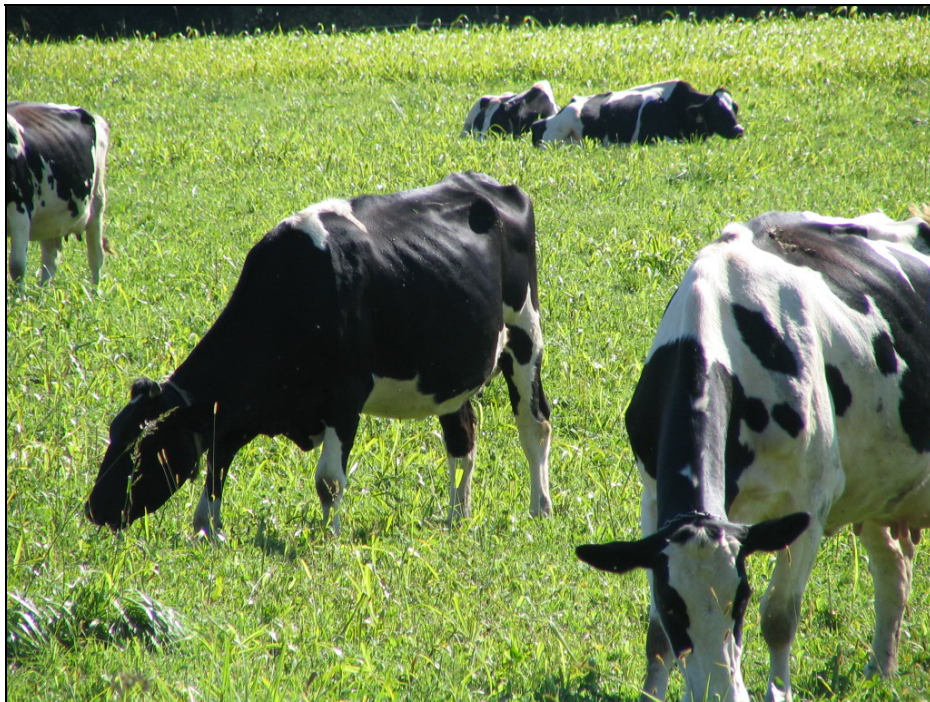


Soil Sample Survey

Rensselaer County

Samples analyzed by CNAL (2002-2006)



Rensselaer County (photo credit: Tom Kilcer, CCE of Rensselaer County).

Summary compiled by
Renuka Rao, Tom Kilcer, Quirine M. Ketterings, and Hettie Krol



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

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



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Rensselaer County

Samples analyzed by CNAL (2002-2006)

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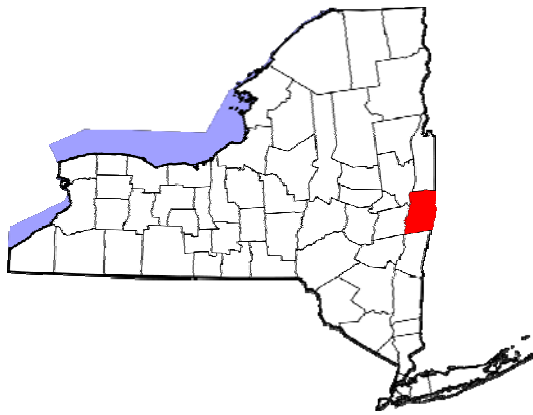
Rensselaer County (photo credit: Tom Kilcer, CCE of Rensselaer County).



1. County Introduction

Rensselaer County is situated between the tidal waters of the Hudson River on the west and the 2,800-foot Taconic range shared with Vermont and Massachusetts on the east. It encompasses 665 square miles or 425,700 acres.

The eastern portion of the county consists of the narrow Little Hoosic River valley with its fertile river outwash soils sandwiched between steep uplands. The Rensselaer Plateau,



a 1,500 foot high, gently rolling table of very resistant rock, dominates one third of the center of the county. Large boulders and numerous bogs and swamps punctuate the hemlock-beech-maple forest on the thin soil cover. The northern portion consists of the Hoosic River and its tributaries. The Hoosic River culminates in a major outwash into the Hudson River Valley in the town of Schaghticoke. The three northern townships of

Hoosic, Pittstown and Schaghticoke, through which the Hoosic River flows, form the major agriculture region. Here the soils are alluvial outwash and very productive upland glacial till.

The western portion of the county is a historical artifact of the extinct Lake Albany. The northwestern area formed on an extensive sand delta where the Hoosic River entered into the lake. Stagnant, melting ice left a mix of rolling glacial till interspersed with extensive gravel outwash soils in the center of the west side of the county. Poorly drained lacustrine silt and clays in very deep deposits comprise the southwestern portion of the county and the bluffs along the Hudson River.

Sixty percent of the county's agricultural sales come from dairy farming. In spite of decreasing numbers, the remaining dairy farms are very competitive with the rest of the state. In the past ten years, NY dairy has increased 13%, while the milk output from Rensselaer County has increased 52%. The dairy farms are concentrated in the three northern townships mentioned above. A narrow, very productive strip of farms runs the length of the Little Hoosic valley between the Plateau and the Taconic range. There are a

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significant number of farms on the silty clays of the southwest, while an ever-shrinking number are located on the gravels of the west central section. Much of the agriculture in the latter section of the county has been consumed by expanding suburbs ringing the major city, Troy, and the bedroom-communities of Albany, the nearby state capital, which is rapidly expanding into the southwest along the I-90 corridor. In response to growing communities, farmers markets, roadside stands, are direct marketing locally produced vegetables and fruit. Specialty horticultural farms producing landscaping plants constitute our most rapid increasing agriculture business.

Due to competing demands for land, for agriculture to continue to survive and thrive in the region, a higher level of management is needed in order to remain competitive. With bedroom-communities dependent on wells and the Tomhannock reservoir supplying water to the city of Troy, nutrient management is becoming a more critical issue as well. Both of these factors have lead to an increase in reliance on soil testing as the basis of fertilizer recommendations and manure management.

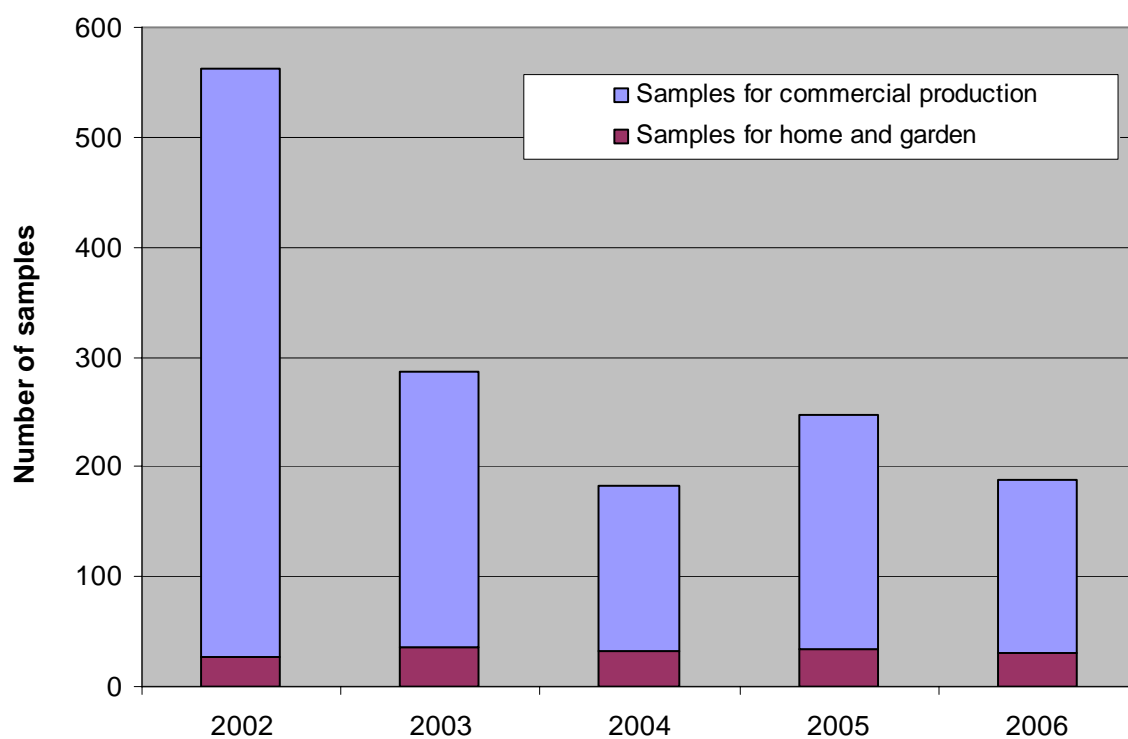
Tom Kilcer
Field Crops Extension Educator
Cornell Cooperative Extension of Rensselaer County



Rensselaer County (photo credit: Tom Kilcer, CCE of Rensselaer County).

2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Rensselaer County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 1465. Of these, 1306 samples (89%) were submitted by commercial growers while 159 samples (11%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	27	2002	535	562
2003	36	2003	250	286
2004	32	2004	150	182
2005	34	2005	213	247
<u>2006</u>	<u>30</u>	<u>2006</u>	<u>158</u>	<u>188</u>
Total	159	Total	1306	1465

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for home garden vegetable production (39%), athletic fields (17%), lawns (15%), and ornamentals (10%). Commercial growers submitted samples to grow corn silage or grain (33%), alfalfa or alfalfa/grass mixes (23%), and grass hay production (14%) while a few growers were planning to grow other crops.

Soils tested for home and garden in Rensselaer County were classified as belonging to soil management group 2 (34%), group 3 (14%), group 4 (41%) or group 5 (10%). 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 (70%) belonged to soil management group 4. There were a few group 1 samples (1%). Thirteen percent belonged to group 2. Group 3 was represented by 8% of the samples. Seven percent belonged to group 5. Bernardston was the most common soil series (36% of all samples), followed by Pittstown (15%), Hoosic (8%), Rhinebeck (6%), and Oakville and Nassau (4% each).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to greater than 50% for one sample (most likely a topsoil sample). For homeowners 60% of the samples had between 2 and 5% organic matter, 13% tested between 5 and 6% organic

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matter and 11% were classified as soils with more than 6.9% organic matter. Of the samples submitted by commercial growers, 77% contained between 2 and 5% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from less than 4.9 to 8.0 for home and garden samples while 56% tested between 6.0 and 7.4 for pH. For the commercial samples, the highest pH was 8.2 and 81% tested between pH 5.5 and 7.0.

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, 13% of the soils tested low for P, 20% tested medium, 32% tested high and 35% tested very high. This meant that 67% tested high or very high in P. For commercial growers, 5% tested very high. In total 25% was low or very low in P, 32% tested medium for P while 38% of the submitted samples were classified as high in soil test P. This means that 43% 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 Rensselaer County soils varied from very low (1% of the commercial growers' soils; none of the homeowner soils) to very high (53% of the homeowner soils and 28% of the commercial growers' soils). For homeowners, 4% tested low in K, 11% tested medium, and 32% tested high for potassium. For commercial growers' soils, 20% tested low, 21% tested medium and 28% 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 13 to more than 3500 lbs Mg/acre. There were only two soils that tested very low for Mg (commercial grower samples). Most soils tested high or very high for Mg (97% of the homeowner soils and 90% of the soils of the commercial growers). In total 3% of the homeowner soils and 10% 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 95-99% in the normal range with 5% of the homeowner soils and 1% of the commercial grower soils testing excessive for Fe. Similarly, 95-98% tested normal for manganese. Soils with more than 100 lbs Morgan extractable Mn per acre are classified as excessive in Mn. Anything less than 100 lbs Mn per acre is classified as normal. Soils with less than 0.5 lb Zn per acre in the Morgan extraction are classified as low in Zn. Medium testing soils have between 0.5 and 1 lb of Morgan extractable Zn per acre. If more than 1 lb of Zn/acre is extracted with the Morgan solution, the soil tests high in Zn. For the homeowner soils, 93% tested high for Zn while 4% tested medium. Of the commercial growers' samples, 7% tested low, 30% tested medium while 64% was high in Zn.

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

3. Cropping Systems

3.1 Homeowner Samples

Crops for which recommendations are requested by homeowners:

	2002	2003	2004	2005	2006	Total	%
ATF	13	4	0	5	5	27	17
BLU	0	1	2	0	0	3	2
GRA	0	0	3	0	0	3	2
LAW	4	7	5	3	5	24	15
MVG	6	20	16	14	6	62	39
OTH	2	0	2	0	0	4	3
PER	0	0	2	0	7	9	6
PRK	0	1	0	0	0	1	1
PTO	0	1	1	0	0	2	1
RSP	0	0	0	0	3	3	2
SAG	2	2	0	10	2	16	10
TRF	0	0	1	2	2	5	3
Total	27	36	32	34	30	159	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	5	0	0	0	8	13	1
AGE/AGT	114	23	18	91	21	267	20
ALE/ALT	2	0	4	6	9	21	2
APP	0	3	0	0	0	3	0
ASP	0	1	0	0	0	1	0
BCE/BCT	0	0	0	7	2	9	1
BGE/BGT	1	5	2	0	0	8	1
BLB	0	2	3	0	0	5	0
BRP	0	0	1	0	0	1	0
BSP	0	0	3	0	0	3	0
BTE	1	0	0	0	0	1	0
BUK	0	0	0	1	0	1	0
CAR	1	0	0	0	0	1	0
CGE/CGT	2	7	2	3	1	15	1
CKP	0	0	0	0	1	1	0
CLE	0	1	0	0	0	1	0
COG/COS	182	93	38	68	52	433	33
CVE	0	0	0	1	0	1	0
GIE/GIT	4	1	21	3	5	34	3
GPF	0	1	0	0	0	1	0
GRE/GRT	74	27	17	13	11	142	11
IDL	0	22	2	0	1	25	2
MIX	8	2	2	1	7	20	2
OAS	9	0	3	2	0	14	1
OAT	1	2	3	0	0	6	0
OTH	1	33	4	0	6	44	3
PGE/PGT	9	3	4	1	9	26	2
PIE/PIT	8	1	2	0	10	21	2
PLE/PLT	2	0	1	0	0	3	0
PNT	10	3	6	2	3	24	2
POT	0	3	0	0	0	3	0
PUM	0	1	5	0	0	6	0
RSF	1	0	1	0	0	2	0
RYC	1	2	1	0	0	4	0
RYS	2	0	0	1	1	4	0
SSH	2	1	1	1	0	5	0

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Current year crop	2002	2003	2004	2005	2006	Total	%
STE	0	0	1	0	0	1	0
STS	1	4	2	3	0	10	1
SUD	0	0	2	0	2	4	0
SWC	1	5	0	0	5	11	1
TME	1	0	0	0	0	1	0
TOM	0	1	0	0	0	1	0
TRE	0	0	0	0	1	1	0
WHT	0	0	1	6	1	8	1
WPE	0	0	0	1	0	1	0
Unknown	92	3	0	2	2	99	8
Total	535	250	150	213	158	1306	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)	13	19	9	11	4	56	35
SMG 3 (silt loam)	3	5	3	4	7	22	14
SMG 4 (sandy loam)	8	12	16	16	14	65	41
SMG 5 (sandy)	3	0	4	3	5	16	10
SMG 6 (mucky)	0	0	0	0	0	0	0
Total	27	36	32	34	30	159	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Albrights	2	0	0	2	0	2	4	0
Berkshire	5	1	0	0	0	0	1	0
Bernardston	4	210	89	46	65	57	467	36
Buckland	3	0	0	0	0	1	1	0
Cambridge	3	0	3	0	2	1	6	0
Castile	4	1	0	1	0	0	2	0
Chenango	3	4	6	1	1	0	12	1
Dannemora	4	1	0	0	0	0	1	0
Elmridge	5	2	0	0	13	0	15	1
Fredon	4	1	0	0	1	0	2	0
Frenchtown	3	0	7	2	1	4	14	1
Georgia	4	0	2	0	0	1	3	0
Hamlin	2	22	6	6	1	7	42	3
Haven	4	7	0	1	0	0	8	1
Hoosic	4	28	16	17	36	2	99	8
Howard	3	0	1	0	0	0	1	0
Hudson	2	9	3	1	0	3	16	1
Junius	5	0	0	2	0	1	3	0
Kingsbury	1	1	0	2	1	0	4	0
Knickerbocker	5	0	0	2	0	0	2	0
Limerick	3	1	1	0	1	1	4	0
Livingston	1	0	0	0	0	2	2	0
Madalin	1	0	0	0	0	3	3	0
Mardin	3	0	6	3	0	0	9	1
Massena	4	0	0	4	0	0	4	0
Nassau	4	21	8	6	7	9	51	4
Oakville	5	21	12	8	5	3	49	4
Pittstown	4	68	39	28	37	26	198	15
Raynham	3	1	0	0	0	0	1	0
Rhinebeck	2	71	3	1	8	1	84	6
Riverhead	4	1	0	0	5	1	7	1
Scio	3	4	6	9	2	1	22	2
Scriba	4	9	3	1	11	1	25	2
Shaker	2	1	0	0	1	0	2	0
Stissing	4	3	21	1	10	6	41	3
Stockbridge	3	2	0	0	0	0	2	0

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Name	SMG	2002	2003	2004	2005	2006	Total	%
Sun	4	1	0	0	0	0	1	0
Teel	2	11	2	3	2	1	19	1
Unadilla	3	11	0	0	0	0	11	1
Venango	3	0	14	2	3	4	23	2
Volusia	3	0	1	0	0	0	1	0
Windsor	5	21	0	0	0	0	21	2
Unknown	-	1	1	1	0	20	23	2
Total	-	535	250	150	213	158	1306	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	1	4	6	7	4	0	3	2	27
2003	0	3	13	6	5	2	4	3	36
2004	0	2	4	11	3	6	1	5	32
2005	2	0	5	6	9	5	4	3	34
2006	0	3	5	9	2	7	0	4	30
Total	3	12	33	39	23	20	12	17	159

	2002	2003	2004	2005	2006
Lowest:	0.4	1.3	1.3	0.2	1.3
Highest:	7.9	8.1	16.4	22.6	11.5
Mean:	3.6	3.9	4.7	5.1	4.2
Median:	3.1	3.5	3.9	4.4	3.8

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	4	15	22	26	15	0	11	7	100
2003	0	8	36	17	14	6	11	8	100
2004	0	6	13	34	9	19	3	16	100
2005	6	0	15	18	26	15	12	9	100
2006	0	10	17	30	7	23	0	13	100
Total	2	8	21	25	14	13	8	11	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
2002	1	28	141	209	94	46	13	3	535
2003	3	38	50	72	47	31	5	4	250
2004	0	10	35	47	43	9	6	0	150
2005	0	14	38	77	47	25	7	5	213
2006	0	28	34	42	35	14	1	4	158
Total	4	118	298	447	266	125	32	16	1306

	2002	2003	2004	2005	2006
Lowest:	0.9	0.6	1.1	1.4	1.1
Highest:	7.6	53.5	6.9	7.5	9.5
Mean:	3.5	3.8	3.6	3.8	3.4
Median:	3.4	3.5	3.6	3.6	3.4

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	5	26	39	18	9	2	1	100
2003	1	15	20	29	19	12	2	2	100
2004	0	7	23	31	29	6	4	0	100
2005	0	7	18	36	22	12	3	2	100
2006	0	18	22	27	22	9	1	3	100
Total	0	9	23	34	20	10	2	1	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
2002	0	0	0	7	4	3	7	6	0	0	0	27
2003	0	0	8	8	2	6	4	7	1	0	0	36
2004	0	0	3	4	7	12	4	1	0	0	1	32
2005	0	0	3	8	7	5	8	2	1	0	0	34
2006	0	1	2	5	9	8	4	1	0	0	0	30
Total	0	1	16	32	29	34	27	17	2	0	1	159

	2002	2003	2004	2005	2006
Lowest:	5.6	5.0	5.0	5.3	4.9
Highest:	7.9	8.0	7.6	8.0	7.9
Mean:	-	-	-	-	-
Median:	6.8	6.4	6.5	6.4	6.4

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	0	0	0	26	15	11	26	22	0	0	0	100
2003	0	0	22	22	6	17	11	19	3	0	0	100
2004	0	0	9	13	22	38	13	3	0	0	3	100
2005	0	0	9	24	21	15	24	6	3	0	0	100
2006	0	3	7	17	30	27	13	3	0	0	0	100
Total	0	1	10	20	18	21	17	11	1	0	1	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
2002	1	14	60	137	166	98	44	13	2	0	535
2003	0	1	22	68	88	49	19	3	0	0	250
2004	0	4	9	40	67	21	7	2	0	0	150
2005	1	1	6	24	80	79	20	2	0	0	213
2006	1	0	11	35	64	38	8	1	0	0	158
Total	3	20	108	304	465	285	98	21	2	0	1306

	2002	2003	2004	2005	2006
Lowest:	4.2	4.7	4.6	3.4	4.3
Highest:	8.2	7.6	7.5	7.9	7.7
Mean:	-	-	-	-	-
Median:	6.1	6.1	6.1	6.4	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	3	11	26	31	18	8	2	0	0	100
2003	0	0	9	27	35	20	8	1	0	0	100
2004	0	3	6	27	45	14	5	1	0	0	100
2005	0	0	3	11	38	37	9	1	0	0	100
2006	1	0	7	22	41	24	5	1	0	0	100
Total	0	2	8	23	36	22	8	2	0	0	100

7. Phosphorus

7.1 Homeowner Samples

Phosphorus (lbs/acre Morgan P) in homeowner samples (numbers):

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
2002	0	3	7	9	2	0	1	1	1	3	27
2003	0	9	6	8	2	1	2	2	0	6	36
2004	0	3	6	12	3	2	0	2	2	2	32
2005	0	2	9	11	3	3	1	0	1	4	34
2006	0	3	4	11	3	3	2	2	1	1	30
Total	0	20	32	51	13	9	6	7	5	16	159

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

	2002	2003	2004	2005	2006
Lowest:	2	1	2	1	2
Highest:	248	344	459	1223	268
Mean:	53	72	59	101	49
Median:	15	16	26	20	23

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	11	26	33	7	0	4	4	4	11	100
2003	0	25	17	22	6	3	6	6	0	17	100
2004	0	9	19	38	9	6	0	6	6	6	100
2005	0	6	26	32	9	9	3	0	3	12	100
2006	0	10	13	37	10	10	7	7	3	3	100
Total	0	13	20	32	8	6	4	4	3	10	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	
2002	0	158	168	178	18	6	0	6	1	0	535
2003	0	38	75	122	10	0	0	1	2	2	250
2004	0	48	40	59	2	1	0	0	0	0	150
2005	0	65	64	74	4	2	1	2	0	1	213
2006	0	20	65	64	4	2	3	0	0	0	158
Total	0	329	412	497	38	11	4	9	3	3	1306

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	161	1134	61	437	99
Mean:	12	22	10	14	13
Median:	6	9	7	5	8

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	30	31	33	3	1	0	1	0	0	100
2003	0	15	30	49	4	0	0	0	1	1	100
2004	0	32	27	39	1	1	0	0	0	0	100
2005	0	31	30	35	2	1	0	1	0	0	100
2006	0	13	41	41	3	1	2	0	0	0	100
Total	0	25	32	38	3	1	0	1	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	
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 (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	1	5	7	13
2003	0	1	5	7	6	19
2004	0	0	2	2	5	9
2005	0	0	0	3	8	11
2006	0	0	0	2	2	4
Total (#)	0	1	8	19	28	56
Total (%)	0	2	14	34	50	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	0	3	3
2003	0	0	0	2	3	5
2004	0	0	2	0	1	3
2005	0	1	0	0	3	4
2006	0	0	0	4	3	7
Total (#)	0	1	2	6	13	22
Total (%)	0	5	9	27	59	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	2	5	7
2003	0	0	1	3	8	12
2004	0	2	1	4	9	16
2005	0	1	3	5	7	16
2006	0	1	0	6	7	14
Total (#)	0	4	5	20	36	65
Total (%)	0	6	8	31	55	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	2	1	1	4
2003	0	0	0	0	0	0
2004	0	0	0	2	2	4
2005	0	1	0	0	2	3
2006	0	0	0	3	2	5
Total (#)	0	1	2	6	7	16
Total (%)	0	6	13	38	44	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 homeowners:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
2002	0	0	3	8	16	27
2003	0	1	6	12	17	36
2004	0	2	5	8	17	32
2005	0	3	3	8	20	34
2006	0	1	0	15	14	30
Grand Total	0	7	17	51	84	159

Summary (%)	Very Low	Low	Medium	High	Very High	Total
2002	0	0	11	30	59	100
2003	0	3	17	33	47	100
2004	0	6	16	25	53	100
2005	0	9	9	24	59	100
2006	0	3	0	50	47	100
Grand Total	0	4	11	32	53	100

	2002	2003	2004	2005	2006
Lowest:	85	60	68	79	99
Highest:	1382	2151	1210	3374	608
Mean:	314	311	314	370	254
Median:	230	196	244	230	235

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	0	1
2003	0	0	0	0	0	0
2004	0	0	0	1	1	2
2005	0	0	0	1	0	1
2006	0	0	0	0	5	5
Total (#)	0	0	0	3	6	9
Total (%)	0	0	0	33	67	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	1	23	31	29	21	105
2003	0	3	1	2	5	11
2004	0	3	0	5	4	12
2005	0	1	1	4	6	12
2006	0	0	0	9	2	11
Total (#)	1	30	33	49	38	151
Total (%)	1	20	22	32	25	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	2	6	7	9	8	32
2003	1	7	12	17	11	48
2004	0	0	3	14	1	18
2005	0	2	0	3	5	10
2006	0	1	3	6	5	15
Total (#)	3	16	25	49	30	123
Total (%)	2	13	20	40	24	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	1	66	78	84	122	351
2003	5	27	43	57	46	178
2004	4	20	17	22	42	105
2005	1	52	44	43	32	172
2006	0	18	21	35	29	103
Total (#)	11	183	203	241	271	909
Total (%)	1	20	22	27	30	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	3	14	8	14	6	45
2003	1	0	4	6	1	12
2004	0	8	2	2	0	12
2005	0	5	3	3	7	18
2006	0	1	1	1	1	4
Total (#)	4	28	18	26	15	91
Total (%)	4	31	20	29	16	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	7	109	124	137	157	1	535
2003	7	37	60	82	63	1	250
2004	4	31	22	44	48	1	150
2005	1	60	48	54	50	0	213
2006	0	20	25	51	42	20	158
Grand Total	19	257	279	368	360	23	1306

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	1	20	23	26	29	0	100
2003	3	15	24	33	25	0	100
2004	3	21	15	29	32	1	100
2005	0	28	23	25	23	0	100
2006	0	13	16	32	27	13	100
Grand Total	1	20	21	28	28	2	100

	2002	2003	2004	2005	2006
Lowest:	30	34	42	52	51
Highest:	1356	8591	536	1449	514
Mean:	208	265	193	182	186
Median:	149	164	164	143	163

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	1	25	27
2003	0	0	0	12	24	36
2004	0	0	0	6	26	32
2005	0	0	1	8	25	34
2006	0	1	1	5	23	30
Total	0	1	3	32	123	159

	2002	2003	2004	2005	2006
Lowest:	77	113	129	91	49
Highest:	996	1149	1192	3411	2709
Mean:	413	386	422	492	403
Median:	339	321	427	293	284

Magnesium in homeowner 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	4	4	93	100
2003	0	0	0	33	67	100
2004	0	0	0	19	81	100
2005	0	0	3	24	74	100
2006	0	3	3	17	77	100
Total	0	1	2	20	77	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	
2002	0	13	32	171	319	535
2003	0	23	21	96	110	250
2004	0	5	8	43	94	150
2005	0	1	8	50	154	213
2006	2	14	10	27	105	258
Total	2	56	79	387	782	1306

	2002	2003	2004	2005	2006
Lowest:	26	27	25	58	13
Highest:	911	3584	540	866	783
Mean:	254	237	236	293	251
Median:	233	183	231	253	260

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	2	6	32	60	100
2003	0	9	8	38	44	100
2004	0	3	5	29	63	100
2005	0	0	4	23	72	100
2006	1	9	6	17	66	100
Total	0	4	6	30	60	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	
2002	24	3	27
2003	33	3	36
2004	32	0	32
2005	34	0	34
2006	28	2	30
Total	151	8	159

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	89	11	100
	92	8	100
	100	0	100
	100	0	100
	93	7	100
	95	5	100

	2002	2003	2004	2005	2006
Lowest:	2	2	2	3	3
Highest:	85	146	26	39	319
Mean:	15	21	10	13	23
Median:	5	11	7	10	10

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	533	2	535
2003	249	1	250
2004	145	5	150
2005	212	1	213
2006	156	2	158
Total	1295	11	1306

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	100	0	100
	97	3	100
	100	0	100
	99	1	100
	99	1	100

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	183	50	82	54	308
Mean:	7	8	11	6	11
Median:	5	6	7	5	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	
2002	25	2	27	93	7	100
2003	34	2	36	94	6	100
2004	32	0	32	100	0	100
2005	32	2	34	94	6	100
2006	28	2	30	93	7	100
Total	151	8	159	95	5	100

	2002	2003	2004	2005	2006
Lowest:	14	14	16	26	16
Highest:	166	239	86	219	250
Mean:	45	62	42	62	51
Median:	38	53	37	52	40

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	517	18	535	97	3	100
2003	247	3	250	99	1	100
2004	149	1	150	99	1	100
2005	210	3	213	99	1	100
2006	156	2	158	99	1	100
Total	1279	27	1306	98	2	100

	2002	2003	2004	2005	2006
Lowest:	10	9	11	14	10
Highest:	303	168	108	150	204
Mean:	37	37	35	33	39
Median:	30	29	34	30	34

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	2	25	27
2003	0	0	36	36
2004	1	0	31	32
2005	1	3	30	34
2006	2	2	26	30
Total	4	7	148	159

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
	0	7	93	100
	0	0	100	100
	3	0	97	100
	3	9	88	100
	7	7	87	100
	3	4	93	100

	2002	2003	2004	2005	2006
Lowest:	0.5	1.3	0.4	0.3	0.1
Highest:	52.6	76.0	49.0	84.5	76.6
Mean:	9.0	7.5	8.0	11.3	9.5
Median:	2.1	3.2	3.4	3.7	3.4

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	12	137	386	535
2003	27	91	132	250
2004	5	47	98	150
2005	20	79	114	213
2006	22	35	101	158
Total	86	389	831	1306

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
	2	26	72	100
	11	36	53	100
	3	31	65	100
	9	37	54	100
	14	22	64	100
	7	30	64	100

	2002	2003	2004	2005	2006
Lowest:	0.1	0.1	0.1	0.1	0.1
Highest:	47.4	34.9	6.4	13.9	11.5
Mean:	2.2	1.8	1.5	1.7	1.8
Median:	1.5	1.1	1.3	1.1	1.5

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
ASP	Asparagus

Crop Code	Crop Description
ATF	Athletic field
BDR/DND	Beans-dry
BLU/BLB	Blueberries
BRP	Broccoli, Transplanted
CAR	Carrots
CEM	Cemetery
CKP	Cucumber, Transplanted
FAR	Fairway
FLA	Flowering annuals
GPF	Grapes, French-American
GRA	Grapes (homeowners)
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
TME	Tomatoes, Early
TOM	Tomatoes
TRE	Christmas trees, Establishment
TRF	Turf
TRT	Christmas trees, Topdressing