

Rao, R., P. Trader, Q.M. Ketterings, and H. Krol (2007). Rockland Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-44. 21 pages.

# Soil Sample Survey

# Rockland County

Samples analyzed by CNAL (2002-2006)



Rockland County (Photo courtesy of the Rockland County Department of Planning).

**Summary compiled by**

**Renuka Rao, Paul Trader, Quirine M. Ketterings, and Hettie Krol**



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

&  
Nutrient Management Spear Program  
<http://nmisp.css.cornell.edu/>



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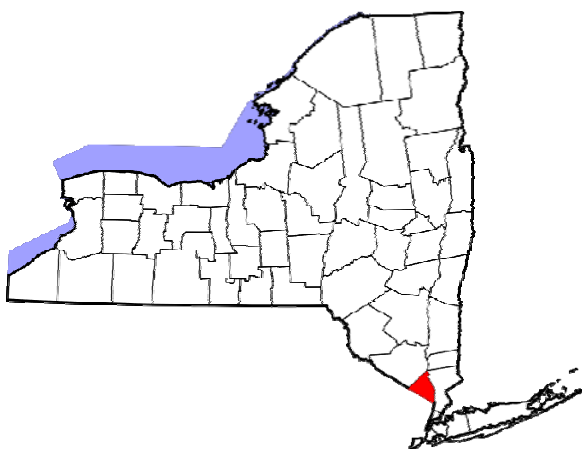
Rockland County (Photo courtesy of the Rockland County Department of Planning).





# 1. County Introduction

Rockland County is a suburban community that lies in the lower Hudson Valley approximately 12 miles north of New York City. Geographically, it is the smallest county in New York State, other than New York City. The county is triangular in shape, bordered



on the northwest by the Ramapo Mountains, the southwest by New Jersey, and the east by the Hudson River. Its terrain is hilly and its elevation ranges from sea level to 1,283 feet. Approximately 30% of Rockland's land is devoted to state and local parks, with less than 10% of all remaining land in the county being available for development.

According to the 2002 Census of Agriculture, Rockland was home to approximately 30 farms including four traditional farms in addition to greenhouses and horse farms. These farms accounted for approximately 1,000 acres of the county's total 111,500 acres (199 square miles). The leading products sold were fruit (apples and peaches), vegetables (corn and tomatoes), and greenhouse crops (bedding plants, holiday plants).

As of 2007, Rockland is home to approximately 295,000 people. As a largely suburban community with more than 95,000 housing units and a population density of more than 1,650 people per square mile, the majority of soil testing is done for residential lawns and gardens. Most home and garden soil samples are classified as silty, silt loam and sandy loam; organic matter is generally low, with 58% of the samples containing less than 5% organic matter. Sixty-three percent have a pH between 6.0 and 8.0, while 34% tested in the slightly-acidic range of pH 5.0 to 6.0. Phosphorus, a nutrient of growing concern in relation to water pollution problems, is adequate in Rockland's soils, with 75% of soil samples testing high or very high in phosphorus content and 16% testing medium in phosphorus. Thus, there is little need to add phosphorus to most home lawns and gardens.

Because of Rockland's suburban nature, its commercial horticulture industry is large, with more than 400 landscape-related businesses (lawn services, landscape contractors, arborists, etc.) and close to 10,000 employees in this seasonal business. Through the

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educational efforts of Cornell Cooperative Extension and the Rockland County Solid Waste Management Authority, homeowners and landscape businesses have been encouraged to establish backyard compost piles (to improve soil quality and reduce waste disposal costs) and properly handle fertilizers, compost, and pesticides (to preserve water quality and reduce environmental and health hazards).

Water bodies comprise 12.6% of the total acreage in Rockland County. However, because of continued building construction and the increasing population density, water is becoming a scarce resource, particularly in years with limited precipitation. The county is now taking steps to find a long-term solution.

