

Ketterings, Q.M., H. Krol, W.S. Reid and J. Degni (2004). Chemung County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-16. 36 pages.

Soil Sample Survey

Chemung Co.

Samples analyzed by CNAL in 1995-2001



Summary compiled by

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



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

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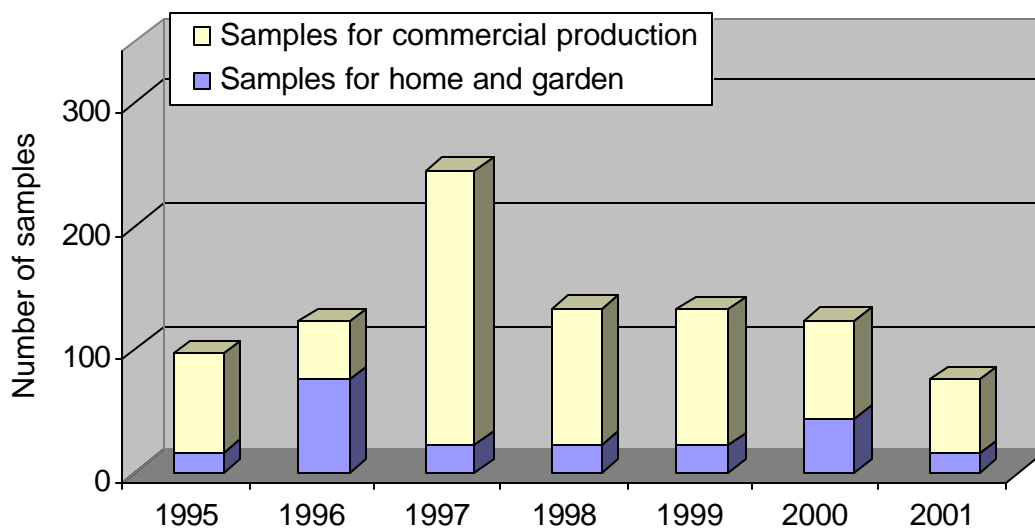
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1. General Survey Summary

This survey summarizes the soil test results from Chemung 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 928. Of these 928 samples, 708 (76%) were submitted to obtain fertilizer recommendations for commercial production while 220 samples (24%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	17	1995	79	96
1996	75	1996	48	123
1997	23	1997	222	245
1998	23	1998	110	133
1999	22	1999	110	132
2000	44	2000	80	124
<u>2001</u>	<u>16</u>	<u>2001</u>	<u>59</u>	<u>75</u>
Total	220	Total	708	928

Of the home and garden soil samples 24% were submitted to request nutrient recommendations for lawns. Seventeen percent of the samples were submitted for mixed vegetable production while another 17% came from athletic fields. People submitting samples for commercial production requested fertilizer recommendations for corn silage or grain (35%), alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (30%), or hay production (9%), while a few producers were planning on growing other crops including clover/grass mixtures, apples, grass for pasture, small grains and vegetables.

Home and garden samples in Chemung County were mostly sandy loam soils belonging to soil management group 4 (52%). Twenty-one percent belonged to soil management group 2. Group 3 was represented by 22% of all samples and 5% were classified as sandy (soil management group 5). 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, 89% belonged to soil management group 3. One percent was from soil management group 4. Less than 1% was classified as

soil management group 1 while 7% belonged to group 2. The five most common soil series, all belonging to soil management group 3, were Volusia (21%), Howard (19%), Unadilla (11%), Mardin (10%), and Tioga (10%). These soils represent 29% (Volusia), 6% (Howard), 1% (Unadilla), 11% (Mardin) and 2% (Tioga) of the 262,800 acres in the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to over 57% with median values ranging from 3.4 to 6.2% organic matter for home and garden samples and values ranging from 3.4 to 4.2 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 12% testing between 2.0 and 2.9% organic matter, 21% between 3.0 and 3.9% organic matter and 18% between 4.0 and 4.9% organic matter. Forty-one percent of the soils submitted for home and garden tested >4.9% in organic matter while 7% had less than 2.0% organic matter. Of the samples submitted for commercial production, 36% contained between 3.0 and 3.9% organic matter, 25% tested between 4.0 and 4.9% while 9% had organic matter concentrations of 5.0-5.9%. In total, 39% of the samples had organic matter levels between 4.0 and 6.9%.

