

Soil Sample Survey

Chenango County

Samples analyzed by CNAL in 2002-2006



Photo credit: Rebecca Hargrave, Cornell Cooperative Extension of Chenango County.

Summary compiled by

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Quirine M. Ketterings, and Hettie Krol**



Cornell Nutrient Analysis Laboratory
<http://www.css.cornell.edu/soiltest/newindex.asp>

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<http://nmsp.css.cornell.edu/>



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Table of Content

1. General Survey Summary	1
2. Cropping Systems	7
2.1 Homeowner Samples	7
2.2 Commercial Samples	8
3. Soil Types	9
3.1 Homeowner Samples	10
3.2 Commercial Samples	11
4. Organic Matter	12
4.1 Homeowner Samples	12
4.2 Commercial Samples	13
5. pH	13
5.1 Homeowner Samples	14
5.2 Commercial Samples	15
6. Phosphorus	16
6.1 Homeowner Samples	16
6.2 Commercial Samples	17
7. Potassium	17
7.1 Homeowner Samples	18
7.2 Commercial Samples	20
8. Magnesium	22
8.1 Homeowner Samples	22
8.2 Commercial Samples	23
9. Iron	24
9.1 Homeowner Samples	24
9.2 Commercial Samples	24
10. Manganese	25
10.1 Homeowner Samples	25
10.2 Commercial Samples	25
11. Zinc	26
11.1 Homeowner Samples	26
11.2 Commercial Samples	26
Appendix: Cornell Crop Codes	27



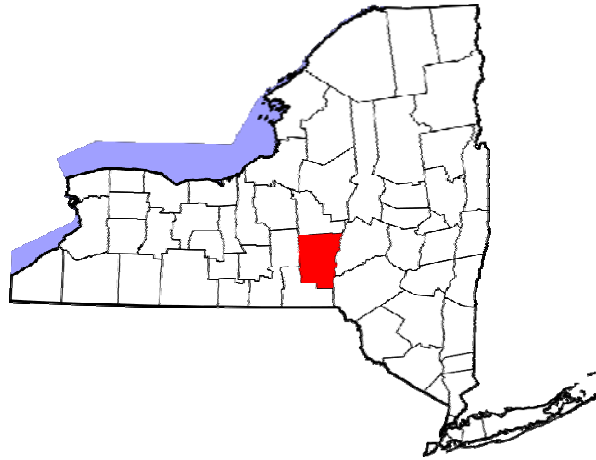
Chenango County (photo credit: Sara Place, Nutrient Management Spear Program)



1. County Introduction

Chenango County is located in south-central New York State. The county covers an area of 581,120 acres of which about 100,000 acres is used for agricultural purposes. Chenango County is bordered by Madison County in the north, Cortland County to the west, Broome County to the south and west, Otsego County to the east, and by Delaware County in a small southeastern portion.

The minimum elevation is 880 feet in the town of Greene where the Chenango River enters Broome County. The maximum elevation of nearly 2000 feet is reached in three locations in the county. The county's topography varies from rolling to steep. The stream valleys in the county are relatively wide when considering the steepness of the topography in the region.



Four main streams drain Chenango County; the Unadilla River, which forms Chenango's eastern border; the Chenango River, which flows north to south through the center of the county; the Otselic River, which runs in the northwest corner of the county; and Genegantslet Creek, which drains the western central part of the county. The county is located on the Allegheny Plateau and was covered in glacial ice as recently as 10,000 to 15,000 years ago. As a result, the soils of the county are relatively young and consist mainly of glacial tills with loamy alluvial deposits located in the creek and river valleys.

Dairy farming is the number one agricultural industry with around 200 operating dairy farms in the county. The majority of the crops are grown to feed the 15,000 dairy cows in the county. According to the 2002 USDA census of agriculture, total cropland acreage in Chenango County is 100,601. The majority of cropland is in hay forage production (62,000 acres) and corn silage production (11,300 acres).

Other agriculture industries include over 400 beef cattle and small livestock farms, 45 maple syrup operations, and over 100 other farms producing vegetables, small and tree

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fruit, and nursery and greenhouse crops. These farms help make up the smallfarm patchwork that dominates the Chenango County landscape.

