

Rao, R., N. Herendeen, Q.M. Ketterings, and H. Krol (2007). Genesee Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-31. 33 pages.

Soil Sample Survey

Genesee County

Samples analyzed by CNAL (2002-2006)



Summary compiled by

Renuka Rao, Nate Herendeen, Quirine M. Ketterings, and Hettie Krol



Cornell Nutrient Analysis Laboratory
<http://www.css.cornell.edu/soiltest/newindex.asp>
&
Nutrient Management Spear Program
<http://nmisp.css.cornell.edu/>



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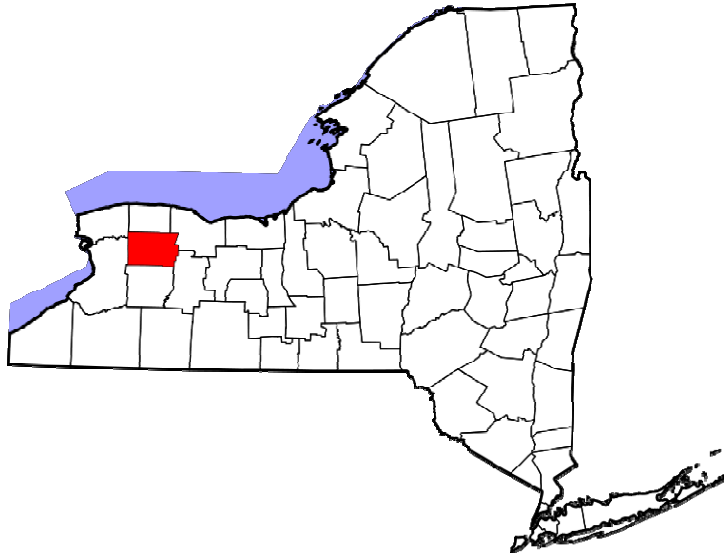
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1. County Introduction

Genesee County is located in northwestern New York, midway between Buffalo and Rochester. It contains over 320,000 acres of land area. Roughly 70% of the area is used



for farm production. It is traditionally the county with the highest percentage of active farmland in New York.

The northern two-thirds of the county lies in the Ontario Lowlands with transition to the Appalachian Uplands in the south. The Ontario Lowlands begin at Lake Ontario, about 25 miles to the north where the

elevation is 245 feet above sea level. In Genesee County, the Lowlands are about 600 feet elevation in the north extending to 1000 feet south of Batavia. At the Appalachian interface, the elevation transitions quickly from 1000 to 1500 feet elevation.

The soils in the north are dominated by high carbonate materials developed from the Niagara dolomite limestone to the north and the Onondaga limestone in the central part of the county. In the south, soils formed from the low carbonate Devonian shale deposits. Large areas of wetlands occur in the northern third of the county, the result of massive glacial outwash during the period of glacial recession from western New York. About 6000 acres of the wetlands were drained nearly 100 years ago. This area comprises the Elba muckland, a rich deposit of organic soils. These soils are used primarily for onion production.

Additional areas of wetlands are protected in the federal Iroquois Wildlife Refuge, the state Tonawanda Wildlife Area and the Bergen Wetlands Wildlife Sanctuary. These areas are seasonal feeding and resting sites to many migratory waterfowl, especially Canada geese.

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The agriculture of Genesee County is diverse. Dairy farming is the largest single generator of farm income. Livestock farmers produce and market beef, hogs and sheep from Genesee County. Thousands of acres are devoted to field and forage crops to support the dairy and livestock industry. Processing vegetable crops comprise the next largest segment of the agricultural economy. Crops grown for processing include peas, snap beans, sweet corn, red beets, kidney beans, cabbage, and carrots.

Fresh vegetables produced include all of the above listed crops plus potatoes, cucumbers, squash, pumpkins, rutabagas and onions. Bedding plants and ornamentals are an increasing commodity on farms with greenhouses and nursery stock. Small fruits such as strawberries and blueberries are grown for fresh market. All the above industries rely heavily on soil testing to maintain optimum production while also protecting the agricultural environment from nutrient runoff.

