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Soil Sample Survey

Yates County

Samples analyzed by CNAL (2002-2006)



Yates County (photo credit: Nate Herendeen, North West 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/>



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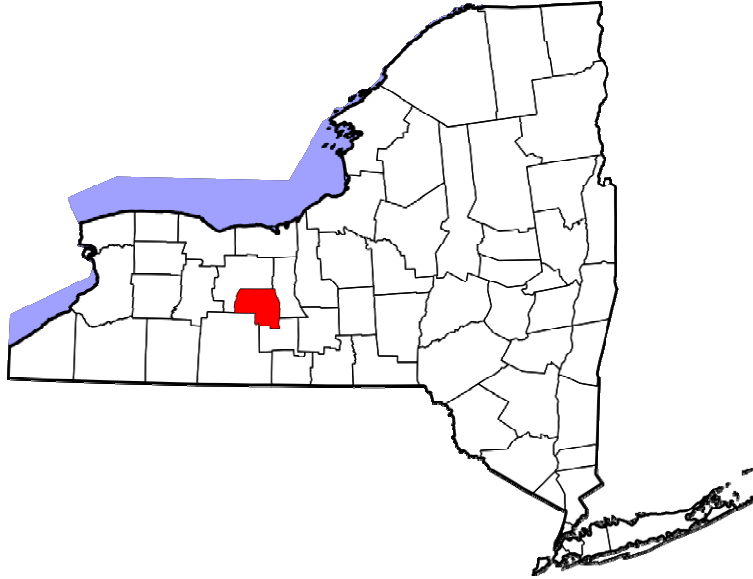
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1. County Introduction

Yates County is located in the central Finger Lakes area of New York, south of Ontario



County. It contains about 220,160 acres of land area. Roughly 50% of the area is used for farm production.

The northeastern one-third of the county lies in the Ontario Lowlands where it transitions to the Allegheny Plateau. The northern boundary joins Ontario County. The elevation is about 600 to 900 feet above sea level. The

glacial till plain is gently undulating. It extends south to the Portage Escarpment where the elevation rises from the 600 to 900 foot level to about 1800 feet in the Allegheny Plateau.

The county's topography is dominated by the deep valleys of the Finger Lakes, beginning with Canandaigua on the west, Keuka in the center and Seneca Lake on the east. These valleys were deepened by the glacial advance against the north flowing rivers. When the ice receded, the deep valleys became the Finger Lakes. The central Finger Lakes drain northward and eastward into the Clyde River and eventually the Oswego River.

Yates County soils are extremely diverse. The soils in the north are dominated by high carbonate materials developed from the limestone parent material in the southern part of Ontario County. This was spread southward by the last glacial action that covered the county. In the south, soils formed from the low carbonate Devonian shale deposits. There is a large area of organic soils between Keuka and Canandaigua Lakes at the head of Flint Creek. This shallow wetland area was drained and is primarily used for onion production. There are several large areas of glacial outwash sediments.

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The agriculture of Yates County is diverse. Dairy farming is the largest single generator of farm income. Thousands of acres are devoted to field and forage crops to support the dairy and livestock industry. Grapes have the second greatest agricultural value. There are 127 grape farms on 4,872 acres growing grapes for bulk processing markets, fresh market, and the 23 wineries operating in the county. The deep, well-drained soils on the lake hillsides plus the climate moderating effect of the lakes make this area ideally suited for grape production. Processing vegetable crops comprise the next largest segment of the agricultural economy. Crops grown for processing include snap beans, sweet corn, red beets, kidney beans, cabbage, carrots, onions and potatoes.

Fresh market produce is a growing industry. Crops include all of the above listed crops plus cucumbers, squash, pumpkins, tomatoes, peppers, melons, cantaloupes, berries and tree fruit. Greenhouse production of ornamental and edible crops is the fastest growing sector within agriculture. Christmas trees are grown on a wide range of soils, especially the acid soils on the hills in the south. Livestock farmers produce and market beef, hogs and sheep.

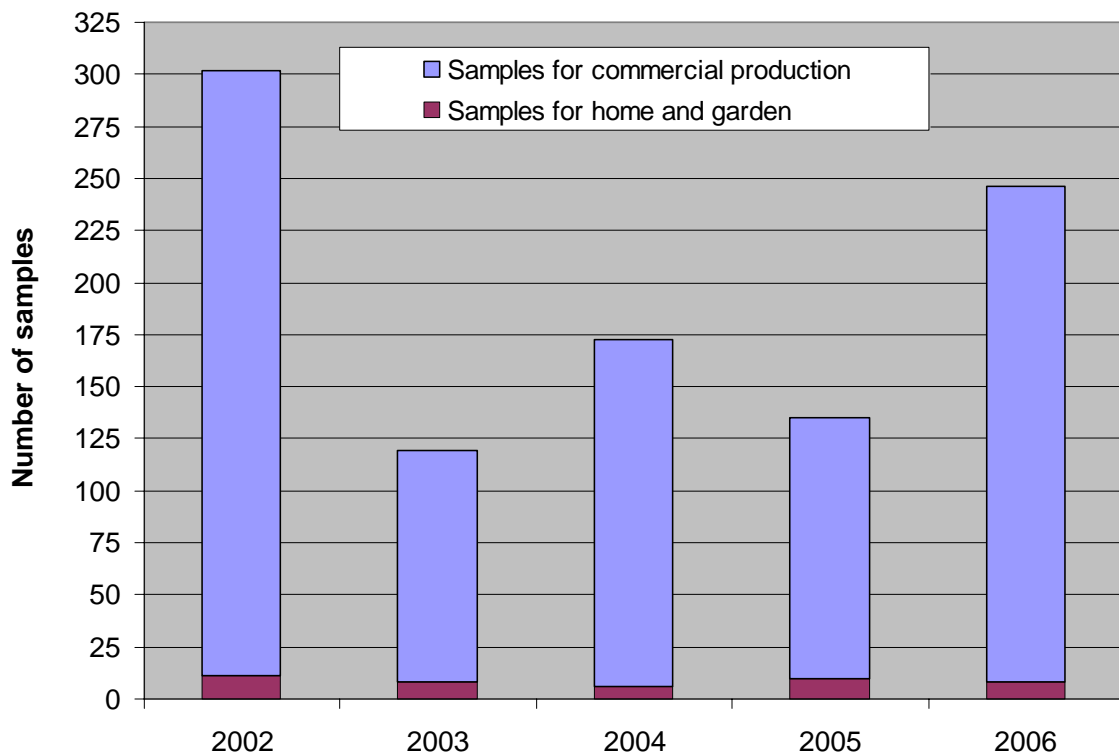
Agriculture supports the county's other major industry-tourism. There are two wine trails in the county and over 50 retail farm stands. Family farms typify Yates County. While the number of farms in New York State is declining overall, Yates County is experiencing a renaissance in agriculture largely due to the influx of Mennonites and the growth of the wine industry. Dairy farms have increased from 100 in 1980 to over 220 in 2003. Greenhouse and produce production has increased over 600% between 2000 and 2003. The wine industry has increased approximately 15% per year in the last 10 years.

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 Yates County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 975. Of these, 932 samples (96%) were submitted by commercial growers while 43 samples (4%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	11	2002	291	302
2003	8	2003	111	119
2004	6	2004	167	173
2005	10	2005	125	135
<u>2006</u>	<u>8</u>	<u>2006</u>	<u>238</u>	<u>246</u>
Total	43	Total	932	975

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (23%), for home garden vegetable production (26%) and for ornamentals (14%). Commercial growers submitted samples primarily to grow corn silage or grain (35%), alfalfa or alfalfa/grass mixes (22%), and grapes (18%).

Soils tested for home and garden in Yates County were classified as belonging to soil management group 2 (37%), group 3 (33%), or group 4 (30%). 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, 52% belonged to soil management group 2. Forty-two percent were group 3 soils. Groups 1 and 6 were represented with 2% of all samples while only one soil each belonged to soil management groups 4 and 5. Honeoye was the most common soil series (18% of all samples), followed by Lansing (10%), Langford (9%), Lima (8%) and Mardin (6%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to greater than 50% (muck soil). For homeowners 9% had less than 2% organic matter, 9% had 2-3% organic matter, while 37% tested between 3 and 4% organic matter and 44% had more than 4% organic matter.

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Soil pH in water (1:1 soil:water extraction ratio) varied from 4.8 to 7.9 for home and garden samples while 67% tested between pH 6.0 and 7.4 and 21% were pH 7.5 or higher. For the commercial samples, 71% tested between 6.0 and 7.4, 3% were pH 7.5 or higher and 26% were pH 5.9 or lower.

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, 9% of the soils tested low for P, 9% tested medium, 35% tested high and 47% tested very high. This meant that 81% tested high or very high in P. For commercial growers, 14% tested very high. In total 19% were low in P, 25% tested medium for P while 42% of the submitted samples were classified as high in soil test P. This means that 56% 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).

Soil Management Group	Potassium Soil Test Value (Morgan extraction in lbs K/acre)				
	Very low	Low	Medium	High	Very High
1	<35	35-64	65-94	95-149	>149
2	<40	40-69	70-99	100-164	>164
3	<45	45-79	80-119	120-199	>199
4	<55	55-99	100-149	150-239	>239
5 and 6	<60	60-114	115-164	165-269	>269

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Potassium classifications for Yates County soils varied from low (2% of the homeowner soils and 2% of the commercial growers' soils) to very high (77% of the homeowner soils and 52% of the commercial growers' soils). For homeowners, 5% tested medium, and 16% tested high for potassium. For commercial growers' soils, 10% tested medium and 36% 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 26 to more than 10000 lbs Mg/acre (muck soil). There were no soil samples that tested very low for Mg. Most soils tested high or very high for Mg (100% of the homeowner soils and 98% of the soils of the commercial growers). In total 1% of the commercial growers' soil tested low, 1% tested medium and 12% were high 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 94-100% in the normal range with only 46% of the commercial grower soils testing excessive for Fe. Similarly, most soils (91-98%) 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, 88% tested high for Zn while 12% tested medium. Of the commercial growers' samples, a almost 5% tested low, 23% tested medium while 73% 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	2	5
FLA	4	9
HRB	1	2
LAW	14	33
MVG	11	26
OTH	2	5
PER	1	2
RSP	1	2
SAG	6	14
TRF	1	2
Total	43	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	0	2	1	2	0	5	1
AGE/AGT	17	4	7	7	8	43	5
ALE/ALT	46	14	12	6	69	147	16
APP	1	1	1	2	1	6	1
ASP	0	0	1	1	0	2	0
BCE	0	0	2	3	0	5	1
BLB	0	0	1	2	1	4	0
BNS	5	4	0	0	0	9	1
BSS	3	0	2	0	0	5	1
BUS	0	0	0	0	1	1	0
BWI	0	0	1	0	0	1	0
CFP	1	0	0	0	0	1	0
CGE	1	1	1	1	5	9	1
CKP	0	0	0	0	1	1	0
CLE/CLT	1	1	0	2	0	4	0
COG/COS	102	39	49	37	97	324	35
GIE	0	2	0	0	0	2	0
GPA	48	5	7	6	5	71	8
GPF	16	6	6	4	3	35	4
GPV	7	11	26	11	4	59	6
GRE/GRT	3	0	3	5	0	11	1
IDL	1	0	0	0	0	1	0
MIX	2	4	5	6	11	28	3
MML	1	1	0	0	0	2	0
MVG	2	0	0	0	0	2	0
OAS	2	0	0	0	5	7	1
ONP	0	1	1	0	0	2	0
ONS	2	0	6	0	2	10	1
OTH	1	0	1	11	1	14	2
PCH	0	0	1	0	0	1	0
PEA	0	0	0	0	1	1	0
PEP	1	2	0	1	1	5	1
PGE	0	0	1	0	1	2	0
PIE/PIT	1	0	3	1	0	5	1
PLE	0	0	1	0	0	1	0
PLM	0	2	0	0	0	2	0

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Current year crop	2002	2003	2004	2005	2006	Total	%
PLT	1	0	0	0	1	2	0
PNT	5	0	0	0	0	5	1
POT	3	0	2	0	0	5	1
PUM	0	0	1	2	1	4	0
RSS	0	1	1	0	0	2	0
RYC	0	0	8	0	0	8	1
RYS	0	0	1	0	0	1	0
SAG	0	0	2	0	0	2	0
SOF	0	0	1	0	1	2	0
SOY	0	0	4	1	4	9	1
SQW	0	1	0	0	1	2	0
SSH	2	0	0	1	0	3	0
STS	0	0	1	0	1	2	0
SWC	5	2	3	2	1	13	1
TME	0	3	1	1	0	5	1
TOM	1	1	1	4	3	10	1
TRE	0	0	0	0	1	1	0
TRP	0	0	1	0	0	1	0
WHS	1	0	0	3	0	4	0
WHT	9	3	1	0	6	19	2
Unknown	0	0	0	3	1	4	0
Total	291	111	167	125	238	932	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)	16	37
SMG 3 (silt loam)	14	33
SMG 4 (sandy loam)	13	30
SMG 5 (sandy)	0	0
SMG 6 (mucky)	0	0
Total	43	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Allis	3	0	0	0	1	0	1	0
Appleton	2	1	0	3	4	0	8	1
Arkport	4	0	0	1	0	0	1	0
Aurora	2	7	0	6	0	5	18	2
Barre	1	1	0	0	0	0	1	0
Bath	3	3	0	0	4	1	8	1
Braceville	4	0	0	1	0	0	1	0
Caneadea	2	0	0	0	3	0	3	0
Carlisle	6	5	4	6	0	2	17	2
Cayuga	3	5	0	2	7	4	18	2
Chagrin	3	0	0	0	0	3	3	0
Chenango	3	1	9	12	4	7	33	4
Chippewa	3	2	0	1	0	0	3	0
Churchville	2	0	0	12	0	5	17	2
Conesus	2	3	0	2	0	0	5	1
Dunkirk	3	0	1	0	0	2	3	0
Erie	3	13	15	11	0	3	42	5
Fonda	2	1	3	0	0	4	8	1
Fremont	2	0	2	0	1	1	4	0
Genesee	2	0	0	1	0	0	1	0
Granby	5	0	0	0	1	0	1	0
Honeoye	2	76	6	9	17	61	169	18
Hornell	2	0	3	3	2	0	8	1
Howard	3	7	5	4	5	1	22	2
Kendaia	2	2	1	0	1	17	21	2
Lakemont	1	0	1	0	1	1	3	0
Langford	3	32	12	21	18	3	86	9
Lansing	2	32	4	25	9	27	97	10
Lima	2	20	11	13	7	19	70	8
Lyons	2	0	2	0	0	3	5	1
Madalin	1	2	1	0	0	3	6	1
Manlius	3	9	0	2	3	0	14	2
Mardin	3	18	4	6	17	13	58	6
Middlebury	3	0	0	2	0	0	2	0
Odessa	2	4	0	0	0	5	9	1
Ontario	2	14	4	3	3	10	34	4

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Name	SMG	2002	2003	2004	2005	2006	Total	%
Ovid	2	0	2	4	2	4	12	1
Palmyra	3	3	2	0	1	16	22	2
Phelps	3	11	0	0	1	3	15	2
Schoharie	1	3	3	1	0	1	8	1
Teel	2	1	1	0	0	1	3	0
Valois	3	6	9	7	6	4	32	3
Volusia	3	5	5	5	3	5	23	2
Woostern	3	2	1	3	3	4	13	1
Unknown	-	2	0	1	1	0	4	0
Total	-	291	111	167	125	238	932	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	0	4	4	16	5	6	3	5	43
Percentage	0	9	9	37	12	14	7	12	100

	2002-2006
Lowest:	1.2
Highest:	11.9
Mean:	3.8
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	0	21	136	89	27	9	4	5	291
2003	0	22	48	26	7	3	1	4	111
2004	6	20	68	40	16	6	1	10	167
2005	1	13	51	41	12	4	2	1	125
2006	0	23	110	86	12	2	3	2	238
Total	7	99	413	282	74	24	11	22	923

	2002	2003	2004	2005	2006
Lowest:	1.4	1.4	0.7	0.8	1.5
Highest:	52.6	44.8	48.5	22.2	39.2
Mean:	3.8	3.8	4.6	3.1	3.2
Median:	2.9	2.6	2.8	2.9	2.8

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	7	47	31	9	3	1	2	100
2003	0	20	43	23	6	3	1	4	100
2004	4	12	41	24	10	4	1	6	100
2005	1	10	41	33	10	3	2	1	100
2006	0	10	46	36	5	1	1	1	100
Total	1	11	44	30	8	3	1	2	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	2	2	5	10	14	9	0	0	43
Percentage	0	2	5	5	12	23	33	21	0	0	100

	2002-2006
Lowest:	4.8
Highest:	7.9
Mean:	-
Median:	7.0

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	5	8	28	25	66	85	59	15	0	0	291
2003	0	3	8	18	23	45	9	5	0	0	111
2004	3	7	17	35	49	45	10	1	0	0	167
2005	0	3	8	21	31	42	16	3	0	1	125
2006	0	5	8	36	44	81	60	4	0	0	238
Total	8	26	69	135	213	298	154	28	0	1	932

	2002	2003	2004	2005	2006
Lowest:	4.2	4.6	3.8	4.5	4.6
Highest:	7.8	7.6	7.5	9.3	7.7
Mean:	-	-	-	-	-
Median:	6.6	6.5	6.2	6.4	6.6

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	2	3	10	9	23	29	20	5	0	0	100
2003	0	3	7	16	21	41	8	5	0	0	100
2004	2	4	10	21	29	27	6	1	0	0	100
2005	0	2	6	17	25	34	13	2	0	1	100
2006	0	2	3	15	18	34	25	2	0	0	100
Total	1	3	7	14	23	32	17	3	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	4	4	15	3	2	1	4	1	9	43
Percentage	0	9	9	35	7	5	2	9	2	21	100

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

	2002-2006
Lowest:	1
Highest:	485
Mean:	114
Median:	37

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	62	73	118	19	8	3	3	5	0	291
2003	0	17	36	41	9	1	1	4	0	2	111
2004	0	42	51	60	3	3	1	3	3	1	167
2005	0	37	23	53	6	1	0	0	0	5	125
2006	0	19	51	116	26	9	8	8	1	0	238
Total	0	177	234	388	63	22	13	18	9	8	932

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	171	493	510	519	170
Mean:	20	26	20	26	26
Median:	10	9	7	9	15

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	21	25	41	7	3	1	1	2	0	100
2003	0	15	32	37	8	1	1	4	0	2	100
2004	0	25	31	36	2	2	1	2	2	1	100
2005	0	30	18	42	5	1	0	0	0	4	100
2006	0	8	21	49	11	4	3	3	0	0	100
Total	0	19	25	42	7	2	1	2	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	1	1	2	12	16
Total (%)	0	6	6	13	75	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	1	1	12	14
Total (%)	0	0	7	7	86	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	4	9	13
Total (%)	0	0	0	31	69	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	0	0
Total (%)	-	-	-	-	-	-
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 (%)	-	-	-	-	-	-

Rao, R., N. Herendeen, Q.M. Ketterings, and H. Krol (2007). Yates Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-36. 34 pages.

Potassium classification summary for homeowners:

Summary	Very Low	Low	Medium	High	Very High	Total
Number	0	1	2	7	33	43
Percentage	0	2	5	16	77	100

	2002-2006
Lowest:	69
Highest:	1409
Mean:	462
Median:	292

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	5	6
2003	0	0	1	3	1	5
2004	0	0	0	0	1	1
2005	0	0	0	0	1	1
2006	0	0	0	3	2	5
Total (#)	0	0	1	7	10	18
Total (%)	0	0	6	39	56	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	17	60	87	166
2003	0	2	3	18	16	39
2004	0	3	7	31	42	83
2005	0	1	9	27	19	56
2006	0	2	11	74	79	166
Total (#)	0	10	47	210	243	510
Total (%)	0	2	9	41	48	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	2	10	33	67	112
2003	0	2	4	22	35	63
2004	0	3	14	17	40	74
2005	0	5	8	24	29	66
2006	0	0	6	20	39	65
Total (#)	0	12	42	116	210	380
Total (%)	0	3	11	31	55	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	0	0	0
2003	0	0	0	0	0	0
2004	0	0	0	2	0	2
2005	0	0	0	0	0	0
2006	0	0	0	0	0	0
Total (#)	0	0	0	2	0	2
Total (%)	0	0	0	100	0	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	1	0	0	0	1
2006	0	0	0	0	0	0
Total (#)	0	1	0	0	0	1
Total (%)	0	100	0	0	0	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	5	5
2003	0	0	0	0	4	4
2004	0	0	0	0	6	6
2005	0	0	0	0	0	0
2006	0	0	0	0	2	2
Total (#)	0	0	0	0	17	17
Total (%)	0	0	0	0	100	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	4	27	94	164	2	291
2003	0	4	8	43	56	0	111
2004	0	6	21	50	89	1	167
2005	0	7	17	51	49	1	125
2006	0	2	17	97	122	0	238
Grand Total	0	23	90	335	480	4	932

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	1	9	32	56	1	100
2003	0	4	7	39	50	0	100
2004	0	4	13	30	53	1	100
2005	0	6	14	41	39	1	100
2006	0	1	7	41	51	0	100
Grand Total	0	2	10	36	52	0	100

	2002	2003	2004	2005	2006
Lowest:	52	50	42	47	63
Highest:	1177	1536	1232	7849	818
Mean:	243	263	224	281	215
Median:	187	190	183	164	173

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	0	0	0	43	43
Percentage	0	0	0	0	100	100

	2002-2006
Lowest:	245
Highest:	1194
Mean:	536
Median:	471

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	28	259	291
2003	0	1	0	14	96	111
2004	0	3	2	34	128	167
2005	0	1	1	19	104	125
2006	0	3	1	18	216	238
Total	0	9	7	113	803	932

	2002	2003	2004	2005	2006
Lowest:	33	28	26	52	54
Highest:	1866	1782	2080	10690	2156
Mean:	399	403	372	429	397
Median:	361	337	328	317	377

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	1	10	89	100
2003	0	1	0	13	86	100
2004	0	2	1	20	77	100
2005	0	1	1	15	83	100
2006	0	1	0	8	91	100
Total	0	1	1	12	86	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	43	0	43

Percentages:

0-49	>49	Total
Normal	Excessive	
100	0	100

	2002-2006
Lowest:	1
Highest:	48
Mean:	8
Median:	5

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	269	22	291
2003	107	4	111
2004	154	13	167
2005	120	5	125
2006	226	12	238
Total	876	56	932

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	92	8	100
	96	4	100
	92	8	100
	96	4	100
	95	5	100
	94	6	100

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	263	121	887	130	263
Mean:	14	12	26	14	11
Median:	5	6	8	7	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	39	4	43

Percentages:

0-99	>99	Total
Normal	Excessive	
91	9	100

	2002-2006
Lowest:	18
Highest:	148
Mean:	52
Median:	43

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	285	6	291	98	2	100
2003	110	1	111	99	1	100
2004	163	4	167	98	2	100
2005	122	3	125	98	2	100
2006	236	2	238	99	1	100
Total	916	16	932	98	2	100

	2002	2003	2004	2005	2006
Lowest:	9	6	2	8	10
Highest:	653	126	357	268	200
Mean:	37	31	37	39	36
Median:	32	27	32	31	31

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	0	5	38	43

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	12	88	100

	2002-2006
Lowest:	0.6
Highest:	69.5
Mean:	9.3
Median:	3.9

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	5	49	237	291
2003	6	31	74	111
2004	2	50	115	167
2005	13	39	73	125
2006	17	42	179	238
Total	43	211	678	932

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	17	81	100
5	28	67	100
1	30	69	100
10	31	58	100
7	18	75	100
5	23	73	100

	2002	2003	2004	2005	2006
Lowest:	0.3	0.2	0.1	0.1	0.1
Highest:	64.7	111.8	34.4	68.1	24.4
Mean:	2.8	4.5	3.5	3.9	3.2
Median:	1.9	1.6	1.3	1.2	2.2

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