Muskoka Lime Study

2006 Report

Purpose:

The study addresses 4 questions:

1. Are recommended rates of Lime optimal for Muskoka soils?
2. Can higher than recommended rates maintain adequate pH levels longer?
3. Can lower than recommended rates maintain adequate pH?
4. Is macro - micro nutrient availability affected by lime rate?

Methods

- Ontario Soil and Crop Improvement Association Major Grant awarded April 2005. Grant extended to 2006.
- Study to continue to 2008
- Six participating farmers; grant covers half of their additional costs
- Plot size varies from 0.5 to 2.5 acres at different sites (yields reported on per hectare basis). Visually observed differences recorded when yields cannot be obtained
- Single source of lime - calcitic - 70% agr. index used by all farmers
- Lime rates: recommended, 1.5, and 2 times. Most farmers set out two replications. One farmer tested lower than recommended rates.
- Base pH tested prior to lime application,
- Subsequent soil samples taken each fall after harvest - full soil test at end of trial is planned
- Support from Agri- Food Labs – advance payment for 3 years of tests arranged
- Five Farmers have reported to date

Results

Site 1. Allensville (2 years of trial completed)

Background

- Sandy soil - limed 12 years ago - history of grass-trefoil hay/pasture
- Base pH 5.6 (sampled in spring 2005)
- Recommended lime 6 t/ha
- Lime applied May 2005 using belt broadcaster
- Rate 20% too low because lime delivered wet
- Barley/oats underseeded to grass legume
- Results measured for green cut cereal 2005
- Pastured 2006 , no yield data but good pasture observed

Table 1a. Allensville. Soil Test pH Values (unreplicated)

Date of Sampling	No Lime (Base pH)	Recommended Lime (6 /ha)	Double Rec. rate
Spring 2005	5.6		
Fall 2005		6.5	6.3
Fall 2006		6.3	6.1

Table 1b. Green Cut Cereal. 2005 Large Round Bales/ha

Recommended Lime (6t/ha)	Double rec. rate
5	6

Discussion: Site 1

- The lower pH in the in the plot receiving more lime appears due to soil variation
- Consistent drop in pH by 0.2 between first and second years of trial (2005 to 2006). This may indicate that double recommended rate of lime may not be conferring any advantage in sustaining higher pH levels at this site.
- No yield differences observed between lime rates in either year
- Farmer will continue as hay/pasture for 2 more years and test pH yearly

Site 2. Beatrice

Background

- History:15 yrs hay/pasture
- Clay - Sandy soils
- No knowledge of lime being applied to this field.
- Base pH 5.8 - sampled fall 2005
- Recommended lime rate 7 t/ha
- Lime applied fall 2005 with manure spreader
- 2006 planting. Oats underseeded clover and grasses. Fair-poor crop

Table 2a Soil test pH Values (2 replications)

Date of Sampling	No Lime . Base pH	Recommended Lime (7t/ha)	1.5 times rec. rate	Double rec. rate
Fall 2005	5,8			
Fall 2006		6.3	6.5	6.5

Table 2b Yield of Oats. kg/ha (bu/ac). Fall 2006

Recommended Lime (7t/ha)	1.5 times rec. rate	Double rec. rate
1250 (27.5)	1250 (27.5)	1295 (28.5)

Discussion: Site 2

- 1.5 times recommended rate has improved pH level over recommended rate
- No yield differences in 2006
- Farmer plans to continue trial as ha/pasture for 2 more years and test pH yearly.

