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Soil Sample Survey

Greene 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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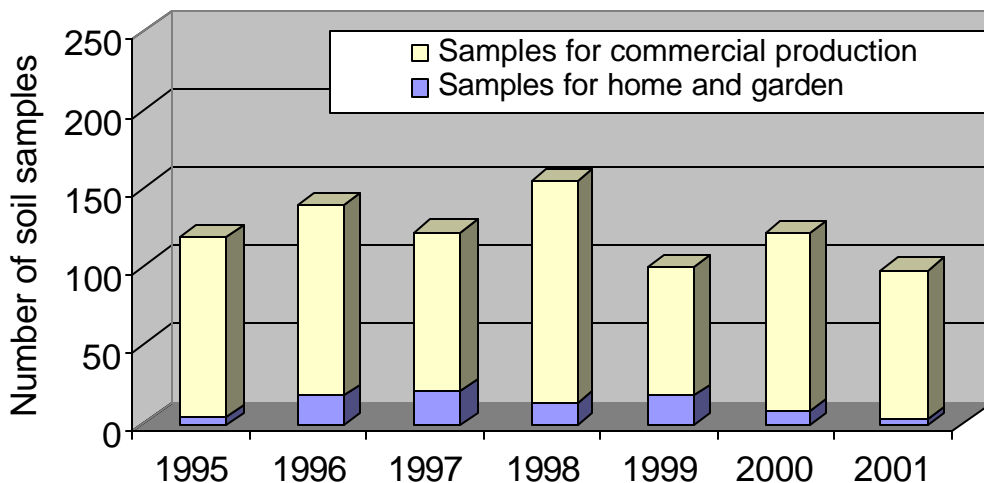
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1. General Survey Summary

This survey summarizes the soil test results from Delaware 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 8735. Of these 8735 samples, 8611 (99%) were submitted to obtain fertilizer recommendations for commercial production while 124 samples (1%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	4	1995	114	118
1996	18	1996	121	139
1997	21	1997	101	122
1998	13	1998	141	154
1999	17	1999	83	100
2000	8	2000	113	121
<u>2001</u>	<u>3</u>	<u>2001</u>	<u>95</u>	<u>98</u>
Total	84	Total	768	852

Twenty-nine percent of the home and garden samples were submitted to request fertilizer recommendations for mixed vegetable gardens while 15% came from lawns, 13% were for ornamentals adapted to pH 6.0 to 7.5, and 10% were for flowering annuals. Other samples were sent in to request recommendations for azaleas, fairways, greens, grapes, perennials, roadsides, and tree fruits. People submitting samples for commercial production requested fertilizer recommendations for hay production (30%), alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (16%), and corn silage or grain production (9%), while the remainder of the samples was sent to the laboratory to request recommendations for other crops including pasture, mixed vegetables, and small grains.

Home and garden samples in Tompkins County were silty (14%), silt loams (29%), sandy loams (45%), or sandy (12%), belonging to soil management groups 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, 62% belonged to soil management group 3 while 8% was classified group 2, 1% each were from soil management group 4

and 5, 4% belonged to soil management group1 and the remainder was of unknown classification. The five most common soil series were Lewbeach (12%), Wellsboro (12%), Tunkhannock (8%), Willowemoc (8%) and Barbour (7%). These soils represent 15% (Lewbeach), 1% (Wellsboro), 2% (Tunkhannock), 2% (Willowemoc), and 1% (Barbour) of the 421,550 acres in the county.

Organic matter levels, as measured by loss on ignition, ranged from 1% to almost 60% (more likely a soil amendment or organic soil) with median values ranging from 2.2 to 5.2% organic matter for home and garden samples and from 4.5 to 6.0% for samples submitted for commercial production. Fifty-two percent of the home and garden samples had between 2.0 and 4.9% organic matter with 24% testing between 2.0 and 2.9% organic matter and 23% between 3.0 and 3.9%. Thirty-five percent of the soils submitted for home and garden tested >4.9% in organic matter while 13% of the samples had less than 2.0% organic matter. Of the samples submitted for commercial production, 10% contained between 3.0 and 3.9% organic matter, 15% tested between 4.0 and 4.9% while 24% had organic matter concentrations of 5.0-5.9%. Twelve percent had less than 3.0% organic matter while 39% of the samples had 6.0% or more organic matter. The last group includes the muck soils.

