Nitrogen Rates on Established Switchgrass

Purpose:

To determine the optimum nitrogen rate and to evaluate the impact on the soil Phosphorus and Potassium levels in production on an established switchgrass stand.

Methods:

Five nitrogen rates were applied (Figure 1) and replicated in early May as the switchgrass began to green up. Yields were to be collected for each plot in the fall about 1 month after a killing frost and again in the spring prior to the initiation of new growth. Nitrogen was applied at the same rates and same strips in both 2009 and 2010.

Figure 1: Plot layout of the 5 Nitrogen Rates and 2 replications.

Figure 2: Nitrogen Application at Kurt Vanclief's

Figure 3: Kurt Vanclief's – 7 July 2009. Note the lighter green strip of 0 pounds per acre rate.

Figure 4: Switchgrass in September 2009 at Ron Toonders, Winchester Springs, ON

Figure 5: Collecting Fall Cut Yields in October 2009 at Ron Toonders

Results:

Table 1: Yield from 21 April 2010 Harvest at Kurt Vanclief's , Ameliasburg ON

Nitrogen Rate (lbs/ac)	Yield per Strip - 21 Apr. 2010 (mt/ac)	Average Yield per Strip - 21 Apr. 2010 (mt/ac)	Net Return to Nitrogen	Soil Nitrogen (kg/ha) 15 Apr 2010	Avg. Soil Nitrogen (kg/ha) 15 Apr 2010
0	3.71			42.0	
0	4.13	3.92		43.6	42.8
50	4.36			44.4	
50	4.05	4.21	$0.68	46.8	45.6
100	4.26			21.2	
100	4.07	4.17	-$27.99	54.4	37.8
150	3.67			58.8	
150	4.03	3.85	-$81.10	66.4	62.6
200	4.10			46.0	
200	4.07	4.09	-$85.19	65.2	55.6

Net Return to Nitrogen - assumes $90/mt for Switchgrass and $0.50 per pound actual Nitrogen

Figure 6: Yield Response to Nitrogen on Established Switchgrass 21 April 2010 Harvest at Kurt Vanclief's , Ameliasburg ON

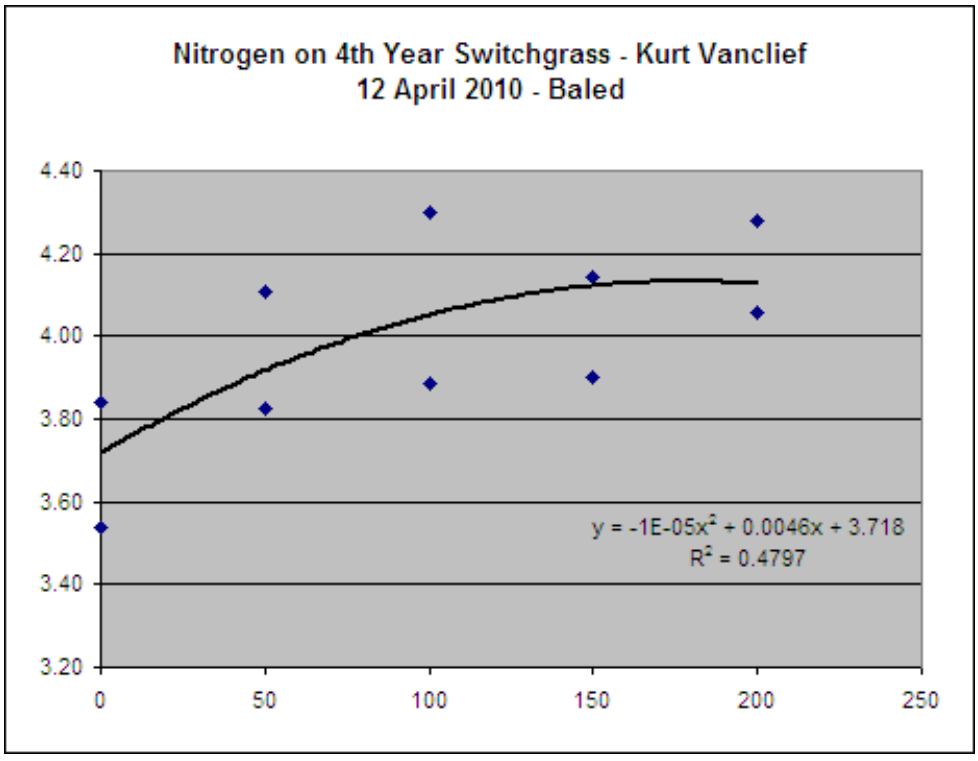

Table 2: % Yield Loss Over Winter at Ron Toonders', Winchester Springs, ON

Nitrogen Rate (lbs/ac)	Fall (10Nov. 2009) Yield (t/ac)	Spring (26 March 2010) Yield (t/ac)	% Loss Over Winter
0	4.07	2.69	10.3
50	4.73	3.29	43.8
100	4.43	3.24	36.7
150	4.18	3.66	14.2
200	4.06	3.34	21.6
Avg.	4.29	3.44	25.3

Table 3: Yield and Net Returns from Nitrogen on Established Switchgrass harvested 8 December 2010 at Ron Toonders farm, Winchester Springs, ON

Nitrogen Rate lbs/ac	Average Yield (t/ac)	Net Return to Nitrogen per acre
0	2.22	
50	2.69	$17
100	2.69	-$7
150	2.92	-$11
200	3.29	-$4

Note: Plots were cut at approximately 6-8 inches above soil surface as to limit the amount of snow collected with the sample, thus reducing actual yield. Net Return of Nitrogen assumes Switchgrass at $90.00/t less N Cost at $0.50 per pound actual nitrogen.

Summary:

Due to the wet fall weather and early snow, fall yields were taken at only one site in 2009 & 2010 (Winchester Springs). At the Winchester Springs site (Table 2), there was a dry matter yield loss of 25.3% between the fall and spring cutting. Although there are small yield differences (Tables 1, 2 and 3) between the different nitrogen rates, the yields are statistically not different. Based on an assumed value of $90.00 per tonne for the switchgrass, it would appear that the most economical nitrogen rate is between 50 to 100 pounds of nitrogen per acre based on one year. Further yield years are needed to determine the optimum nitrogen rate. Analysis of the Soil Nitrogen (Table 1) taken from the nitrogen strips at Kurt Vanclief's site indicate higher residue nitrogen in the 150 & 200 pound per acre nitrogen strips. This could be due to additional nitrogen was available than the switchgrass plant required.

Next Steps:

2010 was the second of a three year project. This project will be repeated and the results will be summarized in 2011.

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Location of Project Final Report:

This is an interim report.