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Soil Sample Survey

Clinton County

Samples analyzed by CNAL (2002-2006)

Clinton County (photo credit: Amy Ivy, CCE of Clinton County).

Summary compiled by

Renuka Rao, Amy Ivy, 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/

Soil Sample Survey

Clinton County

Samples analyzed by CNAL in 1995-2001

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Table of Content

Clinton County (photo credit: Amy Ivy, CCE of Clinton County).

1. County Introduction

Clinton County is located in the northeastern corner of the state. Its northern border is Canada and its eastern border is the west shore of Lake Champlain. Essex County is to the south and Franklin County is to the west. It is about 140 miles north of Albany, 45 miles south of Montreal, Canada, and Plattsburgh is the county seat.

The shape of the county is a rough square, about 35 miles north to south and 30 miles east to west. Its total area is 1117 square miles or 714,800 acres.

According to the 2002 Census of Agriculture there are 604 farms in Clinton County with 168,536 acres of land in farming.

Dairy farming is one of the most important industries in the Clinton County. Although the number of dairy farms has decreased in the past 10-20 years, the number of cows has remained steady. Large farms are growing larger but there are still quite a few smaller farms as well. Of the 160 dairy farms in the county, over half have fewer than 100 cows while 6 farms have 500 cows or more. Eighty percent of the agriculture receipts in the county are from dairy.

Apples are an economically important crop in the Clinton County. McIntosh grows especially well in the climate here but in recent years other varieties have been planted as well, especially Honey Crisp. Our sunny days and cool nights in fall are ideal for apple ripening.

In total, about 550 acres in Clinton County are planted to vegetables, especially pumpkins and sweet corn for direct market. Fewer potatoes are grown now than in the past. There is an increasing interest in grapes along Lake Champlain and several small vineyards (less than 10 acres each) have been recently planted.

Clinton County contains two main soil regions. The southern and western sections are in the Central highlands of the Adirondack uplands. This is a moderate to high relief region underlain by Precambian granite and gneisses. The highest elevation in the county is Lyon Mountain at 1167 meters (3830 feet).

The eastern and northern sections of Clinton County are within the Champlain and St. Lawrence lowlands. The Champlain lowland is of low to moderate relief, underlain by sedimentary rocks and glacial, lacustrine and marine deposits. Potsdam Sandstone is exposed throughout the northern and central regions of the county (*Resource: Soil Survey of Clinton County by NRCS*).

Most of Clinton County lies in the Lake Champlain watershed and Lake Champlain drains north into the St. Lawrence River in Canada. Total annual precipitation averages about 35 inches. The area with the longest growing season is to the north and along Lake Champlain with an average of 130-150 frost free days. As the elevation rises to the west, the number of frost-free days decreases. The primary crops grown are corn, alfalfa and soybeans for dairy feed.

Most of Clinton County, especially the southwestern section, is wooded. Trees are harvested for logs, pulpwood and firewood. Maple syrup is also produced in several locations. Soil best suited for cropping lies along the eastern side of the county in the Champlain Valley. Tile drainage is widely used to improve soil productivity.

Interstate Route 87, also called the Adirondack Northway, runs through the eastern section of the county, linking Albany to Montreal and providing a convenient mode of transportation for products and people. Ferry service runs year round to link Plattsburgh with Burlington, Vermont. The W.H. Miner Research Institute in Chazy provides educational and research opportunities and collaborates with researchers from Cornell University and Clinton County Cornell Cooperative Extension.