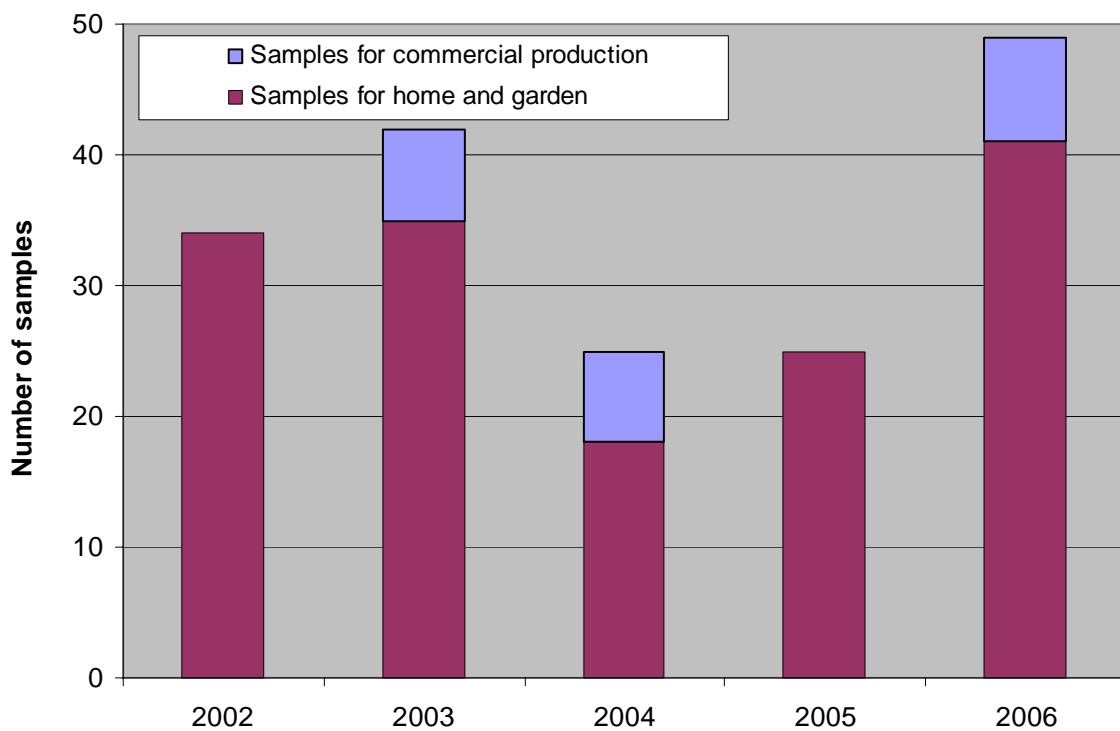
Paul Trader  
Executive Director  
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Rockland County (Photo courtesy of Cornell Cooperative Extension of Rockland County).

## 2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Rockland County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 175. Of these, 22 samples (13%) were submitted by commercial growers while 153 samples (87%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	34	2002	0	34
2003	35	2003	7	42
2004	18	2004	7	25
2005	25	2005	0	25
<u>2006</u>	<u>41</u>	<u>2006</u>	<u>8</u>	<u>49</u>
Total	153	Total	22	175

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (46%), ornamentals (13%) and home garden vegetable production (12%). Commercial growers submitted samples primarily to grow peaches (18%), tomatoes (14%), and apples (14%).

Homeowner samples in Rockland County were classified as belonging to soil management group 2 (25%), group 3 (27%), group 4 (39%), or group 5 (10%). Of the samples submitted by commercial growers, 60% belonged to soil management group 4, 27% were group 5 soils while 3 samples were of unknown origin. Wethersfield was the most common soil series (50%). 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.

Organic matter levels (measured by loss-on-ignition) ranged from less than 1% to greater than 40%. For homeowner samples, 55% had between 2 and 5% organic matter. Of the samples submitted by commercial growers, 68% contained 2 to 4% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 4.4 to 7.7 for home and garden samples while 51% tested between pH 6.0 and 7.4 and 34% had a pH between 5.0 and 6.0. For the commercial samples, the highest pH was 7.1 and 51% tested between pH 6.0 and 7.4.



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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, 10% of the soils tested low for P, 16% tested medium, 41% tested high and 33% tested very high. This meant that 75% tested high or very high in P. For commercial growers, 18% tested very high. In total 5% tested medium for P while 77% of the submitted samples were classified as high in soil test P. This means that 95% 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).

