erodibility for crops)

[www.omafra.gov.on.ca/english/products/soilandwater.html#soilmaps](http://www.omafra.gov.on.ca/english/products/soilandwater.html#soilmaps)

Transition to Organic Crop Production, Order no. 10-001

Weed Control Act – FAQs for farmers

[www.omafra.gov.on.ca/english/crops/facts/faq\\_weeds\\_act.htm](http://www.omafra.gov.on.ca/english/crops/facts/faq_weeds_act.htm)

### BEST MANAGEMENT PRACTICES

BMP publications are excellent sources to better understand on-farm environmental issues and discover a range of proven, practical options to address them. They are available at no charge to Ontario farmers. Below are a few sample titles.

To order, see ServiceOntario information.

A Phosphorus Primer

Buffer Strips

Controlling Soil Erosion on the Farm

Cropland Drainage

Establishing Tree Cover

Field Crop Production

Irrigation Management

Managing Crop Nutrients

No-Till: Making it Working

Nutrient Management Planning

Soil Management

Streamside Grazing

Water Management

### Inquiries to the Ontario Ministry of Agriculture, Food and Rural Affairs

Agricultural Information Contact Centre

Ph: 1-877-424-1300

Email: [ag.info.omafra@ontario.ca](mailto:ag.info.omafra@ontario.ca)

Web: [www.ontario.ca/omafra](http://www.ontario.ca/omafra)

### Order through ServiceOntario

**Online** at ServiceOntario Publications – [www.ontario.ca/publications](http://www.ontario.ca/publications)

**By phone** through the ServiceOntario Contact Centre

Monday–Friday, 8:30 am–5:00 pm

416-326-5300

416-325-3408 TTY

1-800-668-9938 Toll-free across Ontario

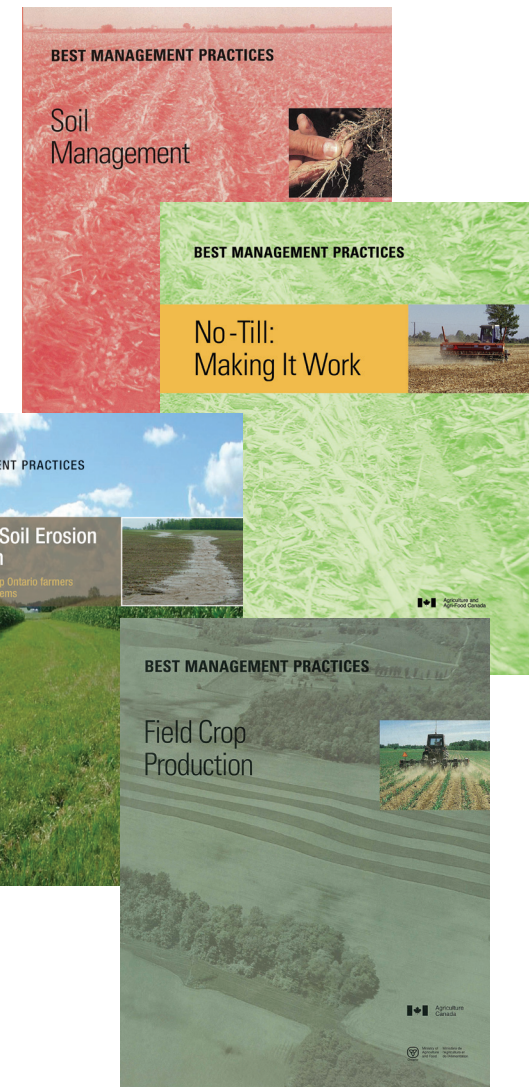
1-800-268-7095 TTY Toll-free across Ontario

## ACKNOWLEDGEMENTS

At the request of the Ontario Farm Environmental Coalition, consisting of Farm & Food Care Ontario, the Ontario Federation of Agriculture, and the Christian Farmers' Federation of Ontario, the following people and organizations contributed to the revision of this infosheet:

**Infosheet#19 Contributing Authors:** Gilles Quesnel (Chair), Brian Hall – Ontario Ministry of Agriculture, Food and Rural Affairs; Henry Denotter – Farm & Food Care Ontario; Neil Moore – Ontario Soil and Crop Improvement Association

**Infosheet Technical Editing Committee:** H.J. Smith (Chair), Kevin McKague, Ted Taylor, Daniel Ward – Ontario Ministry of Agriculture, Food and Rural Affairs; Jim Myslik – Consultant



**Best Management Practices publications present in-depth explanations, tips and advice for Ontario farmers.**