Cover Crop Research and the Bottom Line

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Winter wheat provides ”niche” for cover crop opportunity

- In a corn/soybean/winter wheat rotation winter wheat rotation often perceived as contributing the least to profitability…but perhaps it is equal or more
- Longterm trials at Elora Research Station and Ridgetown Campus demonstrate that addition of winter wheat provides
  - Increase of yield and yield stability of corn and soybean
  - Reduction of corn N requirement
  - Net return from wheat straw
  - An opportunity for cover crop and associated benefits

What cover crop to grow in “niche” provided by winter wheat?

- Substantial data set demonstrating that N benefit of cover crop to subsequent corn crop observed for red clover and not for other cover crops
- Substantial data demonstrating rotation benefit of red clover to subsequent crops… less data for other crops

Table 2. Analysis of maximum economic rates of nitrogen, yield gains and profits associated with red clover inter-seeded to winter wheat under different tillage systems and maize and nitrogen prices.

Tillage system	Maize price [1]	N cost	Cover crop	MERN [2]	MEY [3]	Gross return [4]	Profit
	$ Mg^{-1}	$ Kg^{-1}		Kg N ha^{-1}	Mg ha^{-1}	$ ha^{-1}	
Conventional tillage	150	1	No red clover	143	9454	1293	89
			Red clover	79	9886	1382	
			Difference,	**	**	**	
			Rotational effect (%)		4.57%		
	100	1	No red clover	129	9338	822	66
			Red clover	74	9841	888	
			Difference	**	**	**	
			Rotational effect (%)		5.38%		
	150	1.5	No red clover	129	9338	1234	118
			Red clover	74	9841	1352	
			Difference	**	**	**	
			Rotational effect (%)		5.38%		
	100	1.5	No red clover	107	9068	772	90
			Red clover	63	9713	863	
			Difference	**	**	**	
			Rotational effect (%)		7.11%		

Analysis was conducted using paired comparison of red clover/no red clover for different tillage groups and N rates on a subset of 28 site-year from the Ontario Nitrogen Database project [79–124]. [1] Maize price after drying, handling and marketing; [2] Maximum Economic Rate of Nitrogen (MERN) calculated using quadratic-plateau functions; [3] Maximum Economic Yield (MEY) at MERN; [4] Gross return based on nitrogen cost and maize yield at MERN with clover establishment cost estimated at $40 ha^{-1}; ns: non significant; ** significant at $p < 0.01$.

Gaudin et al, 2013. Agron.

Estimated gross margin of C/S rotation

	Corn	Soy
Yield (bu/ac)	175	50
$/bu	5.25	12.00
Gross Revenue ($/ac)	918.75	600.00
Operating Expenses ($/ac)	477.00	231.00
Gross Margin ($/ac)	441.75	369.00

Operating expenses taken from 2012 OMAFRA Crop Budgets - (http://www.omafra.gov.on.ca/english/busdev/facts/pub60.htm)
Nutrient price taken from October 2012 - Ridgetown Input Price Survey - http://www.ridgetownc.uoguelph.ca/research/research_reports_topic.cfm?ref=FARM_INPUT_PRICES

Estimated gross margin of C/S/W rotation – No red clover

	Corn	Soy		Wheat
Yield (bu/ac)	175	50		80
$/bu	5.25	12.00		7.00
Gross Revenue ($/ac)	918.75	600.00		560.00
Operating Expenses ($/ac)	477.00	231.00		274.00
Gross Margin ($/ac)	441.75	369.00		286.00
Adj Gross Margin ($/ac)	487.69	417.00		368.50
GM Diff ($/ac)	45.94	48.00		82.50
True Gross Margin ($/ac)	**441.75**	**369.00**		**462.44**
Adjustments				
Rotation Adjustment (%)	5	8		0
Straw Revenue ($/ac)				82.50
Red Clover (adj for stand success) (%)	0	0		0
Red clover N Adj (adj for stand success) ($/ac)	0.00			
Double crop revenue - oat/pea				Bonus

Straw Value		
Straw yield	2500	lbs
Straw value in winrow	0.04	$/lb
Nutrient removal	0.007	$/lb
Net straw value	0.033	$/lb

Red cover N credit		
Ncorn N rate reduction	75	lbs/ac
Nitrogen cost	0.5	$/lb
Red clover success rate	0.00	

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Estimated gross margin of C/S/W rotation – Red clover

	Corn	Soy		Wheat
Yield (bu/ac)	175	50		80
$/bu	5.25	12.00		7.00
Gross Revenue ($/ac)	918.75	600.00		560.00
Operating Expenses ($/ac)	477.00	231.00		274.00
Gross Margin ($/ac)	441.75	369.00		286.00
Adj Gross Margin ($/ac)	571.13	447.00		368.50
GM Diff ($/ac)	129.38	78.00		82.50
True Gross Margin ($/ac)	**441.75**	**369.00**		**575.88**
Adjustments				
Rotation Adjustment (%)	5	8		0
Straw Revenue ($/ac)				82.50
Red Clover (adj for stand success) (%)	5	5		0
Red clover N Adj (adj for stand success) ($/ac)	37.50			

Straw Value		
Straw yield	2500	lbs
Straw value in winrow	0.04	$/lb
Nutrient removal	0.007	$/lb
Net straw value	0.033	$/lb

Red cover N credit		
Ncorn N rate reduction	75	lbs/ac
Nitrogen cost	0.5	$/lb
Red clover success rate	1.00	

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