Potassium classifications for Rockland County soils varied from very low (1% of the homeowner soils) to very high (50% of the homeowner soils and 36% of the commercial growers' soils). For homeowners, 6% tested low in K, 13% tested medium, and 29% tested high for potassium. For commercial growers' soils, 9% tested low, 9% tested medium and 32% 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

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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 49 to more than 5000 lbs Mg/acre. There were no soils that tested very low for Mg. Most soils tested very high for Mg (70% 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 95-100% in the normal range with 5% of the homeowner soils testing excessive for Fe. Similarly, most soils (86% of homeowner samples and 100% of the commercial samples) 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, 98% tested high for Zn while 1% tested medium and 1% was low in Zn. Of the commercial growers' samples, all tested 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	2003	2004	2005	2006	Total	%
ALG	2	5	1	1	0	9	6
ATF	0	2	0	3	11	16	10
GEN	0	0	1	0	0	1	1
LAW	15	16	8	10	22	71	46
MVG	5	2	2	6	4	19	12
OTH	2	0	0	1	0	3	2
PER	1	2	0	0	0	3	2
PRK	0	0	0	2	0	2	1
ROS	1	1	0	0	0	2	1
ROU	0	0	1	0	0	1	1
SAG	5	5	4	2	4	19	13
SOD	0	1	0	0	0	1	1
STR	1	0	0	0	0	1	1
SWC	1	0	0	0	0	1	1
TRF	0	0	1	0	0	1	1
Unknown	1	1	0	0	0	2	1
Total	34	35	18	25	41	153	100

Note: See Appendix for Cornell crop codes.

#### 3.2 Commercial Samples

Crops for which recommendations are requested in commercial samples:

Current year crop	2002-06	%
APP	3	14
BLB	1	5
CHS	1	5
MIX	1	5
PCH	4	18
PLM	1	5
SWC	2	9
TME	1	5
TOM	3	14
Unknown	5	23
Total	22	100

Note: See Appendix for Cornell crop codes.

## 4. Soil Types

### 4.1 Homeowner Samples

Soil types (soil management groups) for homeowner samples:

	2002	2003	2004	2005	2006	Total	%
SMG 1 (clayey)	0	0	0	0	0	0	0
SMG 2 (silty)	5	12	7	5	9	38	25
SMG 3 (silt loam)	12	5	3	8	13	41	27
SMG 4 (sandy loam)	15	13	6	10	15	59	39
SMG 5 (sandy)	2	5	2	2	4	15	10
SMG 6 (mucky)	0	0	0	0	0	0	0
Total	34	35	18	25	41	153	100

### 4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002-2006	%
Hinckley	5	6	27
Paxton	4	1	5
Wethersfield	4	11	50
Yalesville	4	1	5
Unknown	-	3	14
Total	-	22	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
2002	0	1	5	11	4	3	5	5	34
2003	0	1	4	5	5	5	1	14	35
2004	1	0	3	2	3	2	3	4	18
2005	0	1	4	5	6	3	3	3	25
2006	0	0	5	15	7	6	1	7	41
Total	1	3	21	38	25	19	13	33	153

	2002	2003	2004	2005	2006
Lowest:	1.2	1.7	0.5	1.8	2.1
Highest:	9.9	38.3	42.4	10.1	35.8
Mean:	6.4	9.5	7.2	4.7	6.0
Median:	3.8	5.5	4.9	4.6	4.0

Organic matter in homeowner 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	3	15	32	12	9	9	15	100
2003	0	3	11	14	14	14	14	40	100
2004	6	0	17	11	17	11	11	22	100
2005	0	4	16	20	24	12	12	12	100
2006	0	0	12	37	17	15	15	17	100
Total	1	2	14	25	16	12	12	22	100

### 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
Total	0	0	5	10	4	1	0	2	22
Total	0	0	23	45	18	5	0	9	100

	2002-06
Lowest:	2.3
Highest:	9.9
Mean:	4.0
Median:	3.4

## 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
2002	1	0	6	4	10	8	5	0	0	0	34
2003	0	0	7	8	6	2	11	1	0	0	35
2004	0	0	2	5	1	3	6	1	0	0	18
2005	1	2	1	6	6	7	2	0	0	0	25
2006	0	1	6	7	13	7	5	2	0	0	41
Total	2	3	22	30	36	27	29	4	0	0	153

	2002	2003	2004	2005	2006
Lowest:	4.4	5.0	5.1	4.4	4.9
Highest:	7.3	7.7	7.5	7.1	7.6
Mean:	-	-	-	-	-
Median:	6.2	6.2	6.6	6.0	6.2

pH of homeowner of 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	3	0	18	12	29	24	15	0	0	0	100
2003	0	0	20	23	17	6	31	3	0	0	100
2004	0	0	11	28	6	17	33	6	0	0	100
2005	4	8	4	24	24	28	8	0	0	0	100
2006	0	2	15	17	32	17	12	5	0	0	100
Total	1	2	14	20	24	18	19	3	0	0	100

### 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
Total	0	0	0	5	11	5	1	0	0	0	22

	2002-06
Lowest:	5.5
Highest:	7.1
Mean:	-
Median:	6.1

## 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	
2002	0	5	5	11	4	1	2	1	0	5	34
2003	0	3	7	9	1	0	1	1	1	12	35
2004	0	0	3	8	2	0	0	0	0	5	18
2005	0	3	5	12	1	1	1	1	0	1	25
2006	0	4	4	23	2	1	1	1	0	5	41
Total	0	15	24	63	10	3	5	4	1	28	153

	2002	2003	2004	2005	2006
Lowest:	2	2	6	2	3
Highest:	1259	1945	1330	220	1126
Mean:	125	234	161	33	95
Median:	18	36	32	12	22

Phosphorus in homeowner 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	15	15	32	12	3	6	3	0	15	100
2003	0	9	20	26	3	0	3	3	3	34	100
2004	0	0	17	44	11	0	0	0	0	28	100
2005	0	12	20	48	4	4	4	4	0	4	100
2006	0	10	10	56	5	2	2	2	0	12	100
Total	0	10	16	41	7	2	3	3	1	18	100

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

### 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	
Total	0	0	1	17	1	1	0	0	0	2	22
Total	0	0	5	77	5	5	0	0	0	9	100

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

Lowest:	5	Highest:	755	Mean:	69	Median:	21
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## 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	
2002	0	0	1	0	4	5
2003	0	1	1	4	6	12
2004	0	0	0	3	4	7
2005	0	1	1	1	2	5
2006	0	0	0	1	8	9
Total (#)	0	2	3	9	24	38
Total (%)	0	5	8	24	63	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
2002	0	0	1	4	7	12
2003	0	1	1	2	1	5
2004	0	0	0	2	1	3
2005	0	0	2	4	2	8
2006	0	0	3	2	8	13
Total (#)	0	1	7	14	19	41
Total (%)	0	2	17	34	46	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
2002	1	3	3	4	4	15
2003	0	0	2	3	8	13
2004	0	0	1	1	4	6
2005	0	0	1	4	5	10
2006	0	2	1	6	6	15
Total (#)	1	5	8	18	27	59
Total (%)	2	8	14	31	46	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
2002	0	0	0	1	1	2
2003	0	0	1	1	3	5
2004	1	0	0	0	1	2
2005	0	1	1	0	0	2
2006	0	0	0	2	2	4
Total (#)	1	1	2	4	7	15
Total (%)	7	7	13	27	47	100



Potassium classification summary for homeowners:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
2002	1	3	5	9	16	34
2003	0	2	5	10	18	35
2004	1	0	1	6	10	18
2005	0	2	5	9	9	25
2006	0	2	4	11	24	41
Grand Total	2	9	20	45	77	153

Summary (%)	Very Low	Low	Medium	High	Very High	Total
2002	3	9	15	26	47	100
2003	0	6	14	29	51	100
2004	6	0	6	33	56	100
2005	0	8	20	36	36	100
2006	0	5	10	27	59	100
Grand Total	1	6	13	29	50	100

	2002	2003	2004	2005	2006
Lowest:	41	62	43	61	77
Highest:	4811	9573	10785	584	5534
Mean:	542	1188	1030	209	646
Median:	197	222	231	177	214

## 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	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	2	2	3	6	13
Total (%)	0	15	15	23	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	0	4	2	6
Total (%)	0	0	0	67	33	100

Potassium classification summary for commercial samples.

