

Soil Sample Survey

Saratoga Co.

Samples analyzed by CNAL in 1995-2001



Summary compiled by

Quirine M. Ketterings, Hettie Krol, and W. Shaw Reid



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

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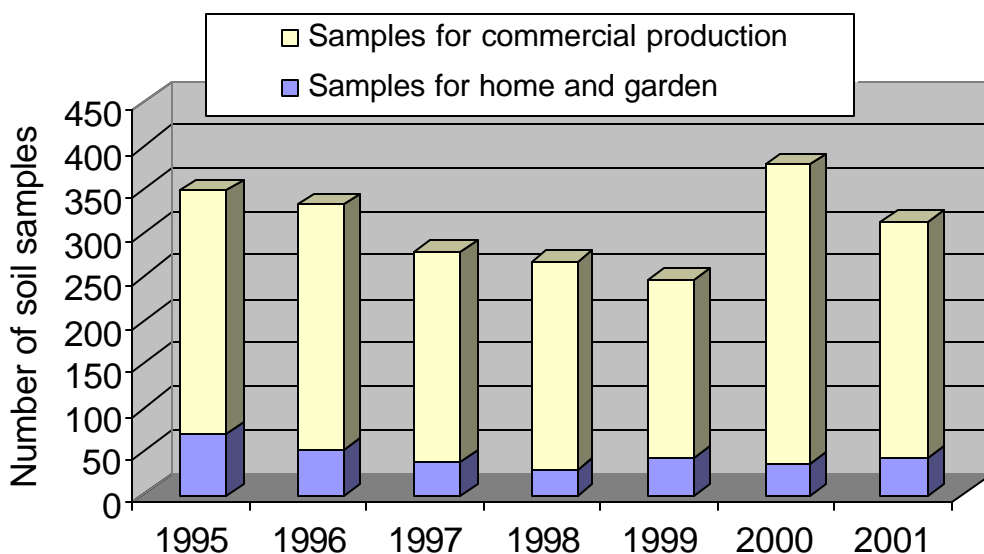
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1. General Survey Summary

This survey summarizes the soil test results from Saratoga County soil samples submitted for analyses to the Cornell Nutrient Analysis Laboratory (CNAL) during 1995-2001. The total number of samples analyzed in these years amounted to 2162. Of these 2162 samples, 1857 (86%) were submitted to obtain fertilizer recommendations for commercial production while 305 samples (14%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	70	1995	278	348
1996	50	1996	283	333
1997	36	1997	242	278
1998	28	1998	240	268
1999	43	1999	202	245
2000	35	2000	342	377
<u>2001</u>	<u>43</u>	<u>2001</u>	<u>270</u>	<u>313</u>
Total	305	Total	1857	2162

Many of the home and garden (32%) were submitted to request fertilizer recommendations for lawns while 19% of the samples came from cemeteries and 11% of the samples were submitted to obtain home garden vegetable recommendation. People submitting samples for commercial production requested fertilizer recommendations for corn silage or grain production (45%), alfalfa or alfalfa/grass mixtures (29%), hay production (8%), and apples (5%), while fewer samples were submitted for other crops including pumpkins, pastures, and vegetables.

Home and garden samples in Saratoga County were silty (14%), silt loams (11%), sandy loams (15%) or sandy (60%) belonging to soil management group 2, 3, 4, and 5, respectively. The table below gives descriptions of each of the soil management groups.

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 for commercial production, 34% belonged to soil management group 2. One percent belonged to soil management group 1 while 5% were classified as group 3 soils, 23% as group 4 soils and 25% as group 5 soils. The remainder of the soils

could not be classified with regards to soil management group. The four most common soil series were Hudson (19%), Rhinebeck (14%), Oakville (13%), and Broadalbin (7%). These soils comprise 4% (Hudson), 3% (Rhinebeck), 10% (Oakville), and 4% (Broadalbin) of the 537,300 acres in the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to almost 50% with median values ranging from 1.4 to 2.8% organic matter for home and garden samples and 2.6 to 3.3% for samples submitted for commercial production. Forty-two percent of the home and garden samples had between 2.0 and 4.9% organic matter with 21% testing between 2.0 and 2.9% organic matter, 12% between 3.0 and 3.9% organic matter, and 9% between 4.0 and 4.9% organic matter. Ten percent of the soils submitted for home and garden tested >4.9% in organic matter while 48% had less than 2.0% organic matter. Of the samples submitted for commercial production, 21% contained between 1.0-1.9% organic matter, while 30% had between 2.0 and 2.9% organic matter and 27% contained between 3.0 and 3.9% organic matter. In total, 79% of the samples had less than 4% organic matter.

