

Rao, R., C. Logue, Q.M. Ketterings, and H. Krol (2007). Schenectady Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-24. 19 pages.

Soil Sample Survey

Schenectady County

Samples analyzed by CNAL (2002-2006)



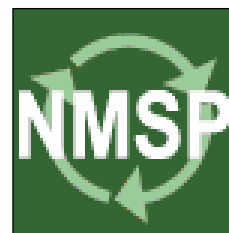
Schenectady County (photo credit: Anita Paley, CCE of Schenectady County).

Summary compiled by
Renuka Rao, Chris Logue, Quirine M. Ketterings, and Hettie Krol



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

&
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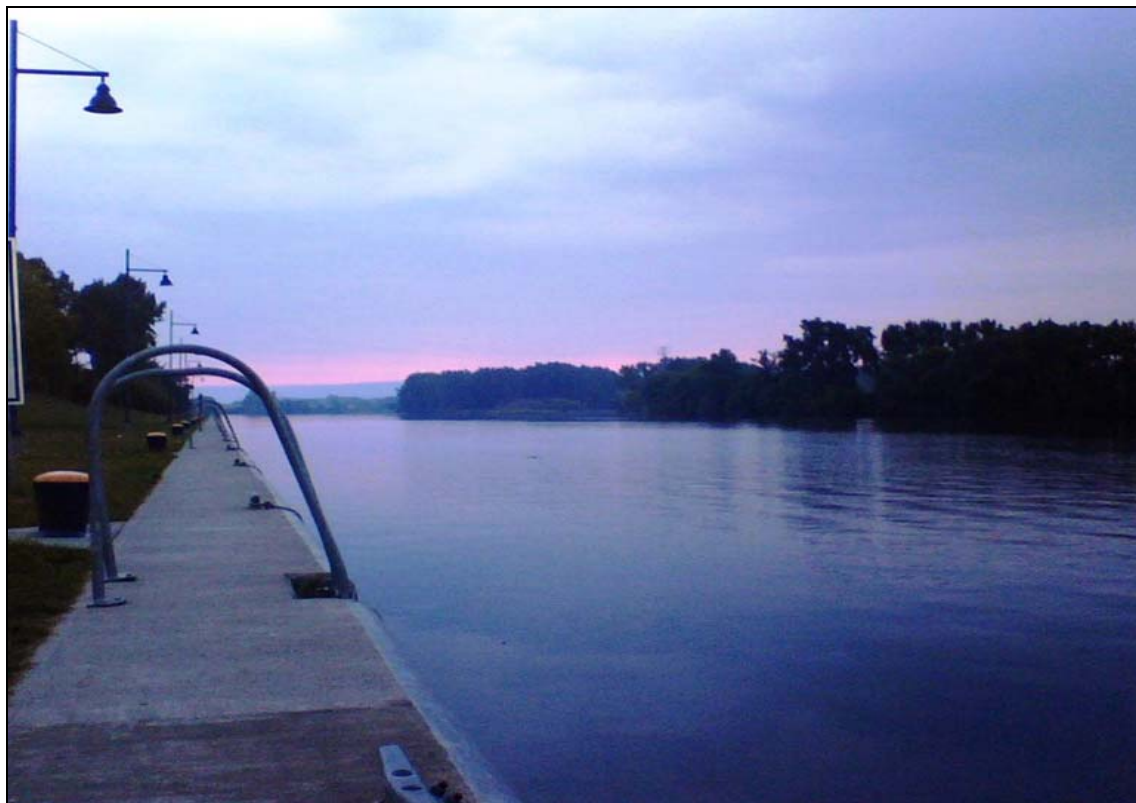
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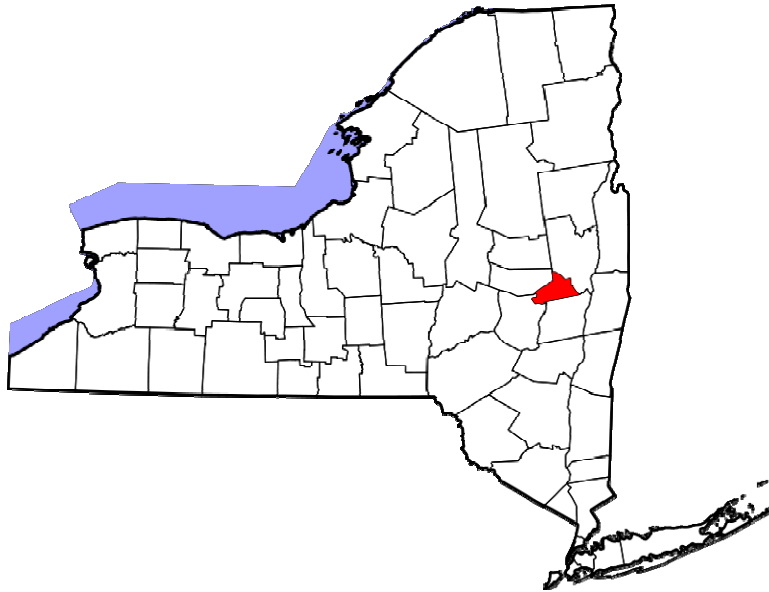


Schenectady County (photo credit: Chris Logue (above) + Anita Paley (below), Schenectady County CCE).



1. County Introduction

Schenectady County is the second smallest of the upstate counties covering approximately 208 square miles in east central New York. The county lies at the eastern end of the



Mohawk Valley just west of the confluence of the Mohawk and Hudson Rivers in Cohoes, Albany County. The total county population is approximately 150,440. Schenectady County is considered an urban county with the majority of the population residing in eastern part of the county including: the City of Schenectady (pop.

61,000), and the towns of Glenville, Niskayuna, and Rotterdam. The western portion of the county is comprised of the towns of Duanesburg, Delanson and Princetown. The western portion of the county is quite rural, but it has experienced significant growth in the past ten years.

The Great Flats Aquifer is located within the boundaries of Schenectady County and provides drinking water to approximately 150,000 residents of Schenectady and neighboring Saratoga County. The existence of this aquifer and the important role that it plays in our county and region puts a high priority on water quality and other environmental issues as they relate to industrial, suburban and agricultural sectors within the county.

The leading agricultural commodities in the county are: dairy products (23% of total sales), vegetables (21% of total), and nursery and greenhouse crops (20% of total).

The most productive farmland lies along the Mohawk River in the Northeast portion of the county and the Schoharie Creek in the western part of the county.

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In 2003 there were 21,700 acres of land in agricultural production in the county or about 16% of the total. In 2002 there were 200 farms in the county. In 1997 there were 187 farms in the county. The increase in the number of farms is in the categories of under \$10,000 in sales and in the \$10,000-\$49,000 sales category.

Based on an increased interest in locally produced food, we anticipate that the increase in the number of small farms and associated marketing channels such as farmers markets will continue in the county for a number of years to come. This trend is a positive one for the county, region and our agricultural producers.

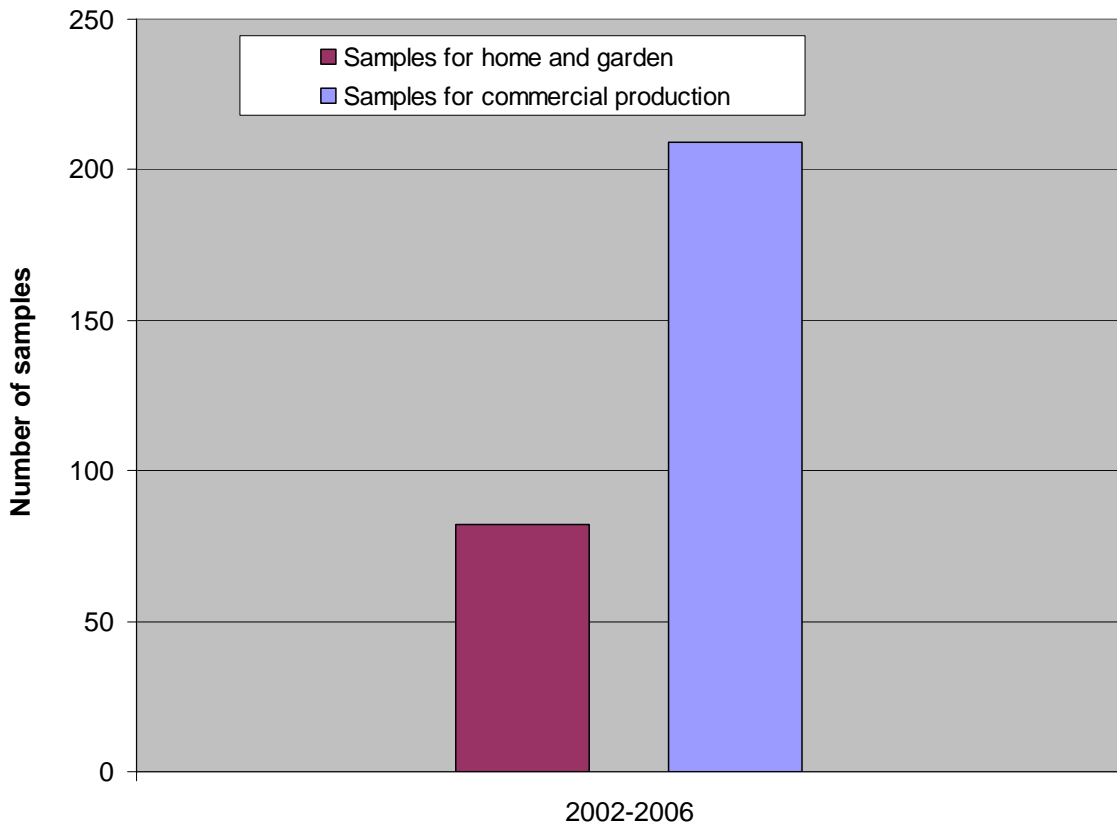
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Cornell Cooperative Extension of Schenectady County



Schenectady County (photo credit: Chris Logue, CCE of Schenectady County).

2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Schenectady County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 291. Of these, 209 samples (72%) were submitted by commercial growers while 82 samples (28%) were submitted by homeowners.



Homeowners		Commercial growers		Total
Total	82	Total	209	291

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Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (50%) or home garden vegetable production (17%). Commercial growers submitted samples primarily to grow corn silage or grain (40%), alfalfa or alfalfa/grass mixes (32%), and grass hay production (17%).

Soils tested for home and garden in Schenectady County were classified as belonging to soil management group 2 (10%), group 3 (25%), group 4 (24%), or group 5 (43%). 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 (88%) belonged to soil management group 2. There were no group 1 samples. Groups 3, 4 and 5 were represented with 7%, 1% and 4% of the samples, respectively. There were no organic soils. Lansing was the most common soil series (42% of all samples), followed by Burdett (22%) and Honeoye (18%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to almost 9%. For homeowners, 49% had between 2 and 5% organic matter, while 33% were classified as soils with less than 2% organic matter. Of the samples submitted by commercial growers, 72% contained between 2 and 5% organic matter.

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Soil pH in water (1:1 soil:water extraction ratio) varied from 3.5 to 8.3 for home and garden samples with 68% testing between pH 6.0 and 7.4. For the commercial samples, the highest pH was 7.9 and 83% 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, 12% of the soils tested low for P, 13% tested medium, 50% tested high and 24% tested very high. This meant that 74% tested high or very high in P. For commercial growers, 4% tested very high. In total 37% were low in P, 32% tested medium for P while 27% of the submitted samples were classified as high in soil test P. Thus, 31% 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 Schenectady County soils varied from very low (7% of the homeowner soils and 2% of the commercial growers' soils) to very high (13% of the

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homeowner soils and 24% of the commercial growers' soils). For homeowners, 23% tested low in K, 27% tested medium, and 29% tested high for potassium. For commercial growers' soils, 23% tested low, 30% tested medium and 22% 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 23 to 1093 lbs Mg/acre. Most soils tested high or very high for Mg (67% of the homeowner soils and 96% 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 93-99% in the normal range with 7% of the homeowner soils and 1% of the commercial grower soils testing excessive for Fe. Similarly, most soils (98-99%) 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, 85% tested high for Zn while 13% tested medium and the remainder were low in Zn. Of the commercial growers' samples, 20% tested low, 42% tested medium while only 38% 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 were requested by homeowners:

	2002-2006	%
ALG	3	4
ATF	1	1
BLU	1	1
FLA	3	4
HRB	1	1
IDL	2	2
LAW	41	50
MVG	14	17
OTH	1	1
PER	3	4
PTO	1	1
SAG	5	6
STR	1	1
TRF	2	2
Unknown	3	4
Total	82	100

3.2 Commercial Samples

Crops for which recommendations were requested in commercial samples:

	2002-2006	%
ABE	1	0
AGE/AGT	66	32
BKB	1	0
CGE/CGT	4	2
COS/COG	83	40
GIT	4	2
GRE/GRT	32	15
MIX	4	2
OAS	1	0
OTH	2	1
PGE	1	0
RSF	1	0
RSS	1	0
RYC	1	0
SOY	3	1
SWC	1	0
TOM	1	0
Unknown	2	1
Total	209	100

Note: See Appendix for Cornell crop codes.

4. Soil Types

4.1 Homeowner Samples

Soil types (soil management groups) for homeowner samples:

	Total	%
SMG 1 (clayey)	0	0
SMG 2 (silty)	8	10
SMG 3 (silt loam)	19	23
SMG 4 (sandy loam)	20	24
SMG 5 (sandy)	35	43
SMG 6 (mucky)	0	0
Total	82	100

4.2 Homeowner Samples

Soil series for commercial samples:

Name	SMG	Total	%
Angola	2	2	1
Arnot	3	2	1
Burdett	2	47	22
Charlton	4	3	1
Colonie	5	6	3
Darien	2	2	1
Elnora	5	2	1
Herkimer	3	4	2
Honeoye	2	38	18
Hornell	2	2	1
Howard	3	2	1
Ilion	2	3	1
Lansing	2	87	42
Lordstown	3	3	1
Nunda	2	3	1
Tuller	3	3	1
Total	-		100

5. Organic Matter

5.1 Homeowner Samples

Organic matter (loss-on-ignition method) in homeowner 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
Total	9	18	20	12	9	8	4	2	82
Total	11	22	24	15	11	10	5	2	100

	2002-2006
Lowest:	0.4
Highest:	8.7
Mean:	3.0
Median:	2.7

5.2 Commercial Samples

Organic matter (loss-on-ignition method) in commercial 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
Total	7	2	50	68	33	33	6	10	209
Total	3	1	24	33	16	16	3	5	100

	2002-2006
Lowest:	0.2
Highest:	8.5
Mean:	3.9
Median:	3.6

6. pH

6.1 Homeowner Samples

pH of homeowner 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
Number	1	2	8	7	14	22	20	6	2	0	82
Percentage	1	2	10	9	17	27	24	7	2	0	100

	2002-2006
Lowest:	3.5
Highest:	8.3
Mean:	-
Median:	6.8

6.2 Commercial Samples

pH of commercial 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
Number	0	0	7	24	60	81	32	5	0	0	209
Percentage	0	0	3	11	29	39	15	2	0	0	100

	2002-2006
Lowest:	5.3
Highest:	7.9
Mean:	-
Median:	6.5

7. Phosphorus

7.1 Homeowner Samples

Phosphorus (lbs/acre Morgan P) in homeowner 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	
Number	0	10	11	41	4	5	2	2	1	6	82
Percentage	0	12	13	50	5	6	2	2	1	7	100

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

	2002-2006
Lowest:	1
Highest:	524
Mean:	55
Median:	19

7.2 Commercial Samples

Phosphorus (lbs P/acre Morgan extraction) for commercial 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	
Number	0	78	67	56	4	2	0	1	1	0	209
Percentage	0	37	32	27	2	1	0	0	0	0	100

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

	2002-2006
Lowest:	1
Highest:	197
Mean:	10
Median:	5

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	2	5	1	8
Total (%)	0	0	25	63	13	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	7	6	3	19
Total (%)	0	16	37	32	16	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	1	3	4	8	4	20
Total (%)	5	15	20	40	20	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	5	13	9	5	3	35
Total (%)	14	37	26	14	9	100

Potassium classification summary for homeowners:

	Very Low	Low	Medium	High	Very High	Total
Number	6	19	22	24	11	82
Percentage	7	23	27	29	13	100

	2002-2006
Lowest:	14
Highest:	759
Mean:	156
Median:	131

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 (#)	2	42	56	42	42	184
Total (%)	1	23	30	23	23	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	3	1	7	14
Total (%)	0	21	21	7	50	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	0	0	3
Total (%)	0	33	67	0	0	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	2	2	1	2	1	8
Total (%)	25	25	13	25	13	100

Potassium classification summary for commercial samples.

	Very Low	Low	Medium	High	Very High	Total
Number	4	48	62	45	50	209
Percentage	2	23	30	22	24	100

	2002-2006
Lowest:	37
Highest:	1273
Mean:	141
Median:	98

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	4	7	17	54	82
Percentage	0	5	9	21	66	100

	2002-2006
Lowest:	25
Highest:	662
Mean:	271
Median:	256

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	5	3	31	170	209
Percentage	0	2	1	15	81	100

	2002-2006
Lowest:	23
Highest:	1093
Mean:	314
Median:	300

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	76	6	82

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	93	7	100

	2002-2006
Lowest:	1
Highest:	97
Mean:	15
Median:	8

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
Total	206	3	209

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	99	1	100

	2002-2006
Lowest:	1
Highest:	109
Mean:	9
Median:	4

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	80	2	82

Percentages:

0-99	>99	Total
Normal	Excessive	
98	2	100

	2002-2006
Lowest:	1
Highest:	187
Mean:	32
Median:	24

11.2 Commercial Samples

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
Total	207	2	209

Percentages:

0-99	>99	Total
Normal	Excessive	
99	1	100

	2002-2006
Lowest:	6
Highest:	122
Mean:	24
Median:	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	1	11	70	82

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	13	85	100

	2002-2006
Lowest:	0.3
Highest:	84.4
Mean:	7.3
Median:	3.1

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	42	88	79	209

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
20	42	38	100

	2002-2006
Lowest:	0.1
Highest:	6.7
Mean:	1.1
Median:	0.9

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