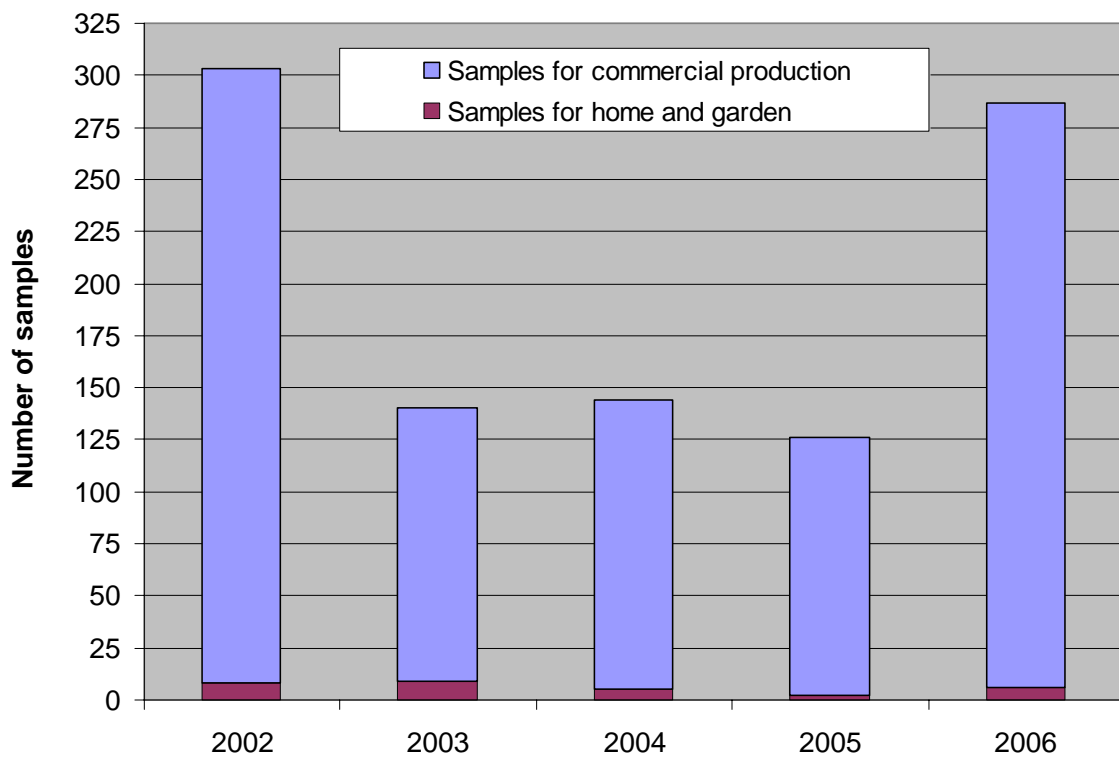
Genesee County is headquarters to many of the largest farms in New York. It also has a large number of small farms with niche markets and grass based dairy farms.

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2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Genesee County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 1000. Of these, 970 samples (97%) were submitted by commercial growers while 30 samples (3%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	8	2002	295	303
2003	9	2003	131	140
2004	5	2004	139	144
2005	2	2005	124	126
<u>2006</u>	<u>6</u>	<u>2006</u>	<u>281</u>	<u>287</u>
Total	30	Total	970	1000

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (37%) or for home garden vegetable production (13%) and ornamentals (13%). Commercial growers submitted samples primarily to grow corn silage or grain (19%), beans (16%), alfalfa or alfalfa/grass mixes (15%), sweet corn (13%) and peas (13%).

Soils tested for home and garden in Genesee County were classified as belonging to soil management group 2 (20%), group 3 (37%), group 4 (30%), or group 25 (13%). A description of the different management groups is given below.

Soil Management Groups for New York

1	Fine-textured soils developed from clayey lake sediments and medium- to fine-textured soils developed from lake sediments.
2	Medium- to fine-textured soils developed from calcareous glacial till and medium-textured to moderately fine-textured soils developed from slightly calcareous glacial till mixed with shale and medium-textured soils developed in recent alluvium.
3	Moderately coarse textured soil developed from glacial outwash and recent alluvium and medium-textured acid soil developed on glacial till.
4	Coarse- to medium-textured soils formed from glacial till or glacial outwash.
5	Coarse- to very coarse-textured soils formed from gravelly or sandy glacial outwash or glacial lake beach ridges or deltas.
6	Organic or muck soils with more than 80% organic matter.

Of the samples submitted by commercial growers, the majority (81%) belonged to soil management group 2. Groups 1, 3, 4, and 6 were represented with 1, 10, 5, and 1% of all samples. Less than 1% belonged to group 5. Lima was the most common soil series (19% of all samples), followed by Ontario (12%), Conesus (11%), Lyons (9%) and Lansing (7%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to greater than 50% (muck soil). For homeowners most samples had between 2 and 5% organic matter (70% of all samples) and 20% testing higher than 5% organic matter. Of the samples submitted by commercial growers, 79% contained between 2 and 4% organic

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matter, 10% had more than 4% organic matter while 11% tested lower than 2% in organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 5.8 to 8.0 for home and garden samples while 69% tested between pH 7.0 and 7.9 and 20% were between pH 6.0 and 6.9. For the commercial samples, the highest pH was 8.2 and 89% tested between pH 6.0 and 7.4.

Extractable nutrients such as phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), iron (Fe), manganese (Mn), and zinc (Zn) were measured using the Morgan method (Morgan, 1941). This solution contains sodium acetate buffered at pH of 4.8.

Soil test P levels of <1 lb P/acre are classified as very low. Between 1-3 lbs P/acre is low. Medium is between 4-8 lbs P/acre. High testing soils have P levels between 9 and 39 lbs P/acre and anything higher is classified as very high. For homeowners, 17% of the soils tested low for P, 23% tested medium, 27% tested high and 33% tested very high. This meant that 60% tested high or very high in P. For commercial growers, 15% tested very high. In total 9% were low in P, 20% tested medium for P while 57% of the submitted samples were classified as high in soil test P. This means that 72% tested high or very high in P.

Classifications for K depend on soil management group. The fine textured soils (soil management group 1) have a greater K supplying capacity than the coarse textured sandy soils (soil management group 5). Classification for each of the management groups in the above table represent very low, low, medium, high and very high. So for example for soil management group 5 and 6, <60 lbs K/acre means the soil is very low in K, between 60 and 114 lbs K/acre is medium, 115-164 lbs K/acre is medium, 165-269 lbs K/acre is high and >269 lbs K/acre is classified as very high (see Table on page 6).

Potassium classifications for Genesee County soils varied from very low (10% of the homeowner soils) to very high (40% of the homeowner soils and 47% of the commercial growers' soils). For homeowners, 10% tested low in K, 10% tested medium, and 30% tested high for potassium. For commercial growers' soils, 2% tested low, 11% tested medium and 37% tested high in K.

Soil Management Group	Potassium Soil Test Value (Morgan extraction in lbs K/acre)				
	Very low	Low	Medium	High	Very High
1	<35	35-64	65-94	95-149	>149
2	<40	40-69	70-99	100-164	>164
3	<45	45-79	80-119	120-199	>199
4	<55	55-99	100-149	150-239	>239
5 and 6	<60	60-114	115-164	165-269	>269

Soils test very low for Mg if Morgan extractable Mg is less than 20 lbs Mg/acre. Low testing soils have 20-65 lbs Morgan Mg per acre. Soils with 66-100 lbs Mg/acre test medium for Mg. High testing soils have 101-199 lbs Mg/acre while soils with more than 200 lbs Mg/acre in the Morgan extraction are classified as very high in Mg. Magnesium levels ranged from 3 to more than 2500 lbs Mg/acre. There was only one soil sample that tested very low for Mg. Most soils tested high or very high for Mg (100% of the homeowner soils and 99% of the soils of the commercial growers).

Soils with more than 50 lbs Morgan extractable Fe per acre test excessive for Fe. Anything lower than 50 lbs Fe/acre is considered normal. Iron levels ranged from 97-98% in the normal range with only 3% of the homeowner soils and 2% of the commercial grower soils testing excessive for Fe. Similarly, most soils (93-100%) tested normal for manganese. Soils with more than 100 lbs Morgan extractable Mn per acre are classified as excessive in Mn. Anything less than 100 lbs Mn per acre is classified as normal. Soils with less than 0.5 lb Zn per acre in the Morgan extraction are classified as low in Zn. Medium testing soils have between 0.5 and 1 lb of Morgan extractable Zn per acre. If more than 1 lb of Zn/acre is extracted with the Morgan solution, the soil tests high in Zn. For the homeowner soils, 93% tested high for Zn while 3% tested medium and 3% were low in Zn. Of the commercial growers' samples, 3% tested low, 20% tested medium while 77% were high in Zn.

In the following sections, the summary tables for each of the soil fertility indicators described above are given. The appendix contains the crop codes used in section 3.

3. Cropping Systems

3.1 Homeowner Samples

Crops for which recommendations are requested by homeowners:

	2002-2006	%
ALG	2	7
ATF	3	10
FLA	2	7
LAW	11	37
MVG	4	13
OTH	1	3
SAG	4	13
TRF	1	3
Unknown	2	7
Total	30	100

Note: See Appendix for Cornell crop codes.

3.2 Commercial Samples

Crops for which recommendations are requested in commercial samples:

Current year crop	2002	2003	2004	2005	2006	Total	%
AGE/AGT	56	2	12	6	20	96	10
ALE/ALT	5	11	0	0	30	46	5
APP	1	2	1	1	1	6	1
BCE	0	0	0	0	2	2	0
BET	3	1	0	0	6	10	1
BLB	0	0	0	2	0	2	0
BND	3	0	4	2	6	15	2
BNS	15	14	28	33	50	140	14
BSS	0	0	0	0	2	2	0
BUK	0	0	0	2	0	2	0
CAR	2	0	2	0	4	8	1
CBS	1	0	0	0	0	1	0
CGE/CGT	0	1	3	0	1	5	1
COG/COS	74	24	22	7	60	187	19
CRD	0	0	0	2	0	2	0
GIE/GIT	4	0	0	0	0	4	0
GPA	0	0	0	0	1	1	0
GRE/GRT	9	3	0	1	8	21	2
MIX	0	0	1	0	0	1	0
OAS/OAT	2	0	5	0	2	9	1
ONP	1	0	0	0	0	1	0
ONS	0	4	0	11	0	15	2
PEA	18	26	24	21	7	96	10
PGE/PGT	36	0	0	0	5	41	4
PIT	0	0	0	4	0	4	0
PLT	0	1	0	0	0	1	0
PNT	0	0	1	0	0	1	0
POT	5	0	9	0	11	25	3
PUM	2	0	0	0	0	2	0
SOY	21	0	0	7	15	43	4
SUN	1	0	0	0	0	1	0
SWC	23	16	24	20	40	123	13
TRT	0	0	0	0	1	1	0
WAT	0	0	0	0	2	2	0
WHS/WHT	13	6	2	2	6	29	3
WPT	0	0	0	1	0	1	0
Other/Unknown	0	20	1	2	1	24	3
Total	295	131	139	124	281	970	100

Note: See Appendix for Cornell crop codes.

4. Soil Types

4.1 Homeowner Samples

Soil types (soil management groups) for homeowner samples:

	2002-2006	%
SMG 1 (clayey)	0	0
SMG 2 (silty)	6	20
SMG 3 (silt loam)	11	37
SMG 4 (sandy loam)	9	30
SMG 5 (sandy)	4	13
SMG 6 (mucky)	0	0
Total	30	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Allis	3	0	0	4	1	0	5	1
Angola	2	1	0	0	0	0	1	0
Appleton	2	0	1	4	2	3	10	1
Arkport	4	11	1	2	2	0	16	2
Bath	3	0	0	1	0	0	1	0
Benson	4	9	0	0	0	5	14	1
Berrien	5	0	0	1	0	0	1	0
Burdett	2	22	0	3	1	20	46	5
Canandaigua	3	0	0	0	7	2	9	1
Cazenovia	2	2	0	0	0	2	4	0
Chenango	3	0	0	1	0	0	1	0
Chippewa	3	0	0	0	0	1	1	0
Collamer	3	0	0	0	3	1	4	0
Colonie	5	0	0	0	1	0	1	0
Conesus	2	36	13	7	4	50	110	11
Cosad	4	1	0	0	1	0	2	0
Darien	2	6	1	4	2	1	14	1
Dunkirk	3	1	0	0	0	0	1	0
Fahey	5	1	0	0	0	0	1	0
Fremont	2	0	0	7	1	0	8	1
Galen	4	5	0	5	0	5	15	2
Halsey	4	1	0	1	0	1	3	0
Hilton	2	15	1	0	7	9	32	3
Homer	2	0	0	0	0	1	1	0
Honeoye	2	11	0	0	5	6	22	2
Hornell	2	0	0	3	0	1	4	0
Ilion	2	2	1	0	2	1	6	1
Lansing	2	14	11	16	7	24	72	7
Lima	2	50	32	36	22	48	188	19
Lyons	2	27	14	15	7	24	87	9
Madalin	1	0	0	0	0	1	1	0
Manheim	2	2	0	0	1	1	4	0
Manlius	3	0	0	2	0	0	2	0
Mardin	3	0	0	1	0	0	1	0
Mohawk	2	2	1	1	2	1	7	1
Muck	6	1	4	0	0	0	5	1

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Name	SMG	2002	2003	2004	2005	2006	Total	%
Niagara	3	4	0	0	0	2	6	1
Nunda	2	15	0	3	1	11	30	3
Odessa	2	3	1	0	1	3	8	1
Ontario	2	35	22	8	26	29	120	12
Ovid	2	1	0	0	3	0	4	0
Palmyra	3	9	4	10	5	18	46	5
Phelps	3	2	2	3	1	5	13	1
Remsen	2	0	0	0	0	5	5	1
Rhinebeck	2	1	1	0	1	0	3	0
Schoharie	1	4	0	0	3	0	7	1
Scio	3	0	0	0	4	0	4	0
Teel	2	1	0	0	0	0	1	0
Volusia	3	0	0	1	0	0	1	0
Wayland	2	0	1	0	0	0	1	0
Unknown	-	0	20	0	1	0	21	2
Total	-	295	131	139	124	281	970	100

5. Organic Matter

5.1 Homeowner Samples

Organic matter (loss-on-ignition method) in homeowner samples (number):

	<1	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
Number	0	0	6	7	8	4	2	3	30
Percentage	0	0	20	23	27	13	7	10	100

	2002-2006
Lowest:	2.1
Highest:	9.0
Mean:	4.4
Median:	4.2

5.2 Commercial Samples

Organic matter (loss-on-ignition method) in commercial samples (number):

	<1	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
2002	0	24	118	118	28	3	2	2	295
2003	0	10	79	33	4	1	0	4	131
2004	0	11	67	38	10	10	1	2	139
2005	0	14	61	30	6	2	0	11	124
2006	2	47	156	63	8	4	1	0	281
Total	2	106	481	282	56	20	4	19	970

	2002	2003	2004	2005	2006
Lowest:	1.2	1.2	1.2	1.1	0.8
Highest:	21.6	51.9	11.6	52.3	6.9
Mean:	3.1	4.1	3.1	5.9	2.6
Median:	3.0	2.6	2.8	2.7	2.5

Organic matter in commercial samples (% of total number of samples):

	<1	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
2002	0	8	40	40	9	1	1	1	100
2003	0	8	60	25	3	1	0	3	100
2004	0	8	48	27	7	7	1	1	100
2005	0	11	49	24	5	2	0	9	100
2006	1	17	56	22	3	1	0	0	100
Total	0	11	50	29	6	2	0	2	100

6. pH

6.1 Homeowner Samples

pH of homeowner samples (numbers):

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
Number	0	0	0	2	3	3	13	8	1	0	30
Percentage	0	0	0	7	10	10	43	27	3	0	100

	2002-2006
Lowest:	5.8
Highest:	8.0
Mean:	-
Median:	7.3

6.2 Commercial Samples

pH of commercial samples (number):

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
2002	0	1	1	12	25	79	150	25	2	0	295
2003	0	0	1	3	28	48	42	9	0	0	131
2004	0	2	11	6	35	49	35	1	0	0	139
2005	0	2	2	10	25	43	38	4	0	0	124
2006	0	1	2	4	48	104	113	9	0	0	281
Total	0	6	17	35	161	323	378	48	2	0	970

	2002	2003	2004	2005	2006
Lowest:	4.6	5.0	4.5	4.8	4.8
Highest:	8.2	7.7	7.6	7.7	7.7
Mean:	-	-	-	-	-
Median:	7.0	6.8	6.6	6.8	6.9

pH of commercial samples (% of total number of samples):

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
2002	0	0	0	4	8	27	51	8	1	0	100
2003	0	0	1	2	21	37	32	7	0	0	100
2004	0	1	8	4	25	35	25	1	0	0	100
2005	0	2	2	8	20	35	31	3	0	0	100
2006	0	0	1	1	17	37	40	3	0	0	100
Total	0	1	2	4	17	33	39	5	0	0	100

7. Phosphorus

7.1 Homeowner Samples

Phosphorus (lbs/acre Morgan P) in homeowner samples (numbers):

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
Number	0	5	7	8	3	2	1	1	1	2	30
Percentage	0	17	23	27	10	7	3	3	3	7	100

VL = very low, L = low, M = medium, H = high, VH = very high.

	2002-2006
Lowest:	1
Highest:	413
Mean:	53
Median:	14

7.2 Commercial Samples

Phosphorus (lbs P/acre Morgan extraction) for commercial samples (number):

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
2002	0	13	45	185	30	13	2	5	1	1	295
2003	0	18	23	69	12	1	1	2	1	4	131
2004	0	22	30	76	7	2	1	0	0	1	139
2005	0	11	27	69	5	0	0	2	6	4	124
2006	0	22	65	154	20	9	7	3	1	0	281
Total	0	86	190	553	74	25	11	12	9	10	970

VL = very low, L = low, M = medium, H = high, VH = very high.

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	217	308	207	281	156
Mean:	25	28	16	31	22
Median:	17	14	10	12	14

Phosphorus in commercial samples (% of total number of samples):

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
2002	0	4	15	63	10	4	1	2	0	0	100
2003	0	14	18	53	9	1	1	2	1	3	100
2004	0	16	22	55	5	1	1	0	0	1	100
2005	0	9	22	56	4	0	0	2	5	3	100
2006	0	8	23	55	7	3	2	1	0	0	100
Total	0	9	20	57	8	3	1	1	1	1	100

VL = very low, L = low, M = medium, H = high, VH = very high.

8. Potassium

8.1 Homeowner Samples

Potassium (lbs K/acre Morgan extraction) in homeowner samples (number):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	4	2	6
Total (%)	0	0	0	67	33	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	2	5	4	11
Total (%)	0	0	18	45	36	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	2	1	0	6	9
Total (%)	0	22	11	0	67	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	3	1	0	0	0	4
Total (%)	75	25	0	0	0	0
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

Rao, R., N. Herendeen, Q.M. Ketterings, and H. Krol (2007). Livingston Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-37. 34 pages.

Potassium classification summary for homeowners:

Summary	Very Low	Low	Medium	High	Very High	Total
Number	3	3	3	9	12	30
Percentage	10	10	10	30	40	100

	2002-2006
Lowest:	34
Highest:	511
Mean:	213
Median:	164

8.2 Commercial Samples

Potassium (lbs K/acre Morgan extraction) in commercial samples (number):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	1	3	4
2003	0	0	0	0	0	0
2004	0	0	0	0	0	0
2005	0	0	1	0	2	3
2006	0	0	0	1	0	1
Total (#)	0	0	1	2	5	8
Total (%)	0	0	13	25	63	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	1	3	30	84	128	246
2003	0	2	4	28	66	100
2004	0	1	24	53	29	107
2005	0	4	5	35	51	95
2006	0	5	16	100	119	240
Total (#)	1	15	79	300	393	788
Total (%)	0	2	10	38	50	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	2	6	8	16
2003	0	0	4	1	1	6
2004	0	1	2	14	6	23
2005	0	1	4	11	5	21
2006	0	0	4	15	10	29
Total (#)	0	2	16	47	30	95
Total (%)	0	2	17	49	32	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	4	7	14	27
2003	0	1	0	0	0	1
2004	0	0	2	0	6	8
2005	0	1	1	1	0	3
2006	0	0	0	4	7	11
Total (#)	0	4	7	12	27	50
Total (%)	0	8	14	24	54	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	1	0	1
2003	0	0	0	0	0	0
2004	0	1	0	0	0	1
2005	0	1	0	0	0	1
2006	0	0	0	0	0	0
Total (#)	0	2	0	1	0	3
Total (%)	0	67	0	33	0	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	0	1	1
2003	0	0	0	0	4	4
2004	0	0	0	0	0	0
2005	0	0	0	0	0	0
2006	0	0	0	0	0	0
Total (#)	0	0	0	0	5	5
Total (%)	0	0	0	0	100	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	1	5	36	99	154	0	295
2003	0	3	8	29	71	20	131
2004	0	3	28	67	41	0	139
2005	0	7	11	47	58	1	124
2006	0	5	20	120	136	0	281
Grand Total	1	23	103	362	460	21	970

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	2	12	34	52	0	100
2003	0	2	6	22	54	15	100
2004	0	2	20	48	29	0	100
2005	0	6	9	38	47	1	100
2006	0	2	7	43	48	0	100
Grand Total	0	2	11	37	47	2	100

	2002	2003	2004	2005	2006
Lowest:	39	36	68	56	57
Highest:	974	908	2498	963	546
Mean:	223	206	172	208	186
Median:	178	176	138	169	169

9. Magnesium

9.1 Homeowner Samples

Magnesium (lbs Mg/acre Morgan extraction) in homeowner samples (numbers):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Number	0	0	0	2	28	30
Percentage	0	0	0	7	93	100

	2002-2006
Lowest:	109
Highest:	1325
Mean:	602
Median:	535

9.2 Commercial Samples

Magnesium (lbs Mg/acre Morgan extraction) in commercial samples (number):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	1	2	15	277	295
2003	0	1	0	4	126	131
2004	0	1	1	6	131	139
2005	0	0	0	14	110	124
2006	1	0	0	9	271	281
Total	1	3	3	48	915	970

	2002	2003	2004	2005	2006
Lowest:	59	55	47	101	3
Highest:	1707	2204	1071	2539	943
Mean:	478	446	371	546	393
Median:	455	398	344	370	380

Magnesium in commercial samples (% of total number of samples):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	1	5	94	100
2003	0	1	0	3	96	100
2004	0	1	1	4	94	100
2005	0	0	0	11	89	100
2006	0	0	0	3	96	100
Total	0	0	0	5	94	100

10. Iron

10.1 Homeowner Samples

Iron (lbs Fe/acre Morgan extraction) in homeowner samples:

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
Total	29	1	30

Percentages:

0-49	>49	Total
Normal	Excessive	
97	3	100

	2002-2006
Lowest:	2
Highest:	68
Mean:	11
Median:	7

10.2 Commercial Samples

Iron (lbs Fe/acre Morgan extraction) in commercial samples:

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	295	0	295
2003	131	0	131
2004	125	14	139
2005	121	3	124
2006	280	1	281
Total	952	18	970

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	100	0	100
	90	10	100
	98	2	100
	100	0	100
	98	2	100

	2002	2003	2004	2005	2006
Lowest:	1	1	2	1	1
Highest:	32	46	271	80	91
Mean:	4	5	20	10	5
Median:	4	4	7	6	4

11. Manganese

11.1 Homeowner Samples

Manganese (lbs Mn/acre Morgan extraction) in homeowner samples:

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
Total	28	2	30

Percentages:

0-99	>99	Total
Normal	Excessive	
93	7	100

	2002-2006
Lowest:	9
Highest:	187
Mean:	49
Median:	42

11.2 Commercial Samples

Manganese (lbs Mn/acre Morgan extraction) in commercial samples:

Total number of samples:				Percentages:		
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
2002	295	0	295	100	0	100
2003	131	0	131	100	0	100
2004	138	1	139	99	1	100
2005	124	0	124	100	0	100
2006	281	0	281	100	0	100
Total	969	1	970	100	0	100

	2002	2003	2004	2005	2006
Lowest:	11	10	14	5	13
Highest:	76	57	113	61	58
Mean:	33	27	32	30	27
Median:	33	24	28	30	26

12. Zinc

12.1 Homeowner Samples

Zinc (lbs Zn/acre Morgan extraction) in homeowner samples:

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
Total	1	1	28	30

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
3	3	93	100

	2002-2006
Lowest:	0.2
Highest:	38.3
Mean:	7.0
Median:	3.7

12.2 Commercial Samples

Zinc (lbs Zn/acre Morgan extraction) in commercial samples:

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
2002	2	14	279	295
2003	1	25	105	131
2004	3	41	95	139
2005	2	30	92	124
2006	23	85	173	281
Total	31	195	744	970

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	5	95	100
1	19	80	100
2	29	68	100
2	24	74	100
8	30	62	100
3	20	77	100

	2002	2003	2004	2005	2006
Lowest:	0.4	0.4	0.3	0.1	0.1
Highest:	11.1	105.4	5.9	24.4	7.6
Mean:	2.4	3.2	1.5	2.8	1.4
Median:	2.0	1.6	1.2	1.3	1.2

Appendix: Cornell Crop Codes

Crop codes used in the Cornell Nutrient Analysis Laboratory.

Crop Code	Crop Description
Alfalfa	
ABE	Alfalfa trefoil grass, Establishment
ABT	Alfalfa trefoil grass, Established
AGE	Alfalfa grass, Establishment
AGT	Alfalfa grass, Established
ALE	Alfalfa, Establishment
ALT	Alfalfa, Established
Birdsfoot	
BCE	Birdsfoot trefoil clover, Establishment
BCT	Birdsfoot trefoil clover, Established
BGE	Birdsfoot trefoil grass, Establishment
BGT	Birdsfoot trefoil grass, Established
BSE	Birdsfoot trefoil seed, Establishment
BST	Birdsfoot trefoil seed, Established
BTE	Birdsfoot trefoil, Establishment
BTT	Birdsfoot trefoil, Established
Barley	
BSP	Spring barley
BSS	Spring barley with legumes
BUK	Buckwheat
BWI	Winter barley
BWS	Winter barley with legumes
Clover	
CGE	Clover grass, Establishment
CGT	Clover grass, Established
CLE	Clover, Establishment
CLT	Clover, Established
CSE	Clover seed production, Establishment
CST	Clover seed production, Established

Crop Code	Crop Description
	Corn
COG	Corn grain
COS	Corn silage
	Grasses, pastures, covercrops
CVE	Crownvetch, Establishment
CVT	Crownvetch, Established
GIE	Grasses intensively managed, Establishment
GIT	Grasses intensively managed, Established
GRE	Grasses, Establishment
GRT	Grasses, Established
PGE	Pasture, Establishment
PGT	Pasture improved grasses, Established
PIE	Pasture intensively grazed, Establishment
PIT	Pasture intensively grazed, Established
PLE	Pasture with legumes, Establishment
PLT	Pasture with legumes, Established
PNT	Pasture native grasses
RYC	Rye cover crop
RYS	Rye seed production
TRP	Triticale peas
	Small grains
MIL	Millet
OAS	Oats seeded with legume
OAT	Oats
SOF	Sorghum forage
SOG	Sorghum grain
SOY	Soybeans
SSH	Sorghum sudan hybrid
SUD	Sudangrass
WHS	Wheat with legume
WHT	Wheat
	Others
ALG	Azalea
APP	Apples
ATF	Athletic field

Crop Code	Crop Description
BDR/DND	Beans-dry
BLU	Blueberries
CEM	Cemetery
FAR	Fairway
FLA	Flowering annuals
GRA	Grapes
GEN	Green
HRB	Herbs
IDL	Idle land
LAW	Lawn
MIX/MVG	Mixed vegetables
PER	Perennials
PRK	Park
POT/PTO	Potatoes
PUM	Pumpkins
ROD	Roadside
ROS	Roses
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TRE	Christmas trees, Establishment
TRF	Turf
TRT	Christmas trees, Topdressing