

Rao, R., D. Sprague, Q.M. Ketterings, and H. Krol (2007). Allegany Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-10. 33 pages.

# Soil Sample Survey

# **Allegany County**

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

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Allegany County (photo credit: Dean Sprague, CCE of Allegany County).

**Summary compiled by**  
**Renuka Rao, Dean Sprague, Quirine M. Ketterings, and Hettie Krol**



**Cornell Nutrient Analysis Laboratory**

<http://www.css.cornell.edu/soiltest/newindex.asp>

**&**

**Nutrient Management Spear Program**

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**October 10, 2007**

Correct Citation:

Rao, R., D. Sprague, Q.M. Ketterings, and H. Krol (2007). Soil sample survey of Allegany County. Samples analyzed by the Cornell Nutrient Analysis Laboratory (2002-2006). CSS Extension Bulletin E07-10. 33 pages.

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## Table of Content

1. County Introduction.....	1
2. General Survey Summary.....	3
3. Cropping Systems.....	7
3.1 Homeowner Samples.....	7
3.2 Commercial Samples.....	8
4. Soil Types.....	9
4.1 Homeowner Samples.....	9
4.2 Commercial Samples.....	10
5. Organic Matter.....	12
5.1 Homeowner Samples.....	12
5.2 Commercial Samples.....	13
6. pH.....	14
6.1 Homeowner Samples.....	14
6.2 Commercial Samples.....	15
7. Phosphorus.....	16
7.1 Homeowner Samples.....	16
7.2 Commercial Samples.....	17
8. Potassium.....	18
8.1 Homeowner Samples.....	18
8.2 Commercial Samples.....	20
9. Magnesium.....	23
9.1 Homeowner Samples.....	23
9.2 Commercial Samples.....	24
10. Iron.....	25
10.1 Homeowner Samples.....	25
10.2 Commercial Samples.....	26
11. Manganese.....	27
11.1 Homeowner Samples.....	27
11.2 Commercial Samples.....	28
12. Zinc.....	29
12.1 Homeowner Samples.....	29
12.2 Commercial Samples.....	30
Appendix: Cornell Crop Codes.....	31

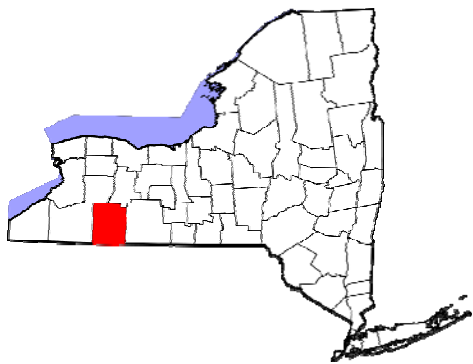
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# 1. County Introduction

Allegany County is located in the southwestern part of New York State bordering Pennsylvania to the south; Cattaraugus County, NY to the west; and Steuben County, NY



to the east. Allegany County is located in a portion of the Appalachian Region and has many unique geographic and geological features including the Genesee River (which bisects the county), a major watershed linking Lake Ontario to the Finger Lakes and continuing into Pennsylvania. Allegany County is a rural county with 180,000 acres in farms (27% of the land in the county). In 2002, Allegany

County ranked 14<sup>th</sup> in the state for number of farms and 16<sup>th</sup> for land in farms with 860 farms averaging 209 acres each.

Dairy is the number one farm product for the county with approximately 59% of the total dollar agriculture sales. The other major agricultural products for the county are: cattle and calves (15% of total sales), nursery and greenhouse (8%), vegetables (6%), and hay and silage (5%).

Agriculture is a major land use and contributor to the tax base in Allegany County. The industry continues to restructure to take advantage of economies of scale and technological advances like automated milking systems, biotechnology, and integrated pest management. New concentrated animal feeding operation regulations may hasten the restructuring in the dairy sector. Dairy farming continues to be the primary farm enterprise in the county. The production of vegetables and specialty horticultural crops, like herbs, bedding plants, and tomatoes, is a growing sector of the industry. Small farm numbers are increasing as people from other occupations seek a lifestyle that is closer to the land. Agriculture is an integral part of the landscape and cultural fabric of Allegany County.