Soil pH in water (1:1 extraction ratio) varied from pH 4.4 to 8.5 with the median for home and garden samples ranging from pH 6.6 to pH 7.1 and for samples submitted for commercial production ranging from pH 6.3 to pH 6.6. Of the home and garden samples, 87% had a pH of 6.0 or higher. For the samples submitted for commercial production, this was 82% while 18% tested between pH 5.0 and pH 5.9.

Extractable nutrients such as phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), iron (Fe), manganese (Mn), and zinc (Zn) were measured using the Morgan solution and extraction method (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 soils with >39 lbs P/acre are classified as very high. Of the home and garden samples, 28% tested low, 16% tested medium, 37% tested high and 19% tested very high. This meant that 55% tested high or very high in P. Phosphorus levels for samples for commercial production in Saratoga County were similar to the state average: 9% percent of the samples tested very high in P. Twenty-eight percent were low in P, 27% tested

medium for P while 35% of the submitted samples were classified as high in soil test P. This means that 44% tested high or very high in P. There were no clear trends in P levels over the 7 years.

Classifications for potassium depend on soil management group. The fine-textured soils of 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 low, 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 the table below).

Potassium classifications depend on soil test K levels and soil management group.

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

Of the home and garden samples, 17% were classified as very low while 30% were low in potassium. Seventeen percent tested medium, 12% high and 23% very high. For samples submitted for commercial production, 5% tested very low in K, 17% tested low, 21% tested medium, 28% tested high and 26% tested very high in potassium with the remainder being of unknown K classification. As with phosphorus, there were no trends over the 7 years of soil sampling.

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 3 to almost 4,600 lbs Mg/acre (Morgan extraction). There were only 18 samples (12 home and garden and 6 commercial samples) that tested very low in Mg. Most soils tested high or very high for Mg (68% of the homeowner soils and 90% of the soils of the commercial growers). Fifty-six of the homeowner soils (18%) and 67 of the commercial growers' soils (4%) tested low in Mg. Nine percent of the home and garden samples and 6% of the commercial samples were 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 fell for 95-99% in the normal range with 14 of the home and garden samples and 24 of the samples for commercial production testing excessive for Fe. Similarly, most soils (97-100%) for both groups 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 zinc 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 home and garden samples, 62% tested high for zinc while 23% tested medium and 15% was low in zinc. Of the samples for commercial production, 10% tested low in zinc, 40% tested medium while 50% were high in zinc.

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.

Reference

- Morgan, M.F. 1941. Chemical soil diagnosis by the universal soil testing system. Connecticut Agricultural Experimental Station. Bulletin 450.

2. Cropping Systems

2.1 Samples for Home and Garden

Crops for which recommendations are requested by homeowners:

	1995	1996	1997	1998	1999	2000	2001	Total	%
ALG	0	0	0	0	2	2	0	4	1
ATF	0	0	5	4	6	5	6	26	9
BLU	0	0	0	0	0	0	1	1	0
CEM	56	0	0	1	0	0	0	57	19
FAR	0	6	1	0	0	0	0	7	2
FLA	1	9	0	0	0	0	4	14	5
HRB	0	0	3	0	1	0	0	4	1
LAW	7	21	11	10	17	18	15	99	32
MVG	3	4	7	1	7	9	2	33	11
OTH	0	0	6	3	4	0	0	13	4
PER	2	3	1	2	4	0	0	12	4
ROS	0	0	0	0	1	0	0	1	0
SAG	0	6	1	4	1	0	0	12	4
SOD	1	0	0	3	0	1	14	19	6
SPB	0	1	0	0	0	0	0	1	0
SUB	0	0	1	0	0	0	0	1	0
Unknown	0	0	0	0	0	0	1	1	0
Total	70	50	36	28	43	35	43	305	100

Notes:

See Appendix for Cornell crop codes.