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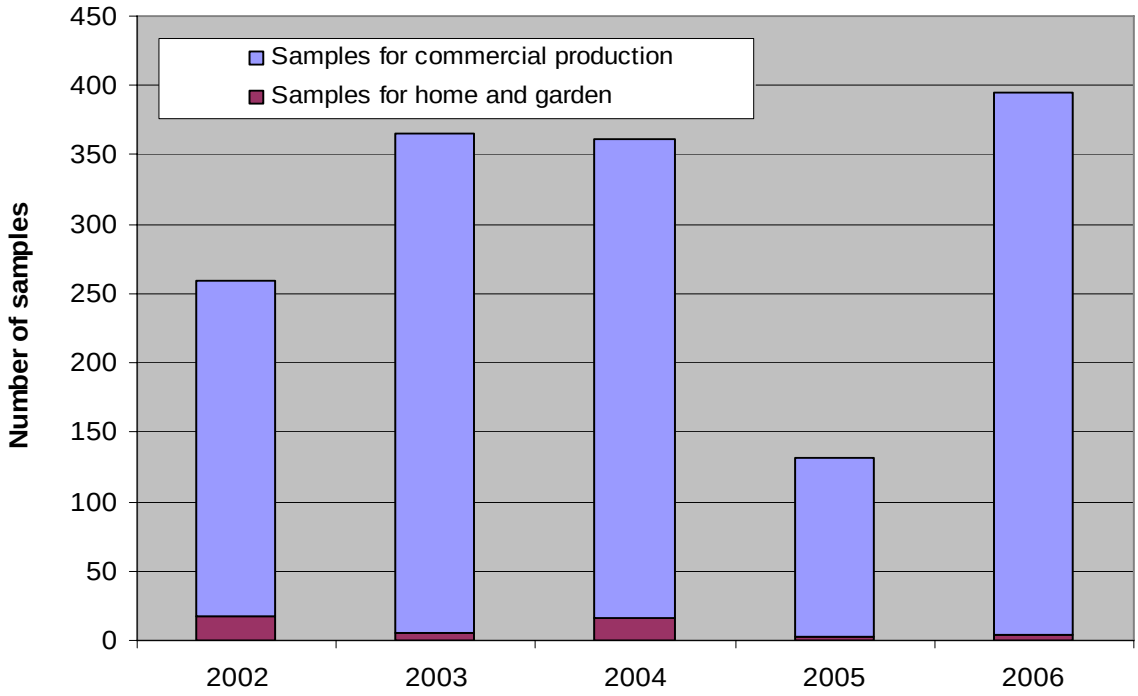
2. General Survey Summary

This survey summarizes the soil test results from grower (identified as "commercial samples") and homeowner samples from Clinton County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) during 2002 and 2006. The total number of samples analyzed in these years amounted to 1511. Of these 1465 samples (97%) were submitted by commercial growers while 46 samples (3%) were submitted by homeowners. The number of samples has been fluctuating over the past years.



Homeowners		Commercial		Total
2002	18	2002	241	259
2003	5	2003	360	365
2004	16	2004	345	361
2005	3	2005	128	131
2006	4	2006	391	395
Total	46	Total	1465	1511

The homeowners who submitted soil samples to the Cornell Nutrient Analysis Laboratory from 2002 to 2006 requested fertilizer recommendations for athletic fields (22%), lawns (22%), ornamentals (20%) and vegetables (17%) while the remainder requests were for azaleas, perennials, roses, roughs, and raspberries. Of all commercial grower samples, 59% did not indicate the crop to be grown. Other samples submitted for soil testing were for alfalfa or alfalfa/grass mixes (12%), corn silage or grain (10%), and grass hay production (8%) while a few growers were planning to grow clover/grass, soybeans, sweet corn, or grass for pasture.

Soils tested for home and garden in Clinton County were classified as soil management group 2 (9%), 3 (17%), 4 (20%), and 5 (54%) soils. A description of the different management groups is given below. Of the samples submitted by commercial growers, the majority (33%) belonged to group 4. Twenty percent belonged to group 1, 3% to group 2, and 9% was from group 3. Group 5 was represented by 31% of the samples while 1% was muck soils and 3% were of unknown origin. Naumburg was the most common soil series (25%), followed by Kingsbury (16%), Empeyville (9%), Malone (7%) and Muskellunge and Hogansburg (6% each).

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.

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to more than 20%. For homeowners most samples had between 2.0 and 5.0% (57% of all samples) with 33% testing between 3.0 and 6.0% organic matter and 11% with more than 6.9% organic matter. Of the samples submitted by commercial growers, 80% contained between 2.0 and 5.0% organic matter and 52% had between 3.0 and 6.0% organic matter. Only 2% of samples had 7% or greater organic matter content. The median organic matter level was 3.0% for the homeowner samples and ranged from 2.7 to 3.7% for commercial samples.