Soil pH in water (1:1 extraction ratio) varied from pH 3.5 to pH 8.0 with the median for home and garden samples ranging from pH 5.3 to pH 7.3 and for samples submitted for commercial production ranging from pH 5.7 to pH 6.2. Of the home and garden samples, 41% tested between pH 6.0 and pH 7.4. For the samples submitted for commercial production, this was 48% while 34% 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, 19% tested low, 23% tested medium, 25% tested high and 33% tested very high. This meant that 58% tested high or very high in P. Of the samples submitted for

commercial production, 27% tested low in P. Another 27% were medium in P, 35% tested high while 11% of the samples were very high in P. In total, 46% of the samples tested high or very high in P. There were no clear trends 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, 7% was classified as very low, 19% were low in potassium, 20% tested medium, another 18% were high and 36% were very high in potassium. For samples submitted for commercial production, 3% tested very low, 12% were low, 15% tested medium, 20% tested high and 25% tested very high in potassium while the remainder was 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 24 to 5005 lbs Mg/acre (Morgan extraction). There were no samples in either datasets that tested very low in Mg. Most soils tested high or very high for Mg (79% of the homeowner soils and 89% of the soils of the commercial growers). Twelve percent of the home and garden samples and 5% of the commercial growers' soils tested low in Mg while 10% (home and garden) and 7% (commercial) tested medium in Mg availability.

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. Eighty-eight percent of the home and garden samples were classified as normal in Fe while 80% of the commercial samples tested in the normal range for Fe. Similarly, the majority of the soils (88% of the home and garden samples and 81% of the commercial samples) tested normal for manganese with the remainder being classified as excessive in Mn (100 lbs Morgan extractable Mn per acre or more). 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 11% tested medium and 89% tested high for zinc. Of the samples for commercial production, 4% tested low in zinc, 18% tested medium while 78% of the samples 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	1	0	0	0	0	0	1	1
FAR	0	0	0	0	0	1	0	1	1
FLA	1	2	3	2	0	0	0	8	10
GEN	1	0	0	1	0	0	0	2	2
GRA	0	0	0	0	1	0	0	1	1
LAW	1	2	2	1	3	2	2	13	15
MVG	0	3	3	6	7	5	0	24	29
OTH	0	7	0	0	1	0	0	8	10
PER	1	1	3	0	1	0	0	6	7
ROD	0	0	1	0	0	0	0	1	1
SAG	0	0	9	2	0	0	0	11	13
TRF	0	0	0	1	3	0	0	4	5
Unknown	0	2	0	0	1	0	1	4	5
Total	4	18	21	13	7	8	3	84	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	1	3	1	7	0	0	4	16	2
AGE/AGT	36	17	11	7	13	10	7	101	13
ALE/ALT	0	0	4	0	1	1	0	6	1
APP	0	3	0	0	0	0	0	3	0
BCE/BCT	2	0	0	0	1	0	0	3	0
BGE/BGT	2	0	0	1	2	0	0	5	1
BND	0	0	0	1	0	0	0	1	0
CGE/CGT	2	0	2	0	0	1	0	5	1
COG/COS	23	8	11	10	7	5	5	69	9
GRE/GRT	27	21	42	55	30	28	25	228	30
IDL	0	0	0	1	0	0	0	1	0
MIX	1	0	0	4	4	5	1	15	2
NUR	0	0	0	0	1	0	0	1	0
OAS	1	0	0	0	0	0	0	1	0
OAT	1	0	0	0	0	0	0	1	0
OTH	9	55	20	46	5	3	8	146	19
PGE/PGT	1	0	0	0	4	6	0	11	1
PIE/PIT	0	0	0	0	0	3	0	3	0
PNE/PNT	6	11	1	9	0	2	9	38	5
SOY	0	1	0	0	0	0	0	1	0
SQW	0	0	0	0	0	0	1	1	0
STS	0	0	0	0	0	0	1	1	0
SWC	0	0	1	0	0	0	2	3	0
TRE/TRT	0	0	0	0	0	0	1	1	0
Unknown	2	2	8	0	15	49	31	107	14
Total	114	121	101	141	83	113	85	768	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)	0	5	0	2	4	1	0	12	14
SMG 3 (silt loam)	3	3	1	6	6	2	3	24	29
SMG 4 (sandy loam)	0	7	19	4	4	4	0	38	45
SMG 5 (sandy)	1	3	1	1	3	1	0	10	12
SMG 6 (mucky)	0	0	0	0	0	0	0	0	0
Total	4	18	21	13	19	8	3	84	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	%
Arnot	3	2	6	1	0	1	1	0	11	1
Barbour	3	9	4	1	10	4	28	1	57	7
Basher	3	0	2	3	0	0	0	0	5	1
Burdett	2	1	1	0	0	0	0	0	2	0
Covington	1	1	0	0	0	0	0	0	1	0
Elmridge	5	1	0	0	6	0	0	0	7	1
Galway	4	0	0	0	0	0	3	0	3	0
Halcott	2	0	0	4	3	0	0	2	9	1
Hudson	2	1	1	0	11	16	2	0	31	4
Kingsbury	1	5	1	0	0	0	0	20	26	3
Lackawanna	3	9	10	4	0	0	4	0	27	4
Lewbeach	3	10	21	8	16	19	7	9	90	12
Lordstown	3	0	0	1	0	0	0	1	2	0
Maplecrest	2	0	0	0	1	2	0	0	3	0
Mardin	3	1	3	4	6	1	3	1	19	2
Middlebury	3	0	0	0	0	1	1	0	2	0
Morris	3	1	1	0	0	0	0	0	2	0
Nunda	2	1	1	0	1	0	0	0	3	0
Onteora	3	6	0	1	6	1	0	7	21	3
Oquaga	3	2	0	0	0	0	0	0	2	0
Rhinebeck	2	4	1	2	0	1	3	0	11	1
Riverhead	4	1	0	0	1	0	1	0	3	0
Tor	4	0	0	1	0	0	0	0	1	0
Tunkhannock	3	21	2	13	14	7	3	4	64	8
Valois	3	2	5	3	0	0	1	0	11	1
Vly	3	0	1	0	7	0	1	1	10	1
Volusia	3	1	0	0	0	0	1	0	2	0
Wellsboro	3	13	49	14	2	5	3	3	89	12
Willowemoc	3	14	2	14	8	8	5	9	60	8
Unknown	-	8	10	27	49	17	46	37	194	25
Total	-	114	121	101	141	83	113	95	768	100

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	0	0	2	1	0	1	0	0	4
1996	1	1	4	5	1	1	2	3	18
1997	1	2	1	3	0	7	1	6	21
1998	0	3	4	3	1	2	0	0	13
1999	0	2	5	5	1	1	0	3	17
2000	0	1	2	2	1	0	0	2	8
2001	0	0	2	0	1	0	0	0	3
Total	2	9	20	19	5	12	3	14	84

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2.8	0.5	0.8	1.7	1.0	1.2	2.0	
Highest:	5.9	15.2	10.3	5.6	14.0	27.7	4.5	
Mean:	3.7	5.2	5.6	3.2	4.0	6.5	2.9	
Median:	3.1	3.5	5.2	2.9	3.0	3.2	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
1996
1997
1998
1999
2000
2001
Total	2	11	24	23	6	14	4	17	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	0	2	6	11	15	35	30	15	114
1996	0	4	6	13	14	32	7	45	121
1997	0	1	11	13	14	27	11	24	101
1998	0	3	13	21	26	32	15	31	141
1999	1	4	9	4	17	20	11	17	83
2000	2	7	22	14	14	7	4	43	113
2001	0	0	2	2	13	29	16	33	95
Total	3	21	69	78	113	182	94	208	768

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.2	1.0	1.8	1.6	0.8	0.7	2.4	
Highest:	14.8	56.9	50.7	16.4	26.2	22.7	48.5	
Mean:	5.6	8.4	7.2	5.8	6.0	6.1	7.9	
Median:	5.8	5.7	5.5	5.2	5.3	4.5	6.0	

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	0	2	5	10	13	31	26	13	100
1996	0	3	5	11	12	26	6	37	100
1997	0	1	11	13	14	27	11	24	100
1998	0	2	9	15	18	23	11	22	100
1999	1	5	11	5	20	24	13	20	100
2000	2	6	19	12	12	6	4	38	100
2001	0	0	2	2	14	31	17	35	100
Total	0	3	9	10	15	24	12	27	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	0	0	2	0	2	0	0	0	4
1996	1	3	4	0	1	4	3	2	0	0	18
1997	0	6	6	0	3	2	4	0	0	0	21
1998	0	0	1	3	4	4	1	0	0	0	13
1999	0	1	2	6	0	1	4	3	0	0	17
2000	0	1	0	2	1	1	2	1	0	0	8
2001	0	0	0	0	0	1	1	1	0	0	3
Total	1	11	13	11	11	13	17	7	0	0	84

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6.0	4.2	4.6	5.0	4.7	4.9	6.5	
Highest:	7.3	7.8	7.4	7.1	7.6	7.9	7.7	
Mean:	-	-	-	-	-	-	-	
Median:	6.7	6.4	5.3	6.2	5.9	6.4	7.3	

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
1996
1997
1998
1999
2000
2001
Total	1	11	13	11	11	13	17	7	0	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	1	4	7	30	25	27	18	0	2	0	114
1996	18	12	14	31	24	15	7	0	0	0	121
1997*	15	8	10	17	29	14	3	0	0	0	96
1998*	11	14	18	32	41	20	5	0	0	0	141
1999	3	4	9	31	14	11	10	1	0	0	83
2000	11	16	12	22	20	24	6	1	1	0	113
2001	13	10	12	12	13	23	11	1	0	0	95
Total	72	68	82	175	166	134	60	3	3	0	763

* Five samples were not analyzed for pH in 1997.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	3.9	3.8	3.5	3.9	4.1	4.0	3.6	
Highest:	8.0	7.4	7.3	7.2	7.8	8.2	7.5	
Mean:	-	-	-	-	-	-	-	
Median:	6.2	5.7	5.8	5.9	5.9	5.8	6.0	

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	1	4	6	26	22	24	16	0	2	0	100
1996	15	10	12	26	20	12	6	0	0	0	100
1997	16	8	10	18	30	15	3	0	0	0	100
1998	8	10	13	23	29	14	4	0	0	0	100
1999	4	5	11	37	17	13	12	1	0	0	100
2000	10	14	11	19	18	21	5	1	1	0	100
2001	14	11	13	13	14	24	12	1	0	0	100
Total	9	9	11	23	22	18	8	0	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	0	1	2	0	0	0	0	0	1	4
1996	0	6	2	3	1	3	0	1	2	0	18
1997	0	2	6	7	0	2	0	1	0	3	21
1998	0	4	2	3	1	0	1	1	1	0	13
1999	0	3	5	4	3	0	0	0	0	2	17
2000	0	0	2	2	1	1	0	1	0	1	8
2001	0	1	1	0	1	0	0	0	0	0	3
Total	0	16	19	21	7	6	1	4	3	7	84

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6	1	2	1	1	6	2	
Highest:	389	197	252	152	367	1109	51	
Mean:	115	47	51	41	57	178	20	
Median:	34	18	9	18	9	35	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
1996
1997
1998
1999
2000
2001
Total	0	19	23	25	8	7	1	5	4	8	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	28	28	35	10	2	5	4	0	2	114
1996	0	27	37	47	5	2	0	2	0	1	121
1997	0	11	20	50	10	1	3	5	1	0	101
1998	0	43	41	52	3	1	1	0	0	0	141
1999	0	22	21	31	3	2	1	2	0	1	83
2000	0	39	34	32	4	1	1	0	0	2	113
2001	0	37	23	22	4	3	3	2	1	0	95
Total	0	207	204	269	39	12	14	15	2	6	768

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	2	1	1	1	1	
Highest:	381	319	195	92	389	427	170	
Mean:	27	17	28	11	21	16	17	
Median:	9	8	18	7	7	5	5	

