

Economics of Hairy Vetch and Rye Cover Crops

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It is difficult to characterize the full economic benefit of cover crop systems. The full value of nitrogen from legumes, for example, is not available for some years. Similarly the dollar value of nutrients lost in eroded soil is also difficult to calculate.

Seed costs for alternative legume cover crops have been a deterrent to their adoption. Preliminary data from research in Massachusetts have shown that seeding rates of hairy vetch may be reduced from the currently recommended 40 lbs/acre to 25-30 lbs/acre without a reduction in the biomass of hairy vetch accumulated in the spring. To help farmers adopt new systems, we have developed partial enterprise budgets. These show hairy vetch/rye cover crops to be more profitable than rye alone when reduced seeding rates are used.

The partial enterprise budgets have been prepared using a LOTUS template developed for ease of input data manipulation. The user has flexibility to change inputs and expected returns from nitrogen contribution. Sensitivity analysis examining the economics of varying seeding rate and nitrogen fertilizer price has been included in the LOTUS template and this is shown below (table 2).

Four sample budgets used in the sensitivity analysis are shown Tables 3 to 6. The first two budgets vary only in rate of seed used to establish the hairy vetch cover crop. The second two vary in estimate of nitrogen contribution for the next crop keeping seeding rate constant. This simulates early and late cover crop incorporation into the soil.

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Table 2. Sensitivity analysis comparing hairy vetch seeding rate, nitrogen contribution and nitrogen fertilizer price.

The economic benefit of the hairy vetch/rye cover crop over the conventional rye cover crop, is in part a function of the price of nitrogen fertilizer (N), the residual N, and the hairy vetch seeding rate. Given the assumptions from the previous work-sheet, this table calculates the benefit at three different seeding rates for a specified range of N prices and a specified residual N.

ASSUMPTIONS (from the worksheets as in tables 3 to 6):

Cover Crop			
Rye:	Rye seed (\$/lb)	\$0.11	
	Rye rate (Lbs/ac)	112	
Hairy Vetch/Rye:			
	Vetch seed	\$0.55	
	Rye rate	56	

NITROGEN ASSUMPTIONS:

Price of N fertilizer = \$0.30	Residual N Lbs./acre @	Vetch seed rate:
	40	20
Price range (% +/-) 30%	55	30
	60	40

BENEFIT/(COST) OF HAIRY VETCH/RYE MIXTURE OVER RYE ALONE
at different prices of N and different seeding rates of vetch.

VETCH SEED RATE (Lbs/acre)		20	30	40
	\$0.21	\$3.39	\$0.77	(\$3.96)
Price of N (\$/lb)	\$0.30	\$6.99	\$5.72	\$1.44
	\$0.39	\$10.59	\$10.67	\$6.84

Table 3. Economics of hairy vetch/rye vs. Rye cover crops

	Unit:	Amount:	Price: (\$/unit)	Cover Crop	
				Rye	Hairy Vetch/Rye
Cover Crop Inputs:					
Rye seed (straight rye)	Lbs.	112	\$0.11	12.32	
Rye seed in mixture	Lbs.	56	\$0.11		5.88
Hairy vetch seed	Lbs.	40	\$0.55		22.00
Vetch inoculant	Bag	0.12	\$1.75		0.21
Herbicide for rye	Gals.	0	\$35.65		
Herbicide for rye/vetch	Gals.	0	\$35.65		
Mowing straight rye	Acres	0	\$7.00		
Plowing & disking rye	Acres	1	\$25.00	25.00	
Mowing mixture	Acres	0	\$7.00		
Plowing & disking mixture	Acres	1	\$25.00		25.00
Interest (6 months)	%	10.0%		<u>1.87</u>	<u>2.65</u>
Total Cost (per acre)				\$39.19	\$55.74
Cover Crop Outputs:					
Nitrogen for next crop	Lbs.	50	\$0.30	<u>0.00</u>	<u>15.00</u>
Net Cost of Cover Crop				\$39.19	\$40.74
Benefit / (Extra Cost) of Hairy Vetch/Rye Cover Crop:				<u>(\$1.56) per acre</u>	

Table 4. Economics of hairy vetch/rye vs. Rye cover crops

	Unit:	Amount:	Price: (\$/unit)	Cover Crop	
				Rye	Hairy Vetch/Rye
Cover Crop Inputs:					
Rye seed (straight rye)	Lbs.	112	\$0.11	12.32	
Rye seed in mixture	Lbs.	56	\$0.11		5.88
Hairy vetch seed	Lbs.	25	\$0.55		13.75
Vetch inoculant	Bag	0.12	\$1.75		0.21
Herbicide for rye	Gals.	0	\$35.65		
Herbicide for rye/vetch	Gals.	0	\$35.65		
Mowing straight rye	Acres	0	\$7.00		
Plowing & disking rye	Acres	1	\$25.00	25.00	
Mowing mixture	Acres	0	\$7.00		
Plowing & disking mixture	Acres	1	\$25.00		25.00
Interest (6 months)	%	10.0%		<u>1.87</u>	<u>2.24</u>
Total Cost (per acre)				\$39.19	\$47.08
Cover Crop Outputs:					
Nitrogen for next crop	Lbs.	50	\$0.30	<u>0.00</u>	<u>15.00</u>
Net Cost of Cover Crop				\$39.19	\$32.08
Benefit / (Extra Cost) of Hairy Vetch/Rye Cover Crop:				<u>\$7.10 per acre</u>	

Table 5. Economics of hairy vetch/rye vs. Rye cover crops

	Unit:	Amount:	Price: (\$/unit)	Cover Crop	
				Rye	Hairy Vetch/Rye
Cover Crop Inputs:					
Rye seed (straight rye)	Lbs.	112	\$0.11	12.32	
Rye seed in mixture	Lbs.	56	\$0.11		5.88
Hairy vetch seed	Lbs.	40	\$0.55		22.00
Vetch inoculant	Bag	0.12	\$1.75		0.21
Herbicide for rye	Gals.	0	\$35.65		
Herbicide for rye/vetch	Gals.	0	\$35.65		
Mowing straight rye	Acres	0	\$7.00		
Plowing & disking rye	Acres	1	\$25.00	25.00	
Mowing mixture	Acres	0	\$7.00		
Plowing & disking mixture	Acres	1	\$25.00		25.00
Interest (6 months)	%	10.0%		1.87	2.65
Total Cost (per acre)				\$39.19	\$55.74
Cover Crop Outputs:					
Nitrogen for next crop	Lbs.	40	\$0.30	0.00	12.00
Net Cost of Cover Crop				\$39.19	\$43.74
Benefit / (Extra Cost) of Hairy Vetch/Rye Cover Crop:				<u>(\$4.56) per acre</u>	

Table 6. Economics of hairy vetch/rye vs. Rye cover crops

	Unit:	Amount:	Price: (\$/unit)	Cover Crop	
				Rye	Hairy Vetch/Rye
Cover Crop Inputs:					
Rye seed (straight rye)	Lbs.	112	\$0.11	12.32	
Rye seed in mixture	Lbs.	56	\$0.11		5.88
Hairy vetch seed	Lbs.	40	\$0.55		22.00
Vetch inoculant	Bag	0.12	\$1.75		0.21
Herbicide for rye	Gals.	0	\$35.65		
Herbicide for rye/vetch	Gals.	0	\$35.65		
Mowing straight rye	Acres	0	\$7.00		
Plowing & disking rye	Acres	1	\$25.00	25.00	
Mowing mixture	Acres	0	\$7.00		
Plowing & disking mixture	Acres	1	\$25.00		25.00
Interest (6 months)	%	10.0%		1.87	2.65
Total Cost (per acre)				\$39.19	\$55.74
Cover Crop Outputs:					
Nitrogen for next crop	Lbs.	70	\$0.30	0.00	21.00
Net Cost of Cover Crop				\$39.19	\$34.74
Benefit / (Extra Cost) of Hairy Vetch/Rye Cover Crop:				<u>\$4.44 per acre</u>	