Chenango County is also dotted with small communities and gardening and landscaping are common pastimes. However, due to the wide range of pH and fertility possibilities in homeowner soil, soil testing is recommended for new and problematic gardens and lawns.

Due to the somewhat wide variation in soil, diverse farming enterprises, and complex previous land use histories in Chenango County, proper soil testing is very important for the success of our crops and our farms.

Sara Place

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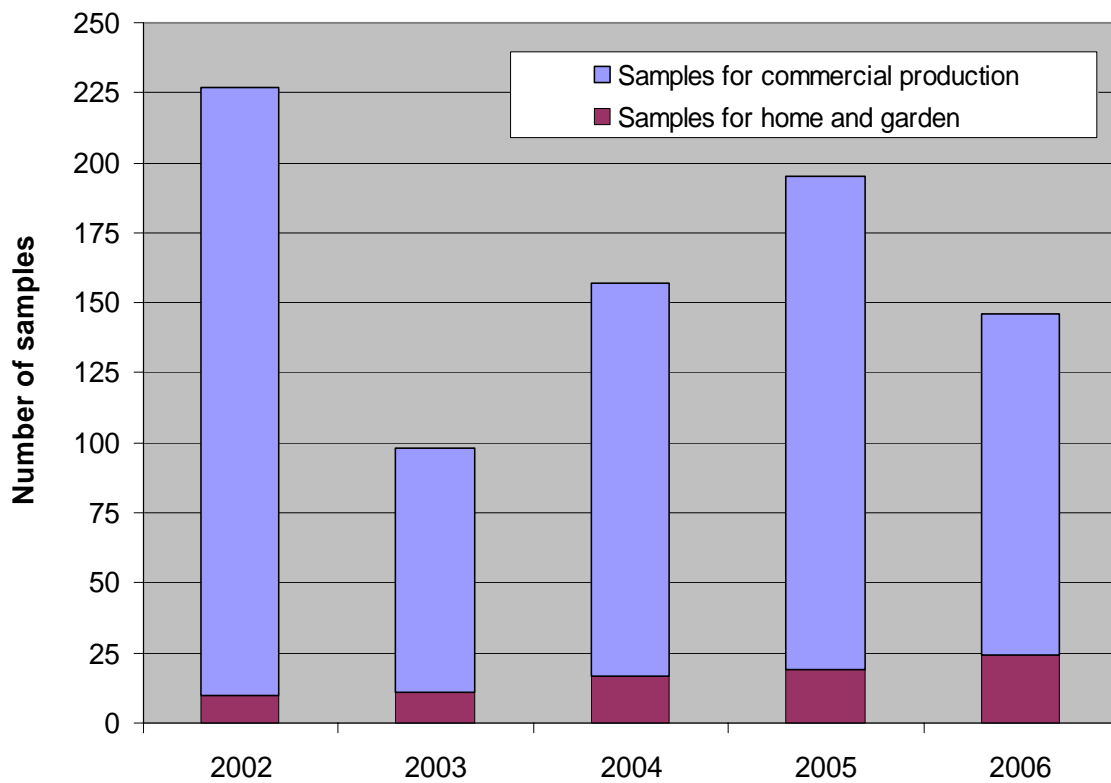
Cornell Cooperative Extension of Chenango County



Chenango County (photo credit: Sara Place, Nutrient Management Spear Program)

1. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Chenango County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) during 2002 and 2006. The total number of samples analyzed in these years amounted to 823. Of these 742 samples (90%) were submitted by commercial growers while 81 samples (10%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	10	2002	217	227
2003	11	2003	87	98
2004	17	2004	140	157
2005	19	2005	176	195
<u>2006</u>	<u>24</u>	<u>2006</u>	<u>122</u>	<u>146</u>
Total	81	Total	742	823

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily requested fertilizer recommendations for home garden vegetable production (40%) and lawns (25%). Commercial growers submitted samples primarily to grow grass for hay (26%), corn silage or grain (24%), and alfalfa or alfalfa/grass mixes (18%).

Soils tested for home and garden in Chenango County were classified as belonging to soil management group 2 (31%), group 3 (20%), group 4 (46%), or group 5 (4%). 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 (87%) belonged to soil management group 3. There were no group 1, 5 or 6 samples. Eleven percent belonged to group 2. Group 4 was represented by 2% of the samples. Chenango was the most common soil series (16% of all samples), followed by Mardin (15%), Howard (13%), Volusia (9%) and Lordstown (8%).

Organic matter levels, as measured by loss-on-ignition, ranged from 1.5% to 16.4%. For homeowner samples, 35% contained between 4 and 6% organic matter. Thirty-seven percent had more than 6% organic matter while 26% had between 2 and 4% organic

matter. Of the samples submitted by commercial growers, 46% contained between 4 and 6% organic matter and 32% had between 2 and 4% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 4.6 to 7.8 for home and garden samples with 43% testing pH 6.5 or higher and 41% testing between pH 5.5 and 6.4. For the commercial samples, the highest pH was 7.4 and 62% tested between pH 5.5 and 6.4.

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 homeowner soils, 11% tested low for P, 19% tested medium, 37% tested high and 33% tested very high. This meant that 70% tested high or very high in P. For commercial growers, 8% tested very high. In total 30% were low in P, 25% tested medium for P while 37% of the samples were classified as high in soil test P. This means that 45% 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 Chenango County soils varied from low (7% of the homeowner soils and 13% commercial growers' soils) to very high (63% of the homeowner soils and 38% of the commercial growers' soils). For homeowners, 12% tested medium, and 17% tested high for potassium. For commercial growers' soils, 19% tested medium and 29% 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 19 more almost 1500 lbs Mg/acre. There was only one sample that tested very low for Mg. Most soils tested high or very high for Mg (95% of the homeowner soils and 91% 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. For 89% of the samples, iron levels were in the normal range with 11% of soils testing excessive for Fe. Similarly, most soils (91-96%) 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, 89% tested high for Zn while 7% tested medium and 4% were low in Zn. Of the commercial growers' samples, 4% tested low, 19% tested medium while 78% 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.

2. Cropping Systems

2.1 Homeowner Samples

Crops for which recommendations were requested by homeowners:

	2002-2006	%
ATF	2	2
FLA	1	1
GRA	2	2
IDL	5	6
LAW	20	25
MVG	32	40
OTH	5	6
PER	2	2
ROD	1	1
RSP	1	1
SAG	5	6
STR	1	1
SUB	1	1
TRF	3	4
Total	81	100

See Appendix for Cornell crop codes.

2.2 Commercial Samples

Crops for which recommendations were requested in commercial samples:

Current year crop	2002	2003	2004	2005	2006	Total	%
ABE/ABT	14	0	0	0	0	14	2
AGE/AGT	42	5	19	22	5	93	13
ALE/ALT	9	3	7	2	0	21	3
APP	0	1	3	0	2	6	1
BCE/BCT	0	1	0	3	0	4	1
BET	1	0	0	0	0	1	0
BGT	2	0	0	0	0	2	0
BLB	0	2	3	0	4	9	1
BSP	0	0	1	0	0	1	0
BSS	1	0	0	0	0	1	0
BTE	0	0	0	1	0	1	0
BUK	1	0	0	0	2	3	0
CGE/CGT	30	0	1	12	1	44	6
CKS	0	0	1	0	0	1	0
CLE/CLT	1	8	3	0	5	17	2
COS/COG	43	9	36	46	43	177	24
GIE/GIT	16	0	2	16	2	36	5
GRE/GRT	23	30	15	48	38	154	21
IDL	4	1	0	0	1	6	1
MIL	2	0	0	0	0	2	0
MIX	1	0	9	2	1	13	2
OAS	0	3	0	0	0	3	0
OAT	7	0	0	0	0	7	1
OTH	1	10	5	0	0	16	2
PCH	0	0	2	0	0	2	0
PGE/PGT	1	0	3	0	0	4	1
PIE/PIT	4	0	2	0	1	7	1
PLT	2	1	20	0	1	24	3
PNT	6	3	0	18	1	28	4
POT	0	5	2	1	2	10	1
PUM	0	0	2	0	0	2	0
RSS	0	0	0	1	0	1	0
SOY	0	0	3	0	13	16	2
SQW	0	0	0	1	0	1	0
STE	0	0	0	1	0	1	0
STS	1	0	0	0	0	1	0
SWC	1	0	1	0	0	2	0

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Current year crop	2002	2003	2004	2005	2006	Total	%
TOM	0	4	0	1	0	5	1
TRE	1	0	0	0	0	1	0
WHS	0	0	0	1	0	1	0
WHT	0	1	0	0	0	1	0
Unknown	3	0	0	0	0	3	0
Total	217	87	140	176	122	742	100

See Appendix for Cornell crop codes.



Chenango County (photo credit: Sara Place, Nutrient Management Spear Program)

3. Soil Types

3.1 Homeowner Samples

Soil types (soil management groups) for homeowner samples:

	2002-2006	%
SMG 1 (clayey)	0	0
SMG 2 (silty)	25	31
SMG 3 (silt loam)	16	20
SMG 4 (sandy loam)	37	46
SMG 5 (sandy)	3	4
SMG 6 (mucky)	0	0
Total	81	100

3.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Arkport	4	1	0	0	0	0	1	0
Arnot	3	1	0	0	0	1	2	0
Bath	3	12	2	4	5	1	24	3
Canandaigua	3	1	0	0	0	0	1	0
Castile	4	2	1	0	0	0	3	0
Chenango	3	34	22	25	15	24	120	16
Chippewa	3	0	0	0	2	1	3	0
Cosad	4	1	0	0	0	0	1	0
Fredon	4	4	0	1	0	0	5	1
Greene	3	0	0	0	1	0	1	0
Hamlin	2	8	2	10	12	11	43	6
Howard	3	17	5	30	32	16	100	13
Lackawanna	3	5	0	5	9	5	24	3
Lordstown	3	15	22	6	7	6	56	8
Mardin	3	51	13	21	17	11	113	15
Morris	3	0	2	1	8	0	11	1
Oquaga	3	2	1	0	9	2	14	2
Palmyra	3	0	0	0	0	1	1	0
Phelps	3	7	0	0	0	1	8	1
Raynham	3	5	0	0	0	0	5	1
Raypol	3	0	0	0	0	1	1	0
Red Hook	4	2	0	0	0	3	5	1
Scio	3	3	1	1	0	0	5	1
Teel	2	11	2	3	4	11	31	4
Trestle	3	3	0	7	0	0	10	1
Tuller	3	0	1	0	5	0	6	1
Unadilla	3	1	3	0	0	17	21	3
Valois	3	10	2	7	19	0	38	5
Volusia	3	16	7	14	24	5	66	9
Wayland	2	5	0	1	0	0	6	1
Wellsboro	3	0	0	4	7	1	12	2
Wenonah	4	0	0	0	0	1	1	0
Unknown	-	0	1	0	0	3	4	1
Total	-	217	87	140	176	122	742	100

4. Organic Matter

4.1 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	2	5	16	14	14	12	18	81
Percentage	0	2	6	20	17	17	15	22	100

	2002-2006
Lowest:	1.6
Highest:	16.4
Mean:	5.6
Median:	5.2

4.2 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	0	13	36	60	52	32	24	217
2003	0	0	10	11	16	31	7	12	87
2004	0	1	14	38	33	28	14	12	140
2005	0	0	12	47	35	43	23	16	176
2006	0	4	28	31	23	18	12	6	122
Total	0	5	77	163	167	172	88	70	742

	2002	2003	2004	2005	2006
Lowest:	2.1	2.0	1.5	2.0	1.6
Highest:	12.6	15.5	11.5	9.7	9.5
Mean:	5.0	5.2	4.8	4.9	4.1
Median:	4.9	5.2	4.4	4.8	3.9

Organic matter 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	0	6	17	28	24	15	11	100
2003	0	0	11	13	18	36	8	14	100
2004	0	1	10	27	24	20	10	9	100
2005	0	0	7	27	20	24	13	9	100
2006	0	3	23	25	19	15	10	5	100
Total	0	1	10	22	23	23	12	9	100

5. pH

5.1 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	11	22	11	12	19	4	0	0	1	81
Percentage	0	1	14	27	14	15	23	5	0	0	1	100

	2002-2006
Lowest:	4.6
Highest:	7.8
Mean:	-
Median:	6.2

5.2 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	1	7	32	66	62	33	16	0	0	0	217
2003	0	9	8	28	25	13	4	0	0	0	87
2004	0	1	16	42	51	26	4	0	0	0	140
2005	1	0	18	51	52	50	4	0	0	0	176
2006	1	4	19	36	46	15	1	0	0	0	122
Total	3	21	93	223	236	137	29	0	0	0	742

	2002	2003	2004	2005	2006
Lowest:	4.1	4.5	4.9	4.4	4.1
Highest:	7.4	7.3	7.3	7.3	7.2
Mean:	-	-	-	-	-
Median:	6.0	5.9	6.1	6.1	6.0

pH of commercial samples (% of total amount 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	3	15	30	29	15	7	0	0	0	100
2003	0	10	9	32	29	15	5	0	0	0	100
2004	0	1	11	30	36	19	3	0	0	0	100
2005	1	0	10	29	30	28	2	0	0	0	100
2006	1	3	16	30	38	12	1	0	0	0	100
Total	0	3	13	30	32	18	4	0	0	0	100

6. Phosphorus

6.1 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	9	15	30	4	7	3	2	2	9	81
Percentage	0	11	19	37	5	9	4	2	2	11	100

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

	2002-2006
Lowest:	1
Highest:	914
Mean:	70
Median:	25

6.2 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	73	44	79	15	3	1	0	1	1	217
2003	0	27	31	27	2	0	0	0	0	0	87
2004	0	30	41	53	12	2	1	1	0	0	140
2005	0	58	41	68	8	1	0	0	0	0	176
2006	0	36	30	47	3	5	1	0	0	0	122
Total	0	224	187	274	40	11	3	1	1	1	742

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	287	48	103	69	87
Mean:	15	9	15	11	13
Median:	7	6	8	7	8

Phosphorus in commercial samples (% of total amount 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	20	36	7	1	0	0	0	0	100
2003	0	31	36	31	2	0	0	0	0	0	100
2004	0	21	29	38	9	1	1	1	0	0	100
2005	0	33	23	39	5	1	0	0	0	0	100
2006	0	30	25	39	2	4	1	0	0	0	100
Total	0	30	25	37	5	1	0	0	0	0	100

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

7. Potassium

7.1 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	1	3	21	25
Total (%)	0	0	4	12	84	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	1	4	11	16
Total (%)	0	0	6	25	69	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	6	7	7	17	37
Total (%)	0	16	19	19	46	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	1	0	2	3
Total (%)	0	0	33	0	67	100
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 (%)	-	-	-	-	-	-

Potassium classification summary for homeowners:

	Very Low	Low	Medium	High	Very High	Total
Number	0	6	10	14	51	81
Percentage	0	7	12	17	63	100

	2002-2006
Lowest:	73
Highest:	2298
Mean:	347
Median:	243

7.2 Commercial Samples

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

Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	2	6	14	24
2003	0	1	0	2	1	4
2004	0	3	0	3	8	14
2005	0	2	2	4	8	16
2006	0	4	5	10	3	22
Total (#)	0	12	9	25	34	80
Total (%)	0	15	11	31	43	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	25	28	38	92	183
2003	1	9	17	26	28	81
2004	0	13	20	34	58	125
2005	1	19	47	51	42	160
2006	0	19	17	32	25	93
Total (#)	2	85	129	181	245	642
Total (%)	0	13	20	28	38	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	2	3	5	10
2003	0	0	0	0	1	1
2004	0	1	0	0	0	1
2005	0	0	0	0	0	0
2006	0	1	0	3	0	4
Total (#)	0	2	2	6	6	16
Total (%)	0	13	13	38	38	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	?	Total
2002	0	27	32	47	111	0	217
2003	1	10	17	28	30	1	87
2004	0	17	20	37	66	0	140
2005	1	21	49	55	50	0	176
2006	0	24	22	45	28	3	122
Grand Total	2					4	742