2.2 Samples for Commercial Production

Crops for which recommendations are requested for commercial production:

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
ABE/ABT	0	1	0	2	0	0	0	3	0
AGE/AGT	85	48	89	47	57	67	51	444	24
ALE/ALT	8	15	1	1	7	30	7	69	4
APP	23	49	4	4	4	1	10	95	5
ASP	0	0	0	0	0	1	0	1	0
BCE/BCT	0	0	0	0	3	0	0	3	0
BGE/BGT	0	0	1	1	0	0	0	2	0
BLB	0	2	0	4	0	0	2	8	0
BUK	0	0	0	0	0	1	0	1	0
CGE/CGT	5	1	9	16	6	9	10	56	3
CLE/CLT	4	2	0	0	0	2	0	8	0
COG/COS	127	144	111	114	61	169	110	836	45
GIE/GIT	0	3	6	2	18	0	47	76	4
GPA	0	0	0	0	1	0	0	1	0
GRE/GRT	5	3	4	25	22	30	13	102	5
IDL	0	0	0	2	0	0	0	2	0
MIX	1	2	2	4	4	7	1	21	1
MML	3	0	1	0	0	0	0	4	0
OAT	0	0	0	0	4	1	0	5	0
OTH	0	0	0	1	0	0	2	3	0
PCH	0	0	0	0	0	0	2	2	0
PEP	0	0	0	0	0	1	0	1	0
PGE/PGT	2	0	3	0	6	2	7	20	1
PIE/PIT	3	1	0	0	3	5	0	12	1
PLE/PLT	0	0	0	0	0	0	4	4	0
PLM	1	2	0	0	0	0	0	3	0
PNE/PNT	1	0	0	1	1	4	3	10	1
PUM	2	7	1	3	0	3	0	16	1
RSF	0	0	0	1	0	0	0	1	0
RSS	0	0	1	0	0	0	0	1	0
RYS	1	2	0	0	0	1	0	4	0
SQW	0	0	1	0	0	0	0	1	0
SSH	0	0	0	0	2	1	0	3	0
STE	0	0	0	3	0	0	0	3	0
STS	0	0	0	6	0	0	0	6	0

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Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
SWC	2	1	1	1	0	1	0	6	0
TME	0	0	1	0	0	0	0	1	0
TOM	0	0	0	0	1	0	0	1	0
TRE/TRT	0	0	3	0	0	0	0	3	0
WHT	0	0	0	2	0	0	0	2	0
Unknown	5	0	3	0	2	6	1	17	1
Total	278	283	242	240	202	342	270	1857	100

Notes:

See Appendix for Cornell crop codes.

3. Soil Types

3.1 Samples for Home and Garden

Soil types (soil management groups) for home and garden samples:

	1995	1996	1997	1998	1999	2000	2001	Total	%
SMG 1 (clayey)	0	0	0	0	0	0	0	0	0
SMG 2 (silty)	9	19	5	0	2	5	2	42	14
SMG 3 (silt loam)	0	2	7	7	9	2	5	32	11
SMG 4 (sandy loam)	5	14	5	6	9	5	1	45	15
SMG 5 (sandy)	56	15	18	15	23	23	35	182	60
SMG 6 (mucky)	0	0	0	0	0	0	0	0	0
Unknown	0	0	1	0	0	0	0	1	0
Total	70	50	36	28	43	35	43	305	100

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Becket	4	0	0	0	0	0	0	1	1
Berkshire	5	1	0	0	0	0	1	0	2
Bernardston	4	5	14	2	1	1	21	13	57
Broadalbin	4	12	12	30	26	33	4	9	126
Burdett	2	0	1	0	2	0	1	0	4
Cambridge	3	1	0	1	3	0	0	0	5
Charlton	4	5	3	0	6	7	1	2	24
Chenango	3	0	5	0	1	3	0	2	11
Claverack	4	1	3	6	5	3	16	4	38
Cosad	4	0	0	2	1	0	8	1	12
Deerfield	5	3	7	1	0	9	6	31	57
Elmridge	5	14	23	3	20	5	4	8	77
Farmington	3	0	0	0	0	1	2	3	6
Galway	4	1	0	1	4	16	0	2	24
Hinckley	5	0	1	0	0	1	0	1	3
Hoosic	4	9	2	2	0	2	3	9	27
Hudson	2	59	66	72	44	23	63	28	355
Ilion	3	0	7	0	1	0	0	0	8
Madalin	1	0	9	1	1	2	1	2	16
Manlius	3	3	5	3	0	0	12	1	24
Mosherville	4	2	0	2	8	13	3	10	38
Nassau	4	3	8	15	9	6	10	6	57
Nunda	2	0	2	1	1	9	1	2	16
Oakville	5	44	31	41	33	29	46	38	262
Paxton	4	1	0	1	3	0	0	0	5
Rhinebeck	2	61	56	20	43	19	46	10	255
Scarboro	4	0	1	0	0	0	0	0	1
Scio	3	5	0	3	4	4	8	8	32
Shaker	2	0	2	0	0	0	1	0	3
Sun	4	0	0	0	5	0	0	0	5
Sutton	4	1	0	0	0	1	0	0	2
Teel	2	0	1	2	2	0	2	0	7
Tioga	3	0	0	0	0	0	1	0	1
Unadilla	3	2	1	4	2	1	4	1	15
Wareham	5	0	1	4	1	2	2	6	16
Windsor	5	16	7	5	8	3	0	0	39

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Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Woodbridge	4	4	0	0	0	0	0	0	4
Unknown	-	25	15	20	6	9	75	72	222
Total	-	278	283	242	240	202	342	270	1857

4. Organic Matter

4.1 Samples for Home and Garden

Number of home and garden samples within each % organic matter range:

	<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
1995	27	28	5	4	1	2	3	0	70
1996	3	13	14	8	4	2	3	3	50
1997	6	9	4	4	10	1	0	2	36
1998	2	7	7	1	4	0	1	6	28
1999	1	14	14	9	4	0	0	1	43
2000	4	12	10	2	2	0	0	5	35
2001	7	12	11	8	3	1	0	1	43
Total	50	95	65	36	28	6	7	18	305

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.6	0.1	0.8	0.9	0.4	0.1	
Highest:	6.5	8.8	41.6	47.8	10.4	33.5	28.4	
Mean:	1.6	3.2	3.9	6.7	2.7	3.7	2.8	
Median:	1.4	2.7	2.8	2.4	2.3	2.0	2.2	

Percent of home and garden samples within each % organic matter range:

	<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
1995	39	40	7	6	1	3	4	0	100
1996	6	26	28	16	8	4	6	6	100
1997	17	25	11	11	28	3	0	6	100
1998	7	25	25	4	14	0	4	21	100
1999	2	33	33	21	9	0	0	2	100
2000	11	34	29	6	6	0	0	14	100
2001	16	28	26	19	7	2	0	2	100
Total	16	31	21	12	9	2	2	6	100

4.2 Samples for Commercial Production

Number of samples for commercial production within each % organic matter range:

	<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
1995	3	73	99	66	29	6	1	1	278
1996	7	52	87	59	52	18	8	0	283
1997	0	46	75	66	46	7	0	2	242
1998	7	47	77	76	24	6	0	3	240
1999	2	33	37	85	34	8	2	1	202
2000	3	74	100	86	65	11	3	0	342
2001	1	65	87	62	37	13	4	1	270
Total	23	390	562	500	287	69	18	8	1857

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.5	1.0	0.4	0.8	0.5	0.3	
Highest:	7.8	6.9	10.0	9.1	8.6	6.1	7.7	
Mean:	2.7	3.1	3.0	2.8	3.2	3.0	2.9	
Median:	2.6	2.9	3.0	2.7	3.3	2.9	2.8	

Percent of samples for commercial production within each % organic matter range:

	<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
1995	1	26	36	24	10	2	0	0	100
1996	2	18	31	21	18	6	3	0	100
1997	0	19	31	27	19	3	0	1	100
1998	3	20	32	32	10	3	0	1	100
1999	1	16	18	42	17	4	1	0	100
2000	1	22	29	25	19	3	1	0	100
2001	0	24	32	23	14	5	1	0	100
Total	1	21	30	27	15	4	1	0	100

5. pH

5.1 Samples for Home and Garden

Number of home and garden samples within each pH range:

	<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
1995	0	0	1	8	16	27	13	1	4	0	70
1996	0	0	0	4	8	18	17	3	0	0	50
1997	0	1	2	7	6	4	11	4	1	0	36
1998	0	0	3	2	7	5	7	3	1	0	28
1999	0	0	0	6	13	13	7	4	0	0	43
2000	0	0	2	0	5	8	7	12	1	0	35
2001	0	0	1	4	12	9	6	8	2	1	43
Total	0	1	9	31	67	84	68	35	9	1	305

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.4	5.5	4.5	5.0	5.5	5.2	5.2	
Highest:	8.3	7.6	8.1	8.3	7.9	8.0	8.5	
Mean:	-	-	-	-	-	-	-	
Median:	6.6	6.8	6.7	6.6	6.6	7.1	6.6	

Percent of home and garden samples within each pH range:

	<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
1995	0	0	1	11	23	39	19	1	6	0	100
1996	0	0	0	8	16	36	34	6	0	0	100
1997	0	3	6	19	17	11	31	11	3	0	100
1998	0	0	11	7	25	18	25	11	4	0	100
1999	0	0	0	14	30	30	16	9	0	0	100
2000	0	0	6	0	14	23	20	34	3	0	100
2001	0	0	2	9	28	21	14	19	5	2	100
Total	0	0	3	10	22	28	22	11	3	0	100

5.2 Samples for Commercial Production

Number of samples for commercial production within each pH range:

	<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
1995	0	1	6	43	100	105	22	1	0	0	278
1996	0	2	12	51	86	96	34	2	0	0	283
1997*	0	1	5	35	76	75	23	1	0	0	216
1998*	0	2	7	33	75	88	19	8	0	0	232
1999	0	0	6	27	53	70	41	5	0	0	202
2000	0	2	10	47	85	97	80	21	0	0	342
2001	0	1	16	41	67	77	58	10	0	0	270
Total	0	9	62	277	542	608	277	48	0	0	1823

*Twenty-six and eight samples were not analyzed in 1997 and in 1998, respectively.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.7	4.7	4.7	4.9	5.1	4.6	4.8	
Highest:	7.5	.5	7.7	7.7	7.7	7.8	7.9	
Mean:	-	-	-	-	-	-	-	
Median:	6.4	6.4	6.3	6.4	6.5	6.6	6.5	

Percent of samples for commercial production within each pH range:

	<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
1995	0	0	2	15	36	38	8	0	0	0	100
1996	0	1	4	18	30	34	12	1	0	0	100
1997	0	0	2	16	35	35	11	0	0	0	100
1998	0	1	3	14	32	38	8	3	0	0	100
1999	0	0	3	13	26	35	20	2	0	0	100
2000	0	1	3	14	25	28	23	6	0	0	100
2001	0	0	6	15	25	29	21	4	0	0	100
Total	0	0	3	15	30	33	15	3	0	0	100

6. Phosphorus

6.1 Samples for Home and Garden

Number of home and garden samples within each range Morgan extractable P range (lbs/acre Morgan P):

	<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	
1995	0	30	13	21	0	0	1	1	3	1	70
1996	0	5	7	26	1	1	0	8	1	1	50
1997	0	12	7	8	2	2	0	3	0	2	36
1998	0	7	5	9	2	0	1	0	0	4	28
1999	0	13	7	20	1	2	0	0	0	0	43
2000	0	5	3	16	3	2	1	1	0	4	35
2001	0	14	8	13	2	0	1	1	1	3	43
Total	0	86	50	113	11	7	4	14	5	15	305

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	252	223	375	1394	66	1428	1344	
Mean:	21	42	40	123	16	85	66	
Median:	4	22	8	14	11	15	8	

Percent of home and garden samples within each Morgan extractable phosphorus range:

	<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	
1995	0	43	19	30	0	0	1	1	4	1	100
1996	0	10	14	52	2	2	0	16	2	2	100
1997	0	33	19	22	6	6	0	8	0	6	100
1998	0	25	18	32	7	0	4	0	0	14	100
1999	0	30	16	47	2	5	0	0	0	0	100
2000	0	14	9	46	9	6	3	3	0	11	100
2001	0	33	19	30	5	0	2	2	2	7	100
Total	0	28	16	37	4	2	1	5	2	5	100

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

6.2 Samples for Commercial Production

Number of samples submitted for commercial production within each Morgan extractable phosphorus (lbs P/acre) range:

	<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	
1995	0	87	89	93	5	3	0	1	0	0	278
1996	0	70	91	106	10	3	2	0	1	0	283
1997	0	48	59	111	14	3	1	4	1	1	242
1998	0	55	65	80	28	4	2	2	2	2	240
1999	0	88	52	58	2	0	1	1	0	0	202
2000	0	97	95	107	13	13	2	1	1	13	342
2001	0	83	55	97	10	5	2	6	2	10	270
Total	0	528	506	652	82	31	10	15	7	26	1857

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	107	157	202	145	135	547	468	
Mean:	11	12	18	20	9	28	29	
Median:	6	7	10	9	4	7	8	

Percent of samples submitted for commercial production within each Morgan P range:

	<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	
1995	0	31	32	33	2	1	0	0	0	0	100
1996	0	25	32	37	4	1	1	0	0	0	100
1997	0	20	24	46	6	1	0	2	0	0	100
1998	0	23	27	33	12	2	1	1	1	1	100
1999	0	44	26	29	1	0	0	0	0	0	100
2000	0	28	28	31	4	4	1	0	0	4	100
2001	0	31	20	36	4	2	1	2	1	4	100
Total	0	28	27	35	4	2	1	1	0	1	100

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

7. Potassium

7.1 Samples for Home and Garden

Number of home and garden samples within each K range (lbs K/acre Morgan extraction):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	4	3	1	1	9
1996	0	2	1	1	15	19
1997	0	2	1	1	1	5
1998	0	0	0	0	0	0
1999	0	0	0	1	1	2
2000	0	0	2	0	3	5
2001	0	0	0	1	1	2
Total (#)	0	8	7	5	22	42
Total (%)	0	19	17	12	52	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	2	2
1997	2	1	2	0	2	7
1998	2	2	0	0	3	7
1999	1	2	3	1	2	9
2000	0	1	0	0	1	2
2001	0	0	1	0	4	5
Total (#)	5	6	6	1	14	32
Total (%)	16	19	19	3	44	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	1	1	3	5
1996	1	2	2	2	7	14
1997	2	1	0	0	2	5
1998	1	1	0	2	2	6
1999	0	0	3	3	3	9
2000	0	1	0	0	4	5
2001	0	0	0	0	1	1
Total (#)	4	5	6	8	22	45
Total (%)	9	11	13	18	49	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	13	19	8	14	2	56
1996	2	7	4	0	2	15
1997	3	11	3	1	0	18
1998	5	4	1	2	3	15
1999	6	11	3	3	0	23
2000	7	10	2	0	4	23
2001	8	10	11	4	2	35
Total (#)	44	72	32	24	13	185
Total (%)	24	39	17	13	7	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

Number of home and garden samples within each potassium classification:

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	13	23	12	16	6	0	70
1996	3	11	7	3	26	0	50
1997	7	15	6	2	5	1	36
1998	8	7	1	4	8	0	28
1999	7	13	9	8	6	0	43
2000	7	12	4	0	12	0	35
2001	8	10	12	5	8	0	43
Total #	53	91	51	38	71	1	305

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	8	42	17	25	38	27	13	
Highest:	545	1634	736	7457	3128	5714	5183	
Mean:	136	318	131	735	227	345	308	
Median:	97	232	84	95	108	84	122	

Percent of samples submitted for home and garden within each potassium classification.

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	19	33	17	23	9	0	100
1996	6	22	14	6	52	0	100
1997	19	42	17	6	14	3	100
1998	29	25	4	14	29	0	100
1999	16	30	21	19	14	0	100
2000	20	34	11	0	34	0	100
2001	19	23	28	12	19	0	100
Grand Total	17	30	17	12	23	0	100

7.2 Samples for Commercial Production

Number of samples submitted for commercial production within each potassium (lbs K/acre Morgan extraction) range:

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	2	3	10	15
1997	0	0	2	1	4	7
1998	0	0	0	0	1	1
1999	0	1	0	0	2	3
2000	0	0	0	0	1	1
2001	0	0	5	11	4	20
Total (#)	0	1	9	15	22	47
Total (%)	0	2	19	32	47	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	12	15	54	58	139
1996	0	5	20	54	49	128
1997	1	7	13	43	32	96
1998	0	4	17	33	39	93
1999	0	3	19	18	13	53
2000	4	12	18	43	38	115
2001	2	4	16	23	36	81
Total (#)	7	47	118	268	265	705
Total (%)	1	7	17	38	38	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	2	0	5	4	11
1996	1	2	4	4	7	18
1997	1	3	2	2	3	11
1998	0	3	2	2	4	11
1999	0	1	3	3	2	9
2000	2	4	9	6	6	27
2001	0	3	6	1	5	15
Total (#)	4	18	26	23	31	102
Total (%)	4	18	25	23	30	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	14	10	18	12	54
1996	3	5	19	13	14	54
1997	12	11	17	14	10	64
1998	3	18	22	17	10	70
1999	10	23	20	18	16	87
2000	8	29	16	18	21	92
2001	5	16	24	10	15	70
Total (#)	41	116	128	108	98	491
Total (%)	8	24	26	22	20	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	1	24	21	17	5	68
1996	6	14	15	19	6	60
1997	1	13	17	13	9	53
1998	3	11	15	11	22	62
1999	9	16	8	12	3	48
2000	9	15	15	14	5	58
2001	5	36	16	15	10	82
Total (#)	34	129	107	101	60	431
Total (%)	8	30	25	23	14	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

Number of samples submitted for commercial production within each potassium classification.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	1	52	46	94	79	6	278
1996	10	26	60	93	86	8	283
1997	15	34	51	73	58	11	242
1998	6	36	56	63	76	3	240
1999	19	44	50	51	36	2	202
2000	23	60	58	81	71	49	342
2001	12	59	67	60	70	2	270
Grand Total	86	311	388	515	476	81	1857

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	13	28	31	27	8	14	11	
Highest:	484	899	1330	27397	717	965	608	
Mean:	170	187	167	383	143	178	162	
Median:	149	146	140	148	114	120	123	

Percent of samples submitted for commercial production within each potassium classification.

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	19	17	34	28	2	100
1996	4	9	21	33	30	3	100
1997	6	14	21	30	24	5	100
1998	3	15	23	26	32	1	100
1999	9	22	25	25	18	1	100
2000	7	18	17	24	21	14	100
2001	4	22	25	22	26	1	100
Grand Total	5	17	21	28	26	4	100

8. Magnesium

8.1 Samples for Home and Garden

Number of home and garden samples within each Mg range (lbs Morgan Mg/acre):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	8	24	11	7	20	70
1996	0	1	2	8	39	50
1997	0	5	4	8	19	36
1998	2	4	1	8	13	28
1999	0	4	4	13	22	43
2000	1	5	3	7	19	35
2001	1	13	3	14	12	43
Total	12	56	28	65	144	305

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	9	56	22	11	26	8	10	
Highest:	1565	1846	979	4597	578	3431	3449	
Mean:	241	353	269	550	221	384	265	
Median:	77	265	226	193	215	234	145	

Percent of home and garden samples within each Mg range (lbs Morgan Mg/acre):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	11	34	16	10	29	100
1996	0	2	4	16	78	100
1997	0	14	11	22	53	100
1998	7	14	4	29	46	100
1999	0	9	9	30	51	100
2000	3	14	9	20	54	100
2001	2	30	7	33	28	100
Total	4	18	9	21	47	100

8.2 Samples for Commercial Production

Number of samples submitted for commercial production within each Mg range (lbs Mg/acre Morgan extraction):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	2	14	20	50	192	278
1996	0	14	18	59	192	283
1997	0	6	7	60	169	242
1998	1	7	13	50	170	240
1999	1	4	14	44	139	202
2000	1	15	28	66	232	342
2001	1	7	11	78	173	270
Total	6	67	111	407	1266	1857

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	7	24	32	19	3	8	10	
Highest:	853	2061	1809	1568	1093	1333	1338	
Mean:	300	364	359	336	320	316	313	
Median:	259	306	304	299	279	299	246	

Percent of samples submitted for commercial production within each magnesium range (lbs Mg/acre Morgan extraction):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	1	5	7	18	69	100
1996	0	5	6	21	68	100
1997	0	2	3	25	70	100
1998	0	3	5	21	70	100
1999	0	2	7	22	69	100
2000	0	4	8	19	68	100
2001	0	3	4	29	64	100
Total	0	4	6	22	68	100

9. Iron

9.1 Samples for Home and Garden

Iron (lbs Fe/acre Morgan extraction) in samples for home and garden:

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
1995	69	1	70
1996	50	0	50
1997	35	1	36
1998	26	2	28
1999	38	5	43
2000	33	2	35
2001	40	3	43
Total	291	14	305

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	99	1	100
	100	0	100
	97	3	100
	93	7	100
	88	12	100
	94	6	100
	93	7	100
	95	5	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	2	2	3	2	1	1	
Highest:	70	38	184	290	96	84	190	
Mean:	9	10	14	24	18	11	19	
Median:	5	9	6	9	7	5	11	

9.2 Samples for Commercial Production

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
1995	277	1	278
1996	278	5	283
1997	240	2	242
1998	239	1	240
1999	202	0	202
2000	336	6	342
2001	261	9	270
Total	1833	24	1857

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	98	2	100
	99	1	100
	100	0	100
	100	0	100
	98	2	100
	97	3	100
	99	1	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	54	72	54	79	46	151	170	
Mean:	9	11	9	8	9	9	10	
Median:	6	8	6	6	6	5	6	

10. Manganese

10.1 Samples for Home and Garden

Manganese (lbs Mn/acre Morgan extraction) in samples for home and garden:

Total number of samples:				Percentages:		
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
1995	67	3	70	96	4	100
1996	50	0	50	100	0	100
1997	35	1	36	97	3	100
1998	24	4	28	86	14	100
1999	43	0	43	100	0	100
2000	34	1	35	97	3	100
2001	42	1	43	98	2	100
Total	295	10	305	97	3	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	5	3	7	6	2	1	
Highest:	169	61	250	159	92	157	140	
Mean:	19	28	36	38	26	26	27	
Median:	8	27	25	16	19	20	20	

10.2 Samples for Commercial Production

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
1995	275	3	278
1996	283	0	283
1997	240	2	242
1998	238	2	240
1999	202	0	202
2000	342	0	342
2001	270	0	270
Total	1850	7	1857

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4	3	5	2	1	3	7	
Highest:	280	96	107	112	81	91	60	
Mean:	22	22	25	25	22	23	26	
Median:	18	20	21	22	19	20	24	

11. Zinc

11.1 Samples for Home and Garden

Zinc (lbs Zn/acre Morgan extraction) in samples for home and garden:

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	30	16	24	70
1996	2	14	34	50
1997	1	9	26	36
1998	0	4	24	28
1999	1	6	36	43
2000	5	5	25	35
2001	7	16	20	43
Total	46	70	189	305

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
43	23	34	100
4	28	68	100
3	25	72	100
0	14	86	100
2	14	84	100
14	14	71	100
16	37	47	100
15	23	62	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.1	0.2	0.5	0.3	0.1	0.2	
Highest:	97.7	118.6	53.5	54.1	32.4	25.3	58.3	
Mean:	3.8	5.5	5.8	7.0	3.5	4.9	4.8	
Median:	0.5	1.6	1.4	2.7	2.2	1.9	1.0	

11.2 Samples for Commercial Production

Zinc (lbs Zn/acre Morgan extraction) in samples for commercial production:

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	18	117	143	278
1996	24	120	139	283
1997	24	97	121	242
1998	21	102	117	240
1999	31	87	84	202
2000	26	147	169	342
2001	42	79	149	270
Total	186	749	922	1857

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
6	42	51	100
8	42	49	100
10	40	50	100
9	43	49	100
15	43	42	100
8	43	49	100
16	29	55	100
10	40	50	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.3	0.1	0.1	0.1	0.1	0.1	0.1	
Highest:	32.0	12.6	14.8	55.8	30.6	14.6	17.0	
Mean:	1.6	1.4	1.4	2.6	1.4	1.7	1.9	
Median:	1.1	1.0	1.0	1.0	0.9	1.0	1.2	

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	
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
PNE	Pasture native grasses, Established
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

Crop Code	Crop Description
ASP	Asparagus
ATF	Athletic Field
BDR/BND	Beans-dry
BLU/BLB	Blueberries
CEM	Cemetery
EGG	Eggplants
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GPA	Grapes, American
GPF	Grapes, French-American
GPV	Grapes, Vinifera
GEN	Green
GRA	Grapes
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
NUR	Nursery
ONS	Onion-seeded
OTH	Other
PAR	Pears
PCH	Peaches
PEA	Peas
PEP	Peppers
PER	Perennials
PLM	Plums
POP	Popcorn
POT/PTO	Potatoes
PRK	Parks
PUM	Pumpkins
ROD	Roadside
ROS	Roses
ROU	Rough
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer

Crop Code	Crop Description
SAG	Ornamentals adapted to pH 6.0 to 7.5
SOD	Sod production
SPB	Spring flowering bulbs
SQS	Squash, Summer
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUB	Summer flowering bulbs
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TME	Tomatoes, Early
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing