

Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Herkimer Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

# Soil Sample Survey

# Herkimer County

Samples analyzed by CNAL (2002-2006)

---



Herkimer County (Photo credit: Bernard Armata, Cornell Cooperative Extension of Herkimer County).

**Summary compiled by**

**Renuka Rao, Bernard Armata, 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/>



Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Herkimer Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

# Soil Sample Survey

# Herkimer County

**Samples analyzed by CNAL (2002-2006)**

Summary compiled by

**Renuka Rao**

Director

Cornell Nutrient Analysis Laboratory  
Department of Crop and Soil Sciences  
804 Bradfield Hall, Cornell University  
Ithaca NY 14853

**Bernard Armata**

Executive Director / Agriculture Issues Leader  
Cornell Cooperative Extension of Herkimer County

**Quirine M. Ketterings and Hettie Krol**

Nutrient Management Spear Program

**December 13, 2007**

Correct Citation:

Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Soil sample survey of Herkimer County. Samples analyzed by the Cornell Nutrient Analysis Laboratory (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

---

## Table of Content

1. County Introduction.....	1
2. General Survey Summary.....	1
3. Cropping Systems.....	6
3.1 Homeowner Samples.....	6
3.2 Commercial Samples.....	7
4. Soil Types.....	8
4.1 Homeowner Samples.....	8
4.2 Commercial Samples.....	9
5. Organic Matter.....	10
5.1 Homeowner Samples.....	10
5.2 Commercial Samples.....	10
6. pH.....	11
6.1 Homeowner Samples.....	11
6.2 Commercial Samples.....	11
7. Phosphorus.....	12
7.1 Homeowner Samples.....	12
7.2 Commercial Samples.....	13
8. Potassium.....	14
8.1 Homeowner Samples.....	14
8.2 Commercial Samples.....	15
9. Magnesium.....	17
9.1 Homeowner Samples.....	17
9.2 Commercial Samples.....	18
10. Iron.....	19
10.1 Homeowner Samples.....	19
10.2 Commercial Samples.....	19
11. Manganese.....	20
11.1 Homeowner Samples.....	20
11.2 Commercial Samples.....	20
12. Zinc.....	21
12.1 Homeowner Samples.....	21
12.2 Commercial Samples.....	21
Appendix: Cornell Crop Codes.....	22

Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Herkimer Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

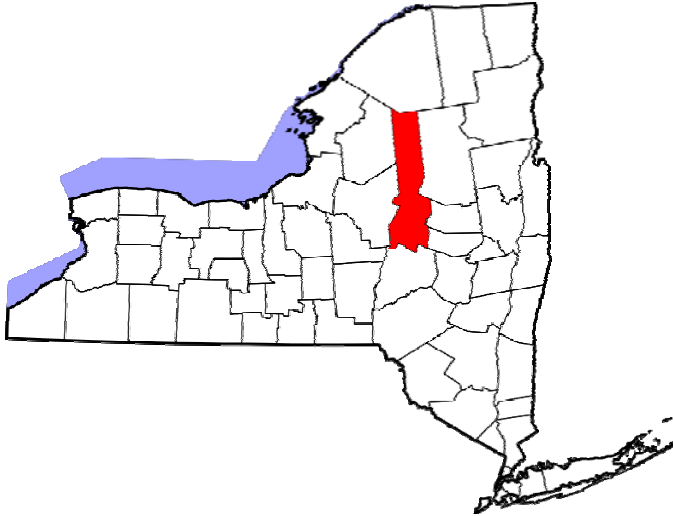


Herkimer County (Photo credit: Bernard Armata, Cornell Cooperative Extension of Herkimer County).



# 1. County Introduction

Herkimer County extends from the Adirondacks in the north to the Mohawk Valley and the Erie Canal in the south. It is rich in the history of the American Revolution, and is



named for General Nicholas Herkimer, who led the colonial militia at the Battle of Oriskany. The county population is approximately 63,000, with just under 700 farms and 154,000 farmed acres accounting for 16.5% of the total land area. Farming activities are located almost exclusively in the southern part of the county, where the conditions

are most conducive to farming and there is an abundance of prime soils. It is important to note that a significant portion of the county is located within the Adirondack Park (555,690 out of 931,923 total acres). Approximately 41% of the land south of the Adirondack Park is in farmland.

Dairying is the largest agricultural enterprise in Herkimer County with sales of approximately \$52 million accounting for upwards of 80% of the total agricultural income. Dairy farms in the county now number approximately 240, with most being in the 260 to 499 acre size range. According to NRCS, 25.2% of the land in Herkimer County is categorized as prime soils. Those categorized as “lands of statewide importance” or just below the prime soils, account for another 41% of county land. In addition to agriculture, the county relies heavily on tourism for income; with Old Forge, in the Adirondack Park, a nationally recognized winter recreational resort. Herkimer County includes only one city, that of Little Falls. The county seat is located in the town of Herkimer itself.

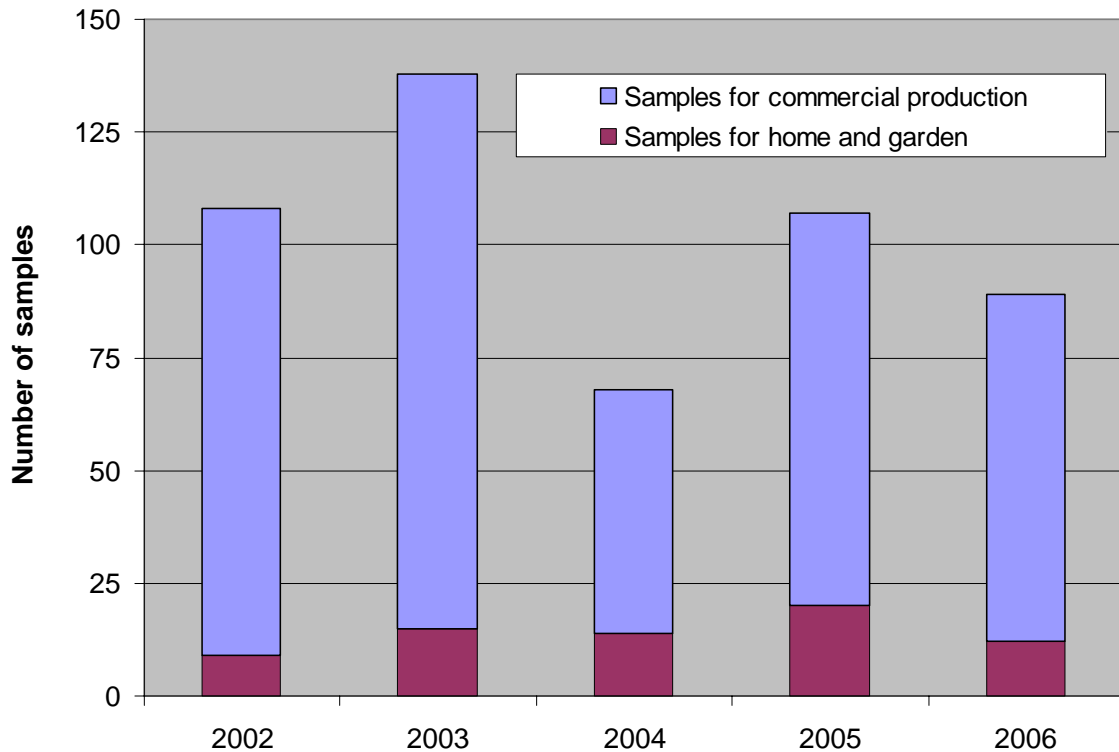
Bernard Armata

Executive Director / Agriculture Issues Leader

Cornell Cooperative Extension of Herkimer County

## 2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Herkimer County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 510. Of these, 440 samples (86%) were submitted by commercial growers while 70 samples (14%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	9	2002	99	108
2003	15	2003	123	138
2004	14	2004	54	68
2005	20	2005	87	107
<u>2006</u>	<u>12</u>	<u>2006</u>	<u>77</u>	<u>89</u>
Total	70	Total	440	510

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to requested fertilizer recommendations for home garden vegetable production (34%) and lawns (17%). Commercial growers predominantly submitted samples to grow alfalfa or alfalfa/grass mixes (32%), corn silage or grain (17%), and grass hay production (14%) while a few growers were planning to grow clover/grass mixes, small grains and other crops.

Soils tested for home and garden in Herkimer County were classified as belonging to soil management group 5 (40%), group 4 (36%), group 3 (6%), or group 2 (19%). 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, 67% belonged to soil management group 2. There were no group 1 samples. Eight percent belonged to group 2. Group 3 was represented by 17% of the samples, 4% were group 4 soils while the remainder was of unknown origin. There were no organic soils. Honeoye was the most common soil series (17% of all samples), followed by Lima (12%), Mohawk (10%), Manheim (8%) and Wassaic (6%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to almost 20%. For homeowner samples 39% tested between 2 and 5% organic matter, 13%

Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Herkimer Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

testing between 5 and 6% organic matter, while 37% had more than 6.9% organic matter. Of the commercial grower samples, 77% contained between 3 and 6% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from less than 3.6 to 8.3 for home and garden samples while 54% tested between pH 6.0 and 7.4. For the commercial samples, the highest pH was 7.9 and 71% 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, 29% of the soils tested low for P, 16% tested medium, 23% tested high and 32% tested very high. This meant that 55% tested high or very high in P. For commercial growers, only 4% tested very high. In total 45% were low in P, 28% tested medium while 23% were classified as high in soil test P. This means that 27% 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 below).

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



Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Herkimer Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

Potassium classifications for Herkimer County soils varied from very low (7% of the homeowner soils and 4% of the commercial growers' soils) to very high (36% of the homeowner soils and 31% of the commercial growers' soils). For homeowners, 16% tested low in K, 16% tested medium, and 26% tested high for potassium. For commercial growers' soils, 14% tested low, 19% tested medium and 29% tested high in K while for 3% the K status was unknown.

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 5 to 1436 lbs Mg/acre. There were only three soils that tested very low for Mg within the homeowner samples while 1% of the samples for commercial production tested very low in Mg. Most soils tested high or very high for Mg (72% of the homeowner soils and 88% of the soils of the commercial growers). In total 28% of the homeowner soils and 12% of the commercial growers' soil tested low or medium in Mg.

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 76-89% in the normal range with 24% of the homeowner soils and 11% of the commercial grower soils testing excessive for Fe. Most soils (86-99%) 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, 93% tested high for Zn while 7% tested medium. Of the commercial growers' samples, 7% tested low, 32% tested medium while 61% was 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	3	4
APR	1	1
ATF	4	6
BLU	1	1
FAR	6	9
GRA	1	1
HRB	1	1
LAW	12	17
MVG	24	34
OTH	6	9
PER	1	1
ROU	2	3
SAG	6	9
TRF	2	3
Total	70	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	22	59	23	16	16	136	31
ALE/ALT	0	1	4	0	0	5	1
APP	0	0	0	1	1	2	0
ASP	0	1	1	0	0	2	0
BCE	0	0	0	4	1	5	1
BGE/BGT	3	0	2	1	1	7	2
BLB	0	1	1	0	0	2	0
BSP	0	6	0	0	0	6	1
BSS	0	0	0	0	1	1	0
BUK	7	0	0	0	0	7	2
CGE/CGT	1	4	4	12	2	23	5
CLE/CLT	6	2	0	1	1	10	2
COG/COS	14	22	7	9	24	76	17
GIT	3	0	0	18	0	21	5
GRE/GRT	12	6	1	13	9	41	9
MIX	5	1	2	5	0	13	3
OAS	0	0	3	0	1	4	1
OAT	0	0	0	0	1	1	0
ONP	1	0	1	0	1	3	1
OTH	9	0	0	1	3	13	3
PGE/PGT	0	2	0	1	0	3	1
PIE/PIT	11	0	2	0	2	15	3
PNT	0	2	1	1	0	4	1
PUM	0	0	0	0	1	1	0
RSS	0	1	0	0	0	1	0
RYC	1	0	0	0	0	1	0
SOF	0	0	0	0	4	4	1
SOY	0	0	2	0	0	2	0
SQW	0	0	0	0	1	1	0
SSH	1	0	0	0	0	1	0
STE	0	1	0	0	0	1	0
SWC	0	1	0	0	0	1	0
TRE	1	0	0	1	0	2	0
TRP	1	2	0	0	0	3	1
TRT	1	0	0	0	0	1	0
WHT	0	0	0	0	1	1	0
Unknown	0	11	0	3	6	20	5
total	99	123	54	87	77	440	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)	13	19
SMG 3 (silt loam)	4	6
SMG 4 (sandy loam)	25	36
SMG 5 (sandy)	28	40
SMG 6 (mucky)	0	0
Total	70	100



Herkimer County (Photo credit: Bernard Armata, Cornell Cooperative Extension of Herkimer County).

## 4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Adams	5	0	0	0	0	3	3	1
Appleton	2	4	5	0	4	2	15	3
Becket	4	0	0	0	9	0	9	2
Broadalbin	4	2	0	5	10	5	22	5
Burdett	2	1	2	0	7	1	11	3
Cazenovia	2	0	0	0	0	1	1	0
Cohoctah	4	0	0	0	1	0	1	0
Conesus	2	5	2	1	5	4	17	4
Croghan	5	3	0	0	0	1	4	1
Deerfield	5	2	1	0	0	0	3	1
Farmington	3	1	1	6	1	1	10	2
Fredon	4	0	0	0	0	1	1	0
Hartland	4	0	0	0	1	1	2	0
Herkimer	3	2	5	1	0	2	10	2
Hilton	2	9	0	0	2	0	11	3
Hinckley	5	0	0	0	2	1	3	1
Honeoye	2	28	9	16	8	12	73	17
Hornell	2	0	0	0	1	0	1	0
Howard	3	1	5	1	0	1	8	2
Hudson	2	0	1	2	0	1	4	1
Ilion	2	0	1	0	0	1	2	0
Lansing	2	4	1	2	5	8	20	5
Lima	2	22	17	4	3	5	51	12
Manheim	2	0	8	4	10	12	34	8
Manlius	3	3	1	0	0	0	4	1
Massena	4	0	0	0	0	1	1	0
Mohawk	2	0	36	0	3	3	42	10
Mosherville	4	4	0	0	0	5	9	2
Nassau	4	3	0	0	0	0	3	1
Naumburg	5	2	0	0	2	2	6	1
Ontario	2	0	1	0	0	0	1	0
Palatine	2	0	3	0	0	0	3	1
Palmyra	3	0	1	1	0	2	4	1
Potsdam	4	0	0	0	1	0	1	0
Rhinebeck	2	0	5	0	3	0	8	2
Teel	2	0	0	0	1	0	1	0
Wassaic	4	0	8	11	7	0	26	6
Unknown	-	3	10	0	1	1	15	3
Total		99	123	54	87	77	440	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	2	1	5	18	9	9	9	17	70
Percentage	3	1	7	26	13	13	13	24	100

	2002-2006
Lowest:	0.5
Highest:	19.2
Mean:	5.8
Median:	5.0

### 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	0	1	3	12	39	27	10	7	99
2003	0	0	2	22	61	24	10	4	123
2004	1	1	1	11	23	9	5	3	54
2005	0	1	4	8	22	16	19	17	87
2006	0	0	5	29	32	5	2	4	77
Total	1	3	15	82	177	81	46	35	440

	2002	2003	2004	2005	2006
Lowest:	1.7	2.6	0.6	1.4	2.4
Highest:	13.3	17.1	9.1	18.3	9.1
Mean:	5.0	4.8	4.6	5.7	4.2
Median:	4.8	4.6	4.4	5.5	4.1