Soil pH in water (1:1 soil:water extraction ratio) varied from 5.2 to 8.0 for home and garden samples while 70% tested between 6.0 and 7.4 for pH. For the commercial samples, the highest pH was 8.2 and 84% 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 soil test method (Morgan, 1941). This solution contains sodium acetate buffered at a 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, 4% tested low for phosphorus, 11% tested medium, 54% tested high and 31% tested very high. This meant that 85% tested high or very high in P. For commercial growers, only 8% tested very high. In total 18% was low in P, 29% tested medium for P while 45% of the submitted samples were classified as high in soil test P. This means that 53% tested high or very high in P. There were no clear trends in P levels over the 5 years.

Classifications for potassium 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 soil test ranges in each of the management groups are given on page 6. 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.

Potassium classifications for Clinton County soils varied from very low (15% of the homeowner soils and 8% of the commercial growers' soils) to very high (28% of the homeowner soils and 17% of the commercial growers' soils). For homeowners, 26% tested low in K, 17% tested medium, and 13% tested high for potassium. For commercial growers' soils, 24% tested low, 22% tested medium and 26% tested high in potassium while for 3% of the samples, the K status could not be derived because soil series information was not provided.

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 magnesium 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 magnesium. 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 less than 10 to more than 2000 lbs Mg/acre (Morgan extraction). There were no soils that tested very low for Mg within the homeowner samples while only 5 commercial grower samples (<1%) tested very low in Mg. Most soils tested very high or very high for Mg (96% of the homeowner soils and 90% of the soils of the commercial growers). In total 10% of the homeowner soils and 5% of the commercial growers' soil tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Clinton County provided a desirable soil pH range is maintained

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 fell for 97-98% in the normal range with only one homeowner sample and two commercial grower soils testing excessive for Fe.

Similarly, most soils (98-100%) 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 lbs Zn per acre in the Morgan extraction are classified as low in Zn. Medium testing soils have between 0.5 and 1 lbs 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 zinc while 9% tested medium. Of the commercial growers' samples, 4% tested low in zinc, 22% tested medium while 74% was high in zinc.

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.

Clinton County (photo credit: Amy Ivy, CCE of Clinton County).

3. Cropping Systems

3.1 Homeowner Samples

Crops for which recommendations were requested by homeowners:

	2002-2006	%
ALG	2	4
ATF	10	22
LAW	10	22
MVG	8	17
PER	2	4
ROS	1	2
ROU	3	7
RSF	1	2
SAG	9	20
Total	46	100

Notes: 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	%
ABE/ABT	0	0	2	0	1	3	0
AGE/AGT	59	33	62	17	11	182	12
ALE/ALT	0	3	2	1	1	7	0
APP	1	0	18	2	7	28	2
BGE/BGT	0	0	0	2	0	2	0
BLB	2	1	0	1	0	4	0
BUK	1	0	0	0	0	1	0
CGE/CGT	2	5	2	2	0	11	1
CLE/CLT	1	4	0	2	0	7	0
COG/COS	65	33	34	17	2	151	10
GIE/GIT	28	9	0	5	0	42	3
GPF	0	4	0	1	2	7	0
GRE/GRT	7	12	33	14	6	72	5
MIX	1	2	0	0	0	3	0
OAS	3	0	0	0	0	3	0
OAT	1	0	0	0	0	1	0
OTH	1	1	9	0	0	11	1
PGE/PGT	0	2	0	0	0	2	0
PIE/PIT	11	6	7	0	0	24	2
PNT	0	4	1	1	1	7	0
PUM	5	0	0	2	0	7	0
SOY	8	0	0	0	0	8	1
STS	1	1	0	1	0	3	0
SWC	6	2	0	3	0	11	1
Unknown	38	238	175	57	360	868	59
Total	241	360	345	128	391	1465	100

Notes: 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)	4	9
SMG 3 (silt loam)	8	17
SMG 4 (sandy loam)	9	20
SMG 5 (sandy)	25	54
SMG 6 (mucky)	0	0
Total	46	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Adams	5	2	3	1	3	1	10	1
Adjidaumo	1	3	9	3	2	2	19	1
Amenia	4	1	0	0	1	0	2	0
Appleton	2	0	18	7	0	1	26	2
Becket	4	0	0	0	2	0	2	0
Bice	5	10	0	1	0	0	11	1
Bombay	4	0	25	21	0	4	50	3
Brayton	4	0	1	0	0	0	1	0
Broadalbin	4	2	0	0	0	0	2	0
Bucksport	6	3	3	0	0	0	6	0
Cathro	6	0	0	0	0	1	1	0
Champlain	5	0	1	0	0	0	1	0
Colosse	4	0	0	3	3	0	6	0
Colton	5	0	0	10	0	1	11	1
Cook	5	0	0	1	0	0	1	0
Cornish	3	2	0	0	0	0	2	0
Covert	4	0	8	0	0	0	8	1
Coveytown	4	0	8	7	6	1	22	2
Covington	1	28	2	0	2	0	32	2
Croghan	5	1	0	2	1	0	4	0
Deerfield	5	0	1	0	0	0	1	0
Empeyville	4	20	0	58	0	56	134	9
Fahey	5	1	1	0	3	1	6	0
Fernlake	4	0	2	0	0	0	2	0
Flackville	4	0	3	0	0	0	3	0
Fonda	2	0	0	0	0	1	1	0
Galway	4	6	0	0	0	0	6	0
Grenville	4	0	6	0	0	0	6	0
Hailsboro	3	6	8	3	2	0	19	1
Heuvelton	2	3	2	0	0	0	5	0
Hogansburg	4	7	18	42	10	5	82	6
Hoosic	4	0	0	0	0	3	3	0
Hudson	2	0	7	0	0	0	7	0
Junius	5	0	1	0	0	0	1	0
Kalurah	4	1	0	1	0	0	2	0
Kingsbury	1	9	50	61	12	108	240	16
Lordstown	3	1	0	0	0	0	1	0

Name	SMG	2002	2003	2004	2005	2006	Total	%
Lovewell	2	0	0	0	1	0	1	0
Madrid	4	1	1	0	0	0	2	0
Malone	4	31	39	21	5	7	103	7
Massena	4	2	1	5	0	0	8	1
Mino	4	0	2	1	0	0	3	0
Mooers	5	1	1	0	0	0	2	0
Munuscong	4	0	0	1	0	0	1	0
Muskellunge	3	28	44	8	7	1	88	6
Naumburg	5	35	58	47	50	183	373	25
Nehasne	4	0	1	0	0	0	1	0
Ogdensburg	4	0	4	0	0	0	4	0
Panton	1	2	0	0	0	0	2	0
Pinckney	3	3	0	0	0	0	3	0
Pipestone	5	0	3	0	0	0	3	0
Plainfield	5	0	3	1	0	0	4	0
Ricker	4	0	0	1	0	0	1	0
Runeberg	4	1	0	0	1	0	2	0
Schroon	5	13	2	6	3	1	25	2
Shaker	2	1	1	0	0	0	2	0
Skerry	5	0	1	0	0	0	1	0
Stockbridge	3	4	2	2	0	0	8	1
Summerville	4	0	1	0	1	0	2	0
Sunapee	4	0	3	0	3	0	6	0
Swanton	4	7	0	4	3	0	14	1
Trout River	5	0	0	1	0	0	1	0
Venango	3	0	5	1	0	0	6	0
Vergennes	1	0	1	0	0	0	1	0
Waddington	4	0	1	0	3	0	4	0
Wainola	5	2	1	1	1	0	5	0
Westbury	4	2	4	0	0	0	6	0
Wonsqueak	6	1	1	1	0	0	3	0
Worth	4	0	0	0	1	0	1	0
Unknown	-	1	3	23	2	14	43	3
Total	-	241	360	345	128	391	1465	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
Total #	1	10	12	10	4	1	3	5	46
Total %	2	22	26	22	9	2	7	11	100

	2002-2006
Lowest:	0.8
Highest:	22.5
Mean:	4.1
Median:	3.0

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	2	15	34	87	66	25	5	7	241
2003	1	29	124	113	58	22	5	8	360
2004	3	40	109	116	46	19	8	4	345
2005	0	15	40	45	16	5	3	4	128
2006	0	48	188	84	44	17	6	4	391
Total	6	147	495	445	230	88	27	27	1465

	2002	2003	2004	2005	2006
Lowest:	0.1	0.7	0.3	1.1	1.1
Highest:	19.0	23.0	8.2	8.4	19.1
Mean:	4.0	3.5	3.2	3.3	3.1
Median:	3.7	3.1	3.1	3.2	2.7

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	1	6	14	36	27	10	2	3	100
2003	0	8	34	31	16	6	1	2	100
2004	1	12	32	34	13	6	2	1	100
2005	0	12	31	35	13	4	2	3	100
2006	0	12	48	21	11	4	2	1	100
Total	0	10	34	30	16	6	2	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
Total #	0	0	1	1	8	15	9	11	1	0	46
Total %	0	0	2	2	17	33	20	24	2	0	100

	2002-2006
Lowest:	5.2
Highest:	8.0
Mean:	-
Median:	6.7

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	1	0	9	26	48	76	61	19	1	0	241
2003	0	0	3	16	88	156	85	12	0	0	360
2004	0	0	10	62	133	97	38	5	0	0	345
2005	0	0	4	6	33	60	21	3	1	0	128
2006	0	1	3	49	147	129	56	6	0	0	391
Total	1	1	29	159	449	518	261	45	2	0	1465

	2002	2003	2004	2005	2006
Lowest:	3.9	5.1	5.2	5.1	4.8
Highest:	8.2	7.7	7.7	8.0	7.6
Mean:	-	-	-	-	-
Median:	6.7	6.7	6.3	6.6	6.4

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	4	11	20	32	25	8	0	0	100
2003	0	0	1	4	24	43	24	3	0	0	100
2004	0	0	3	18	39	28	11	1	0	0	100
2005	0	0	3	5	26	47	16	2	1	0	100
2006	0	0	1	13	38	33	14	2	0	0	100
Total	0	0	2	11	31	35	18	3	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	
Total #	0	2	5	25	7	2	0	2	0	3	46
Total %	0	4	11	54	15	4	0	4	0	7	100

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

	2002-2006
Lowest:	2
Highest:	785
Mean:	66
Median:	28

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	66	54	89	19	0	4	7	1	1	241
2003	0	55	131	150	14	2	4	2	1	1	360
2004	0	69	86	164	16	3	2	4	0	1	345
2005	0	13	38	67	6	2	0	0	1	1	128
2006	1	64	121	184	13	5	1	1	0	1	391
Total	1	267	430	654	68	12	11	14	3	5	1465

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	2	0
Highest:	323	533	314	276	242
Mean:	20	16	15	18	14
Median:	9	8	10	10	9

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	100
2002	0	27	22	37	8	0	2	3	0	0	100
2003	0	15	36	42	4	1	1	1	0	0	100
2004	0	20	25	48	5	1	1	1	0	0	100
2005	0	10	30	52	5	2	0	0	1	1	100
2006	0	16	31	47	3	1	0	0	0	0	100
Total	0	18	29	45	5	1	1	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):

Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	4	4
Total (%)	0	0	0	0	100	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	0	1	4	8
Total (%)	0	38	0	13	50	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	2	3	1	3	9
Total (%)	0	22	33	11	33	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	7	7	5	4	2	25
Total (%)	28	28	20	16	8	100
Grand Total						
	Very Low	Low	Medium	High	Very High	Total
Total #	7	12	8	6	13	46
Total %	15	26	17	13	28	100

	2002-2006
Lowest:	34
Highest:	4529
Mean:	307
Median:	132

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	1	5	11	25	42
2003	2	14	17	15	14	62
2004	7	17	13	20	7	64
2005	0	2	4	7	3	16
2006	0	1	23	47	39	110
Total (#)	9	35	62	100	88	294
Total (%)	3	12	21	34	30	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	1	2	1	4
2003	0	3	4	7	14	28
2004	0	2	4	0	1	7
2005	0	0	0	1	0	1
2006	0	1	1	0	0	2
Total (#)	0	6	10	10	16	42
Total (%)	0	14	24	24	38	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	16	19	7	44
2003	0	5	10	22	22	59
2004	0	1	3	5	5	14
2005	0	0	1	4	4	9
2006	0	0	1	0	0	1
Total (#)	0	8	31	50	38	127
Total (%)	0	6	24	39	30	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	9	18	17	21	16	81
2003	15	36	25	35	17	128
2004	15	58	43	30	19	165
2005	2	13	13	8	3	39
2006	2	17	15	25	17	76
Total (#)	43	142	113	119	72	498
Total (%)	9	29	23	24	15	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	16	18	11	15	5	65
2003	11	20	16	23	6	76
2004	10	22	17	18	4	71
2005	11	24	9	8	9	61
2006	19	78	46	34	10	187
Total (#)	67	162	99	98	34	460
Total (%)	15	35	22	21	7	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	4	0	0	4
2003	0	0	4	0	0	4
2004	0	0	1	0	0	1
2005	0	0	0	0	0	0
2006	0	0	1	0	0	1
Total (#)	0	0	10	0	0	10
Total (%)	0	0	100	0	0	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	25	39	54	68	54	1	241
2003	28	78	76	102	73	3	360
2004	32	100	81	73	36	23	345
2005	13	39	27	28	19	2	128
2006	21	97	87	106	66	14	391
Grand Total	119	353	325	377	248	43	1465

