

Rao, R., C. Tillinghast, Q.M. Ketterings, and H. Krol (2007). Franklin Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-3. 32 pages.

Soil Sample Survey

Franklin County

Samples analyzed by CNAL (2002-2006)



Franklin County (photo credit: Carl Tillinghast, CCE of Franklin County).

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

&

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



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July 30, 2007

Correct Citation:

Rao, R. C. Tillinghast, Q.M. Ketterings, and H. Krol (2007). Soil sample survey of Franklin County. Samples analyzed by the Cornell Nutrient Analysis Laboratory (2002-2006). CSS Extension Bulletin E07-3. 32 pages.

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1. County Introduction

Franklin County is a rural and relatively isolated county located in Northern New York bordered by Canada to the North and the Adirondack Mountains to the south. Agriculture, along with tourism, is of vital importance to the economic health of the County. The majority of receipts from agriculture are derived from the 150 dairy farms in the county. Milk and other farm products resulting from dairy farms are estimated at over 50 million dollars annually. In addition to dairy, Franklin County has a solid core of vegetable producers and livestock farmers. Franklin County geography spans well over a million acres with nearly all of the commercial agriculture occurring in the top 1/3 of the county.

The farmland in Northern Franklin County is subject to a relatively short growing season extending on an average from May 21st to September 21st. The moderately cool climate and soils in the northern region of the county are conducive to a variety of forage and grain crops. Crops that grow successfully in Franklin County include, corn, alfalfa, grass forages, soybeans, oats, potatoes, barley, cool season vegetables, berry crops, and more.

Franklin County has an abundance of water resources with over 350 lakes, rivers, streams, ponds, etc. Land and farm prices remain very affordable within the county and very competitive when compared to other farmland in the northeast. Marginal farmland that was once used for dairy farming, in some cases, is being put back into production by new farm managers with “alternative” agricultural businesses. As such, the rise in viable small farm businesses, other than dairy, has increased significantly in recent years.

With abundant natural resources, competitive land values and accessibility to markets, the outlook for agriculture in Franklin County is promising. For the foreseeable future, dairy farming will remain the backbone of the county’s agricultural economy with a trend toward an increase in alternative enterprises related to livestock and crops.

Carl Tillinghast
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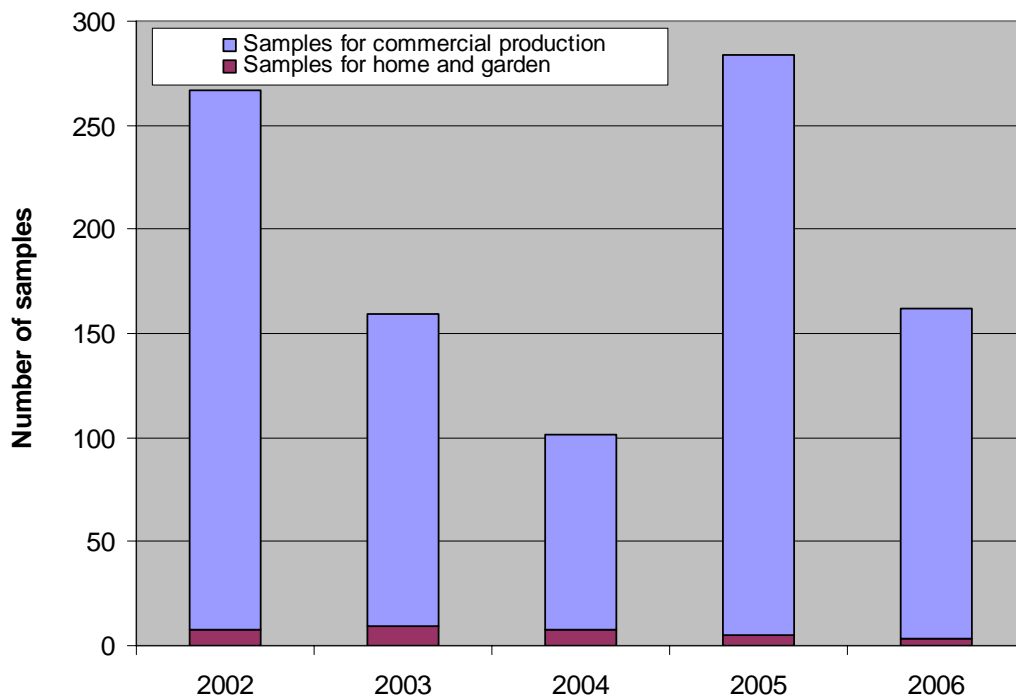


Franklin County (photo credit: Carl Tillinghast, CCE of Franklin County).



2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Lewis County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) during 2002 and 2006. The total number of samples analyzed in these years amounted to 973. Of these 940 samples (97%) were submitted by commercial growers while 33 samples (3%) were submitted by homeowners. The number of samples has been fluctuating over the past years.



Homeowners		Commercial		Total
2002	8	2002	259	267
2003	9	2003	150	159
2004	6	2004	93	101
2005	5	2005	279	284
<u>2006</u>	<u>3</u>	<u>2006</u>	<u>159</u>	<u>162</u>
Total	33	Total	940	973

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 to request recommendations for lawns (21%), mixed vegetables (15%), athletic fields (15%), perennials (9%), raspberries (6%), apricots, blueberries or road sites (3% each). Commercial growers submitted samples to grow alfalfa or alfalfa/grass mixes (14%), corn silage or grain (13%), and grass hay production (13%) while a few growers were planning to grow other crops (clover, oats, pasture, etc.).

Soils tested for home and garden were classified as belonging to soil management group 2 (9%), group 3 (27%), group 4 (24%), or group 5 (39%). Of the samples submitted by commercial growers, the majority (53%) belonged to soil management group 4. Only 4% belonged to group 1, 3% was from group 2, 1% from group 3, and 34% from group 5. Adams (30%), Empeyville (25%), Brayton (6%), and Westbury (6%) were the most common soil series. 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.

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to 12%. For homeowners, 54% of the samples had between 3.0 and 6.0% organic matter. Of the samples submitted by commercial growers, 76% contained between 3.0 and 6.0% organic matter.

Soil pH in water (1:1 extraction ratio) varied from 4.3 to over 7.2 for home and garden samples while 51% tested between 6.0 and 7.4 for pH. For the commercial samples, 74% tested between 6.0 and 7.4 while 86% had a pH between 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 extraction (Morgan, 1941). This solution contains sodium acetate buffered at a 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, 45% tested low for phosphorus, 15% tested medium, 30% tested high and 9% tested very high. This meant that 39% tested high or very high in P. For commercial growers, 3% tested very high. In total 27% was low, 36% tested medium while 33% of the submitted samples were classified as high in soil test P. This means that 36% tested high or very high in P.

Classifications for potassium 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 Franklin County soils varied from very low (9% of the homeowner soils and 7% of the commercial growers' soils) to very high (18% of the homeowner soils and 19% of the commercial growers' soils). For homeowners, 39% tested low in K, 15% tested medium, and 18% tested high for potassium. For commercial growers' soils, 22% tested low, 22% tested medium and 19% tested high in potassium.

Soils test very low for magnesium 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 magnesium. 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 10 to almost 6000 lbs Mg/acre (Morgan extraction). There were no soils that tested very low for Mg within the homeowner samples while 1% of the samples for commercial production tested very low in Mg. Most soils, however, tested very high or very high for Mg (69% of the homeowner soils and 91% of the soils of the commercial growers). In total, 30% of the homeowner soils and 8% 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 of commercial samples fell for 95% in the normal range with only 5% excessive. In contrast, 42% of the homeowner samples tested excessive. All but two of the samples tested in the normal range for Mn. 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, 97% tested high for Zn while 3% tested medium. Of the commercial growers' samples, 2% tested low in Zn, 15% tested medium while 83% 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 2.

3. Cropping Systems

3.1 Homeowner Samples

Crops for which recommendations are requested by homeowners:

	2002-2006	%
APR	1	3
ATF	5	15
BLU	1	3
LAW	7	21
MVG	5	15
PER	3	9
ROD	1	3
RSP	2	6
SAG	7	21
Unknown	1	3
Total	33	100

Notes: See Appendix for Cornell crop codes.

3.2 Commercial Samples

Crops for which commercial growers requested recommendations:

Current year crop	2002	2003	2004	2005	2006	Total	%
ABE/ABT	24	0	0	32	0	56	6
AGE/AGT	6	10	7	0	42	65	7
ALE/ALT	0	1	4	1	1	7	1
APP	1	0	0	0	0	1	0
BGE/BGT	1	1	0	1	1	4	0
BLB	1	0	0	0	0	1	0
BSP	0	0		0	1	1	0
BSS	0	0	0	0	0	0	0
BUK	0	0	0	1	0	1	0
BWI	0	0	0	0	0	0	0
BWS	0	0	0	0	0	0	0
CGE/CGT	5	3	4	8	5	25	3
CLE/CLT	1	1	0	1	1	4	0
COG/COS	58	11	20	13	24	126	13
GIE/GIT	11	0	35	0	0	46	5
GPF	0	1	0	0	0	1	0
GRE/GRT	33	3	0	14	21	71	8
MIX	1	2	1	2	6	12	1
OAS	0	0	2	7	0	9	1
OAT	1	2	6	2	2	13	1
OTH	1	3	1	0	2	7	1
PGE/PGT	0	0	2	0	3	5	1
PIE/PIT	0	0	0	0	0	0	0
PLE/PLT	0	4	0	1	0	5	1
PNE/PNT	3	0	3	0	0	6	1
POT	3	7	0	0	0	10	1
RSS	1	0	0	0	0	1	0
RYC	0	0	0	0	0	0	0
RYS	0	0	0	1	0	1	0
SOG	0	0	0	0	0	0	0
SOY	10	6	6	2	0	24	3
SSH	0	0	0	0	0	0	0
SUD	3	0	0	4	0	7	1
SWC	3	0	0	0	0	3	0
TRE/TRT	0	0	0	0	0	0	0
WHT	0	0	0	0	0	0	0
Unknown	92	95	2	189	50	428	46
Total	259	150	93	279	159	940	100

Notes: 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)	3	9
SMG 3 (silt loam)	9	27
SMG 4 (sandy loam)	8	24
SMG 5 (sandy)	13	39
SMG 6 (mucky)	0	0
Total	33	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Adams	5	47	14	11	196	13	281	30
Brayton	4	7	29	2	10	6	54	6
Colton	5	0	0	1	0	2	3	0
Cook	5	0	0	0	0	1	1	0
Coveytown	4	0	8	2	3	0	10	1
Covington	1	11	0	2	0	0	16	1
Croghan	5	8	4	1	1	2	16	2
Dannemora	4	8	2	0	1	0	11	1
Duane	4	0	0	1	0	0	1	0
Empeyville	4	100	31	11	33	56	231	25
Fahey	5	3	5	2	0	0	10	1
Fonda	2	0	0	2	0	1	3	0
Grenville	4	13	0	6	0	1	20	2
Hermon	4	1	3	17	1	1	23	2
Hogansburg	4	3	0	2	2	0	7	1
Kars	4	0	0	4	4	0	8	1
Kingsbury	1	0	0	0	0	1	1	0
Livingston	1	4	0	0	0	0	4	0
Madalin	1	2	10	0	2	5	19	2
Massena	4	0	2	0	0	2	4	0
Morris	3	1	0	0	0	0	1	0
Niagara	3	0	2	0	0	1	3	0
Nicholville	4	10	1	0	0	0	11	1
Rhinebeck	2	5	15	2	0	0	22	2
Salmon	4	1	3	0	5	5	14	1
Skerry	5	0	0	0	0	1	1	0
Swanton	4	0	0	1	0	0	1	0
Trout River	5	0	0	0	0	9	9	1
Tughill	4	0	0	1	0	0	1	0
Wallington	3	0	6	0	0	0	6	1
Walpole	4	9	4	1	2	4	20	2
Westbury	4	10	4	20	2	24	60	6
Worth	4	2	7	2	9	0	20	2
Unknown	-	14	0	2	8	24	48	5
Total	-	259	150	93	279	159	940	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
#	2	2	6	11	5	2	3	2	33
%	6	6	18	33	15	6	9	6	100

	2002-2006
Lowest:	0.5
Highest:	11.4
Mean:	4.0
Median:	3.7

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	7	45	94	71	28	7	7	259
2003	0	6	22	53	50	12	4	3	150
2004	0	5	10	31	26	11	8	2	93
2005	1	13	29	93	100	37	3	3	279
2006	0	10	30	50	38	23	8	0	159
Total	1	41	136	321	285	111	30	15	940

	2002	2003	2004	2005	2006
Lowest:	1.1	1.3	1.3	0.9	1.0
Highest:	9.8	7.5	7.6	12.0	6.6
Mean:	3.9	3.9	4.1	3.9	3.8
Median:	3.8	3.9	4.0	4.0	3.7

Organic matter 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	3	17	36	27	11	3	3	100
2003	0	4	15	35	33	8	3	2	100
2004	0	5	11	33	28	12	9	2	100
2005	0	5	10	33	36	13	1	1	100
2006	0	6	19	31	24	14	5	0	100
Total	0	4	14	34	30	12	3	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	Un-known	Total
#	1	5	1	8	9	6	2	0	0	0	1	33
%	3	15	3	24	27	18	6	0	0	0	3	100

	2002-2006
Lowest:	4.4
Highest:	7.2
Mean:	-
Median:	6.0

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	1	2	10	54	70	83	32	5	1	1	259
2003	0	0	8	28	55	52	7	0	0	0	150
2004	0	2	8	14	21	34	12	2	0	0	93
2005	0	3	13	60	128	64	10	1	0	0	279
2006	1	1	5	22	72	53	4	1	0	0	159
Total	2	8	44	178	346	286	65	9	1	1	940

	2002	2003	2004	2005	2006
Lowest:	4.3	5.1	4.9	4.6	4.4
Highest:	9.7	7.1	7.6	7.6	7.5
Mean:	-	-	-	-	-
Median:	3.8	3.9	4.0	4.0	3.7

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	4	21	27	32	12	2	0	0	100
2003	0	0	5	19	37	35	5	0	0	0	100
2004	0	2	9	15	23	37	13	2	0	0	100
2005	0	1	5	22	46	23	4	0	0	0	100
2006	1	1	3	14	45	33	3	1	0	0	100
Total	0	1	3	19	37	30	7	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	
#	0	15	5	10	0	1	0	0	1	1	33
%	0	45	15	30	0	3	0	0	3	3	100

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

	2002-2006
Lowest:	1
Highest:	387
Mean:	26
Median:	4

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	83	75	91	4	2	2	2	0	0	259
2003	0	25	66	57	1	0	0	1	0	0	150
2004	0	34	32	21	4	1	1	0	0	0	93
2005	0	78	117	80	3	0	0	0	1	0	279
2006	0	37	53	62	7	0	0	0	0	0	159
Total	0	257	343	311	19	3	3	3	1	0	940

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	113	101	93	154	53
Mean:	11	10	10	9	11
Median:	6	7	5	5	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	32	29	35	2	1	1	1	0	0	100
2003	0	17	44	38	1	0	0	1	0	0	100
2004	0	37	34	23	4	1	1	0	0	0	100
2005	0	28	42	29	1	0	0	0	0	0	100
2006	0	23	33	39	4	0	0	0	0	0	100
Total	0	27	36	33	2	0	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	
2002-2006 (#)	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	
2002-2006 (#)	0	1	0	0	2	3
Total (%)	0	33	0	0	67	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002-2006 (#)	0	5	3	1	0	9
Total (%)	0	56	33	11	0	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002-2006 (#)	1	2	2	2	1	8
Total (%)	13	25	25	25	13	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002-2006 (#)	2	5	0	3	3	13
Total (%)	15	38	0	23	23	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002-2006 (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

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Potassium classification summary for homeowners:

Summary	Very Low	Low	Medium	High	Very High	Total
#	3	13	5	6	6	33
%	9	39	15	18	18	100

	2002-2006
Lowest:	37
Highest:	865
Mean:	163
Median:	104

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	3	11	3	17
2003	0	1	3	1	5	10
2004	0	0	0	1	1	2
2005	0	2	1	2	0	5
2006	1	0	1	2	2	6
Total (#)	1	3	8	17	11	40
Total (%)	3	8	20	43	28	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	1	1	3	5
2003	0	0	4	7	4	15
2004	0	0	2	2	0	4
2005	0	0	0	0	0	0
2006	0	0	0	1	0	1
Total (#)	0	0	7	11	7	25
Total (%)	0	0	28	44	28	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	1	0	1
2003	0	1	3	2	2	8
2004	0	0	0	0	0	0
2005	0	0	0	0	0	0
2006	0	0	0	1	0	1
Total (#)	0	1	3	4	2	10
Total (%)	0	10	30	40	20	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	9	32	40	29	54	164
2003	3	21	23	25	22	94
2004	12	16	14	18	10	70
2005	6	23	12	20	8	69
2006	7	21	24	34	13	99
Total (#)	37	113	100	126	107	483
Total (%)	7	23	23	25	22	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	3	16	13	21	5	58
2003	11	1	2	5	4	23
2004	6	5	4	0	0	15
2005	9	57	54	48	29	197
2006	1	9	5	4	9	28
Total (#)	30	88	78	78	47	321
Total (%)	9	27	24	24	15	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	12	48	57	63	65	14	259
2003	14	24	35	40	37	0	150
2004	18	21	20	21	11	2	93
2005	15	82	67	70	37	8	279
2006	9	30	30	42	24	24	159
Grand Total	68	205	209	236	174	48	940

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	5	19	22	24	25	5	100
2003	9	16	23	27	25	0	100
2004	19	23	22	23	12	2	100
2005	5	29	24	25	13	3	100
2006	6	19	19	26	15	15	100
Grand Total	7	22	22	25	19	5	100

	2002	2003	2004	2005	2006
Lowest:	30	14	10	25	25
Highest:	1022	675	706	753	611
Mean:	189	167	131	166	166
Median:	144	144	113	136	142

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	
#	0	8	2	8	15	33
%	0	24	6	24	45	100

	2002-2006
Lowest:	23
Highest:	783
Mean:	221
Median:	179

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	1	6	8	28	216	259
2003	0	7	5	16	122	150
2004	2	9	2	7	73	93
2005	2	8	21	45	203	279
2006	1	7	4	192	130	159
Total	6	37	40	113	744	940

	2002	2003	2004	2005	2006
Lowest:	18	37	10	15	15
Highest:	5915	1070	1888	1772	1692
Mean:	469	405	403	313	473
Median:	394	396	345	295	404

Magnesium 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	3	11	83	100
2003	0	5	3	11	81	100
2004	2	10	2	8	78	100
2005	1	3	8	16	73	100
2006	1	4	3	11	82	100
Total	1	4	4	12	79	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	
2002-2006	19	14	33

Percentages:

0-49	>49	Total %
Normal	Excessive	
58	42	100

	2002-2006
Lowest:	3
Highest:	763
Mean:	87
Median:	21

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	245	14	259
2003	146	4	150
2004	83	10	93
2005	265	14	279
2006	153	6	159
Total	892	48	940

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	95	5	100
	97	3	100
	89	11	100
	95	5	100
	96	4	100
	95	5	100

	2002	2003	2004	2005	2006
Lowest:	1	2	3	1	2
Highest:	155	95	113	260	144
Mean:	16	13	23	22	18
Median:	9	9	16	17	12

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	
2002-2006	33	0	33

Percentages:

0-99	>99	Total %
Normal	Excessive	
100	0	100

	2002-2006
Lowest:	5
Highest:	173
Mean:	30
Median:	19

11.2 Commercial Samples

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
2002	259	0	259
2003	150	0	150
2004	93	0	93
2005	277	2	279
2006	159	0	159
Total	938	2	940

Percentages:

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

	2002	2003	2004	2005	2006
Lowest:	3	1	2	4	2
Highest:	92	62	76	263	99
Mean:	18	14	18	27	25
Median:	16	12	15	23	22

12. Zinc

12.1 Homeowner Samples

Zinc (lbs Zn/acre Morgan extraction) in homeowner samples:

Total number of samples:

	<0.5	0.5-1.0	>1	Total #
	Low	Medium	High	
2002-2006	0	1	32	33

Percentages:

<0.5	0.5-1.0	>1	Total %
Low	Medium	High	
0	3	97	100

	2002-2006
Lowest:	0.7
Highest:	56.1
Mean:	8.8
Median:	3.3

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	1	24	233	259
2003	2	14	134	150
2004	4	18	71	93
2005	3	56	220	279
2006	8	26	125	159
Total	18	138	784	940

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	9	90	100
1	9	89	100
4	19	76	100
1	20	79	100
5	16	79	100
2	15	83	100

	2002	2003	2004	2005	2006
Lowest:	0.3	0.3	0.1	0.3	0.1
Highest:	90.8	17.2	20.7	40.5	8.9
Mean:	3.6	2.5	2.1	2.1	2.1
Median:	2.1	2.0	1.6	1.6	1.8

Appendix: Cornell Crop Codes

Crop codes are used in the Cornell Nutrient Analyses 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
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 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
APR	Apricots
ATF	Athletic field
BDR/DND	Beans-dry

Crop Code	Crop Description
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, Established
TRF	Turf
TRT	Christmas trees, Topdressing