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	1	3	12	39	27	10	7	100
2003	0	0	2	18	50	20	8	3	100
2004	2	2	2	20	43	17	9	6	100
2005	0	1	5	9	25	18	22	20	100
2006	0	0	6	38	42	6	3	5	100
Total	0	1	3	19	40	18	10	8	100

## 6. pH

### 6.1 Homeowner Samples

pH of homeowner samples (numbers, 2002-2006):

	<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	8	8	4	3	9	10	19	7	2	0	70
Percentage	11	11	6	4	13	14	27	10	3	0	100

Lowest:	3.6
Highest:	8.3
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	0	4	13	13	18	23	23	5	0	0	99
2003	5	2	8	15	50	36	7	0	0	0	123
2004	0	0	0	9	23	15	5	2	0	0	54
2005	1	6	5	17	21	21	16	0	0	0	87
2006	0	0	9	18	31	10	9	0	0	0	77
Total	6	12	35	72	143	105	60	7	0	0	440

	2002	2003	2004	2005	2006
Lowest:	4.5	0.0	5.5	4.0	5.1
Highest:	7.7	7.3	7.9	7.4	7.4
Mean:	-	-	-	-	-
Median:	6.5	6.3	6.4	6.2	6.2

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	4	13	13	18	23	23	5	0	0	100
2003	4	2	7	12	41	29	6	0	0	0	100
2004	0	0	0	17	43	28	9	4	0	0	100
2005	1	7	6	20	24	24	18	0	0	0	100
2006	0	0	12	23	40	13	12	0	0	0	100
Total	1	3	8	16	33	24	14	2	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	20	11	16	5	4	1	3	0	10	70
Percentage	0	29	16	23	7	6	1	4	0	14	100

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

	2002-2006
Lowest:	1
Highest:	730
Mean:	81
Median:	11



## 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	55	25	18	0	0	0	0	0	1	99
2003	0	33	40	47	2	0	1	0	0	0	123
2004	0	28	14	10	0	0	0	1	0	1	54
2005	0	36	26	19	3	0	0	1	1	1	87
2006	0	47	17	9	2	1	0	1	0	0	77
Total	0	199	122	103	7	1	1	3	1	3	440

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	222	88	372	229	122
Mean:	8	10	14	14	8
Median:	2	5	3	4	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	56	25	18	0	0	0	0	0	1	100
2003	0	27	33	38	2	0	1	0	0	0	100
2004	0	52	26	19	0	0	0	2	0	2	100
2005	0	41	30	22	3	0	0	1	1	1	100
2006	0	61	22	12	3	1	0	1	0	0	100
Total	0	45	28	23	2	0	0	1	0	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 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	5	8	13
Total (%)	0	0	0	38	62	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
Total (#)	0	0	0	0	4	4
Total (%)	0	0	0	0	100	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
Total (#)	0	2	5	7	11	25
Total (%)	0	8	20	28	44	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
Total (#)	5	9	6	6	2	28
Total (%)	18	32	21	21	7	100

Potassium classification summary for homeowners:

Summary	Very Low	Low	Medium	High	Very High	Un-known	Total
Number	5	11	11	18	25	0	70
Percentage	7	16	16	26	36	0	100

	2002-2006
Lowest:	20
Highest:	3565
Mean:	305
Median:	178

## 8.2 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	9	20	25	19	73
2003	0	3	14	32	42	91
2004	0	3	7	7	12	29
2005	1	3	4	17	28	53
2006	0	6	12	18	14	50
Total (#)	1	24	57	99	115	296
Total (%)	0	8	19	33	39	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	2	2	1	7
2003	0	0	1	4	8	13
2004	0	5	1	1	2	9
2005	0	0	1	0	0	1
2006	0	0	0	2	4	6
Total (#)	0	7	5	9	15	36
Total (%)	0	19	14	25	42	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	1	2	3	2	1	9
2003	0	1	1	6	0	8
2004	1	3	4	4	4	16
2005	5	11	7	5	1	29
2006	0	9	3	0	1	13
Total (#)	7	26	18	17	7	75
Total (%)	9	35	24	23	9	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	6	1	0	0	0	7
2003	0	1	0	0	0	1
2004	0	0	0	0	0	0
2005	2	0	2	0	0	4
2006	3	3	0	1	0	7
Total (#)	4	5	2	1	2	21
Total (%)	52	24	10	5	10	100

Potassium classification summary for commercial samples.

Rao, R., B. Armata, Q.M. Ketterings, and H. Krol (2007). Herkimer Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-51. 24 pages.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	7	14	25	29	21	3	99
2003	0	5	16	42	50	10	123
2004	1	11	12	12	18	0	54
2005	8	14	14	22	29	0	87
2006	3	18	15	21	19	1	77
Grand Total	19	62	82	126	137	14	440

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	7	14	25	29	21	3	100
2003	0	4	13	34	41	8	100
2004	2	20	22	22	33	0	100
2005	9	16	16	25	33	0	100
2006	4	23	19	27	25	1	100
Grand Total	4	14	19	29	31	3	100

	2002	2003	2004	2005	2006
Lowest:	20	60	37	18	45
Highest:	1038	914	2216	959	711
Mean:	8	10	14	14	8
Median:	2	5	3	4	3

## 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	3	10	7	11	39	70
Percentage	4	14	10	16	56	100

	2002-2006
Lowest:	6
Highest:	1436
Mean:	290
Median:	223

## 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	5	7	34	51	99
2003	0	2	8	11	102	123
2004	0	2	1	8	43	54
2005	3	4	0	18	62	87
2006	0	12	7	20	38	77
Total	5	25	23	91	296	440

	2002	2003	2004	2005	2006
Lowest:	5	28	31	12	31
Highest:	1194	1050	989	1203	883
Mean:	241	349	326	398	218
Median:	205	357	249	271	194

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	2	5	7	34	52	100
2003	0	2	7	9	83	100
2004	0	4	2	15	80	100
2005	3	5	0	21	71	100
2006	0	16	9	26	49	100
Total	1	6	5	21	67	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	53	17	70

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	76	24	100

	2002-2006
Lowest:	2
Highest:	714
Mean:	65
Median:	16

### 10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	81	18	99
2003	118	5	123
2004	53	1	54
2005	66	21	87
2006	73	4	77
Total	391	49	440

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	82	18	100
	96	4	100
	98	2	100
	76	24	100
	95	5	100
	89	11	100

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	2
Highest:	498	208	50	378	95
Mean:	38	14	12	56	17
Median:	6	8	8	14	10

## 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	60	10	70

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	86	14	100

	2002-2006
Lowest:	3
Highest:	1392
Mean:	73
Median:	36

### 11.2 Commercial Samples

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
2002	99	0	99
2003	122	1	123
2004	52	2	54
2005	86	1	87
2006	76	1	77
Total	435	5	440

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	100	0	100
	99	1	100
	96	4	100
	99	1	100
	99	1	100
	99	1	100

	2002	2003	2004	2005	2006
Lowest:	3	14	9	5	12
Highest:	99	204	205	205	116
Mean:	28	37	36	37	35
Median:	28	36	25	35	33



## 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	0	5	65	70

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
	0	7	93	100

	2002-2006
Lowest:	0.7
Highest:	48.4
Mean:	12.8
Median:	4.6

### 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	0	23	76	99
2003	3	44	76	123
2004	8	20	26	54
2005	9	25	53	87
2006	12	28	37	77
Total	32	140	268	440

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
	0	23	77	100
	2	36	62	100
	5	37	48	100
	10	29	61	100
	16	36	48	100
	7	32	61	100

	2002	2003	2004	2005	2006
Lowest:	0.5	0.2	0.1	0.1	0.1
Highest:	15.6	12.7	17.8	29.9	70.6
Mean:	2.3	1.6	1.7	2.2	2.3
Median:	1.6	1.2	1.0	1.3	1.0

## 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