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Soil Sample Survey

Broome 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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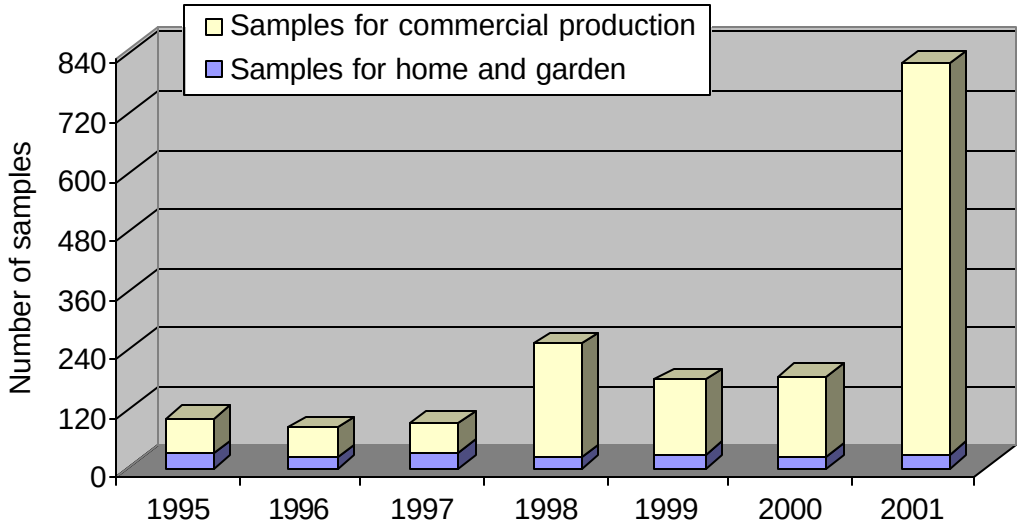
Table of Content

1. General Survey Summary

This survey summarizes the soil test results from Broome 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 1710. Of these 1710 samples, 1229 (89%) were submitted to obtain fertilizer recommendations for commercial production while 182 samples (11%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	30	1995	73	103
1996	21	1996	60	81
1997	32	1997	58	90
1998	21	1998	230	251
1999	27	1999	152	179
2000	24	2000	161	185
2001	27	2001	495	821
Total	182	Total	1229	1710

Twenty-four percent of the home and garden soil samples were submitted to request fertilizer recommendations for lawns while 23% of the samples were submitted to obtain recommendations for home garden vegetable production. Recommendations for athletic fields and ornamentals were requested for 16% and 14% of the samples, respectively. People submitting samples for commercial production requested fertilizer recommendations for corn silage or grain production (27%), alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (24%), hay (21%) or pasture (8%), while a few producers were planning on growing other crops including clover/grass mixtures, small grains and vegetables.

Home and garden samples in Broome County belonged to soil management group 2 (21%), group 3 (41%), group 4 (32%) or group 4 (6%). 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, 94% belonged to soil management group 3. Two percent was from soil management group 2 and the remainder was of

unknown soil management group classification. The five most common soil series, all belonging to soil management group 3, were Mardin (32%), Volusia (23%), Chenango (16%), Tioga (8%) and Lordstown (6%). These soils represent 24% (Mardin), 36% (Volusia), 4% (Chenango), 2% (Tioga), and 17% (Lordstown) of the total 457,700 acres in the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to over 40% with median values ranging from 3.3 to 5.3% organic matter for home and garden samples and values ranging from 4.2 to 5.1 for samples submitted for commercial production. Fifty-four percent of the home and garden samples had between 2 and 5% organic matter with 16% testing between 2 and 2.9% organic matter, 24% between 3.0 and 3.9% organic matter and 14% between 4.0 and 4.9% organic matter. Thirty-eight percent of the soils submitted for home and garden tested >4.9% in organic matter while 8% has less than 2% organic matter. Of the samples submitted for commercial production, 20% contained between 3 and 4% organic matter, 34% tested between 4.0 and 4.9% while 27% had organic matter concentrations of 5.0-5.9%. In total, 72% of the samples had organic matter levels of 4.0% or higher.