Dean Sprague

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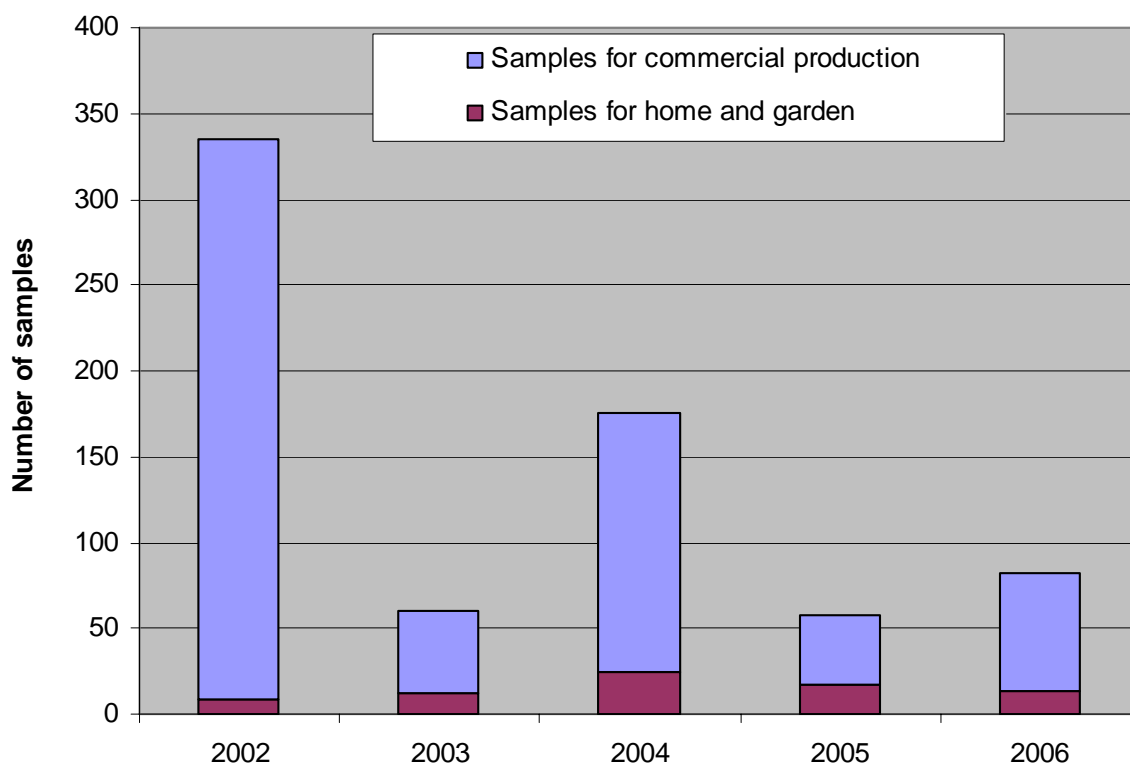
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## 2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Allegany County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 711. Of these, 635 samples (89%) were submitted by commercial growers while 76 samples (11%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	9	2002	326	335
2003	12	2003	48	60
2004	25	2004	151	176
2005	17	2005	41	58
<u>2006</u>	<u>13</u>	<u>2006</u>	<u>69</u>	<u>82</u>
<b>Total</b>	<b>76</b>	<b>Total</b>	<b>635</b>	<b>711</b>

The majority (56%) of the homeowners who submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 requested fertilizer recommendations for home garden vegetable production, lawns and perennials. Commercial growers submitted samples to grow corn silage or grain (30%), grass hay production (19%), alfalfa or alfalfa/grass mixes (17%), while a few growers were planning to grow clover/grass mixes.

Soils tested for home and garden in Allegany County were classified as belonging to soil management group 3 (58%), group 2 (24%), group 4 (17%), or group 5 (1%). 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 (84%) belonged to soil management group 3. There were only two group 1 samples. Eleven percent belonged to group 2. Group 4 was represented by 1% of the samples while the remainder was of unknown origin. There were no organic soils. Chenango was the most common soil series (17% of all samples), followed by Mardin (14%), Volusia and Tioga (9% each) and Willdin and Hornell (6% each).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 2% to 37%. For homeowners most samples had between 3 and 6% organic matter (71% of all



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samples), while 19% was classified as soils with more than 6.0% organic matter. Of the samples submitted by commercial growers, 77% contained between 3 and 6% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 4.6 to 8.0 for home and garden samples while 46% tested between 6.0 and 7.4 for pH. For the commercial samples, the highest pH was 7.7 and 62% 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, 30% of the soils tested low for P, 20% tested medium, 22% tested high and 28% tested very high. This meant that 50% tested high or very high in P. For commercial growers, 4% tested very high. In total 39% were low in P, 27% tested medium for P while 30% of the submitted samples were classified as high in soil test P. This means that 34% tested high or very high in P.

Classifications for K depend on soil management group. The fine textured soils (soil management group 1) have a greater K supplying capacity than the coarse textured sandy soils (soil management group 5). Classification for each of the management groups in the above table represent very low, low, medium, high and very high. So for example for soil management group 5 and 6, <60 lbs K/acre means the soil is very low in K, between 60 and 114 lbs K/acre is medium, 115-164 lbs K/acre is medium, 165-269 lbs K/acre is high and >269 lbs K/acre is classified as very high (see Table on page 6).

Potassium classifications for Allegany County soils varied from very low (1% of the homeowner soils and commercial growers' soils) to very high (59% of the homeowner soils and 37% of the commercial growers' soils). For homeowners, less than 1% tested low in K, 13% tested medium, and 26% tested high for potassium. For commercial growers' soils, 9% tested very low or low, 18% 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

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 32 to almost 6000 lbs Mg/acre. None of the soil samples tested very low for Mg. Most soils tested high or very high for Mg (95% of the homeowner soils and 97% of the soils of the commercial growers). In total 5% of the homeowner soils and 3% 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 ranged from 71-86% in the normal range with 29% of the homeowner soils and 14% 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. Eighteen percent of the homeowner soils tested excessive in Mn with the remainder in the normal range. For commercial agriculture samples, 93% were in the normal range with 7% being excessive in Mn. 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, 87% tested high for Zn while 12% tested medium. Of the commercial growers' samples, 4% tested low, 19% tested medium while 78% were high in Zn.

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

### 3. Cropping Systems

#### 3.1 Homeowner Samples

Crops for which recommendations are requested by homeowners:

	2002-2006	%
FLA	2	3
HRB	4	5
LAW	9	12
MIX	1	1
MVG	24	32
OTH	18	24
PER	4	5
PTO	2	3
PUM	1	1
SAG	9	12
Unknown	2	3
Total	76	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	0	2	1	0	0	3	0
AGE/AGT	54	4	1	2	3	64	10
ALE/ALT	2	2	33	4	2	43	7
ALG	0	0	1	0	0	1	0
APP	0	0	2	0	0	2	0
BCE/BCT	6	1	2	0	5	14	2
BGE/BGT	3	0	6	4	4	17	3
BSP	0	0	0	1	0	1	0
BUK	2	0	3	0	0	5	1
CBS	0	0	0	0	1	1	0
CGE/CGT	26	1	6	6	4	43	7
CLECLT	6	5	8	2	7	28	4
COG/COS	116	13	44	4	11	188	30
GIE/GIT	34	0	0	8	3	45	7
GPV	0	0	1	0	0	1	0
GRE/GRT	36	10	32	1	0	79	12
IDL	0	1	2	0	1	4	1
MIX	0	0	1	0	1	2	0
OAS	5	0	2	3	2	12	2
OAT	2	0	1	1	2	6	1
OTH	2	2	1	0	1	6	1
PGT	4	1	0	0	0	5	1
PIE/PIT	1	1	0	1	0	3	0
PLE/PLT	0	0	1	1	0	2	0
PNT	0	0	0	3	3	6	1
PUM	0	2	0	0	1	3	0
RYC	0	0	0	0	1	1	0
RYS	0	1	0	0	0	1	0
SSH	21	0	0	0	0	21	3
SUN	0	0	1	0	0	1	0
TRE	3	0	0	0	0	3	0
TRT	2	1	0	0	0	3	0
TUR	1	0	1	0	0	2	0
WPT	0	0	0	0	2	2	0
Unknown	0	1	1	0	15	17	3
Total	326	48	151	41	69	635	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)	18	24
SMG 3 (silt loam)	44	58
SMG 4 (sandy loam)	13	17
SMG 5 (sandy)	1	1
SMG 6 (mucky)	0	0
Total	76	100