Soil pH in water (1:1 extraction ratio) varied from pH 4.3 to 8.3 with the median for home and garden samples ranging from pH 6.2 to pH 6.8 and for samples submitted for commercial production ranging from pH 6.1 to pH 6.5. Of the home and garden samples, 61% tested between pH 6.0 and 7.4. For the samples submitted for commercial production, this was 71% while 27% 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, 7% tested low, 13% tested medium, 40% tested high and 40% tested very high. This meant that 80% tested high or very high in P. Of the samples submitted for commercial production, 23% were low in P, 20% tested medium for P while 45% of the

submitted samples were classified as high in soil test P. This means that 57% tested high or very high in P and. 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, 10% were classified as very low or low in potassium. Ten percent tested medium, 21% high and 58% very high. For samples submitted for commercial production, 10% tested low, 23% tested medium, 33% tested high and 31% 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 28 to a little over 2500 lbs Mg/acre (Morgan extraction).

There were no samples that tested very low in Mg. Most soils tested high or very high for Mg (99% of the homeowner soils and 97% of the soils of the commercial growers). No more than 2 of the homeowner soils and 18 of the commercial growers' soil tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Chemung 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 93-95% in the normal range with 7% of the home and garden samples and 5% of the samples for commercial production testing excessive for Fe. Similarly, most soils (90-97%) 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, 96% tested high for zinc while 4% tested medium. Of the samples for commercial production, 3% tested low in zinc, almost 24% tested medium while 73% was 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	5	0	0	2	0	3	10	5
APR	0	0	1	0	0	0	0	1	0
ATF	0	1	0	11	0	24	2	38	17
CEM	0	0	0	0	0	2	0	2	1
FAR	0	13	0	0	0	0	0	13	6
FLA	0	3	0	0	0	4	0	7	3
GEN	0	15	2	0	1	0	0	18	8
LAW	5	22	5	5	10	5	1	53	24
MVG	3	11	5	4	6	5	4	38	17
OTH	0	0	4	0	0	1	2	7	3
PER	0	4	4	2	2	0	0	12	5
PTO	1	0	0	0	0	1	0	2	1
ROS	5	0	0	0	0	0	0	5	2
ROU	0	1	0	0	0	0	0	1	0
SAG	2	0	2	1	1	0	1	7	3
STR	0	0	0	0	0	0	1	1	0
TRF	1	0	0	0	0	1	1	3	1
Unknown	0	0	0	0	0	1	1	2	1
Total	17	75	23	23	22	44	16	220	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	6	5	2	7	4	8	0	32	5
AGE/AGT	23	14	55	12	5	6	1	116	16
ALE/ALT	4	4	18	13	9	5	13	66	9
APP	2	0	16	0	0	0	0	18	3
BCE/BCT	0	1	1	0	0	1	0	3	0
BGE/BGT	1	2	2	0	0	0	0	5	1
BRP	0	1	0	0	0	0	0	1	0
BUK	1	0	0	0	0	1	0	3	0
CGE/CGT	0	0	2	3	1	5	5	16	2
CLE/CLT	0	0	0	3	10	0	1	14	2
COG/COS	28	7	88	42	41	18	22	246	35
GIE/GIT	0	0	0	1	0	0	0	1	0
GPF	0	0	0	2	0	0	0	2	0
GRE/GRT	0	5	20	10	19	11	1	66	9
IDL	0	0	0	0	0	2	0	2	0
LET	0	2	0	0	0	0	0	2	0
MIX	0	1	1	2	4	5	0	13	2
OAS	2	0	0	1	0	4	0	7	1
OAT	1	1	0	3	0	0	0	5	1
OTH	0	4	1	0	2	1	0	8	1
PGE/PGT	3	0	3	2	3	3	0	14	2
PIE/PIT	1	0	9	0	0	0	15	25	4
PLE/PLT	0	0	0	0	0	1	0	1	0
PNE/PNT	0	0	0	1	6	3	0	10	1
PUM	1	0	0	0	0	0	0	1	0
RYC	0	0	0	2	0	0	0	2	0
RYS	0	0	3	0	0	0	0	3	0
SOY	0	0	0	3	0	0	0	3	0
SSH	0	0	0	0	0	1	0	1	0
STS	0	0	1	0	0	0	0	1	0
SWC	2	0	0	2	0	0	0	4	1
WHS	0	1	0	0	0	0	0	1	0
WHT	2	0	0	0	0	0	0	2	0
Unknown	1	0	0	1	6	5	1	14	2
Total	79	48	222	110	110	80	59	708	100

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)	2	22	7	5	5	3	3	47
SMG 3 (silt loam)	9	9	4	1	8	16	2	49
SMG 4 (sandy loam)	5	42	12	17	8	24	6	114
SMG 5 (sandy)	1	2	0	0	1	1	5	10
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	17	75	23	23	22	44	16	220

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Alluvial	3	0	0	1	0	0	0	0	1
Arnot	3	2	0	4	2	4	0	0	12
Chenango	3	3	4	10	0	6	2	3	28
Chippewa	3	0	0	1	1	1	0	1	4
Howard	3	8	11	35	26	25	21	7	133
Hudson	2	2	2	6	7	0	0	5	22
Lansing	2	1	0	9	9	0	4	1	24
Lordstown	3	6	9	18	4	5	2	2	46
Madalin	1	0	0	2	0	0	0	0	2
Mardin	3	11	6	17	5	15	8	11	73
Middlebury	3	1	0	3	3	4	3	0	14
Papakating	2	0	0	3	0	0	0	0	3
Phelps	3	0	0	3	0	3	0	0	6
Rhinebeck	2	0	0	1	1	0	0	0	2
Tioga	3	3	1	19	13	14	6	12	68
Unadilla	3	15	4	28	12	10	7	3	79
Valois	3	0	3	4	0	2	0	3	12
Volusia	3	25	8	45	24	12	26	5	145
Wallington	3	2	0	3	0	0	0	5	10
Williamson	4	0	0	7	0	0	0	0	7
Unknown	-	0	0	3	3	9	1	1	17
Total	-	79	48	222	110	110	80	59	708

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	1	1	3	1	3	2	6	17
1996	0	3	14	15	15	14	6	8	75
1997	0	1	3	0	3	1	9	6	23
1998	0	4	2	9	3	3	0	2	23
1999	0	2	2	4	4	4	3	3	22
2000	0	2	4	10	13	5	1	9	44
2001	1	1	1	6	1	2	1	3	16
Total	1	14	27	47	40	32	22	37	220

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.5	1.1	1.7	1.4	1.7	1.8	0.3	
Highest:	13.1	13.5	20.8	7.5	34.0	18.2	57.0	
Mean:	6.2	4.5	7.0	3.8	6.0	5.3	7.5	
Median:	5.8	3.6	6.2	3.4	4.8	4.5	3.8	

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	6	6	18	6	18	12	35	100
1996	0	4	19	20	20	19	8	11	100
1997	0	4	13	0	13	4	39	26	100
1998	0	17	9	39	13	13	0	9	100
1999	0	9	9	18	18	18	14	14	100
2000	0	5	9	23	30	11	2	20	100
2001	6	6	6	38	6	13	6	19	100
Total	0	6	12	21	18	15	10	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	4	7	21	25	17	3	2	79
1996	0	1	4	16	20	4	2	1	48
1997	0	6	57	91	54	10	3	1	222
1998	0	4	23	42	26	10	5	0	110
1999	2	10	27	35	22	10	2	2	110
2000	0	5	13	24	24	7	2	5	80
2001	0	1	15	27	7	7	0	2	59
Total	2	31	146	256	178	65	17	13	708

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.9	1.8	1.6	1.5	0.2	1.4	1.2	
Highest:	7.6	7.1	20.8	6.5	10.0	12.4	7.6	
Mean:	4.2	4.1	3.6	3.7	3.5	4.1	3.6	
Median:	4.2	4.1	3.6	3.6	3.6	3.9	3.4	

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	5	9	27	32	22	4	3	100
1996	0	2	8	33	42	8	4	2	100
1997	0	3	26	41	24	5	1	0	100
1998	0	4	21	38	24	9	5	0	100
1999	2	9	25	32	20	9	2	2	100
2000	0	6	16	30	30	9	3	6	100
2001	0	2	25	46	12	12	0	3	100
Total	0	4	21	36	25	9	2	2	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	3	6	2	2	1	0	0	17
1996	0	0	4	8	15	12	27	9	0	0	75
1997	0	2	3	2	5	6	4	1	0	0	23
1998	0	0	1	3	3	8	4	4	0	0	23
1999	0	0	1	6	2	5	3	5	0	0	22
2000	0	2	0	7	7	9	1	18	0	0	44
2001	0	1	2	0	3	6	2	1	1	0	16
Total	0	6	13	29	41	48	43	39	1	0	220

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.9	5.0	4.5	5.2	5.3	4.7	4.8	
Highest:	7.8	7.8	7.5	7.8	7.8	7.9	8.3	
Mean:	-	-	-	-	-	-	-	
Median:	6.2	6.3	6.4	6.8	6.8	6.8	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	6	12	18	35	12	12	6	0	0	100
1996	0	0	5	11	20	16	36	12	0	0	100
1997	0	9	13	9	22	26	17	4	0	0	100
1998	0	0	4	13	13	35	17	17	0	0	100
1999	0	0	5	27	9	23	14	23	0	0	100
2000	0	5	0	16	16	20	2	41	0	0	100
2001	0	6	13	0	19	38	13	6	6	0	100
Total	0	3	6	13	19	22	20	18	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	0	11	23	27	14	4	0	0	0	79
1996	0	0	6	15	14	13	0	0	0	0	48
1997	0	2	13	33	96	69	9	0	0	0	222
1998*	2	1	9	13	35	31	16	1	0	0	108
1999	0	5	19	18	22	36	8	1	1	0	110
2000	0	1	6	12	24	34	2	1	0	0	80
2001	0	0	2	10	16	27	2	2	0	0	59
Total	2	9	66	124	234	224	41	5	1	0	706

* Two samples were not analyzed for pH in 1998.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.0	5.1	4.7	4.3	4.6	4.5	5.4	
Highest:	7.1	6.9	7.3	7.5	8.1	7.6	7.5	
Mean:	-	-	-	-	-	-	-	
Median:	6.1	6.1	6.3	6.4	6.2	6.3	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	14	29	34	18	5	0	0	0	100
1996	0	0	13	31	29	27	0	0	0	0	100
1997	0	1	6	15	43	31	4	0	0	0	100
1998	2	1	8	12	32	29	15	1	0	0	100
1999	0	5	17	16	20	33	7	1	1	0	100
2000	0	1	8	15	30	43	3	1	0	0	100
2001	0	0	3	17	27	46	3	3	0	0	100
Total	0	1	9	18	33	32	6	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	4	3	4	0	0	0	1	0	5	17
1996	0	6	10	28	12	5	3	3	1	7	75
1997	0	1	2	8	4	1	1	3	0	3	23
1998	0	0	3	14	3	0	0	1	1	1	23
1999	0	2	3	10	0	1	0	1	0	5	22
2000	0	0	5	23	9	1	1	0	1	4	44
2001	0	2	3	2	1	1	2	4	0	1	16
Total	0	15	29	89	29	9	7	13	3	26	220

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	3	4	1	6	2	
Highest:	510	421	563	240	348	889	389	
Mean:	108	62	102	44	92	83	78	
Median:	23	11	42	26	27	29	62	

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	24	18	24	0	0	0	6	0	29	100
1996	0	8	13	37	16	7	4	4	1	9	100
1997	0	4	9	35	17	4	4	13	0	13	100
1998	0	0	13	61	13	0	0	4	4	4	100
1999	0	9	14	45	0	5	0	5	0	23	100
2000	0	0	11	52	20	2	2	0	2	9	100
2001	0	13	19	13	6	6	13	25	0	6	100
Total	0	7	13	40	13	4	3	6	1	12	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	31	13	30	2	2	0	1	0	0	79
1996	0	14	10	17	2	3	0	1	0	1	48
1997	0	36	59	104	16	5	0	1	1	0	222
1998	0	28	22	45	6	4	2	1	0	2	110
1999	0	32	12	53	8	2	3	0	0	0	110
2000	0	17	19	32	7	2	0	0	1	2	80
2001	0	8	10	38	1	2	0	0	0	0	59
Total	0	166	145	319	42	20	5	4	2	5	708

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:	110	218	188	541	89	763	74	
Mean:	13	22	17	25	19	31	15	
Median:	7	9	10	10	15	10	12	