Soil pH in water (1:1 extraction ratio) varied from pH 3.7 to 8.1 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 5.9 to pH 6.4. Of the home and garden samples, 71% tested between pH 6.0 and 7.4. For the samples submitted for commercial production, this was 65% while 23% tested between pH 5.0 and 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, 8% tested low, 16% tested medium, 34% tested high and 42% tested very high. This meant that 76% tested high or very high in P. Phosphorus levels for samples for commercial production in Broome County were skewed towards low and medium levels.

Eight percent of the samples tested very high in P. Twenty-eight percent were low in P, 30% tested medium for P while 34% of the submitted samples were classified as high in soil test P. This means that 42% 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, 11% was classified as very low or low in potassium. Twenty-one percent tested medium, 26% high and 42% very high. For samples submitted for commercial production, 1% tested very low in K, 12% tested low, 17% tested medium, 28% tested high and 39% tested very high in potassium with the remainder being of unknown K classification. As with phosphorus, there were no trends over the 6 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 less than 30 to slightly over 3000 lbs Mg/acre (Morgan extraction). There were no samples that tested very low in Mg. Most soils tested high or very high for Mg (95% of the homeowner soils and 97% of the soils of the commercial growers). No more than 8 of the homeowner soils and 3% of the commercial growers' soil tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Broome County provided the soil pH is maintained in the desirable range.

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 93-97% in the normal range with only 6 of the home and garden samples and 7% of the samples for commercial production testing excessive for Fe. Similarly, most soils (93-97%) 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, 88% tested high for zinc while 10% tested medium and 2% were low in zinc. Of the samples for commercial production, 3% tested low in zinc, 19% tested medium while 79% 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	1	0	0	1	2	0	0	4	2
ATF	0	10	4	7	3	4	2	30	16
BLU	0	1	0	0	0	0	0	1	1
FLA	1	0	0	1	0	1	1	4	2
GEN	6	0	0	0	0	0	0	6	3
LAW	5	3	8	4	8	7	8	43	24
MVG	5	4	8	4	7	5	8	41	23
OTH	2	0	2	0	0	1	1	6	3
PER	1	0	2	2	1	1	3	10	5
PRK	0	1	0	0	0	0	0	1	1
PUM	0	0	1	0	0	0	0	1	1
RSP	1	0	0	0	0	2	0	3	2
SAG	6	1	6	0	6	3	3	25	14
TRF	2	0	0	1	0	0	1	4	2
Unknown	0	1	1	1	0	0	0	3	2
Total	30	21	32	21	27	24	27	182	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	7	2	1	1	0	2	14	1
AGE/AGT	7	10	9	46	21	3	92	188	15
ALE/ALT	1	4	1	24	7	9	52	98	8
APP	2	4	0	3	0	4	0	13	1
ASP	0	0	0	0	0	0	1	1	0
BCE/BCT	5	0	0	0	0	0	0	5	0
BET	0	0	0	2	0	0	0	2	0
BGE/BGT	3	2	0	0	0	0	0	6	0
BLB	0	0	1	2	3	0	0	6	0
BSS	1	0	0	0	0	0	0	1	0
BTE	1	2	0	0	0	0	0	3	0
CBP	1	0	0	0	0	0	0	1	0
CGE/CGT	5	3	2	23	12	8	13	65	5
CKP	0	0	0	1	0	0	0	1	0
CLE/CLT	3	0	1	0	6	4	15	29	2
COG/COS	10	9	21	80	33	45	129	327	27
GPA	1	0	0	0	0	0	0	1	0
GRE/GRT	2	4	12	16	36	49	144	263	21
IDL	4	0	3	2	4	2	5	20	2
MIX	6	0	0	0	0	0	3	9	1
MML	1	0	0	0	0	0	0	1	0
OAS	3	2	0	3	0	1	1	10	1
OAT	0	0	2	0	2	2	0	6	0
OTH	0	4	0	0	1	1	1	7	1
PGE/PGT	0	0	0	5	14	6	4	29	2
PIE/PIT	2	0	1	5	3	7	5	23	2
PLE/PLT	0	2	0	4	1	6	3	16	1
PLM	0	0	0	0	0	1	0	1	0
PNE/PNT	3	0	1	10	3	3	11	31	3
POP	0	0	0	0	0	0	1	1	0
PUM	2	4	0	0	0	1	0	7	1
RSF	0	1	0	0	0	0	0	1	0
RSS	1	0	0	0	1	1	0	3	0
RYS	0	0	0	1	0	0	1	2	0
SOF	0	0	1	0	0	1	0	2	0