## 4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Allard	3	2	2	0	0	0	4	1
Almond	3	5	0	0	0	0	5	1
Arkport	4	2	0	0	0	0	2	0
Barbour	3	1	0	0	0	0	1	0
Bath	3	3	1	3	1	3	11	2
Braceville	4	0	0	0	0	2	2	0
Caneadea	2	4	0	0	6	0	10	2
Chenango	3	42	6	50	1	8	107	17
Chippewa	3	0	0	0	1	0	1	0
Erie	3	12	1	5	1	1	20	3
Fremont	2	4	0	0	0	1	5	1
Hawksnest	3	4	0	0	0	0	4	1
Hornell	2	38	2	0	0	0	40	6
Hornellsville	3	1	0	0	0	0	1	0
Howard	3	11	2	3	0	0	16	3
Ischua	3	2	0	0	0	0	2	0
Lackawanna	3	2	0	0	2	1	5	1
Langford	3	2	0	0	0	2	4	1
Lewbath	3	13	1	0	0	0	14	2
Lewbeach	3	2	0	0	0	0	2	0
Lobdell	3	1	0	0	0	1	2	0
Lordstown	3	1	0	0	0	0	1	0
Madalin	1	2	0	0	0	0	2	0
Mardin	3	27	6	21	12	20	86	14
Middlebury	3	3	1	4	0	1	9	1
Mongaup	3	1	0	0	0	0	1	0
Morris	3	0	0	1	0	0	1	0
Napoli	3	1	0	0	0	0	1	0
Niagara	3	0	0	1	0	0	1	0
Olean	2	2	1	0	0	0	3	0
Onteora	3	3	0	0	0	0	3	0
Ontusia	3	7	0	0	0	0	7	1
Red Hook	4	0	1	0	0	0	1	0
Rhinebeck	2	7	0	2	0	1	10	2
Rushford	3	1	0	0	0	0	1	0
Scio	3	2	2	0	4	1	9	1



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Name	SMG	2002	2003	2004	2005	2006	Total	%
Teel	2	0	1	0	0	1	2	0
Tioga	3	27	7	15	2	6	57	9
Tunkhannock	3	0	1	1	0	1	3	0
Unadilla	3	16	3	11	1	2	33	5
Valois	3	2	0	0	1	5	8	1
Vly	3	5	0	0	0	0	5	1
Volusia	3	18	8	19	5	7	57	9
Wayland	2	0	1	1	0	0	2	0
Wellsboro	3	0	0	0	4	2	6	1
Willdin	3	35	0	0	0	0	35	6
Willowemoc	3	11	0	0	0	0	11	2
Yorkshire	3	1	0	0	0	0	1	0
Unknown	-	3	1	14	0	3	21	3
Total	-	326	48	151	41	69	635	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
#	0	1	6	17	16	21	4	11	76
%	0	1	8	22	21	28	5	14	100

	2002-2006
Lowest:	1.8
Highest:	37.0
Mean:	5.7
Median:	4.7

## 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	10	25	61	127	72	19	12	326
2003	0	1	6	17	14	8	1	1	48
2004	0	6	17	30	56	34	3	5	151
2005	0	1	9	10	6	11	3	1	41
2006	0	1	13	23	14	5	7	6	69
Total	0	19	70	141	217	130	33	25	635

	2002	2003	2004	2005	2006
Lowest:	1.4	1.5	1.5	1.7	1.8
Highest:	8.9	8.4	8.3	10.0	23.1
Mean:	4.5	4.1	4.2	4.2	4.5
Median:	4.5	4.0	4.3	4.0	3.9

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	3	8	19	39	22	6	4	100
2003	0	2	13	35	29	17	2	2	100
2004	0	4	11	20	37	23	2	3	100
2005	0	2	22	24	15	27	7	2	100
2006	0	1	19	33	20	7	10	9	100
Total	0	3	11	22	34	20	5	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
#	0	6	12	19	9	13	13	3	1	0	76
%	0	8	16	25	12	17	17	4	1	0	100

	2002-2006
Lowest:	4.6
Highest:	8.0
Mean:	-
Median:	6.0

## 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	1	34	87	105	83	15	1	0	0	0	326
2003	0	0	9	7	11	16	3	2	0	0	0	48
2004	0	2	15	37	44	45	7	0	0	0	1	151
2005	0	0	7	11	9	13	1	0	0	0	0	41
2006	0	10	5	14	18	16	6	0	0	0	0	69
Total	0	13	70	156	187	173	32	3	0	0	1	635

	2002	2003	2004	2005	2006
Lowest:	4.9	5.1	4.8	5.1	4.7
Highest:	7.5	7.7	7.0	7.1	7.4
Mean:	-	-	-	-	-
Median:	6.1	6.3	6.2	6.0	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	0	10	27	32	25	5	0	0	0	0	100
2003	0	0	19	15	23	33	6	4	0	0	0	100
2004	0	1	10	25	29	30	5	0	0	0	1	100
2005	0	0	17	27	22	32	2	0	0	0	0	100
2006	0	14	7	20	26	23	9	0	0	0	0	100
Total	0	2	11	25	29	27	5	0	0	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	
#	0	23	15	17	2	1	3	3	4	8	76
%	0	30	20	22	3	1	4	4	5	11	100

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

	2002-2006
Lowest:	1
Highest:	1071
Mean:	73
Median:	8



## 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	131	82	100	9	1	0	2	0	1	130
2003	0	17	19	12	0	0	0	0	0	0	111
2004	0	59	38	49	4	0	0	0	0	1	253
2005	0	17	13	10	0	0	0	0	1	0	270
2006	0	24	21	20	3	0	0	0	0	1	272
Total	0	248	173	191	16	1	0	2	1	3	1036

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	235	31	215	171	1149
Mean:	10	7	11	10	27
Median:	5	5	5	5	5

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	40	25	31	3	0	0	1	0	0	100
2003	0	35	40	25	0	0	0	0	0	0	100
2004	0	39	25	32	3	0	0	0	0	1	100
2005	0	41	32	24	0	0	0	0	2	0	100
2006	0	35	30	29	4	0	0	0	0	1	100
Total	0	39	27	30	3	0	0	0	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 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	0	0	0	0	0	0
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	1	0	1	3	13	18
Total (%)	6	0	6	17	72	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	9	12	23	44
Total (%)	0	0	20	27	52	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	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 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	1	1
Total (%)	0	0	0	0	100	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	0	0	0	0	0	0

Rao, R., D. Sprague, Q.M. Ketterings, and H. Krol (2007). Allegany Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-10. 33 pages.

Potassium classification summary for homeowners:

Summary	Very Low	Low	Medium	High	Very High	Total
Number	1	0	10	20	45	76
Percentage	1	0	13	26	59	100

	2002-2006
Lowest:	37
Highest:	5206
Mean:	413
Median:	246

## 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	0	1	1	2
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	1	1	2
Total (%)	0	0	0	50	50	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	7	14	15	19	55
2003	0	0	1	1	3	5
2004	0	0	1	1	1	3
2005	0	0	0	3	3	6
2006	0	0	0	1	2	3
Total (#)	0	7	16	21	28	72
Total (%)	0	10	22	29	39	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	3	35	49	71	106	264
2003	0	4	8	20	9	42
2004	0	3	33	51	47	124
2005	1	2	5	11	16	35
2006	0	1	4	29	27	61
Total (#)	4	45	99	182	205	535
Total (%)	1	8	19	34	38	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	1	1	2
2003	0	0	1	0	0	1
2004	0	0	0	0	0	0
2005	0	0	0	0	0	0
2006	0	0	0	1	1	2
Total (#)	0	0	1	2	2	5
Total (%)	0	0	20	40	40	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	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 (%)	0	0	0	0	0	0
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 (%)	0	0	0	0	0	0

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	3	42	63	88	127	3	326
2003	0	4	10	21	12	1	48
2004	0	3	34	52	48	14	151
2005	1	2	5	14	19	0	41
2006	0	1	4	31	30	3	69
Grand Total	4	52	116	206	236	21	635

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	1	13	19	27	39	1	100
2003	0	8	21	44	25	2	100
2004	0	2	23	34	32	9	100
2005	2	5	12	34	46	0	100
2006	0	1	6	45	43	4	100
Grand Total	1	8	18	32	37	3	100

	2002	2003	2004	2005	2006
Lowest:	33	59	72	39	79
Highest:	2480	341	1321	686	6543
Mean:	214	161	231	230	323
Median:	152	151	166	171	187



## 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	2	10	62	76
Percentage	0	3	3	13	82	100

	2002-2006
Lowest:	32
Highest:	3588
Mean:	503
Median:	372

## 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	6	30	290	326
2003	0	0	0	7	41	48
2004	0	0	2	11	138	151
2005	0	0	0	3	38	41
2006	0	2	6	7	54	69
Total	0	2	14	58	561	635

	2002	2003	2004	2005	2006
Lowest:	66	118	98	132	37
Highest:	847	811	1019	988	5926
Mean:	425	383	465	466	471
Median:	422	374	468	432	430

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	2	9	89	100
2003	0	0	0	15	85	100
2004	0	0	1	7	91	100
2005	0	0	0	7	93	100
2006	0	3	9	10	78	100
Total	0	0	2	9	88	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	54	22	76

Percentages:

0-49	>49	Total
Normal	Excessive	
71	29	100

	2002-2006
Lowest:	2
Highest:	334
Mean:	44
Median:	23

## 10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	304	22	326
2003	43	5	48
2004	115	36	151
2005	34	7	41
2006	51	18	69
Total	547	88	635

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	93	7	100
	90	10	100
	76	24	100
	83	17	100
	74	26	100
	86	14	100

	2002	2003	2004	2005	2006
Lowest:	1	3	1	2	2
Highest:	225	79	246	158	234
Mean:	21	22	32	31	38
Median:	14	15	15	16	15

## 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	62	14	76

Percentages:

0-99	>99	Total
Normal	Excessive	
82	18	100

	2002-2006
Lowest:	7
Highest:	288
Mean:	71
Median:	50

## 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	315	11	326	97	3	100
2003	44	4	48	92	8	100
2004	143	8	151	95	5	100
2005	39	2	41	95	5	100
2006	48	21	69	70	30	100
Total	598	46	635	93	7	100

	2002	2003	2004	2005	2006
Lowest:	11	7	8	14	13
Highest:	200	136	553	140	447
Mean:	44	49	49	49	92
Median:	38	43	35	40	55

## 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	9	66	76

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	12	87	100

	2002-2006
Lowest:	0.1
Highest:	117.3
Mean:	8.2
Median:	4.0

## 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	48	275	326
2003	2	10	36	48
2004	4	33	114	151
2005	5	11	25	41
2006	9	16	44	69
Total	23	118	494	635

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	15	84	100
4	21	75	100
3	22	75	100
12	27	61	100
13	23	64	100
4	19	78	100

	2002	2003	2004	2005	2006
Lowest:	0.4	0.3	0.1	0.1	0.1
Highest:	36.0	87.7	9.2	23.8	29.2
Mean:	2.4	4.9	1.7	1.9	2.4
Median:	1.7	1.5	1.5	1.2	1.5



## 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

Crop Code	Crop Description
	<b>Corn</b>
COG	Corn grain
COS	Corn silage
	<b>Grasses, pastures, covercrops</b>
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
	<b>Small grains</b>
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
	<b>Others</b>
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