Summary (%)	Very Low	Low	Medium	High	Very High	?	Total
2002	0	12	15	22	51	0	100
2003	1	11	20	32	34	1	100
2004	0	12	14	26	47	0	100
2005	1	12	28	31	28	0	100
2006	0	20	18	37	23	2	100
Grand Total	0	13	19	29	38	1	100

	2002	2003	2004	2005	2006
Lowest:	47	40	49	41	54
Highest:	1012	1263	1531	712	491
Mean:	266	215	237	178	159
Median:	203	146	184	131	132

8. Magnesium

8.1 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	1	3	19	58	81
Percentage	0	1	4	23	72	100

	2002-2006
Lowest:	51
Highest:	1490
Mean:	337
Median:	279

8.2 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	5	13	51	148	217
2003	0	5	6	20	56	87
2004	0	5	9	29	97	140
2005	0	3	4	59	110	176
2006	1	7	12	36	66	122
Total	1	25	44	195	477	742

	2002	2003	2004	2005	2006
Lowest:	45	40	35	47	19
Highest:	840	642	902	601	546
Mean:	284	263	275	259	228
Median:	279	266	263	224	208

Magnesium commercial samples (% of total amount of samples):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	6	24	68	100
2003	0	6	7	23	64	100
2004	0	4	6	21	69	100
2005	0	8	2	34	63	100
2006	1	6	10	30	54	100
Total	0	3	6	26	64	100

9. Iron

9.1 Homeowner Samples

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

Total number of samples:				Percentages:		
	0-49	>49	Total	0-49	>49	Total
	Normal	Excessive		Normal	Excessive	
Total	72	9	81	89	11	100

	2002-2006
Lowest:	1
Highest:	359
Mean:	28
Median:	10

9.2 Commercial Samples

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

Total number of samples:				Percentages:		
	0-49	>49	Total	0-49	>49	Total
	Normal	Excessive		Normal	Excessive	
2002	201	16	217	93	7	100
2003	77	10	87	89	11	100
2004	121	19	140	86	14	100
2005	151	25	176	86	14	100
2006	109	13	122	89	11	100
Total	659	83	742	89	11	100

	2002	2003	2004	2005	2006
Lowest:	1	2	1	2	3
Highest:	409	132	636	381	842
Mean:	20	24	29	28	35
Median:	10	13	15	11	16

10. Manganese

10.1 Homeowner Samples

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

Total number of samples:			Percentages:			
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
Total	74	7	81	91	9	100

	2002-2006
Lowest:	12
Highest:	400
Mean:	61
Median:	24

10.2 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	212	5	217	98	2	100
2003	82	5	87	94	6	100
2004	135	5	140	96	4	100
2005	168	8	176	95	5	100
2006	118	4	122	97	3	100
Total	715	27	742	96	4	100

	2002	2003	2004	2005	2006
Lowest:	6	7	13	7	14
Highest:	186	292	525	187	117
Mean:	33	36	49	36	48
Median:	24	21	36	26	46

11. Zinc

11.1 Homeowner Samples

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

Total number of samples:					Percentages:				
	<0.5	0.5-1.0	>1	Total	<0.5	0.5-1.0	>1	Total	
	Low	Medium	High		Low	Medium	High		
Total	3	6	72	81	4	7	89	100	

	2002-2006
Lowest:	0.2
Highest:	136.7
Mean:	12.0
Median:	1.9

11.2 Commercial Samples

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

Total number of samples:					Percentages:				
	<0.5	0.5-1.0	>1	Total	<0.5	0.5-1.0	>1	Total	
	Low	Medium	High		Low	Medium	High		
2002	2	22	193	217	1	10	89	100	
2003	2	12	73	87	2	14	84	100	
2004	1	35	104	140	1	25	74	100	
2005	11	42	123	176	6	24	70	100	
2006	12	27	83	122	10	22	68	100	
Total	28	138	576	742	4	19	78	100	

	2002	2003	2004	2005	2006
Lowest:	0.3	0.3	0.3	0.1	0.1
Highest:	10.5	21.4	74.6	7.9	25.2
Mean:	2.4	2.8	4.0	1.8	2.4
Median:	1.9	1.7	1.9	1.5	1.6

Appendix: Cornell Crop Codes

Crop codes are used in the Cornell Nutrient Analyses 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
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 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