Soil Sample Survey

Cortland County

Samples analyzed by CNAL (2002-2006)

Tompkins County (photo credit: Janice Degni, South Central NY CCE Dairy and Field Crops Program).

Summary compiled by

Renuka Rao, Janice Degni, 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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1. County Introduction

Cortland County is located in central NY, south of Onondaga County and the city of Syracuse. It is on the eastern fringes of the Finger Lakes Region and the northern edge of the Southern Tier region, which is comprised of counties that border the state of Pennsylvania. Cortland County is nearly square shaped and covers a total of 502 square miles, or 321,280 acres.
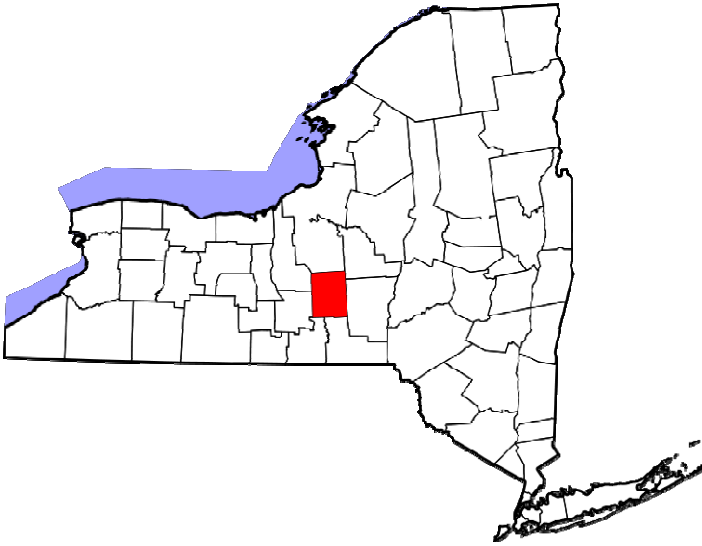
The city of Cortland is located at the intersection of seven valleys. Cortland is the population center of the county with nearly 80% of the population located within a four-mile radius of the city. The county has a strong rural character with beautiful viewscapes. NYS Rte 81, a major transportation artery, passes through prime farmland in the center of the county.

The hills and valleys shaped by glaciers during the last ice age offer different benefits and challenges for agricultural production. The soils in the valleys are typically made up of fertile, well-drained gravelly soils, which warm sooner in the spring allowing an earlier start to the growing season compared to the higher elevations. The mean elevation in the county is approximately 1,250 feet above sea level. The soils on the hills are heavier, containing more silt and clay soil particles. They typically have a natural constricted layer within two feet of the soil surface, which restricts drainage and crop rooting depth. Producers have adapted their farming systems to fit the productive capabilities of the soil types in their farm's landscape. The hill soils can tolerate short rotations of row crops without loosing productivity but are best suited to long-term or permanent cover as hay crops.

There are three main watersheds in the county. The majority of the county's land, 463 square miles or 92% of the land flows into the Upper Susquehanna River, which

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ultimately flows to the Chesapeake Bay. Streams draining the remaining 8 percent of land flow to the Finger Lakes; either Skaneateles to the north or Cayuga, located in neighboring Tompkins County to the west.

Dairy and field crop production are the predominant agricultural enterprises. In addition to the farm producers, Cortland serves as a business hub for agriculture in the region, home to many agribusinesses including machinery dealers, milk handlers, milking equipment dealers and feed suppliers to name a few. In addition to dairy the county has a number of livestock, fresh-market produce and perennial fruit farms and a small nursery and greenhouse industry.

According to the 2002 Census of Agriculture there were 569 farms in the county. Dairy Farms number around 178 and dairy products make up about 83% of total agricultural receipts estimated at $32 million dollars per year. Affiliated with the dairy farming are the farm gate receipts for hay and silage as well as cattle and calves, which earn $6.5 million dollars. Other agricultural enterprises include about 200 beef, sheep and other livestock farms, fresh market produce, blueberry farms and a small commercial nursery and greenhouse industry which earns $942,000 income from sales.

Regular soil tests contribute to optimized crop production while maintaining the quality of the environment through informed management of nutrients and management of soil fertility.

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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 Cortland County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 877. Of these, 803 samples (92%) were submitted by commercial growers while 74 samples (8%) were submitted by homeowners.
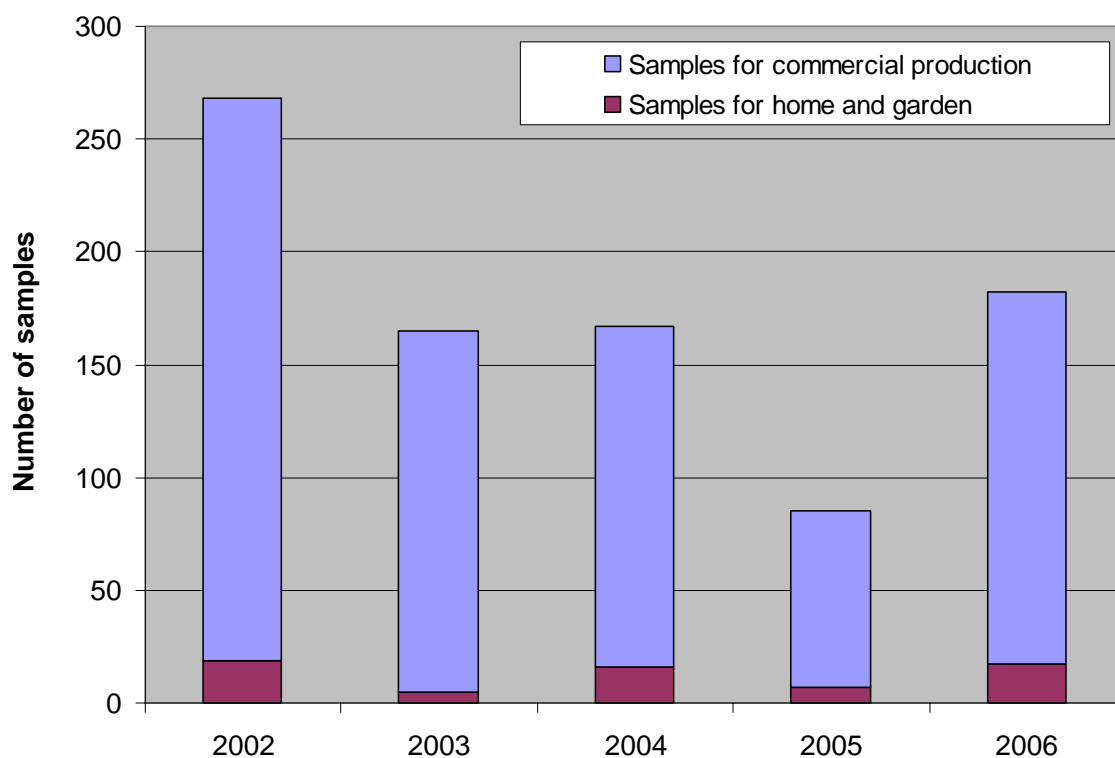
Homeowners		Commercial		Total
2002	19	2002	249	268
2003	5	2003	160	165
2004	16	2004	151	167
2005	7	2005	78	85
2006	17	2006	165	182
Total	74	Total	803	877

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily requested fertilizer recommendations for home garden vegetable production (28%) and lawns (26%). Commercial growers submitted samples primarily to grow corn silage or grain (27%), alfalfa or alfalfa/grass mixes (25%), and grass hay production (21%).

Soils tested for home and garden in Cortland County were classified as belonging to soil management group 2 (19%), group 3 (30%), group 4 (46%), or group 5 (5%). 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 (91%) belonged to soil management group 3. There were no group 1, 5 or 6 samples. Seven percent belonged to group 2. Group 4 was represented by less than 1% of the samples while the remainder was of unknown origin. Volusia was the most common soil series (15% of all samples), followed by Palmyra (14%), Mardin (12%), Lordstown (9%) and Bath (8%).

Organic matter levels, as measured by loss-on-ignition, ranged from 1% to greater than 40%. For homeowner samples, 52% contained between 4 and 6% organic matter. Nine percent had between 7 and 7% organic matter and 22% had more than 7% organic matter.

Of the samples submitted by commercial growers, 71% contained between 4 and 6% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from 4.4 to 8.1 for home and garden samples with 43% testing between pH 5.5 and 7.0. For the commercial samples, the highest pH was 7.3 and 85% 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, 15% of the soils tested low for P, 9% tested medium, 36% tested high and 39% tested very high. This meant that 76% tested high or very high in P. For commercial growers, 7% tested very high. In total 31% were low in P, 27% tested medium for P while 36% of the 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 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 Cortland County soils varied from very low (1% of the the commercial growers' soils) to very high (72% of the homeowner soils and 42% of the commercial growers' soils). For homeowners, 9% tested low in K, 5% tested medium, and 14% tested high for potassium. For commercial growers' soils, 6% tested low, 21% tested medium and 28% 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 36 to more than 5000 lbs Mg/acre. There were no soils that tested very low for Mg. Most soils tested high or very high for Mg (97% of the homeowner soils and 97% 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 91-93% in the normal range with 7% of the homeowner soils and 9% of the commercial grower soils testing excessive for Fe. Similarly, most soils (97-99%) 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, 92% tested high for Zn while 5% tested medium and 3% were low in Zn. Of the commercial growers' samples, 3% tested low, 20% tested medium while 77% 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.

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3. Cropping Systems

3.1 Homeowner Samples

Crops for which recommendations were requested by homeowners:

	2002-2006	%
ATF	6	8
CEM	3	4
RAR	9	12
HRB	3	4
LAW	19	26
MVG	21	28
OTH	1	1
PER	4	5
SAG	2	3
TOM	5	7
Unknown	1	1
Total	74	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	%
AGE/AGT	32	34	33	0	31	130	16
ALE/ALT	20	3	9	8	32	72	9
APP	1	0	0	0	0	1	0
BGE/BGT	4	0	0	0	1	5	1
BSS	0	0	7	0	0	7	1
CBS	0	0	1	0	0	1	0
CGE/CGT	16	3	3	0	8	30	4
CLE/CLT	1	4	0	0	1	6	1
COG/COS	91	49	45	22	9	216	27
GIE/GIT	9	21	4	10	19	63	8
GRE/GRT	23	23	11	17	34	108	13
IGL	0	0	0	0	3	3	0
MIX	3	0	1	1	0	5	1
OAS/OAT	5	2	1	0	9	17	2
OTH	0	3	1	7	0	11	1
PGE/PGT	1	0	4	5	3	13	2
PIE/PIT	4	10	2	0	0	16	2
PLE/PLT	1	2	0	0	2	5	1
PNT	20	4	23	4	0	51	6
PUM	1	0	0	0	0	1	0
RYC	1	0	0	0	1	2	0
RYS	0	0	0	1	0	1	0
SOF	2	0	0	0	0	2	0
SOG	0	0	0	1	0	1	0
SOY	2	0	0	0	1	3	0
STS	1	0	0	0	0	1	0
SUD	0	0	0	0	5	5	1
SWC	0	1	1	0	2	4	0
TOM	0	0	0	0	1	1	0
TRE/TRT	0	1	1	0	0	2	0
WHT	0	0	0	0	1	1	0
Unknown	11	0	4	2	2	19	2
Total	249	160	151	78	165	803	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)	14	19
SMG 3 (silt loam)	22	30
SMG 4 (sandy loam)	34	46
SMG 5 (sandy)	4	5
SMG 6 (mucky)	0	0
Total	74	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Alluvial lands	3	2	0	0	0	0	2	0
Appleton	2	0	1	0	0	0	1	0
Arnot	3	2	2	1	0	0	5	1
Bath	3	7	26	2	7	26	68	8
Chagrin	3	6	2	8	3	3	22	3
Chenango	3	8	2	0	2	0	12	1
Chippewa	3	4	2	1	0	2	9	1
Conesus	2	0	0	13	0	0	13	2
Dunkirk	3	0	0	0	0	1	1	0
Erie	3	11	3	8	6	0	28	3
Fredon	4	1	0	0	0	0	1	0
Halsey	4	1	0	0	0	0	1	0
Homer	2	0	2	2	1	0	5	1
Honeoye	2	0	0	3	0	0	3	0
Howard	3	16	4	17	7	4	48	6
Kendaia	2	1	0	2	0	0	3	0
Langford	3	16	8	9	4	9	46	6
Lansing	2	0	2	16	0	0	18	2
Lobdell	3	4	0	2	0	2	8	1
Lordstown	3	14	34	4	4	19	75	9
Mardin	3	36	18	10	9	24	97	12
Middlebury	3	1	1	4	1	0	7	1
Palmyra	3	55	12	15	5	28	115	14
Phelps	3	3	1	3	0	5	12	1
Scio	3	1	0	0	0	0	1	0
Teel	2	0	2	0	1	0	3	0
Tioga	3	8	5	2	2	2	19	2
Tuller	3	1	1	0	0	0	2	0
Valois	3	6	10	2	2	13	33	4
Venango	3	0	1	0	0	0	1	0
Volusia	3	41	20	23	16	21	121	15
Wayland	2	4	1	1	2	0	8	1
Unknown	-	0	0	3	6	6	15	2
Total	-	249	160	151	78	165	803	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	5	3	21	18	7	16	74
Percentage	0	5	7	4	28	24	9	22	100

	2002-2006
Lowest:	1.1
Highest:	12.8
Mean:	5.4
Median:	5.4

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	0	7	15	91	95	30	11	249
2003	0	0	0	15	39	61	36	9	160
2004	0	0	1	19	63	49	11	8	151
2005	0	0	3	6	23	29	13	4	78
2006	0	0	3	25	86	35	11	5	165
Total	0	0	14	80	302	269	101	37	803

	2002	2003	2004	2005	2006
Lowest:	2.2	3.0	2.4	2.8	2.7
Highest:	16.6	9.1	43.2	10.6	9.1
Mean:	5.1	5.4	5.2	5.2	4.7
Median:	5.1	5.4	4.8	5.1	4.6

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	0	3	6	37	38	12	4	100
2003	0	0	0	9	24	38	23	6	100
2004	0	0	1	13	42	32	7	5	100
2005	0	0	4	8	29	37	17	5	100
2006	0	0	2	15	52	21	7	3	100
Total	0	0	2	10	38	33	13	5	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	1	3	2	9	12	11	23	12	1	0	74
Percentage	1	4	3	12	16	15	31	16	1	0	100

	2002-2006
Lowest:	4.4
Highest:	8.1
Mean:	-
Median:	6.9

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	3	12	61	79	63	26	5	0	0	249
2003	0	2	9	49	58	41	1	0	0	0	160
2004	0	0	10	25	62	39	15	0	0	0	151
2005	0	1	12	16	37	9	3	0	0	0	78
2006	0	0	17	29	77	39	3	0	0	0	165
Total	0	6	60	180	313	191	48	5	0	0	803

	2002	2003	2004	2005	2006
Lowest:	4.6	4.8	5.1	4.9	5.0
Highest:	7.7	7.0	7.3	7.3	7.3
Mean:	-	-	-	-	-
Median:	6.3	6.2	6.3	6.1	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	1	5	24	32	25	10	2	0	0	100
2003	0	1	6	31	36	26	1	0	0	0	100
2004	0	0	7	17	41	26	10	0	0	0	100
2005	0	1	15	21	47	12	4	0	0	0	100
2006	0	0	10	18	47	24	2	0	0	0	100
Total	0	1	7	22	39	24	6	1	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	11	7	27	10	3	2	6	2	6	74
Percentage	0	15	9	36	14	4	3	8	3	8	100

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

	2002-2006
Lowest:	1
Highest:	431
Mean:	60
Median:	25

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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	80	52	96	11	6	1	2	0	1	249
2003	0	42	53	57	6	2	0	0	0	0	160
2004	0	60	42	39	9	0	0	0	0	1	151
2005	0	19	25	31	2	0	0	0	0	1	78
2006	0	44	41	65	7	4	2	1	0	1	165
Total	0	245	213	288	35	12	3	3	0	4	803

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	720	75	2450	338	484
Mean:	17	11	27	15	18
Median:	8	7	4	6	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	32	21	39	4	2	0	1	0	0	100
2003	0	26	33	36	4	1	0	0	0	0	100
2004	0	40	28	26	6	0	0	0	0	1	100
2005	0	24	32	40	3	0	0	0	0	1	100
2006	0	27	25	39	4	2	1	1	0	1	100
Total	0	31	27	36	4	1	0	0	0	0	100

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

8. Potassium

8.1 Homeowner Samples

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

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	2	12	14
Total (%)	0	0	0	14	86	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	1	4	14	22
Total (%)	0	14	5	8	64	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	2	4	25	34
Total (%)	0	9	6	12	74	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	1	1	0	2	4
Total (%)	0	25	25	0	50	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:

Summary	Very Low	Low	Medium	High	Very High	Total
Number	0	7	4	10	53	74
Percentage	0	9	5	14	72	100

	2002-2006
Lowest:	52
Highest:	1382
Mean:	347
Median:	320

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	
2002	0	0	0	4	1	5
2003	0	0	0	2	6	8
2004	0	0	20	9	8	37
2005	0	0	0	1	2	3
2006	0	0	0	0	0	0
Total (#)	0	0	20	16	17	53
Total (%)	0	0	38	30	32	100

Soil Management Group 3					
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	1	11	44	67	119	242
2003	1	15	28	46	62	152
2004	6	7	32	29	37	111
2005	0	3	11	21	34	69
2006	0	15	32	44	68	159
Total (#)	8	51	147	207	320	733
Total (%)	1	7	20	28	44	100

Soil Management Group 4					
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	1	1	2
2003	0	0	0	0	0	0
2004	0	0	0	0	0	0
2005	0	0	0	0	0	0
2006	0	0	0	0	0	0
Total (#)	0	0	0	1	1	2
Total (%)	0	0	0	50	50	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	1	11	44	72	121	0	249
2003	1	15	28	48	68	0	160
2004	6	7	52	38	45	3	151
2005	0	3	11	22	36	6	78
2006	0	15	32	44	68	6	165
Grand Total	8	51	167	224	338	15	803

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	4	18	29	49	0	100
2003	1	9	18	30	43	0	100
2004	4	5	34	25	30	2	100
2005	0	4	14	28	46	8	100
2006	0	9	19	27	41	4	100
Grand Total	1	6	21	28	42	2	100

	2002	2003	2004	2005	2006
Lowest:	41	39	36	45	49
Highest:	1914	870	5392	908	1374
Mean:	264	219	239	224	222
Median:	196	168	131	188	172

9. Magnesium

9.1 Homeowner Samples

Magnesium (lbs Mg/acre Morgan extraction) in homeowner samples (numbers):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Number	0	2	0	6	66	74
Percentage	0	3	0	8	89	100

	2002-2006
Lowest:	55
Highest:	1145
Mean:	441
Median:	403

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	5	5	28	211	249
2003	0	0	2	25	133	160
2004	0	1	5	41	104	151
2005	0	2	2	10	64	78
2006	0	2	2	22	139	165
Total	0	10	16	126	651	803

	2002	2003	2004	2005	2006
Lowest:	46	77	65	48	36
Highest:	1512	717	5397	749	1162
Mean:	419	343	344	354	339
Median:	387	335	264	250	326

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	2	11	85	100
2003	0	0	1	16	83	100
2004	0	1	3	27	69	100
2005	0	3	3	13	82	100
2006	0	1	1	13	84	100
Total	0	1	2	16	81	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	69	5	74

Percentages:

0-49	>49	Total
Normal	Excessive	
93	7	100

	2002-2006
Lowest:	1
Highest:	336
Mean:	20
Median:	7

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	237	12	249
2003	145	15	160
2004	134	17	151
2005	68	10	78
2006	150	15	165
Total	734	69	803

Percentages:

	0-49	>49	Total
	Normal	Excessive	
2002	95	5	100
2003	91	9	100
2004	89	11	100
2005	87	13	100
2006	91	9	100
Total	91	9	100

	2002	2003	2004	2005	2006
Lowest:	1	2	2	4	3
Highest:	100	146	224	102	129
Mean:	14	19	20	24	19
Median:	8	12	9	18	13

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	72	2	74

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	97	3	100

	2002-2006
Lowest:	5
Highest:	188
Mean:	46
Median:	40

Rao, R., J. Degni, Q.M. Ketterings, and H. Krol (2007). Cortland Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-39. 31 pages.

11.2 Commercial Samples

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
2002	246	3	249
2003	160	0	160
2004	150	1	151
2005	78	0	78
2006	159	6	165
Total	793	10	803

Percentages:

	0-99	>99	Total
	Normal	Excessive	
99	1	100
100	0	100
99	1	100
100	0	100
96	4	100
99	1	100

	2002	2003	2004	2005	2006
Lowest:	9	15	12	13	8
Highest:	158	78	189	78	179
Mean:	31	40	31	40	38
Median:	26	39	28	37	32

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	2	4	68	74

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
3	5	92	100

	2002-2006
Lowest:	0.4
Highest:	268.4
Mean:	17.8
Median:	4.1

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	
2002	2	21	226	249
2003	6	42	112	160
2004	5	56	90	151
2005	4	9	65	78
2006	7	33	125	165
Total	24	161	618	803

Percentages:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
	1	8	91	100
	4	26	70	100
	3	37	60	100
	5	12	83	100
	4	20	76	100
	3	20	77	100

	2002	2003	2004	2005	2006
Lowest:	0.2	0.1	0.1	0.2	0.1
Highest:	48.3	11.0	14.8	38.1	18.0
Mean:	2.7	2.0	1.9	2.6	2.1
Median:	2.0	1.5	1.2	1.7	1.7

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

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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