Site 3. Huntsville site

Background

- Field had received lime every 5 years – sandy loam soil
- Base pH 6.4 – tested fall 2005
- Recommended rate 3t/ha
- Applied with lime spreader fall 2005
- .5 acres/plot
- Planted April 2006 Oats underseeded to Orchard grass.
- Good crop and catch of grass
- Oats green cut Aug 2006 and bailed

Table 3a.Huntsville site .Soil pH test values (2 replications)

Date of Sampling	No Lime Base pH	Rec. Lime rate (3 t/ha)	1.5 times Rec .lime	2 times rec lime
Fall 2005	6.4			
Fall 2006		6.75	6.8	6.65

Table 3b. 2006 Yield of Oats (green cut). Square bales/ha

Recommended lime rate	1.5 times rec lime	2 times rec, rate
115	117	123

Discussion Site 3:

- Recommended lime increased pH to fully adequate level - no further increase in pH with higher rates.
- Upward trend in fodder yield with higher lime, but differences not likely significant.
- Farmer will continue as hay/pasture for 2 more years and test pH yearly

Milford Bay Site

Background

- Sandy loam field, limed 10 years ago. History of Corn/cover crop/strawberries
- Base pH 6.3 Sampled Fall 2005
- Recommended lime 4 t/ha

- Lime applied May 2006 using Manure spreader
- Part of trial area planted to sweet corn the rest planted to oats then rye cover crop

Table 4a. Soil test pH values - 2 replications

Date of Sample	No Lime	Rec Lime 4t/ha	1.5 times	2 times
Fall 2005	6.3 (entire field)			
Fall 2006	5.9 (single plot)	6.5	6.6	6.5

Table 4b. 2006 Sweet corn dozens/ha – unreplicated

1.5 times recommended lime	2 times recommended lime
1300	883

Discussion. Site 4

- No visual differences between plots. Fair corn growth, good cover crop growth
- Recommended lime raised pH to adequate level - no further increase with higher rates
- Variation in sweet corn yield likely due to soil variation
- Variation in pH in unlimed treatments in 2005 and 2006 likely due to soil variation also.
- Farmer to continue trial with strawberries for 2 more years and test pH yearly

Site 5. Raymond Site

Background

- Clay loam field, no record of previous lime application
- 2005 base soil test 5.3 pH.
- 15 t/ha lime was recommended
- Farmer wished to test lower than recommended rates, as he felt that higher than recommended rates would be too high.
- Lime applied spring 2006, with manure, then incorporated
- Oats, under-seeded with hay mixture, planted in late June

Table 5a Soil test pH values - unreplicated

Date of Sample	Percent of Recommended Lime applied (t/ha)				
	0% No lime	15% (2.24 t/ha)	45% (6.7 t/ha)	75% (11.2 t/ha)	105% (15.7 t/ha)
Fall 2005	5.3 (entire field)				
Fall 2006	5.9	6.5	6.8	7.1	6.8

Table 5b.Yield of Oats 2006. kg/ha

Percent of Recommended Lime applied				
0	**15%**	**45%**	**75%**	**105%**
279	297	270	196	290

Discussion. Site 5

- Lower than recommended rates (down to 15%) increased pH to adequate level at this site
- Progressive increase of pH with lime up to 75% of recommended level
- Oat yield only fair,: no apparent differences in yield
- The observed variation in pH at the 0 rate from 2005 to 2006 may be due to soil variation
- Farmer to continue as pasture for another 2 years and test pH yearly

Summary

- Recommended lime rates raise pH to satisfactory levels in first year at all 5 sites at these Muskoka sites
- No first year benefit from increasing rates above recommended level.
- Lower than recommended rates at one site increased pH to satisfactory levels
- No yield differences between rates during first year
- Importance to continue study for 2 - 3 more years

Next Steps:

- Participants will continue with the trial for another two years, including growth and yield comparisons, and soil tests
- Attempts will be made to secure funding in 2008 for a tissue analysis comparison for macro and micro nutrient levels from the different lime rates
- Agri-food laboratories continue to undertake soil sample reports
- Full report to be prepared in 2008 - 9

Acknowledgements:

Agri-Food Laboratories in Guelph kindly agreed to provide soil reports at half price. They have also received advance payment to undertake necessary soil analysis for another 2 years.

Project Contacts:

K. Riley MSCIA Secretary k.riley@sympatico.ca
Keith Reid OMAFRA Reid, keith.reid@ontario.ca

Location of Project Final Report

K. Riley MSCIA Secretary k.riley@sympatico.ca