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	10	16	22	28	22	0	100
2003	8	22	21	28	20	1	100
2004	9	29	23	21	10	7	100
2005	10	30	21	22	15	2	100
2006	5	25	22	27	17	4	100
Grand Total	8	24	22	26	17	3	100

	2002	2003	2004	2005	2006
Lowest:	6	23	1	38	10
Highest:	742	5473	2425	665	571
Mean:	156	171	138	141	145
Median:	140	131	114	105	124

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	
Total #	0	1	1	15	29	46
Total %	0	2	2	33	63	100

	2002-2006
Lowest:	54
Highest:	1510
Mean:	401
Median:	308

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	2	10	12	42	175	241
2003	0	9	17	71	263	360
2004	1	9	45	113	177	345
2005	0	2	8	32	86	128
2006	2	9	26	115	239	391
Total	5	39	108	373	940	1465

	2002	2003	2004	2005	2006
Lowest:	2	21	18	59	10
Highest:	1736	2117	1150	1305	1868
Mean:	421	393	271	326	296
Median:	397	320	203	283	240

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	1	4	5	17	73	100
2003	0	3	5	20	73	100
2004	0	3	13	33	51	100
2005	0	2	6	25	67	100
2006	1	2	7	29	61	100
Total	0	3	7	25	64	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	45	1	46

Percentages:

0-49	>49	Total
Normal	Excessive	
98	2	100

	2002-2006
Lowest:	1
Highest:	2182
Mean:	56
Median:	5

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	229	12	241
2003	355	5	360
2004	338	7	345
2005	124	4	128
2006	382	9	391
Total	1428	37	1465

Percentages:

0-49	>49	Total
Normal	Excessive	
95	5	100
99	1	100
98	2	100
97	3	100
98	2	100
97	3	100

	2002	2003	2004	2005	2006
Lowest:	1	1	2	1	1
Highest:	147	67	83	58	254
Mean:	13	8	13	12	13
Median:	7	6	10	9	9

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	45	1	46

Percentages:

0-99	>99	Total
Normal	Excessive	
98	2	100

	2002-2006
Lowest:	5
Highest:	106
Mean:	27
Median:	20

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	240	1	241		100	0	100
2003	359	1	360		100	0	100
2004	345	0	345		100	0	100
2005	128	0	128		100	0	100
2006	391	0	391		100	0	100
Total	1463	2	1465		100	0	100

	2002	2003	2004	2005	2006
Lowest:	2	4	2	6	1
Highest:	105	120	57	94	52
Mean:	20	18	19	21	17
Median:	17	13	18	20	16

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	4	41	46

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	9	89	100

	2002-2006
Lowest:	0.3
Highest:	95.9
Mean:	9.8
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	7	45	189	241
2003	8	86	266	360
2004	22	101	222	345
2005	5	17	106	128
2006	19	79	293	391
Total	61	328	1076	1465

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
3	19	78	100
2	24	74	100
6	29	65	100
4	13	83	100
5	20	75	100
4	22	74	100

	2002	2003	2004	2005	2006
Lowest:	0.1	0.2	0.1	0.1	0.1
Highest:	15.3	24.1	176.9	11.6	16.3
Mean:	2.6	1.9	2.3	2.0	2.2
Median:	2.0	1.5	1.3	1.7	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, 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
	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
BDR/DND	Beans-dry

Crop Code	Crop Description
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
ROU	Rough
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