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
SOY	0	1	0	0	0	0	1	2	0
STE	0	1	0	0	0	0	1	2	0
STS	3	0	1	1	1	2	1	9	1
SWC	4	0	0	1	0	1	3	9	1
TOM	0	0	0	0	0	2	0	2	0
TRE/TRT	1	0	0	0	1	1	0	3	0
Unknown	0	0	0	0	2	1	6	9	1
Total	73	60	58	230	152	161	495	1229	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
SMG 2 (silty)	4	4	9	3	5	8	6	39
SMG 3 (silt loam)	18	12	12	10	6	7	9	74
SMG 4 (sandy loam)	6	5	8	7	14	7	11	58
SMG 5 (sandy)	2	0	3	1	2	2	1	11
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	30	21	32	21	27	24	27	182

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Alden	3	0	0	0	0	0	1	0	1
Alluvial	3	0	0	0	0	0	0	5	5
Arnot	3	0	0	0	1	0	0	0	1
Braceville	4	0	0	0	0	0	1	2	3
Canaseraga	3	0	0	0	0	0	0	4	4
Chenango	3	16	8	14	43	11	16	89	197
Lordstown	3	4	7	4	9	8	18	22	72
Mardin	3	24	17	23	82	65	39	139	389
Middlebury	3	0	3	2	8	1	4	21	39
Morris	3	0	1	0	1	1	0	2	5
Oquaga	3	0	0	0	0	0	0	2	2
Scio	3	0	0	0	0	1	3	4	8
Tioga	3	2	4	2	14	6	17	53	98
Unadilla	3	0	1	2	2	1	17	26	49
Volusia	3	26	12	11	66	50	37	86	288
Wallington	3	0	0	0	0	0	3	0	2
Wayland	2	1	0	0	4	2	5	13	25
Unknown	-	0	7	0	0	6	0	27	40
Total	-	73	60	58	230	152	161	495	1229

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	3	5	2	4	5	1	10	30
1996	0	2	1	10	3	1	1	3	21
1997	0	3	5	6	7	3	3	5	32
1998	0	1	6	3	3	4	1	3	21
1999	0	3	5	11	3	1	3	1	27
2000	0	1	5	6	4	2	1	5	24
2001	0	2	3	6	2	3	4	7	27
Total	0	15	30	44	26	19	14	34	182

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.5	1.6	1.1	1.9	1.7	1.9	1.7	
Highest:	43.0	18.1	32.1	19.7	9.6	20.0	13.7	
Mean:	7.0	4.7	5.8	5.2	3.9	5.3	5.9	
Median:	5.3	3.8	4.4	4.1	3.3	4.0	5.2	

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	0	10	17	7	13	17	3	33	100
1996	0	10	5	48	14	5	5	14	100
1997	0	9	16	19	22	9	9	16	100
1998	0	5	29	14	14	19	5	14	100
1999	0	11	19	41	11	4	11	4	100
2000	0	4	21	25	17	8	4	21	100
2001	0	7	11	22	7	11	15	26	100
Total	0	8	16	24	14	10	8	19	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	0	6	18	17	19	8	5	73
1996	0	4	1	5	20	13	11	6	60
1997	0	0	1	4	19	21	12	1	58
1998	2	0	4	30	84	90	18	2	230
1999	0	0	2	33	67	34	8	8	152
2000	0	5	23	41	52	25	7	8	161
2001	0	1	50	115	157	125	32	15	495
Total	2	10	87	246	416	327	96	45	1229

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2.3	1.3	2.8	0.6	2.6	1.7	1.7	
Highest:	9.4	14.5	8.5	8.1	20.9	14.9	8.7	
Mean:	4.8	5.4	5.2	4.9	4.8	4.3	4.5	
Median:	4.8	5.1	5.0	4.9	4.6	4.2	4.5	

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	0	8	25	23	26	11	7	100
1996	0	7	2	8	33	22	18	10	100
1997	0	0	2	7	33	36	21	2	100
1998	1	0	2	13	37	39	8	1	100
1999	0	0	1	22	44	22	5	5	100
2000	0	3	14	25	32	16	4	5	100
2001	0	0	10	23	32	25	6	3	100
Total	0	1	7	20	34	27	8	4	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	1	2	2	3	10	8	4	0	0	30
1996	0	0	2	1	5	7	4	2	0	0	21
1997	1	1	2	5	1	9	12	1	0	0	32
1998	0	0	4	2	3	5	4	3	0	0	21
1999	0	1	0	3	4	7	8	4	0	0	27
2000	0	0	1	2	2	6	11	2	0	0	24
2001	0	0	2	2	6	5	9	3	0	0	27
Total	1	3	13	17	24	49	56	19	0	0	182

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.5	5.1	4.3	5.0	4.5	5.2	5.1	
Highest:	7.7	7.6	7.7	7.5	7.8	7.7	7.7	
Mean:	-	-	-	-	-	-	-	
Median:	6.8	6.7	6.8	6.6	6.9	7.0	6.9	

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	3	7	7	10	33	27	13	0	0	100
1996	0	0	10	5	24	33	19	10	0	0	100
1997	3	3	6	16	3	28	38	3	0	0	100
1998	0	0	19	10	14	24	19	14	0	0	100
1999	0	4	0	11	15	26	30	15	0	0	100
2000	0	0	4	8	8	25	46	8	0	0	100
2001	0	0	7	7	22	19	33	11	0	0	100
Total	1	2	7	9	13	27	31	10	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	0	1	12	17	16	22	5	0	0	0	73
1996	1	5	11	16	16	8	1	0	2	0	60
1997	1	0	14	16	19	7	0	1	0	0	58
1998	0	6	22	32	65	71	33	1	0	0	230
1999	5	0	12	40	43	39	13	0	0	0	152
2000	0	1	16	47	49	30	17	1	0	0	161
2001	0	0	30	109	135	143	65	13	0	0	495
Total	7	13	117	277	343	320	134	16	2	0	1229

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.9	4.2	3.7	4.6	4.1	4.9	5.0	
Highest:	7.4	8.1	7.6	7.5	7.3	7.7	7.9	
Mean:	-	-	-	-	-	-	-	
Median:	6.2	5.9	5.9	6.3	6.2	6.1	6.4	

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	1	16	23	22	30	7	0	0	0	100
1996	2	8	18	27	27	13	2	0	3	0	100
1997	2	0	24	28	33	12	0	2	0	0	100
1998	0	3	10	14	28	31	14	0	0	0	100
1999	3	0	8	26	28	26	9	0	0	0	100
2000	0	1	10	29	30	19	11	1	0	0	100
2001	0	0	6	22	27	29	13	3	0	0	100
Total	1	1	10	23	28	26	11	1	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	2	2	10	3	4	2	1	4	2	30
1996	0	2	5	9	3	0	0	0	1	1	21
1997	0	2	7	12	4	0	0	1	0	6	32
1998	0	2	2	12	0	1	0	0	0	4	21
1999	0	3	5	7	4	2	0	1	2	3	27
2000	0	1	5	6	1	1	0	1	3	6	24
2001	0	3	3	6	3	3	2	1	2	4	27
Total	0	15	29	62	18	11	4	5512	26	182	182

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	3	1	
Highest:	708	315	2712	588	443	412	406	
Mean:	98	40	165	117	73	119	90	
Median:	51	14	19	20	20	37	47	

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	7	7	33	10	13	7	3	13	7	100
1996	0	10	24	43	14	0	0	0	5	5	100
1997	0	6	22	38	13	0	0	3	0	19	100
1998	0	10	10	57	0	5	0	0	0	19	100
1999	0	11	19	26	15	7	0	4	7	11	100
2000	0	4	21	25	4	4	0	4	13	25	100
2001	0	11	11	22	11	11	7	4	7	15	100
Total	0	8	16	34	10	6	2	3	7	14	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	29	16	24	3	0	0	0	1	0	73
1996	0	20	15	21	1	0	0	1	0	2	60
1997	0	18	14	22	3	0	0	0	0	1	58
1998	0	39	92	82	16	0	0	1	0	0	230
1999	0	79	39	32	2	0	0	0	0	0	152
2000	0	56	50	44	6	1	1	1	0	2	161
2001	0	103	139	198	23	11	8	10	1	2	495
Total	0	344	365	423	54	12	9	13	2	7	1229

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:	190	243	216	128	46	354	355	
Mean:	13	20	15	13	6	15	19	
Median:	4	5	7	7	3	5	9	

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	40	22	33	4	0	0	0	1	0	100
1996	0	33	25	35	2	0	0	2	0	3	100
1997	0	31	24	38	5	0	0	0	0	2	100
1998	0	17	40	36	7	0	0	0	0	0	100
1999	0	52	26	21	1	0	0	0	0	0	100
2000	0	35	31	27	4	1	1	1	0	1	100
2001	0	21	28	40	5	2	2	2	0	0	100
Total	0	28	30	34	4	1	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	0	1	2	1	4
1996	0	0	0	2	2	4
1997	0	0	2	2	5	9
1998	0	0	1	0	2	3
1999	0	0	2	1	2	5
2000	0	3	0	3	2	8
2001	0	0	1	0	5	6
Total (#)	0	3	7	10	19	39
Total (%)	0	8	18	26	49	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	2	5	10	18
1996	0	1	0	6	5	12
1997	0	0	3	6	3	12
1998	0	0	1	4	5	10
1999	0	0	3	2	1	6
2000	0	0	2	0	5	7
2001	0	1	2	2	4	9
Total (#)	0	3	13	25	33	74
Total (%)	0	4	18	34	45	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	2	3	0	1	6
1996	0	0	1	2	2	5
1997	1	0	2	1	4	8
1998	0	2	3	2	0	7
1999	2	3	3	3	3	14
2000	0	0	2	1	4	7
2001	0	1	4	1	5	11
Total (#)	3	8	18	10	19	58
Total (%)	5	14	31	17	33	100

Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	2	2
1996	0	0	0	0	0	0
1997	1	0	0	2	0	3
1998	0	0	0	0	1	1
1999	0	1	0	0	1	2
2000	0	0	0	1	1	2
2001	0	0	0	0	1	1
Total (#)	1	1	0	3	6	11
Total (%)	9	9	0	27	55	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	3	6	7	14	30
1996	0	1	1	10	9	21
1997	2	0	7	11	12	32
1998	0	2	5	6	8	21
1999	2	4	8	6	7	27
2000	0	3	4	5	12	24
2001	0	2	7	3	15	27
Total #	4	15	38	48	77	182

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	69	72	45	76	42	47	64	
Highest:	986	7630	11483	3571	1168	1177	1242	
Mean:	293	560	583	388	233	290	320	
Median:	181	173	158	160	132	204	211	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	0	10	20	23	47	100
1996	0	5	5	48	43	100
1997	6	0	22	34	38	100
1998	0	10	24	29	38	100
1999	7	15	30	22	26	100
2000	0	13	17	21	50	100
2001	0	7	26	11	56	100
Grand Total	2	8	21	26	42	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	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	1	1
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	3	1	4
1999	0	0	1	1	0	2
2000	0	0	3	1	1	5
2001	0	2	1	3	7	13
Total (#)	0	2	5	8	10	25
Total (%)	0	8	20	32	40	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	1	7	8	21	35	72
1996	0	3	10	19	21	53
1997	0	2	17	15	24	58
1998	0	18	36	71	101	226
1999	6	14	38	49	37	144
2000	3	35	17	44	56	155
2001	8	61	73	117	194	453
Total (#)	18	140	199	336	468	1161
Total (%)	2	12	17	29	40	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	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	1	0	0	0	1
2001	0	0	0	1	1	2
Total (#)	0	1	0	1	1	3
Total (%)	0	33	0	33	33	100
Soil Management Group 5						
	<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 (%)	-	-	-	-	-	-
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	7	8	21	36	0	73
1996	0	3	10	19	21	7	60
1997	0	2	17	15	24	0	58
1998	0	18	36	74	102	0	230
1999	6	14	39	50	37	6	152
2000	3	36	20	45	57	0	161
2001	8	63	74	121	202	27	495
Grand Total	18	143	204	345	479	40	1229

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	37	65	48	49	8	28	23	
Highest:	943	1275	1098	1058	731	1699	875	
Mean:	223	257	239	229	170	197	214	
Median:	197	165	165	184	138	150	171	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	1	10	11	29	49	0	100
1996	0	5	17	32	35	12	100
1997	0	3	29	26	41	0	100
1998	0	8	16	32	44	0	100
1999	4	9	26	33	24	4	100
2000	2	22	12	28	35	0	100
2001	2	13	15	24	41	5	100
Grand Total	1	12	17	28	39	3	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	1	2	4	23	30
1996	0	0	1	1	19	21
1997	0	1	1	5	25	32
1998	0	0	0	2	19	21
1999	0	0	0	3	24	27
2000	0	0	0	1	23	24
2001	0	1	1	3	22	27
Total	0	3	5	19	155	182

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	62	98	27	118	125	109	64	
Highest:	1429	1746	2488	1893	817	927	1124	
Mean:	430	413	423	449	379	445	413	
Median:	427	360	326	302	363	381	368	

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	0	3	7	13	77	100
1996	0	0	5	5	90	100
1997	0	3	3	16	78	100
1998	0	0	0	10	90	100
1999	0	0	0	11	89	100
2000	0	0	0	4	96	100
2001	0	4	4	11	81	100
Total	0	2	3	10	85	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	0	2	15	56	73
1996	0	0	0	15	45	60
1997	0	1	1	11	45	58
1998	0	3	9	28	190	230
1999	0	3	4	28	117	152
2000	0	3	6	40	112	161
2001	0	3	7	55	430	495
Total	0	13	29	192	995	1229

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	93	103	36	58	42	33	43	
Highest:	1053	1164	953	1207	858	1588	3095	
Mean:	391	391	375	386	337	339	359	
Median:	370	337	359	360	304	313	337	

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	0	3	21	77	100
1996	0	0	0	25	75	100
1997	0	2	2	19	78	100
1998	0	1	4	12	83	100
1999	0	2	3	18	77	100
2000	0	2	4	25	70	100
2001	0	1	1	11	87	100
Total	0	1	2	16	81	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	29	1	30
1996	21	0	21
1997	30	2	32
1998	20	1	21
1999	25	2	27
2000	24	0	24
2001	27	0	27
Total	176	6	182

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	2	2	1	1	2	1	
Highest:	390	34	155	74	201	37	29	
Mean:	23	9	20	14	14	10	7	
Median:	7	8	10	9	5	7	5	

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	69	4	73
1996	48	12	60
1997	55	3	58
1998	213	17	230
1999	141	11	152
2000	139	22	161
2001	484	11	495
Total	1149	80	1229

Percentages:

0-49	>49	Total
Normal	Excessive	
95	5	100
80	20	100
95	5	100
93	7	100
93	7	100
86	14	100
98	2	100
93	7	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	2	1	2	1	1	
Highest:	111	438	210	216	560	129	90	
Mean:	16	36	17	18	25	21	12	
Median:	11	14	10	10	12	11	7	

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	29	1	30
1996	20	1	21
1997	27	5	32
1998	18	3	21
1999	26	1	27
2000	23	1	24
2001	26	1	27
Total	169	13	182

Percentages:

0-99	>99	Total
Normal	Excessive	
97	3	100
95	5	100
84	16	100
86	14	100
96	4	100
96	4	100
96	4	100
93	7	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	11	22	9	21	14	20	8	
Highest:	131	169	228	263	122	135	118	
Mean:	43	50	69	70	43	42	46	
Median:	33	45	58	51	39	35	46	

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	69	4	73
1996	53	7	60
1997	58	0	58
1998	223	7	230
1999	148	4	152
2000	156	5	161
2001	488	7	495
Total	1195	34	1229

Percentages:

0-99	>99	Total
Normal	Excessive	
95	5	100
88	12	100
100	0	100
97	3	100
97	3	100
97	3	100
99	1	100
97	3	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	12	12	15	12	12	5	10	
Highest:	344	676	95	283	269	258	228	
Mean:	48	74	48	40	40	35	35	
Median:	41	45	47	30	35	27	31	

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	2	28	30
1996	0	1	20	21
1997	1	2	29	32
1998	0	2	19	21
1999	2	2	23	27
2000	0	4	20	24
2001	1	5	21	27
Total	4	18	160	182

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	7	93	100
0	5	95	100
3	6	91	100
0	10	90	100
7	7	85	100
0	17	83	100
4	19	78	100
2	10	88	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.7	0.7	0.3	0.7	0.3	0.5	0.3	
Highest:	72.3	221.1	55.1	33.8	16.2	308.0	56.0	
Mean:	16.6	16.7	9.2	8.0	5.3	32.7	6.7	
Median:	9.4	3.0	3.2	5.5	3.9	4.3	2.8	

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	5	24	44	73
1996	2	11	47	60
1997	2	24	32	58
1998	6	59	165	230
1999	8	47	97	152
2000	4	24	133	161
2001	4	40	451	495
Total	31	229	969	1229

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
7	33	60	100
3	18	78	100
3	41	55	100
3	26	72	100
5	31	64	100
2	15	83	100
1	8	91	100
3	19	79	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.2	0.2	0.1	0.2	0.1	0.1	0.2	
Highest:	19.8	40.4	8.2	14.5	750.0	24.8	21.4	
Mean:	2.0	4.4	1.7	1.9	10.4	2.5	3.9	
Median:	1.3	2.1	1.1	1.5	1.3	1.8	2.7	

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
ATF	Athletic Field

Crop Code	Crop Description
ASP	Asparagus
BDR/BND	Beans-dry
BET	Beets
BLU/BLB	Blueberries
CBP	Cabbage, Transplanted
CEM	Cemetery
CKP	Cucumber, Transplanted
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GPA	Grapes, American
GRA	Grapes (homeowners)
GEN	Green
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
ONS	Onion-seeded
OTH	Other
PAR	Pears
PER	Perennials
PLM	Plums
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
SQS	Squash, Summer
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)

Crop Code	Crop Description
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing