Rao, R., N. Herendeen, Q.M. Ketterings, and H. Krol (2007). Wayne Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-43. 34 pages.

Soil Sample Survey

Wayne County

Samples analyzed by CNAL (2002-2006)

(Photo credit: Nate Herendeen, Field Crops Educator, NW NY Dairy, Livestock & Field Crops Team)

Summary compiled by

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Cornell Nutrient Analysis Laboratory

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

&

Nutrient Management Spear Program

http://nmsp.css.cornell.edu/

Soil Sample Survey

Wayne County

Samples analyzed by CNAL (2002-2006)

Summary compiled by

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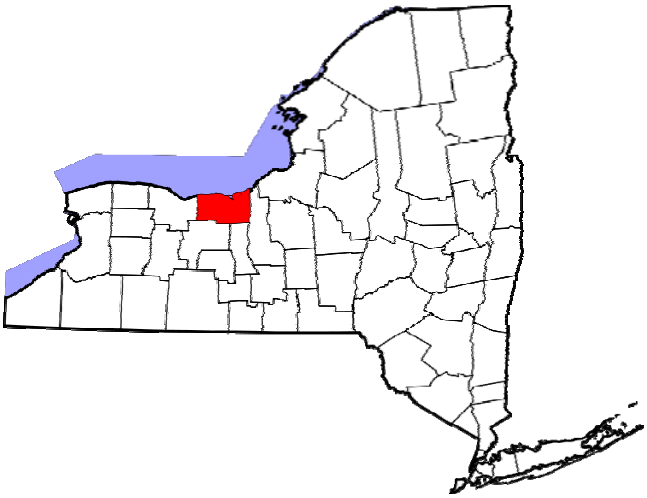
1. County Introduction

Wayne County is located adjacent to Lake Ontario east of Monroe (city of Rochester). It contains 388,480 acres of land area. Approximately 170,000 acres or 43% of the area is used for farm production in any given year. The agriculture in Wayne County is extremely diverse.



The county lies entirely in the Ontario Lake Plains physiographic region. The northern lake plain begins at Lake Ontario, where the elevation is 246 feet above sea level. It increases gradually in elevation to the south, about 600 feet at the Ontario and Seneca County border.

The classic drumlin and drumlin fields are the most conspicuous topography in Wayne County. The drumlins range from 60 feet to 250 feet above the surrounding glacial till plain. The average height above the landscape is 160 feet and the average length is 3500 feet. The drumlins are oriented north-south. The highest is Brantling hill with an elevation of 681 feet.

In the northern third of the county, the streams flow northward directly to Lake Ontario. The rest of the county drains eastward through Ganargua Creek, the Barge Canal and the Clyde River.

The soils in the north are dominated by glacial till that was greatly modified by glacial outwash and/or glacial lake sediments. These soils were mostly derived from the Sodus shale, Medina sandstone and Queenston shale. The soils in the south are derived from high carbonate materials deposited by glacial advance across the dolomitic limestone escarpment. However, glacial outwash materials and/or lacustrine sediments also modified much of this area. Huge deposits of sand and gravel are found in the old channels where the Great Lakes drainage flowed eastward across the face of the receding

glacial ice sheets and intersected with the north flowing rivers that became the Finger Lakes outlets.

Lake Iroquois was a glacial lake that covered the northern third of the county during the glacial recession. The beach ridge from that lake became a prominent feature and was the base for Indian trails that eventually became the Ridge Road (Rt. 104). Large deltaic deposits formed along this lake and became the fine sand and silt soils.

The glacial recession also left many areas of shallow lakes. These became the extensive wetlands in the county. Many were drained to make organic soils, the largest being the Montezuma mucklands on the eastern border with Cayuga County.

The agriculture of Wayne County is diverse. Tree fruit production is the dominant industry in the northern third of the county. Apples cherries, peaches, pears and plums are the most important generator of farm income. Small fruits such as strawberries, brambles and blueberries are grown for fresh market sales. Next is dairy and associated feed grain production. Third is vegetable production for fresh market and processing (peas, snap beans, sweet corn, kidney beans, cabbage, pumpkins, potatoes). Next are greenhouse, nursery and ornamental production. Large and small-scale livestock producers market poultry (eggs), beef, sheep and hogs. There is also a significant pleasure horse industry in the area. Hay and grain crops not used locally are exported to areas throughout the eastern United States.

Wayne County is home to several of the largest tree fruit production farms in New York. Stored apples are marketed throughout the eastern United States all year-round.

All the above industries rely heavily on soil testing to maintain optimum production while protecting the agricultural environment from nutrient runoff.

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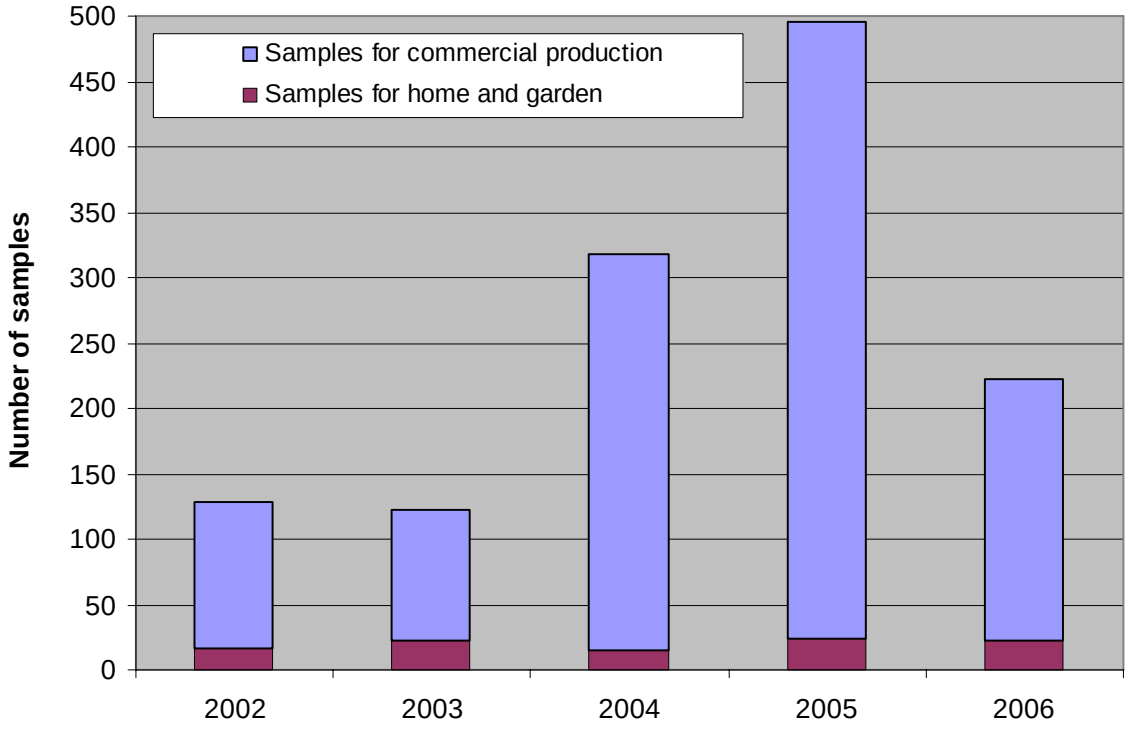
2. General Survey Summary

This survey summarizes the soil test results from grower (identified as "commercial samples") and homeowner samples from Wayne County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 1287. Of these, 1186 samples (92%) were submitted by commercial growers while 101 samples (8%) were submitted by homeowners.



Homeowners			Commercial			Total
2002	17		2002	112		129
2003	23		2003	100		123
2004	15		2004	303		318
2005	24		2005	471		495
2006	22		2006	200		222
Total	101		Total	1186		1287

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (39%), home garden vegetable production (24%), and for ornamentals (11%). Commercial growers submitted samples primarily to grow apples (31%), corn silage or grain (16%), clover (11%) and soybeans (10%).

Soils tested for home and garden in Wayne County were classified as belonging to soil management group 2 (39%), group 3 (21%), group 4 (29%), or group 5 (12%). 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, 1% belonged to soil management group 1, 27% to group 2, 19% to group 3, 25% to group 4, 7% to group 5 and group 6 was represented by 2% of all samples. Ontario was the most common soil series (21% of all samples), followed by Williamson (13%), Hilton (12%) and Palmyra (8%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to almost 60%. For homeowner samples, 50% had between 2 and 4% organic matter and 33% had more than 4% organic matter. Of the samples submitted by commercial growers, 67% contained between 2 and 4% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 4.9 to 8.0 for home and garden samples while 68% tested pH 7 or higher and 22% had a pH between 6.0 and 7.0. For the commercial samples, the highest pH was 8.4 and 60% tested between pH 6.0 and 7.0 and 21% had pH 7.0 or greater.

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, 21% tested medium, 37% tested high and 30% tested very high. All together 66% tested high or very high in P. For commercial growers, 6% tested very high. In total 24% were low in P, 31% tested medium for P while 40% of the submitted samples were classified as high in soil test P. This means that 45% 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).

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 Wayne County soils varied from very low (1% of the commercial growers' soils) to very high (46% of the homeowner soils and 43% of the commercial growers' soils). For homeowners, 9% tested low in K, 19% tested medium, and 27% tested high for potassium. For commercial growers' soils, 6% tested low, 15% tested medium and 35% 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 15 to more than 10000 lbs Mg/acre. There was only one soil sample that tested very low for Mg (commercial grower sample). Most soils tested high or very high for Mg (99% of the homeowner soils and 95% 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 97-100% in the normal range with only 3% of the commercial grower soils testing excessive for Fe. Similarly, most soils (97-98%) 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, 81% tested high for Zn while 16% tested medium and 3% were low in Zn. Of the commercial growers' samples, 6% tested low, 23% tested medium while 71% 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	4	4
ATF	2	2
FLA	6	6
GEN	1	1
GRA	3	3
LAW	39	39
MVG	24	24
OTH	1	1
PER	5	5
PTO	1	1
ROS	2	2
RSP	1	1
SAG	11	11
TRF	1	1
Total	101	100

Note: See Appendix for Cornell crop codes.

3.2 Commercial Samples

Crops for which recommendations were requested in commercial samples:

Current year crop	2002	2003	2004	2005	2006	Total	%
ABE/ABT	2	0	3	0	0	5	0
AGE/AGT	2	1	6	9	2	20	2
ALE/ALT	6	0	3	0	9	18	2
APP	32	45	142	72	76	367	31
ASP	0	0	0	1	0	1	0
BCT	0	2	0	0	0	2	0
BLB	0	0	0	0	2	2	0
BND	5	0	0	0	4	9	1
BNS	1	0	0	1	0	2	0
BSP	2	0	0	0	0	2	0
CBS	0	0	0	0	1	1	0
CGE	0	0	2	0	0	2	0
CHS	0	0	1	0	1	2	0
CHT	1	3	4	2	3	13	1
CLE/CLT	3	0	84	26	13	126	11
COG/COS	12	0	10	145	17	184	16
CST	0	0	0	1	0	1	0
EGG	0	1	0	0	0	1	0
GIE	0	0	0	2	0	2	0
GPF	0	1	0	0	0	1	0
GPV	0	1	0	0	0	1	0
GRE/GRT	2	0	2	1	1	6	1
IDL	2	0	9	18	22	51	4
LET	1	1	0	0	0	2	0
MIX	2	4	1	2	1	10	1
NUR	0	0	0	1	2	3	0
OAT	3	0	0	0	0	3	0
ONP	1	0	0	1	0	2	0
ONS	5	0	4	1	0	10	1
OTH	2	7	3	4	5	21	2
PAR	3	0	1	2	1	7	1
PCH	8	3	9	14	1	35	3
PEA	1	0	0	0	0	1	0
PGE/PGT	0	1	0	1	0	2	0
PIE/PIT	2	0	0	13	3	18	2
PLE/PLT	1	2	0	1	2	6	1

Current year crop	2002	2003	2004	2005	2006	Total	%
PLM	0	0	1	0	0	1	0
PNT	0	3	0	2	0	5	0
POP	0	0	0	1	0	1	0
POT	4	5	3	2	0	14	1
PUM	0	0	1	0	0	1	0
RHU	0	0	0	0	1	1	0
SOG	1	0	0	0	0	1	0
SOY	5	1	2	95	17	120	10
SQS	0	0	0	1	0	1	0
SQW	0	0	1	1	0	2	0
STS	0	3	0	1	0	4	0
SWC	0	13	2	7	0	22	2
TME	0	1	0	0	0	1	0
TOM	0	0	2	0	0	2	0
TRE	2	2	0	6	2	12	1
TRT	1	0	6	4	5	16	1
TUR	0	0	0	1	9	10	1
WHT	0	0	0	31	0	31	3
Unknown	0	0	1	1	0	2	0
Total	112	100	303	471	200	1186	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)	39	39
SMG 3 (silt loam)	21	21
SMG 4 (sandy loam)	29	29
SMG 5 (sandy)	12	12
SMG 6 (mucky)	0	0
Total	101	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Alton	5	0	6	10	13	16	45	4
Amboy	4	0	0	0	0	1	1	0
Appleton	2	0	1	4	4	3	12	1
Bombay	4	3	1	5	34	15	58	5
Canadaigua	3	16	2	1	28	0	47	4
Carlisle	6	8	5	8	4	0	25	2
Cayuga	2	0	0	0	0	1	1	0
Cazenovia	2	2	0	5	2	1	10	1
Chippeny	6	1	0	0	0	0	1	0
Collamer	3	0	0	0	1	4	5	0
Colonie	5	2	0	0	3	3	8	1
Dunkirk	3	0	0	0	2	0	2	0
Edwards	6	0	2	0	0	0	2	0
Elnora	5	1	4	5	5	5	20	2
Farmington	3	0	0	0	1	0	1	0
Fredon	4	0	0	0	6	3	9	1
Galen	4	2	1	0	0	0	3	0
Halsey	4	0	0	0	0	1	1	0
Hilton	2	13	8	34	60	24	139	12
Ira	4	6	11	11	12	17	57	5
Joliet	4	0	0	0	1	0	1	0
Kendaia	2	0	0	1	0	0	1	0
Lakemont	1	0	0	0	1	0	1	0
Lamson	4	0	0	1	1	0	2	0
Lansing	2	0	0	0	4	0	4	0
Lockport	2	0	0	0	7	0	7	1
Lyons	2	0	0	0	0	2	2	0
Madalin	1	1	0	4	0	0	5	0
Madrid	4	9	3	1	25	10	48	4
Massena	4	0	0	0	3	0	3	0
Minoa	4	3	3	4	12	0	22	2
Niagara	3	1	0	1	0	0	2	0
Oakville	5	1	1	0	3	0	5	0
Ontario	2	13	10	70	112	40	245	21
Ovid	2	0	0	2	1	2	5	0
Palmyra	3	3	1	26	54	8	92	8

Name	SMG	2002	2003	2004	2005	2006	Total	%
Phelps	3	1	7	9	16	13	46	4
Rhinebeck	2	0	0	1	4	2	7	1
Sodus	4	11	10	21	10	6	58	5
Stockbridge	3	1	0	0	0	0	1	0
Teel	2	1	0	0	0	0	1	0
Volusia	3	0	2	0	0	0	2	0
Wallington	3	2	3	7	10	4	26	2
Wayland	2	0	0	0	0	1	1	0
Williamson	4	11	19	71	32	18	151	13
Unknown	-	0	0	1	0	0	1	0
Total	-	112	100	303	471	200	1186	100

5. Organic Matter

5.1 Homeowner Samples

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

	<1	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
Number	1	17	34	16	13	7	6	7	101
Percentage	1	17	34	16	13	7	6	7	100

	2002-2006
Lowest:	0.6
Highest:	56.9
Mean:	4.3
Median:	2.9

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	8	34	37	14	8	0	10	112
2003	1	12	33	31	14	2	0	7	100
2004	0	53	160	60	14	4	2	10	303
2005	3	148	214	73	24	3	2	4	471
2006	2	21	89	68	14	4	1	1	200
Total	7	242	530	269	80	21	5	32	1186

	2002	2003	2004	2005	2006
Lowest:	0.4	0.7	1.0	0.8	0.4
Highest:	58.7	55.4	58.2	55.8	7.0
Mean:	6.5	5.9	3.9	2.8	2.9
Median:	3.2	3.0	2.5	2.2	2.9

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	1	7	30	33	13	7	0	9	100
2003	1	12	33	31	14	2	0	7	100
2004	0	17	53	20	5	1	1	3	100
2005	1	31	45	15	5	1	0	1	100
2006	1	11	45	34	7	2	1	1	100
Total	1	20	45	23	7	2	0	3	100

6. pH

6.1 Homeowner Samples

pH of homeowner samples (numbers):

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
Number	0	1	3	7	8	14	39	28	1	0	101
Percentage	0	1	3	7	8	14	39	28	1	0	100

	2002-2006
Lowest:	4.9
Highest:	8.0
Mean:	-
Median:	7.2

6.2 Commercial Samples

pH of commercial samples (number):

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
2002	0	0	4	19	28	36	23	2	0	0	112
2003	1	1	8	17	27	36	10	0	0	0	100
2004	1	4	11	50	79	101	47	9	1	0	303
2005	0	5	10	56	119	160	103	17	1	0	471
2006	0	4	10	20	49	82	33	1	1	0	200
Total	2	14	43	162	302	415	216	29	3	0	1186

	2002	2003	2004	2005	2006
Lowest:	5.2	4.4	4.0	4.6	4.5
Highest:	7.6	7.4	8.4	8.0	8.0
Mean:	-	-	-	-	-
Median:	6.6	6.3	6.5	6.6	6.5

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	4	17	25	32	21	2	0	0	100
2003	1	1	8	17	27	36	10	0	0	0	100
2004	0	1	4	17	26	33	16	3	0	0	100
2005	0	1	2	12	25	34	22	4	0	0	100
2006	0	2	5	10	25	41	17	1	1	0	100
Total	0	1	4	14	25	35	18	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	
Number	0	13	21	37	7	4	6	6	0	7	101
Percentage	0	13	21	37	7	4	6	6	0	7	100

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

	2002-2006
Lowest:	1
Highest:	479
Mean:	50
Median:	18

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	44	32	26	2	0	0	2	5	1	112
2003	0	22	31	38	3	0	1	3	2	0	100
2004	0	80	70	128	7	5	4	3	1	5	303
2005	0	76	168	210	9	5	0	1	1	1	471
2006	0	58	66	70	4	1	0	1	0	0	200
Total	0	280	367	472	25	11	5	10	9	7	1186

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	213	169	643	340	110
Mean:	18	19	21	13	10
Median:	5	8	9	8	7

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	39	29	23	2	0	0	2	4	1	100
2003	0	22	31	38	3	0	1	3	2	0	100
2004	0	26	23	42	2	2	1	1	0	2	100
2005	0	16	36	45	2	1	0	0	0	0	100
2006	0	29	33	35	2	1	0	1	0	0	100
Total	0	24	31	40	2	1	0	1	1	1	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 (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	4	9	10	16	39
Total (%)	0	10	23	26	41	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	2	1	4	14	21
Total (%)	0	10	5	19	67	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	1	7	8	13	29
Total (%)	0	3	24	28	45	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	2	2	5	3	12
Total (%)	0	17	17	42	25	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 (%)	-	-	-	-	-	-

Potassium classification summary for homeowners:

	Very Low	Low	Medium	High	Very High	Total
Number	0	9	19	27	46	101
Percentage	0	9	19	27	46	100

	2002-2006
Lowest:	45
Highest:	2305
Mean:	245
Median:	192

8.2 Commercial Samples

Potassium (lbs K/acre Morgan extraction) in commercial samples (number):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	1	0	0	1
2003	0	0	0	0	0	0
2004	0	1	0	2	1	4
2005	0	0	0	0	1	1
2006	0	0	0	0	0	0
Total (#)	0	1	1	2	2	6
Total (%)	0	17	17	33	33	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	1	4	6	9	9	29
2003	1	2	0	5	11	19
2004	1	9	17	39	51	117
2005	0	3	15	104	72	194
2006	0	2	10	20	44	76
Total (#)	3	20	48	177	187	435
Total (%)	1	5	11	41	43	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	1	5	13	2	3	24
2003	0	0	2	3	10	15
2004	0	5	5	14	20	44
2005	0	3	8	43	58	112
2006	0	1	2	16	10	29
Total (#)	1	14	30	78	101	224
Total (%)	0	6	13	35	45	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	5	8	9	23	45
2003	2	4	6	15	21	48
2004	0	5	15	32	62	114
2005	0	6	48	55	27	136
2006	2	7	10	20	32	71
Total (#)	4	27	87	131	165	414
Total (%)	1	7	21	32	40	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	1	0	0	1	2	4
2003	0	3	2	4	2	11
2004	0	0	1	5	9	15
2005	1	5	2	12	4	24
2006	0	2	3	6	13	24
Total (#)	2	10	8	28	30	78
Total (%)	3	13	10	36	38	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	1	8	9
2003	0	0	0	1	6	7
2004	0	0	0	0	8	8
2005	0	0	0	0	4	4
2006	0	0	0	0	0	0
Total (#)	0	0	0	2	26	28
Total (%)	0	0	0	7	93	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	3	14	28	22	45	0	112
2003	3	9	10	28	50	0	100
2004	1	20	38	92	151	1	303
2005	1	17	73	214	166	0	471
2006	2	12	25	62	99	0	200
Grand Total	10	72	174	418	511	1	1186

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	3	13	25	20	40	0	100
2003	3	9	10	28	50	0	100
2004	0	7	13	30	50	0	100
2005	0	4	15	45	35	0	100
2006	1	6	13	31	50	0	100
Grand Total	1	6	15	35	43	0	100

	2002	2003	2004	2005	2006
Lowest:	31	39	30	55	49
Highest:	1377	1037	47785	1082	822
Mean:	270	293	413	199	232
Median:	151	216	200	166	198

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	1	0	6	94	101
Percentage	0	1	0	6	93	100

	2002-2006
Lowest:	60
Highest:	2641
Mean:	530
Median:	438

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	1	3	16	92	112
2003	1	4	4	17	74	100
2004	0	4	6	48	245	303
2005	1	11	17	109	333	471
2006	0	2	2	26	170	200
Total	2	22	32	216	914	1186

	2002	2003	2004	2005	2006
Lowest:	35	19	24	15	27
Highest:	2332	1568	10788	3535	1019
Mean:	534	416	415	327	379
Median:	394	342	332	271	358

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	1	3	14	82	100
2003	1	4	4	17	74	100
2004	0	1	2	16	81	100
2005	0	2	4	23	71	100
2006	0	1	1	13	85	100
Total	0	2	3	18	77	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	101	0	101

Percentages:

0-49	>49	Total
Normal	Excessive	
100	0	100

	2002-2006
Lowest:	1
Highest:	41
Mean:	8
Median:	6

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	110	2	112
2003	96	4	100
2004	294	9	303
2005	460	11	471
2006	194	6	200
Total	1154	32	1186

Percentages:

0-49	>49	Total
Normal	Excessive	
98	2	100
96	4	100
97	3	100
98	2	100
97	3	100
97	3	100

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	126	209	445	145	125
Mean:	12	13	14	10	11
Median:	7	6	8	6	7

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	98	3	101

Percentages:

0-99	>99	Total
Normal	Excessive	
97	3	100

	2002-2006
Lowest:	8
Highest:	389
Mean:	46
Median:	36

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	110	2	112		98	2	100
2003	92	8	100		92	8	100
2004	297	6	303		98	2	100
2005	466	5	471		99	1	100
2006	197	3	200		99	2	100
Total	1162	24	1186		98	2	100

	2002	2003	2004	2005	2006
Lowest:	5	3	3	3	3
Highest:	139	150	217	154	135
Mean:	25	34	30	29	30
Median:	21	26	25	26	27

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	3	16	82	101

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
3	16	81	100

	2002-2006
Lowest:	0.1
Highest:	208.1
Mean:	9.0
Median:	2.7

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	
2002	2	27	83	112
2003	0	13	87	100
2004	21	106	176	303
2005	15	82	374	471
2006	34	40	126	200
Total	72	268	846	1186

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	24	74	100
0	13	87	100
7	35	58	100
3	17	79	100
17	20	63	100
6	23	71	100

	2002	2003	2004	2005	2006
Lowest:	0.3	0.5	0.1	0.1	0.1
Highest:	21.6	48.6	33.1	197.1	78.4
Mean:	3.8	6.1	2.7	2.6	3.2
Median:	1.7	2.9	1.3	1.6	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
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