	Very Low	Low	Medium	High	Very High	Un-known	Total
Number	0	2	2	7	8	3	22
Percentage	0	9	9	32	36	14	100

	2002-06
Lowest:	91
Highest:	2553
Mean:	353
Median:	233

## 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	
2002	0	0	1	12	21	34
2003	0	0	2	8	25	35
2004	0	0	0	4	14	18
2005	0	2	1	5	17	25
2006	0	1	3	7	30	41
Total	0	3	7	36	107	153

	2002	2003	2004	2005	2006
Lowest:	72	75	107	49	55
Highest:	3751	5100	4745	1314	3973
Mean:	565	928	786	339	536
Median:	297	290	360	298	306

Magnesium in homeowner samples (% of total number of samples):

	Very Low	Low	Medium	High	Very High	Total
2002	0	0	3	35	62	100
2003	0	0	6	23	71	100
2004	0	0	0	22	78	100
2005	0	8	4	20	68	100
2006	0	2	7	17	73	100
Total	0	2	5	24	70	100

### 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	
Number	0	0	0	0	22	22
Percentage	0	0	0	0	100	100

	2002-06
Lowest:	210
Highest:	1063
Mean:	460
Median:	421

## 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	
2002	34	0	34
2003	34	1	35
2004	18	0	18
2005	20	5	25
2006	40	1	41
Total	146	7	153

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	97	3	100
	100	0	100
	80	20	100
	98	2	100
	95	5	100

	2002	2003	2004	2005	2006
Lowest:	2	2	4	3	4
Highest:	42	67	47	115	69
Mean:	14	15	16	28	17
Median:	9	10	13	17	11

### 10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
Total	22	0	22

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100

	2002-06
Lowest:	2
Highest:	27
Mean:	9
Median:	7



## 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	
2002	32	2	34	94	6	100
2003	28	7	35	80	20	100
2004	14	4	18	78	22	100
2005	22	3	25	88	12	100
2006	36	5	41	88	12	100
Total	132	21	153	86	14	100

	2002	2003	2004	2005	2006
Lowest:	13	17	16	20	14
Highest:	257	644	439	301	185
Mean:	39	97	84	54	48
Median:	29	42	46	33	32

### 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	
Total	22	0	22	100	0	100

	2002-06
Lowest:	12
Highest:	88
Mean:	28
Median:	24

## 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	
2002	0	1	33	34
2003	0	0	35	35
2004	0	0	18	18
2005	0	0	25	25
2006	2	0	39	41
Total	2	1	150	153

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
	0	3	97	100
	0	0	100	100
	0	0	100	100
	0	0	100	100
	5	0	95	100
	1	1	98	100

	2002	2003	2004	2005	2006
Lowest:	0.9	1.8	2.9	1.2	0.1
Highest:	186.0	68.8	37.6	74.2	85.8
Mean:	16.9	20.7	12.7	12.7	8.0
Median:	5.8	13.6	10.2	6.1	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	
Total	0	0	22	22

Percentages:

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

	2002-06
Lowest:	1.3
Highest:	22.7
Mean:	8.0
Median:	6.1

## 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
BLB/BLU	Blueberries
CEM	Cemetery
CHS	Cherries, Sweet
FAR	Fairway
FLA	Flowering annuals
GRA	Grapes

Crop Code	Crop Description
GEN	Greens
HRB	Herbs
IDL	Idle land
LAW	Lawn
MIX/MVG	Mixed vegetables
OTH	Others
PCH	Peaches
PER	Perennials
PLM	Plums
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
SOD	Sod production
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TME	Tomatoes, Early
TOM	Tomatoes
TRE	Christmas trees, Establishment
TRF	Turf
TRT	Christmas trees, Topdressing