

Rao, R., C. Stewart, Q.M. Ketterings, and H. Krol (2007). Montgomery Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-49. 22 pages.

# Soil Sample Survey

# Montgomery County

Samples analyzed by CNAL (2002-2006)



Montgomery County (photo credit: Crystal Stewart, CCE of Montgomery County).

**Summary compiled by**

**Renuka Rao, Crystal Stewart, Quirine M. Ketterings, and Hettie Krol**



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



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**December 19, 2007**

Correct Citation:

Rao, R., C. Stewart, Q.M. Ketterings, and H. Krol (2007). Soil sample survey of Montgomery County. Samples analyzed by the Cornell Nutrient Analysis Laboratory (2002-2006). CSS Extension Bulletin E07-49. 22 pages.

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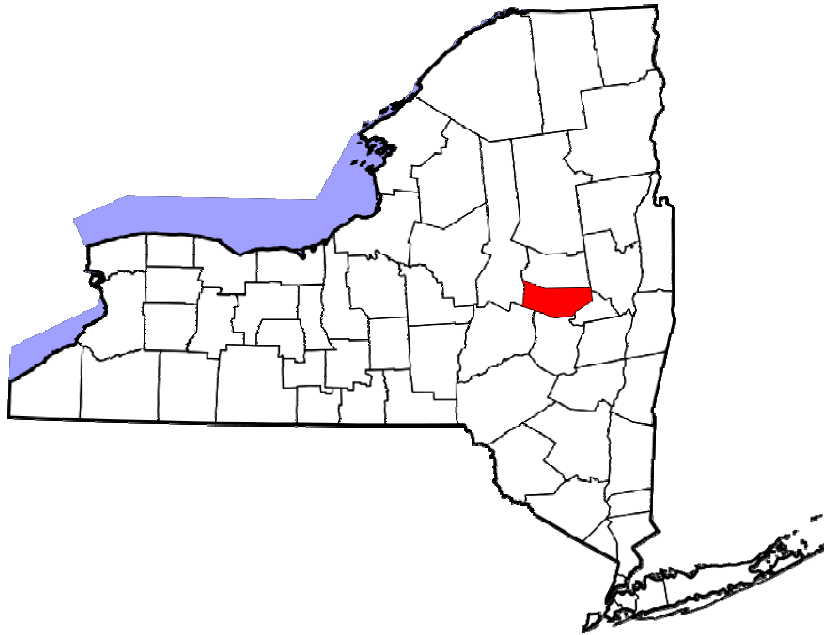


Montgomery County (photo credit: Crystal Stewart, CCE of Montgomery County).



# 1. County Introduction

Montgomery County is a predominantly rural, agricultural community. It has six neighboring counties, Fulton to its north, Herkimer to its west, Saratoga and Schenectady to its east, and Schoharie and Otsego to its south. The total amount of land in farming in



the county has been steadily dropping since the 1950's. Currently land in farms represent 58% of the county's total land.

Dairy represents the majority of the county's agricultural economic value, despite continual loss of dairy farms. Many dairies are trying to diversify into new

areas of agriculture. Areas of diversification include hay and silage, cow/calf operations, grain corn, vegetables and other products. Farms devoted only to these products are also present in the county. Many dairies are being bought by incoming farmers and transitioned to other types of agriculture. Amish are among the incoming buyers, and have established strong colonies in Montgomery County.

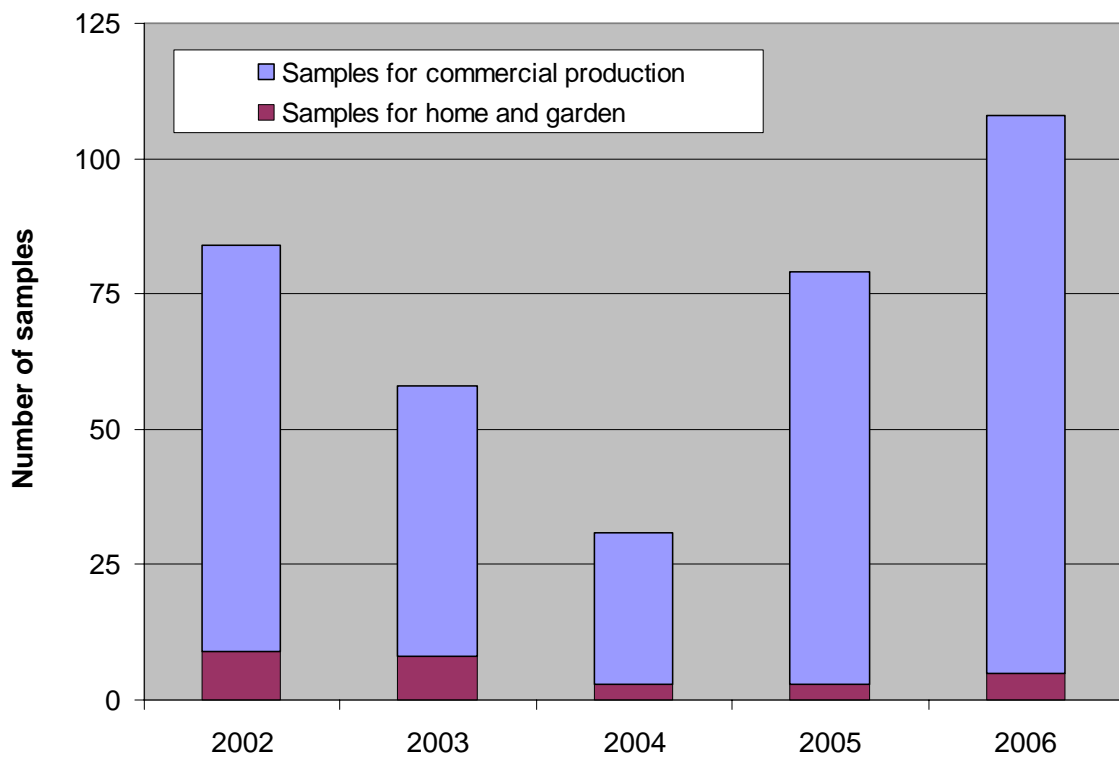
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## 2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Montgomery County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 360. Of these, 332 samples (92%) were submitted by commercial growers while 28 samples (8%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	9	2002	75	84
2003	8	2003	50	58
2004	3	2004	28	31
2005	3	2005	76	79
<u>2006</u>	<u>5</u>	<u>2006</u>	<u>103</u>	<u>108</u>
Total	28	Total	332	360

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (25%), athletic fields (18%) and home garden vegetable production (14%). Commercial growers submitted samples primarily to grow grass hay production (35%), corn silage or grain (23%), and alfalfa or alfalfa/grass mixes (22%).

Soils tested for home and garden in Montgomery County were classified as belonging to soil management group 2 (36%), group 3 (14%), group 4 (21%), or group 5 (29%). 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 (83%) belonged to soil management group 2. There were no group 6 samples, only one group 5 sample, and 2% each of group 1 and 4 samples, while 12% were group 3 soils. Darien was the most common soil series (16% of all samples), followed by Lansing (11%), Churchville (10%) and Mohawk and Palatine (8% each).

Organic matter levels, as measured by loss-on-ignition, ranged from 1% to 10%. For homeowner samples 43% had less than 3% organic matter, 36% tested between 3 and 5% organic matter and 21% had more than 5% organic matter. Of the samples submitted by commercial growers, 68% contained between 3 and 5% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 5.0 to 8.1 for home and garden samples while 50% had a pH of 7 or greater, 32% tested between pH 6 and 7, and 14% had a pH less than 6. For commercial grower samples, 72% had a pH between 6 and 7 while 20% had a pH of 7 or higher.

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, 14% tested medium, 46% tested high and 11% tested very high. This meant that 57% tested high or very high in P. For commercial growers, 4% tested very high. In total 52% were low in P, 21% tested medium for P while 23% of the submitted samples 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



Potassium classifications for Montgomery County soils varied from low (25% of the homeowner soils and 6% of the commercial growers' soils) to very high (25% of the homeowner soils and 30% of the commercial growers' soils). For homeowners, 14% tested medium, and 36% tested high for potassium. For commercial growers' soils, 23% tested medium and 41% tested high in K.

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 30 to almost 1200 lbs Mg/acre. There were no soil samples that tested very low for Mg. Most soils tested high or very high for Mg (93% 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 99-100% in the normal range with only 1% of the commercial grower soils testing excessive for Fe. 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. All but one of the commercial samples tested normal in Mn versus 79% if the homeowner samples. 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, 71% tested high for Zn while 11% tested medium and 18% were low in Zn. Of the commercial growers' samples, 13% tested low, 38% tested medium while 49% were high in Zn.

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

### 3. Cropping Systems

#### 3.1 Homeowner Samples

Crops for which recommendations are requested by homeowners:

	2002-2006	%
ATF	5	18
LAW	7	25
MVG	4	14
OTH	6	21
PER	2	7
RSP	1	4
SAG	1	4
TRF	2	7
Total	28	100

Note: See Appendix for Cornell crop codes.

#### 3.2 Commercial Samples

Crops for which recommendations are requested in commercial samples:

Current year crop	2002	2003	2004	2005	2006	Total	%
ABE/ABT	1	4	5	6	0	16	5
AGE/AGT	13	11	5	19	2	50	15
ALE/ALT	0	0	0	6	0	6	2
BGE	0	0	0	1	0	1	0
CGT/CLE/CLT	1	0	0	2	2	5	2
COG/COS	23	15	0	15	25	78	23
GIE/GIT	0	6	3	0	41	50	15
GRE/GRT	28	5	1	4	27	65	20
MIX	0	0	0	2	0	2	1
OAS/OAT	1	1	0	5	0	7	3
ONP	1	0	0	1	0	2	1
PGE/PGT	1	5	0	8	0	14	4
PIT/PNT	2	2	3	4	0	11	3
PUM	0	0	1	0	0	1	0
RSS/RYC	0	0	6	0	1	7	2
RYS	0	0	2	0	0	2	1
SOY	1	0	0	0	0	1	0
SQS	0	1	0	0	0	1	0
SWC	2	0	2	1	0	5	2
TRE	1	0	0	0	2	3	1
Unknown	0	0	0	2	3	5	2
Total	75	50	28	76	103	332	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)	10	36
SMG 3 (silt loam)	4	14
SMG 4 (sandy loam)	6	21
SMG 5 (sandy)	8	29
SMG 6 (mucky)	0	0
Total	28	100

## 4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Alton	5	0	1	0	0	0	1	0
Amenia	4	0	0	0	1	0	1	0
Angola	2	0	2	2	1	8	13	4
Appleton	2	6	1	4	5	1	17	5
Arnot	3	0	0	2	3	0	5	2
Barre	1	1	0	0	0	0	1	0
Basher	3	1	0	0	0	0	1	0
Burdett	2	4	2	2	5	2	15	5
Cayuga	2	5	1	0	1	0	7	2
Churchville	2	18	6	0	6	2	32	10
Conesus	2	1	2	0	0	2	5	2
Danley	2	6	1	1	1	0	9	3
Darien	2	8	12	0	9	25	54	16
Farmington	3	6	0	2	0	5	13	4
Fredon	4	0	0	0	1	0	1	0
Hamlin	2	1	1	0	2	2	6	2
Herkimer	3	0	0	0	0	4	4	1
Hornell	2	3	0	0	0	2	5	2
Howard	3	1	1	0	4	1	7	2
Hudson	2	0	0	0	2	0	2	1
Ilion	2	2	1	1	0	0	4	1
Joliet	4	0	0	0	0	2	2	1
Lansing	2	4	2	2	12	17	37	11
Madalin	1	0	0	0	1	4	5	2
Manheim	2	0	3	0	1	2	6	2
Minoa	4	1	0	0	0	0	1	0
Mohawk	2	4	5	1	11	7	28	8
Nellis	3	0	0	0	1	2	3	1
Nunda	2	1	1	0	0	0	2	1
Palatine	2	0	7	11	2	7	27	8
Palmyra	3	0	0	0	1	0	1	0
Phelps	3	1	0	0	1	2	4	1
Rhinebeck	2	1	0	0	0	2	3	1
Scio	3	0	0	0	0	1	1	0
Teel	2	0	1	0	3	0	4	1
Venango	3	0	0	0	0	1	1	0
Wassaic	4	0	0	0	2	1	3	1
Unknown	-	0	0	0	0	1	1	0
Total	-	75	50	28	76	103	332	100

## 5. Organic Matter

### 5.1 Homeowner Samples

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

	<1	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
Number	0	6	6	3	7	4	2	0	28
Percentage	0	21	21	11	25	14	7	0	100

	2002-2006
Lowest:	1.0
Highest:	6.2
Mean:	3.4
Median:	3.6

### 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	0	1	12	29	23	8	2	75
2003	0	0	1	12	20	12	1	4	50
2004	0	0	0	4	14	5	2	3	28
2005	0	0	10	26	29	5	5	1	76
2006	0	0	5	33	46	11	6	2	103
Total	0	0	17	87	138	56	22	12	332

	2002	2003	2004	2005	2006
Lowest:	2.9	2.7	3.0	2.4	2.3
Highest:	8.1	9.1	7.9	7.1	10.2
Mean:	4.9	4.7	4.9	4.1	4.4
Median:	4.7	4.5	4.5	4.0	4.2

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	0	1	16	39	31	11	3	100
2003	0	0	2	24	40	24	2	8	100
2004	0	0	0	14	50	18	7	11	100
2005	0	0	13	34	38	7	7	1	100
2006	0	0	5	32	45	11	6	2	100
Total	0	0	5	26	42	17	7	4	100

## 6. pH

### 6.1 Homeowner Samples

pH of homeowner samples (numbers):

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	?	Total
Number	0	0	1	3	6	3	8	3	3	0	1	28
Percentage	0	0	4	11	21	11	29	11	11	0	4	100

	2002-2006
Lowest:	5.0
Highest:	8.1
Mean:	-
Median:	6.8

### 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	4	10	29	25	6	1	0	0	75
2003	0	0	0	3	19	18	8	2	0	0	50
2004	0	0	0	2	10	10	3	3	0	0	28
2005	0	0	2	4	20	36	13	1	0	0	76
2006	0	0	1	2	23	49	24	4	0	0	103
Total	0	0	7	21	101	138	54	11	0	0	332

	2002	2003	2004	2005	2006
Lowest:	5.3	5.7	5.9	5.4	5.4
Highest:	7.5	7.7	7.6	7.5	7.7
Mean:	-	-	-	-	-
Median:	6.3	6.5	6.5	6.6	6.8

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	5	13	39	33	8	1	0	0	100
2003	0	0	0	6	38	36	16	4	0	0	100
2004	0	0	0	7	36	36	11	11	0	0	100
2005	0	0	3	5	47	47	17	1	0	0	100
2006	0	0	1	2	48	48	23	4	0	0	100
Total	0	0	2	6	30	42	16	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	
Number	0	8	4	13	0	0	2	0	0	1	28
Percentage	0	29	14	46	0	0	7	0	0	4	100

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

	2002-2006
Lowest:	1
Highest:	369
Mean:	29
Median:	9

### 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	49	12	11	2	0	1	0	0	0	75
2003	0	24	12	10	1	0	1	1	0	1	50
2004	0	13	4	11	0	0	0	0	0	0	28
2005	0	36	18	17	3	0	2	0	0	0	76
2006	0	50	24	27	1	0	0	0	0	1	103
Total	0	172	70	76	7	0	4	1	0	2	332

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	84	218	35	99	413
Mean:	6	16	8	10	11
Median:	2	4	5	4	4

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	65	16	15	3	0	1	0	0	0	100
2003	0	48	24	20	2	0	2	2	0	2	100
2004	0	46	14	39	0	0	0	0	0	0	100
2005	0	47	24	22	4	0	3	0	0	0	100
2006	0	49	23	26	1	0	0	0	0	1	100
Total	0	52	21	23	2	0	1	0	0	1	100

## 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	2	1	5	2	10
Total (%)	0	20	10	50	20	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	1	0	3	0	4
Total (%)	0	25	0	75	0	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	1	2	1	2	6
Total (%)	0	17	33	17	33	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	1	1	3	8
Total (%)	0	38	13	13	38	100

Potassium classification summary for homeowners:

	Very Low	Low	Medium	High	Very High	Total
Number	0	7	4	10	7	28
Percentage	0	25	14	36	25	100

	2002-2006
Lowest:	68
Highest:	697
Mean:	197
Median:	129



## 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	1	0	0	1
2003	0	0	0	0	0	0
2004	0	0	0	0	0	0
2005	0	0	0	0	1	1
2006	0	0	1	2	1	4
Total (#)	0	0	2	2	2	6
Total (%)	0	0	33	33	33	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	11	26	27	64
2003	0	8	15	12	13	48
2004	0	0	3	11	10	24
2005	0	1	13	32	15	61
2006	0	3	22	35	19	79
Total (#)	0	12	64	116	84	276
Total (%)	0	4	23	42	30	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	1	3	5	9
2003	0	0	0	0	1	1
2004	0	0	2	2	0	4
2005	0	0	0	5	4	9
2006	0	3	5	4	2	14
Total (#)	0	3	8	14	12	37
Total (%)	0	8	22	38	32	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	1	0	1
2003	0	0	0	0	0	0
2004	0	0	0	0	0	0
2005	0	0	1	2	2	5
2006	0	4	1	0	0	5
Total (#)	0	4	2	3	2	11
Total (%)	0	36	18	27	18	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	1	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	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 (%)	-	-	-	-	-	-

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	0	13	30	32	0	75
2003	0	9	15	12	14	0	50
2004	0	0	5	13	10	0	28
2005	0	1	14	39	22	0	76
2006	0	10	29	41	22	1	103
Grand Total	0	20	76	135	100	1	332

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	0	17	40	43	0	100
2003	0	18	30	24	28	0	100
2004	0	0	18	46	36	0	100
2005	0	1	18	51	29	0	100
2006	0	10	28	40	21	1	100
Grand Total	0	6	23	41	30	0	100

	2002	2003	2004	2005	2006
Lowest:	70	45	74	67	56
Highest:	1163	1091	334	653	1868
Mean:	192	176	164	183	161
Median:	154	101	141	129	121

## 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	2	0	3	23	100
Percentage	0	7	0	11	82	100

	2002-2006
Lowest:	30
Highest:	838
Mean:	389
Median:	412

### 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	4	71	75
2003	0	0	0	2	48	50
2004	0	0	0	0	28	28
2005	0	0	0	6	70	76
2006	0	0	0	4	99	103
Total	0	0	0	16	316	332

	2002	2003	2004	2005	2006
Lowest:	146	165	207	149	160
Highest:	852	781	621	1133	1189
Mean:	454	418	400	442	447
Median:	438	415	370	410	406

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	5	95	100
2003	0	0	0	4	96	100
2004	0	0	0	0	100	100
2005	0	0	0	8	92	100
2006	0	0	0	4	96	100
Total	0	0	0	5	95	100

## 10. Iron

### 10.1 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	28	0	28	100	0	100

	2002-2006
Lowest:	1
Highest:	48
Mean:	16
Median:	8

### 10.2 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	74	1	75	99	1	100
2003	50	0	50	100	0	100
2004	28	0	28	100	0	100
2005	74	2	76	97	3	100
2006	103	0	103	100	0	100
Total	329	3	332	99	1	100

	2002	2003	2004	2005	2006
Lowest:	1	1	2	2	1
Highest:	117	36	35	94	44
Mean:	14	9	10	11	8
Median:	9	5	6	7	6

## 11. Manganese

### 11.1 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	22	6	28	79	21	100

	2002-2006
Lowest:	5
Highest:	117
Mean:	46
Median:	34

### 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	75	0	75	100	0	100
2003	50	0	50	100	0	100
2004	28	0	28	100	0	100
2005	75	1	76	99	1	100
2006	103	0	103	100	0	100
Total	331	1	332	100	0	100

	2002	2003	2004	2005	2006
Lowest:	7	14	19	13	11
Highest:	52	99	83	125	61
Mean:	27	32	34	31	24
Median:	25	27	31	26	22

## 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	5	3	20	28

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
18	11	71	100

	2002-2006
Lowest:	0.1
Highest:	65.7
Mean:	6.8
Median:	2.2

### 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	3	26	46	75
2003	6	16	28	50
2004	0	12	16	28
2005	8	26	42	76
2006	26	46	31	103
Total	43	126	163	332

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
4	35	61	100
12	32	56	100
0	43	57	100
11	34	55	100
25	45	30	100
13	38	49	100

	2002	2003	2004	2005	2006
Lowest:	0.1	0.2	0.6	0.1	0.1
Highest:	18.4	7.2	4.6	4.1	8.7
Mean:	1.6	1.6	1.5	1.3	1.1
Median:	1.2	1.2	1.2	1.1	0.8

## Appendix: Cornell Crop Codes

Crop codes used in the Cornell Nutrient Analysis Laboratory.

Crop Code	Crop Description
	<b>Alfalfa</b>
ABE	Alfalfa trefoil grass, Establishment
ABT	Alfalfa trefoil grass, Established
AGE	Alfalfa grass, Establishment
AGT	Alfalfa grass, Established
ALE	Alfalfa, Establishment
ALT	Alfalfa, Established
	<b>Birdsfoot</b>
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
	<b>Barley</b>
BSP	Spring barley
BSS	Spring barley with legumes
BUK	Buckwheat
BWI	Winter barley
BWS	Winter barley with legumes
	<b>Clover</b>
CGE	Clover grass, Establishment
CGT	Clover grass, Established
CLE	Clover, Establishment
CLT	Clover, Established
CSE	Clover seed production, Establishment
CST	Clover seed production, Established
	<b>Corn</b>
COG	Corn grain
COS	Corn silage



Crop Code	Crop Description
	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
BDR/DND	Beans-dry
BLU	Blueberries
CEM	Cemetery
FAR	Fairway
FLA	Flowering annuals
GRA	Grapes
GEN	Green

Crop Code	Crop Description
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