Soil Sample Survey

Seneca County

Samples analyzed by CNAL (2002-2006)

Seneca County (photo credit: Mike Dennis, CCE of Seneca County).

Summary compiled by

Renuka Rao, Mike Dennis, Quirine M. Ketterings, and Hettie Krol

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

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Seneca County (photo credit: Mike Dennis, CCE of Seneca County).

1. County Introduction

Seneca County lies in the heart of the New York Finger Lakes region. Specifically, the county lies between the two largest lakes: Lake Seneca and Lake Cayuga. The county is 35 miles north to south and approximately 8-10 miles east to west (about 330 square miles). The geography of the county lends itself well to production agriculture with 66% of the land area used as farmland.
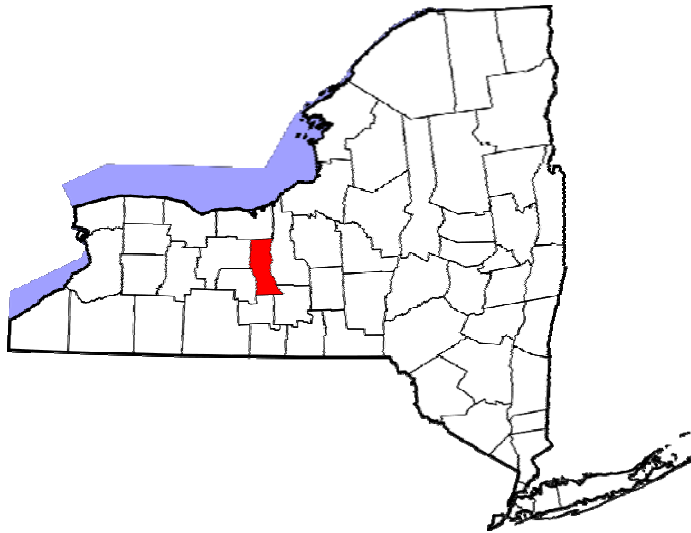
Several soil associations describe the soil characteristics within the county. These associations are categorized as high lime soils, medium lime soils, and low lime soils. Soils were developed in glacial till and glacial lake sediments. A portion of the county is classified as a marsh association containing muck and peat. This area is known as the Montezuma National Wildlife Refuge.

Production agriculture in the county is quite diverse. The primary farming enterprise is row crop and hay production. Dairy, beef, and hog enterprises exist throughout the county and there are numerous "non-conventional" farms including pastured livestock operations, certified organic crop and dairy farms, and small vegetable farms. Within the county there are three Mennonite and two Amish farm communities. For the most part their farms tend to be dairy farms but several are diversified with other enterprises such as vegetables. Farms range in size from several hundred acre grain farms to small part-time livestock farms, all contributing to the farm economy of the county.

In addition to what most would classify as traditional farming or agriculture, Seneca County is home to many vineyards and wineries. These farm operations line both sides of the county along Lakes Seneca and Cayuga making Seneca County a leader in grape and wine production. The annual economic contribution to the agricultural economy by this industry is significant. Many tourists visit the wineries in the county each year and patronize other agricultural enterprises, such as roadside vegetable stands, while visiting

the area. These synergistic contributions make the wine and grape industry is an integral part of the local farm economy.

Soil sampling and analysis by county farmers is a very sound way to manage land from both an economic and environmental standpoint. Soil maps give a fairly good description of soil properties and characteristics. However soil analysis of individual fields gives the producer a better picture of what may be lacking or in abundance within that area. It allows for planning based on the intended land use. A comprehensive soil sampling and analysis program built around an individual farm will benefit the farmer in many ways for years to come.

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Seneca County (photo credit: Mike Dennis, CCE of Seneca County).

2. General Survey Summary

This survey summarizes the soil test results from grower (identified as "commercial samples") and homeowner samples from Seneca County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 327. Of these, 267 samples (82%) were submitted by commercial growers while 60 samples (18%) were submitted by homeowners. The number of samples has increased over the years.
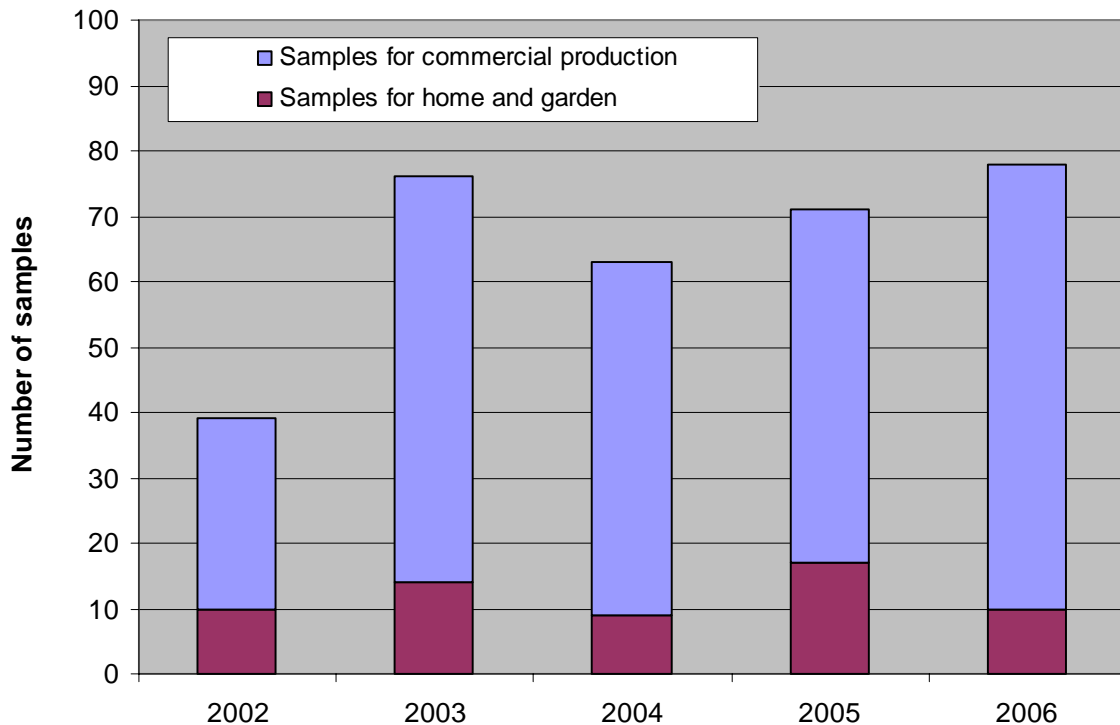
Homeowners		Commercial		Total
2002	10	2002	29	39
2003	14	2003	62	76
2004	9	2004	54	63
2005	17	2005	54	71
2006	10	2006	68	78
Total	60	Total	267	327

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to requested fertilizer recommendations for home garden vegetable production (45%) and lawns (17%). Commercial growers submitted samples primarily to grow grapes (41%), pasture (14%), corn silage or grain (8%), soybean and wheat (6% each) and alfalfa/grass mixtures (5%).

Soils tested for home and garden in Seneca County were classified as belonging to soil management group 2 (33%), 2 (23%), 4 (22%), and 5 (22%). 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, 78% belonged to soil management group 2. Four percent were group 1 soils. Thirteen percent were from group 3 while less than 1% were group 4 or 5 samples. There were no organic soils. Ovid was the most common soil series (21% of all samples), followed by Honeoye (13%), Cazanovia (12%), Darien (9%) and Lima (8%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to 9%. For homeowners most samples had between 2 and 5% organic matter (58% of all samples), 8% testing between 5 and 6% organic matter and 10% were classified as soils

with more than 6.9% organic matter. Of the samples submitted by commercial growers, 71% contained between 2 and 4% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from less than 4.8 to 8.0 for home and garden samples. Sixty-one percent tested pH 7 or higher while 28% were between pH 6 and 7. For the commercial samples, the highest pH was 7.9 and 67% tested between 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, 7% of the soils tested low for P, 10% tested medium, 35% tested high and 49% tested very high. This meant that 83% tested high or very high in P. For commercial growers, 3% tested very high. In total 40% were low in P, 31% tested medium for P while 26% of the submitted samples were classified as high in soil test P. This means that 29% 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 Seneca County soils varied from very low (2% of the homeowner soils just one of the commercial growers' soils) to very high (67% of the homeowner soils and 36% of the commercial growers' soils). For homeowners, 3% tested low in K, 12% tested medium, and 17% tested high for potassium. For commercial growers' soils, 6% tested low, 16% tested medium and 38% 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 31 to more than 2700 lbs Mg/acre. There were no soil samples that tested very low for Mg. Most soils tested high or very high for Mg (97% of the homeowner soils and 100% 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 2% of the homeowner soils and 3% of the commercial grower soils testing excessive for Fe. Similarly, most soils (93-99%) 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, 87% tested high for Zn while 12% tested medium. Of the commercial growers' samples, 7% tested low, 36% tested medium while 57% 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 were requested by homeowners:

	2002-2006	%
ALG	2	3
APR	2	3
ATF	3	5
BLU	1	2
FLA	1	2
GRA	2	3
LAW	10	17
MVG	27	45
OTH	1	2
PER	1	2
ROS	2	3
SAG	8	13
Total	60	100

Note: See Appendix for Cornell crop codes.

3.2 Commercial Samples

Crops for which recommendations were requested in commercial samples:

Current year crop	2002	2003	2004	2005	2006	Total	%
AGE/AGT	4	0	0	2	7	13	5
ASP	0	1	0	0	0	1	0
BLB	0	5	0	1	0	6	2
BSP	0	0	1	0	0	1	0
BUK	0	1	0	0	0	1	0
BWI	0	0	2	0	0	2	1
CGT	3	0	0	0	0	3	1
CHS	0	0	0	0	1	1	0
CLE	0	1	1	0	0	2	1
COG/COS	4	12	1	3	2	22	8
GIT	0	0	0	0	1	1	0
GPA	0	0	4	0	1	5	2
GPF	0	1	5	2	3	11	4
GPV	0	9	30	29	26	94	35
GRE/GRT	1	0	2	1	0	4	1
IDL	0	0	0	2	2	4	1
MIX	1	3	0	2	0	6	2
OAT	1	0	0	0	1	2	1
OTH	1	0	0	0	0	1	0
PER	0	1	0	0	0	1	0
PIT	2	13	1	0	9	25	9
PLE/PLT	0	0	2	0	8	10	4
PNT	1	0	0	0	1	2	1
RSS	0	0	0	1	0	1	0
RYC	0	2	0	0	0	2	1
SOY	7	2	2	3	3	17	6
SQW	0	0	1	0	0	1	0
SSH	0	0	0	1	0	1	0
TOM	0	1	0	0	0	1	0
TRE	0	5	0	0	0	5	2
WHT	4	4	2	7	0	17	6
Unknown	0	1	0	0	3	4	1
Total	29	62	54	54	68	267	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)	20	33
SMG 3 (silt loam)	14	23
SMG 4 (sandy loam)	13	22
SMG 5 (sandy)	13	22
SMG 6 (mucky)	0	0
Total	60	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Angola	2	0	0	0	1	3	4	1
Arkport	4	0	0	0	1	0	1	0
Aurora	2	1	1	1	0	0	3	1
Caneadea	2	0	0	1	0	0	1	0
Cazenovia	2	0	3	4	11	13	31	12
Collamer	3	1	0	2	0	0	3	1
Conesus	2	0	4	0	3	2	9	3
Darien	2	3	1	2	8	10	24	9
Dunkirk	3	0	0	0	0	1	1	0
Erie	3	0	0	0	0	1	1	0
Honeoye	2	7	2	7	7	12	35	13
Howard	3	0	0	12	0	0	12	4
Hudson	2	0	6	0	0	0	6	2
Ilion	2	0	0	0	1	0	1	0
Lakemont	1	0	2	0	0	0	2	1
Langford	3	0	7	3	0	5	15	6
Lansing	2	0	0	0	6	2	8	3
Lima	2	5	8	0	6	2	21	8
Odessa	2	0	2	0	0	1	3	1
Ontario	2	0	3	0	0	0	3	1
Ovid	2	10	20	7	9	11	57	21
Palmyra	3	0	0	2	0	0	2	1
Romulus	2	0	0	1	0	0	1	0
Schoharie	1	2	3	1	0	4	10	4
Varick	2	0	0	0	0	1	1	0
Windsor	5	0	0	1	0	0	1	0
Unknown	-	0	0	10	1	0	11	4
Total	-	29	62	54	54	68	267	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	4	5	14	9	12	5	5	6	60
Percentage	7	8	23	15	20	8	8	10	100

	2002-2006
Lowest:	0.8
Highest:	8.8
Mean:	3.9
Median:	3.9

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	2	14	10	2	1	0	0	29
2003	0	2	18	29	8	5	0	0	62
2004	0	7	30	13	3	0	1	0	54
2005	3	16	24	10	1	0	0	0	54
2006	1	6	22	21	11	3	2	2	68
Total	4	33	108	83	25	9	3	2	267

	2002	2003	2004	2005	2006
Lowest:	1.8	1.7	1.2	0.5	0.9
Highest:	5.1	5.9	6.2	4.1	7.1
Mean:	2.9	3.4	2.7	2.2	3.3
Median:	2.7	3.2	2.6	2.3	3.1

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	7	48	34	7	3	0	0	100
2003	0	3	29	47	13	8	0	0	100
2004	0	13	56	24	6	0	2	0	100
2005	6	30	44	19	2	0	0	0	100
2006	1	9	32	31	16	4	3	3	100
Total	1	12	40	31	9	3	1	1	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	1	1	4	8	9	23	12	2	0	60
Percentage	0	2	2	7	13	15	38	20	3	0	100

	2002-2006
Lowest:	4.8
Highest:	8.0
Mean:	-
Median:	7.1

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	0	0	4	7	6	8	4	0	0	29
2003	3	0	1	11	17	14	11	5	0	0	62
2004	0	2	4	17	13	9	5	4	0	0	54
2005	0	1	7	8	13	9	14	2	0	0	54
2006	0	0	1	10	20	17	15	5	0	0	68
Total	3	3	13	50	70	55	53	20	0	0	267

	2002	2003	2004	2005	2006
Lowest:	5.7	3.9	4.8	4.9	5.4
Highest:	7.8	7.8	7.8	7.5	7.9
Mean:	-	-	-	-	-
Median:	6.8	6.3	6.2	6.3	6.6

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	14	24	21	28	14	0	0	100
2003	5	0	2	18	27	23	18	8	0	0	100
2004	0	4	7	31	24	17	9	7	0	0	100
2005	0	2	13	15	24	17	26	4	0	0	100
2006	0	0	1	15	29	25	22	7	0	0	100
Total	1	1	5	19	26	21	20	7	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	4	6	21	3	8	4	1	3	10	60
Percentage	0	7	10	35	5	13	7	2	5	17	100

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

	2002-2006
Lowest:	2
Highest:	501
Mean:	8
Median:	37

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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	10	8	9	0	0	1	0	0	1	29
2003	0	18	23	18	2	0	0	1	0	0	62
2004	0	11	16	24	2	0	0	1	0	0	54
2005	0	28	20	5	0	1	0	0	0	0	54
2006	0	40	15	13	0	0	0	0	0	0	68
Total	0	107	82	69	4	1	1	2	0	1	267

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	329	143	142	63	26
Mean:	21	12	15	5	5
Median:	5	5	8	3	3

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	34	28	31	0	0	3	0	0	3	100
2003	0	29	37	29	3	0	0	2	0	0	100
2004	0	20	30	44	4	0	0	2	0	0	100
2005	0	52	37	9	0	2	0	0	0	0	100
2006	0	59	22	19	0	0	0	0	0	0	100
Total	0	40	31	26	1	0	0	1	0	0	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):

	<35	35-64	65-94	95-149	>149	Total
Soil Management Group 1						
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

	<40	40-69	70-99	100-164	>164	Total
Soil Management Group 2						
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	2	4	14	20
Total (%)	0	0	10	20	70	100

	<45	45-79	80-119	120-199	>199	Total
Soil Management Group 3						
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	2	1	11	14
Total (%)	0	0	14	7	79	100

	<55	55-99	100-149	150-239	>239	Total
Soil Management Group 4						
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	2	2	9	13
Total (%)	0	0	15	15	69	100

	<60	60-114	115-164	165-269	>269	Total
Soil Management Group 5						
	Very Low	Low	Medium	High	Very High	
Total (#)	1	2	1	3	6	13
Total (%)	8	15	8	23	46	100

	<60	60-114	115-164	165-269	>269	Total
Soil Management Group 6						
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

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Potassium classification summary for homeowners:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
Number	1	2	7	10	40	60
Percentage	2	3	12	17	67	100

	2002-2006
Lowest:	55
Highest:	1114
Mean:	337
Median:	244

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	0	2	2
2003	0	0	0	4	1	5
2004	0	0	0	0	1	1
2005	0	0	0	0	0	0
2006	0	0	0	4	0	4
Total (#)	0	0	0	8	4	12
Total (%)	0	0	0	67	33	100

Soil Management Group 2					
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	1	4	10	11	26
2003	0	2	6	28	14	50
2004	0	1	6	10	6	23
2005	0	3	14	18	17	52
2006	1	4	9	14	29	57
Total (#)	1	11	39	80	77	208
Total (%)	0	7	16	25	51	100

Soil Management Group 3					
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	1	0	0	0	1
2003	0	1	1	4	1	7
2004	0	0	1	7	11	19
2005	0	0	0	0	0	0
2006	0	1	1	3	2	7
Total (#)	0	3	3	14	14	34
Total (%)	0	9	9	41	41	100

Soil Management Group 4					
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	0	0	0
2003	0	0	0	0	0	0
2004	0	0	0	0	0	0
2005	1	0	0	0	0	1
2006	0	0	0	0	0	0
Total (#)	1	0	0	0	0	1
Total (%)	100	0	0	0	0	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	0	0	0
2003	0	0	0	0	0	0
2004	0	1	0	0	0	1
2005	0	0	0	0	0	0
2006	0	0	0	0	0	0
Total (#)	0	1	0	0	0	1
Total (%)	0	100	0	0	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	0	0
2003	0	0	0	0	0	0
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	0	0
Total (%)	-	-	-	-	-	-

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Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	2	4	10	13	0	29
2003	0	3	7	36	16	0	62
2004	0	1	8	17	18	10	54
2005	0	4	14	18	17	1	54
2006	1	5	10	21	31	0	68
Grand Total	1	15	43	102	95	11	267

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	7	14	34	45	0	100
2003	0	5	11	58	26	0	100
2004	0	2	15	31	33	19	100
2005	0	7	26	33	31	2	100
2006	1	7	15	31	46	0	100
Grand Total	0	6	16	38	36	4	100

	2002	2003	2004	2005	2006
Lowest:	60	54	61	44	36
Highest:	835	1111	947	530	415
Mean:	181	166	221	148	166
Median:	152	125	194	128	147

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	2	3	55	60
Percentage	0	0	3	5	92	100

	2002-2006
Lowest:	58
Highest:	2710
Mean:	570
Median:	529

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	0	0	3	26	29
2003	0	0	0	6	56	62
2004	0	1	0	13	40	54
2005	0	0	0	11	43	54
2006	0	0	0	1	67	68
Total	0	1	0	34	232	267

	2002	2003	2004	2005	2006
Lowest:	127	121	31	102	125
Highest:	948	1173	810	691	1324
Mean:	391	414	314	340	471
Median:	376	363	274	337	402

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	0	10	90	100
2003	0	0	0	10	90	100
2004	0	2	0	24	74	100
2005	0	0	0	20	80	100
2006	0	0	0	1	99	100
Total	0	0	0	13	87	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	59	1	60

Percentages:

0-49	>49	Total
Normal	Excessive	
98	2	100

	2002-2006
Lowest:	1
Highest:	208
Mean:	12
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	29	0	29
2003	58	4	62
2004	52	2	54
2005	53	1	54
2006	67	1	68
Total	259	8	267

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	94	6	100
	96	4	100
	98	2	100
	99	1	100
	97	3	100

	2002	2003	2004	2005	2006
Lowest:	1	1	2	2	1
Highest:	22	184	132	100	64
Mean:	5	17	17	12	9
Median:	4	9	10	7	6

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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	56	4	60

Percentages:

0-99	>99	Total
Normal	Excessive	
93	7	100

	2002-2006
Lowest:	8
Highest:	179
Mean:	47
Median:	42

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11.2 Commercial Samples

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
2002	29	0	29
2003	59	3	62
2004	54	0	54
2005	54	0	54
2006	67	1	68
Total	263	4	267

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	100	0	100
	95	5	100
	100	0	100
	100	0	100
	99	1	100
	99	1	100

	2002	2003	2004	2005	2006
Lowest:	17	9	18	11	11
Highest:	54	199	91	87	191
Mean:	32	40	39	37	38
Median:	32	34	32	33	34

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	7	52	60

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	12	87	100

	2002-2006
Lowest:	0.3
Highest:	158.6
Mean:	10.9
Median:	4.5

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	18	9	29
2003	2	21	39	62
2004	0	17	37	54
2005	4	28	22	54
2006	11	12	45	68
Total	19	96	152	267

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
7	62	31	100
3	34	63	100
0	31	69	100
7	52	41	100
16	18	66	100
7	36	57	100

	2002	2003	2004	2005	2006
Lowest:	0.4	0.1	0.5	0.1	0.1
Highest:	10.4	13.5	50.7	3.4	3.9
Mean:	1.7	1.6	2.6	1.1	1.4
Median:	1.0	1.2	1.5	0.9	1.4

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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

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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

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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