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	39	16	38	3	3	0	1	0	0	100
1996	0	29	21	35	4	6	0	2	0	2	100
1997	0	16	27	47	7	2	0	0	0	0	100
1998	0	25	20	41	5	4	2	1	0	2	100
1999	0	29	11	48	7	2	3	0	0	0	100
2000	0	21	24	40	9	3	0	0	1	3	100
2001	0	14	17	64	2	3	0	0	0	0	100
Total	0	23	20	45	6	3	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	0	1	1	2
1996	0	0	0	2	20	22
1997	0	0	0	1	6	7
1998	0	0	0	0	5	5
1999	0	0	2	0	3	5
2000	0	0	0	1	2	3
2001	0	0	0	1	2	3
Total (#)	0	0	2	6	39	47
Total (%)	0	0	4	13	83	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	1	0	8	9
1996	0	1	1	4	3	9
1997	0	0	2	0	2	4
1998	0	0	0	0	1	1
1999	0	2	0	1	5	8
2000	0	0	0	4	12	16
2001	0	0	0	0	2	2
Total (#)	0	3	4	9	33	49
Total (%)	0	6	8	18	67	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	1	1	2	5
1996	5	6	10	10	11	42
1997	0	0	1	2	9	12
1998	0	2	2	4	9	17
1999	0	1	0	2	5	8
2000	0	0	1	10	13	24
2001	0	2	0	2	2	6
Total (#)	5	12	15	31	51	114
Total (%)	4	11	13	27	45	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	1	1	0	0	2
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	1	1
2000	0	0	0	1	0	1
2001	1	0	0	0	4	5
Total (#)	1	1	2	1	5	10
Total (%)	10	10	20	10	50	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	3	2	11	17
1996	5	8	12	16	34	75
1997	0	0	3	3	17	23
1998	0	2	2	4	15	23
1999	0	3	2	3	14	22
2000	0	0	1	16	27	44
2001	1	2	0	3	10	16
Total #	6	16	23	47	128	220

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	92	21	91	64	70	102	38	
Highest:	3669	1883	755	536	1570	2830	1549	
Mean:	540	283	338	281	431	431	418	
Median:	282	143	287	276	293	252	332	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	0	6	18	12	65	100
1996	7	11	16	21	45	100
1997	0	0	13	13	74	100
1998	0	9	9	17	65	100
1999	0	14	9	14	64	100
2000	0	0	2	36	61	100
2001	6	13	0	19	63	100
Grand Total	3	7	10	21	58	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	2	2
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	2	2
Total (%)	0	0	0	0	100	100
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	3	3
1996	0	0	0	0	2	2
1997	0	1	4	4	10	19
1998	1	1	2	8	5	17
1999	0	0	0	0	0	0
2000	0	0	0	1	3	4
2001	0	1	1	3	1	6
Total (#)	1	3	7	16	24	51
Total (%)	2	6	14	31	47	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	8	13	26	29	76
1996	0	5	13	14	14	46
1997	1	21	51	71	47	191
1998	0	13	27	27	23	90
1999	1	9	22	35	34	101
2000	0	7	21	19	28	75
2001	0	5	9	24	14	52
Total (#)	2	68	156	216	189	631
Total (%)	0	11	25	34	30	100

Ketterings, Q.M., H. Krol, W.S. Reid and J. Degni (2004). Chemung County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-16. 36 pages.

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	1	3	0	3	7
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	1	3	0	3	7
Total (%)	0	14	43	0	43	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	0	8	13	26	32	0	79
1996	0	5	13	14	16	0	48
1997	1	23	58	75	62	3	222
1998	1	14	29	35	28	3	110
1999	1	9	22	35	34	9	110
2000	0	7	21	20	31	1	80
2001	0	6	10	27	15	1	59
Grand Total	3	72	166	232	218	17	708

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	59	55	34	32	24	49	59	
Highest:	869	1325	731	801	843	1052	607	
Mean:	191	227	167	180	190	209	169	
Median:	173	137	144	130	147	155	142	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	10	16	33	41	0	100
1996	0	10	27	29	33	0	100
1997	0	10	26	34	28	1	100
1998	1	13	26	32	25	3	100
1999	1	8	20	32	31	8	100
2000	0	9	26	25	39	1	100
2001	0	10	17	46	25	2	100
Grand Total	0	10	23	33	31	2	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	1	14	17
1996	0	0	0	2	73	75
1997	0	0	0	1	22	23
1998	0	0	0	0	23	23
1999	0	0	0	1	21	22
2000	0	0	0	0	44	44
2001	0	0	0	0	16	16
Total	0	0	2	5	213	220

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	82	146	161	243	190	220	254	
Highest:	1444	1132	1223	577	2581	1832	1226	
Mean:	643	428	488	381	553	583	442	
Median:	587	392	454	376	404	531	383	

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	0	12	6	82	100
1996	0	0	0	3	97	100
1997	0	0	0	4	96	100
1998	0	0	0	0	100	100
1999	0	0	0	5	95	100
2000	0	0	0	0	100	100
2001	0	0	0	0	100	100
Total	0	0	1	2	97	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	0	10	69	79
1996	0	0	2	1	45	48
1997	0	1	2	12	207	222
1998	0	0	4	11	95	110
1999	0	6	2	16	86	110
2000	0	0	1	4	75	80
2001	0	0	0	0	59	59
Total	0	7	11	54	636	708

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	109	78	53	69	28	95	206	
Highest:	843	770	1041	922	1630	2166	989	
Mean:	374	363	420	395	376	471	441	
Median:	315	344	400	355	359	441	440	

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	0	13	87	100
1996	0	0	4	2	94	100
1997	0	0	1	5	93	100
1998	0	0	4	10	86	100
1999	0	5	2	15	78	100
2000	0	0	1	5	94	100
2001	0	0	0	0	100	100
Total	0	1	2	8	90	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	15	2	17
1996	69	6	75
1997	19	4	23
1998	22	1	23
1999	20	2	22
2000	43	1	44
2001	16	0	16
Total	204	16	220

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	88	12	100
	92	8	100
	83	17	100
	96	4	100
	91	9	100
	98	2	100
	100	0	100
	93	7	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	1	1	1	1	1	3	
Highest:	59	129	148	68	70	63	42	
Mean:	16	16	24	12	17	12	10	
Median:	6	6	5	7	9	9	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	72	7	79
1996	48	0	48
1997	220	2	220
1998	105	5	110
1999	95	15	110
2000	75	5	80
2001	57	2	59
Total	672	36	708

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	91	9	100
	100	0	100
	99	1	100
	95	5	100
	86	14	100
	94	6	100
	97	3	100
	95	5	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	2	1	1	1	1	1	
Highest:	186	42	399	230	173	247	62	
Mean:	19	12	10	13	19	14	8	
Median:	10	9	6	5	5	5	4	

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	17	0	17	100	0	100
1996	69	6	75	92	8	100
1997	17	6	23	74	26	100
1998	23	0	23	100	0	100
1999	19	3	22	86	14	100
2000	42	2	44	95	5	100
2001	12	4	16	75	25	100
Total	199	21	220	90	10	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	9	9	20	13	33	20	16	
Highest:	68	617	505	60	204	321	719	
Mean:	40	59	94	35	70	62	112	
Median:	40	30	51	34	57	53	48	

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	77	2	79
1996	44	4	48
1997	222	0	222
1998	106	4	110
1999	102	8	110
2000	80	0	80
2001	59	0	59
Total	690	18	708

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	97	3	100
	92	8	100
	100	0	100
	96	4	100
	93	7	100
	100	0	100
	100	0	100
	97	3	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	10	12	5	9	8	8	12	
Highest:	221	131	73	157	362	76	96	
Mean:	42	41	32	36	46	36	37	
Median:	41	31	29	25	31	38	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	16	17
1996	0	5	70	75
1997	0	0	23	23
1998	0	1	22	23
1999	0	1	21	22
2000	0	0	44	44
2001	0	1	15	16
Total	0	9	111	220

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	6	94	100
0	7	93	100
0	0	100	100
0	4	96	100
0	5	95	100
0	0	100	100
0	6	94	100
0	4	96	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.0	0.9	1.4	0.8	0.9	1.1	0.7	
Highest:	261.4	158.8	78.4	16.5	36.6	45.1	130.8	
Mean:	22.8	11.2	11.9	5.2	8.1	6.3	14.0	
Median:	3.1	1.5	8.2	4.8	4.5	3.3	3.4	

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	15	63	79
1996	2	14	32	48
1997	4	57	161	222
1998	2	33	75	110
1999	5	21	84	110
2000	8	17	55	80
2001	1	9	49	59
Total	23	166	519	708

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	19	80	100
4	29	67	100
2	26	73	100
2	30	68	100
5	19	76	100
10	21	69	100
2	15	83	100
3	23	73	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.3	0.4	0.4	0.3	0.3	0.1	0.2	
Highest:	17.2	68.4	18.7	8.8	18.2	10.5	6.0	
Mean:	3.2	3.2	1.8	1.8	1.9	2.1	1.9	
Median:	2.1	1.2	1.4	1.4	1.6	1.6	1.7	

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
APR	Apricots

Crop Code	Crop Description
ASP	Asparagus
ATF	Athletic Field
BDR/BND	Beans-dry
BLU/BLB	Blueberries
BRP	Broccoli, Transplanted
CEM	Cemetery
EGG	Eggplants
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GPF	Grapes, French
GRA	Grapes (homeowners)
GEN	Green
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
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
SQS	Squash, Summer
SQW	Squash, Winter

Crop Code	Crop Description
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