ECONOMICS & SOIL HEALTH

ADDING WHEAT TO A CORN-SOYBEAN ROTATION

THINK YOU'LL LOSE MONEY GROWING WHEAT?

Think again.

Based on crop acreage, roughly 2/3 of Ontario farmers are using corn-soybean rotations. If farmers can win with wheat, why are so many leaving money on the table?

It's likely because there can be an initial financial cost when adding wheat into a corn-soybean rotation. A report by the Greenbelt Foundation figures that once a grower gets through an initial transition phase, the rotation as a whole will be more profitable over time. In other words, give it time and wheat in the rotation pays!

> *"There are years here in Niagara where wheat followed by cover crops has been the bright light - it makes sense agronomically and breaks up our workload in a more practical way. It's hard to put a dollar value on that, but I wouldn't go back to a rotation without wheat."* | Dyck

INVESTING IN SOIL HEALTH YIELDS CROP RESILIENCE

In a dry year, research shows yields can be lower in a corn-soy rotation by as much as 17% in corn and 30% in soybeans compared to a rotation that includes wheat (Greenbelt 2022, Gaudin et al. 2015).

Why might this be?

Healthier soils can store and retain more water for longer periods, meaning crops are more resilient during periods of drought. In a corn-soy rotation, soil health suffers: soil organic matter levels become depleted and this leads to poorer soil structure, less biological activity, less available nitrogen and less drought resistance, compared to a 3 year corn-soy-wheat rotation.

Larry Dyck, farmer, Campden, Ontario has made wheat an essential part of his rotation for over 10 years. Photo: Ontario Soil Network

Benefits of adding wheat to corn-soy rotations:

1. You can spread out the timing of field operations over the growing season, with less happening all at once.

2. You open a large window after wheat harvest for growing a cover crop which helps reduce erosion, increase moisture retention and infiltration, and reduce pest and weed pressure.

3. It allows you to reduce nitrogen fertilizer application, meaning lower production costs.

4. You help the environment through climate change mitigation and water quality improvement.

UNIVERSITY of GUELPH

SOILS AT GUELPH

GREEN BELT

Possibility grows here.

SOILS AT GUELPH
Alexander Hall Building
50 Stone Road East
Guelph, ON, N1G 2W1
soils@uoguelph.ca

PLANNING FOR NET PROFITS

What does it look like to add wheat into a corn-soy rotation? It takes planning to go from planting 1/6th of the acreage in wheat in Year 1 to even acres of corn, soy, and wheat in Year 4. This includes planning for the short-term financial hit you might expect as well as the change in workload-management. The Greenbelt Foundation Report found that after only 4 years, net returns with wheat in rotation had grown to +$55/ac compared to the corn-soy rotation, with the returns turning positive as soon as the second year (Figure 1 and Table 1).

Figure 1: Visualizing the addition of wheat (red) into a corn (black) and soybean (grey) rotation, and mapping out the gains in net returns over 4 years.

Year 1: **-$10** Year 2: **+$25** Year 3: **+$40** Year 4: **+$55**

WHAT'S THE BOTTOM LINE?

Table 1: Showing how adding wheat into a corn-soy rotation can achieve maximum sustained benefits (aka profitability) after 4 years.

		Year 1			Year 4		
		Corn	Soy	Wheat	Corn	Soy	Wheat
Change in Yield (%)		0%	0%	0%	+7%	+12%	0%
Cost (per ac)	High	-$805	-$450	-$435	-$825	-$460	-$450
	Low	-$650	-$400	-$400	-$575	-$420	-$415
Revenue (per ac)	High	$955	$700	$620	$1020	$810	$620
	Low	$590	$550	$385	$630	$610	$385
Crop Net Return (per ac)	High	$150	$300	$185	$340	$350	$185
	Low	-$65	$100	-$15	$110	$190	-$15
Portion in Crop		2/6	3/6	1/6	2/6	2/6	2/6
Mean Net Return (per ac)		$130			$195		
Change from C-S (per ac)		-$10			$55		

The ranges in yield were determined by figuring two standard deviations from the mean crop yield. For example, the corn yield ranges from 119-192 bu/ac. Results for years 2 and 3 are visually represented in Figure 1, and can also be found on pages 39 and 40 in Towards a Business Case for Soil Health.

Additional resources:

Towards a Business Case for Soil Health: A Synthesis of Current Knowledge on the Economics of Soil Health Practices in Ontario. 2022. The Greenbelt Foundation. *www.greenbelt.ca/business_case_soil_health*

Gaudin et al. 2015. Increasing crop diversity mitigates weather variations and improves yield stability. PLoS ONE 10(2), e113261

For all OMAFRA's Best Management Practices Resources, including Rotation of Agronomic Crops, Field Crop Management, and Soil Health in Ontario, go to: *bmpbooks.com*

Possible funding programs to support equipment modifications, purchase, new practices, etc., consult:

- Your local Conversation Authority
- OMAFRA Programs
- Ontario Soil and Crop Improvement Association, or your local Soil and Crop Group

Photo: Dave Hooker, University of Guelph, Ridgetown Campus

Pro Tips:

Start small: You don't need a third of your acres in wheat in Year 1! Get comfortable with the new system by planting wheat in one of your smaller fields.

Plant early: Select a shorter season variety to ensure timely wheat planting. Check for resources listing the best planting time for optimal yield.

Choose the right variety: Talk to your local agronomist or seed dealer about the latest top-performing wheat varieties for your location, soil type, tillage practices, etc.

Give it your best: Ensure the wheat crop receives adequate and timely fertility, and protection from disease and pests. In furrow application of phosphorus is a proven key to success.

Sell the straw or trade for manure: Get a better return by selling your straw. Worried about soil organic matter? Seed a cover crop in to help make up for the removal of the straw.

This factsheet is a summary of key findings from the report, Towards a Business Case for Soil Health. Soil health practices considered in the report and this Factsheet Series are: reduced tillage, cover crops, crop rotation, manure amendments, rotational grazing and various 4R nutrient practices. The report estimated that Ontario farm net returns would increase by approximately $14.6 million dollars per year if an additional 10% of the agricultural land in Ontario were to be managed to support soil health.

The numbers come from peer-reviewed, Ontario-based research and the analysis is based on financially-representative, farm-level budgeting techniques for Southern Ontario. Estimates are conservative and do not represent profits possible with experienced management.

UNIVERSITY of GUELPH
SOILS AT GUELPH
GREEN BELT
Possibility grows here.

SOILS AT GUELPH
Alexander Hall Building
50 Stone Road East
Guelph, ON, N1G 2W1
soils@uoguelph.ca