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	25	25	31	9	2	4	4	0	2	100
1996	0	22	31	39	4	2	0	2	0	1	100
1997	0	11	20	50	10	1	3	5	1	0	100
1998	0	30	29	37	2	1	1	0	0	0	100
1999	0	27	25	37	4	2	1	2	0	1	100
2000	0	35	30	28	4	1	1	0	0	2	100
2001	0	39	24	23	4	3	3	2	1	0	100
Total	0	27	27	35	5	2	2	2	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	0	0	0	0	0
1996	0	2	1	1	1	5
1997	0	0	0	0	0	0
1998	0	0	0	0	2	2
1999	0	0	0	2	2	4
2000	0	1	0	0	0	1
2001	0	0	0	0	0	0
Total (#)	0	3	1	3	5	12
Total (%)	0	25	8	25	42	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	3	3
1996	0	0	2	1	0	3
1997	0	0	0	0	1	1
1998	0	1	1	2	2	6
1999	0	1	1	1	3	6
2000	0	1	0	0	1	2
2001	0	0	2	1	0	3
Total (#)	0	3	6	5	10	24
Total (%)	0	13	25	21	42	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	1	0	1	0	5	7
1997	2	3	8	3	3	19
1998	1	1	0	1	1	4
1999	1	1	0	1	1	4
2000	0	1	0	0	3	4
2001	0	0	0	0	0	0
Total (#)	5	6	9	5	13	38
Total (%)	13	16	24	13	34	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	0	0	0	1
1996	1	1	0	0	1	3
1997	0	1	0	0	0	1
1998	0	0	0	1	0	1
1999	0	1	1	1	0	3
2000	0	0	0	0	1	1
2001	0	0	0	0	0	0
Total (#)	1	4	1	2	2	10
Total (%)	10	40	10	20	20	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	Total
1995	0	1	0	0	3	4
1996	2	3	4	2	7	18
1997	2	4	8	3	4	21
1998	1	2	1	4	5	13
1999	1	3	2	5	6	17
2000	0	3	0	0	5	8
2001	0	0	2	1	0	3
Total #	6	16	17	15	30	84

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	106	29	42	37	47	45	82	
Highest:	532	972	530	643	421	13736	147	
Mean:	331	194	156	210	181	1910	111	
Median:	347	107	129	160	172	298	104	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Grand Total	7	19	20	18	36	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	2	0	1	3	6
1996	0	0	1	0	0	1
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	3	8	9	20
Total (#)	0	2	4	9	12	27
Total (%)	0	7	15	33	44	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	1	2	3	7
1996	0	0	1	2	1	4
1997	0	0	0	2	4	6
1998	0	7	2	5	2	16
1999	0	5	5	3	6	19
2000	0	0	0	1	4	5
2001	0	1	1	0	0	2
Total (#)	0	14	10	15	20	59
Total (%)	0	24	17	25	34	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	13	35	43	91
1996	2	13	24	31	36	106
1997	1	6	13	25	22	67
1998	1	8	22	21	17	69
1999	1	10	13	7	16	47
2000	9	27	11	3	8	58
2001	4	6	3	8	15	36
Total (#)	18	70	99	130	157	474
Total (%)	4	15	21	27	33	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	0	0	0	1
1996	0	0	0	0	0	0
1997	0	0	1	0	0	1
1998	0	0	0	1	0	1
1999	0	0	0	0	0	0
2000	2	1	0	0	1	4
2001	0	0	0	0	0	0
Total (#)	2	2	1	1	1	7
Total (%)	29	29	14	14	14	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	1	0	0	1
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	4	2	0	0	0	6
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	4	2	1	0	0	7
Total (%)	57	29	14	0	0	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	0	4	15	38	49	8	114
1996	2	13	26	33	37	10	121
1997	1	6	14	27	26	27	101
1998	5	17	24	27	19	49	141
1999	1	15	18	10	22	17	83
2000	11	28	11	4	13	46	113
2001	4	7	7	16	24	37	95
Grand Total	24	90	115	155	190	194	768

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	45	28	39	36	44	35	29	
Highest:	976	1311	730	973	982	966	1342	
Mean:	251	207	214	170	191	172	252	
Median:	176	140	164	130	134	119	193	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	4	13	33	43	7	100
1996	2	11	21	27	31	8	100
1997	1	6	14	27	26	27	100
1998	4	12	17	19	13	35	100
1999	1	18	22	12	27	20	100
2000	10	25	10	4	12	41	100
2001	4	7	7	17	25	39	100
Grand Total	3	12	15	20	25	25	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	0	0	2	0	2	4
1996	0	5	2	4	7	18
1997	0	3	1	4	13	21
1998	0	0	0	8	5	13
1999	0	0	2	6	9	17
2000	0	2	1	1	4	8
2001	0	0	0	2	1	3
Total	0	10	8	25	41	84

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	90	24	36	105	81	51	163	
Highest:	360	879	720	406	725	3579	390	
Mean:	191	239	294	214	228	613	243	
Median:	156	159	267	171	203	171	177	

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	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Total	0	12	10	30	49	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	0	4	11	33	66	114
1996	0	5	3	40	73	121
1997	0	2	6	35	58	101
1998	0	7	10	57	67	141
1999	0	3	7	16	57	83
2000	0	9	11	40	53	113
2001	0	5	3	32	55	95
Total	0	35	51	253	429	768

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	36	41	43	37	53	37	37	
Highest:	977	2634	992	1354	1033	5005	1368	
Mean:	285	337	261	255	340	284	390	
Median:	219	239	221	190	332	191	229	

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	0	4	10	29	58	100
1996	0	4	2	33	60	100
1997	0	2	6	35	57	100
1998	0	5	7	40	48	100
1999	0	4	8	19	69	100
2000	0	8	10	35	47	100
2001	0	5	3	34	58	100
Total	0	5	7	33	56	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	4	0	4
1996	16	2	18
1997	15	6	21
1998	12	1	13
1999	16	1	17
2000	8	0	8
2001	3	0	3
Total	74	10	84

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	88	12	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	3	2	1	2	4	3	
Highest:	23	203	114	55	116	30	12	
Mean:	9	27	36	10	20	13	7	
Median:	5	13	28	6	8	11	6	

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	107	7	114
1996	90	31	121
1997	80	21	101
1998	109	32	141
1999	74	9	83
2000	81	32	113
2001	73	22	95
Total	614	154	768

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	94	6	100
	74	26	100
	79	21	100
	77	23	100
	89	11	100
	72	28	100
	77	23	100
	80	20	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	1	2	1	1	1	1	
Highest:	454	420	665	375	402	644	273	
Mean:	23	58	54	52	27	59	36	
Median:	8	13	10	16	11	15	10	

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:

	0-99	>99	Total
	Normal	Excessive	
1995	3	1	4
1996	18	0	18
1997	15	6	21
1998	12	1	13
1999	17	0	17
2000	6	2	8
2001	3	0	3
Total	74	10	84

Percentages:

0-99	>99	Total
Normal	Excessive	
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
88	12	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	13	15	23	14	18	6	32	
Highest:	117	68	237	101	92	173	71	
Mean:	41	34	79	35	43	59	49	
Median:	17	27	55	32	36	40	42	

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	104	10	114
1996	83	38	121
1997	87	14	101
1998	117	24	141
1999	68	15	83
2000	85	28	113
2001	76	19	95
Total	620	148	768

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	91	9	100
	69	31	100
	86	14	100
	83	17	100
	82	18	100
	75	25	100
	89	20	100
	81	19	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	11	4	10	10	14	10	7	
Highest:	355	867	529	373	344	907	818	
Mean:	46	127	71	65	64	88	84	
Median:	30	58	35	37	39	50	35	

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	0	1	3	4
1996	0	1	17	18
1997	0	0	21	21
1998	0	4	9	13
1999	0	2	15	17
2000	0	1	7	8
2001	0	0	3	3
Total	0	9	75	84

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
.	.	.	100
.	.	.	100
.	.	.	100
.	.	.	100
.	.	.	100
.	.	.	100
.	.	.	100
0	11	89	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.9	1.0	1.2	0.7	0.5	0.9	1.1	
Highest:	12.3	35.2	22.2	11.8	27.2	36.8	36.7	
Mean:	5.2	7.3	6.3	3.2	5.7	9.0	15.6	
Median:	3.8	2.3	4.1	2.5	2.4	5.3	8.9	

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	1	24	89	114
1996	3	19	99	121
1997	2	24	75	101
1998	1	24	116	141
1999	3	10	70	83
2000	13	16	84	113
2001	5	22	68	95
Total	28	139	601	768

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	21	78	100
2	16	82	100
2	24	74	100
1	17	82	100
4	12	84	100
12	14	74	100
5	23	72	100
4	18	78	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.3	0.2	0.3	0.3	0.2	0.1	0.2	
Highest:	26.1	59.8	35.9	30.7	151.0	57.8	50.3	
Mean:	2.9	8.6	4.7	4.3	6.7	5.2	5.2	
Median:	2.0	2.8	2.1	2.2	2.0	1.9	2.2	

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
POP	Popcorn
PRK	Park
POT/PTO	Potatoes
PUM	Pumpkins
ROD	Roadside
ROS	Roses
ROU	Rough
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5

Crop Code	Crop Description
SQS	Squash, Summer
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing