

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoe (2004). Chenango County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-8. 37 pages.

Soil Sample Survey

Chenango Co.

Samples analyzed by CNAL in 1995-2001



Summary compiled by

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



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

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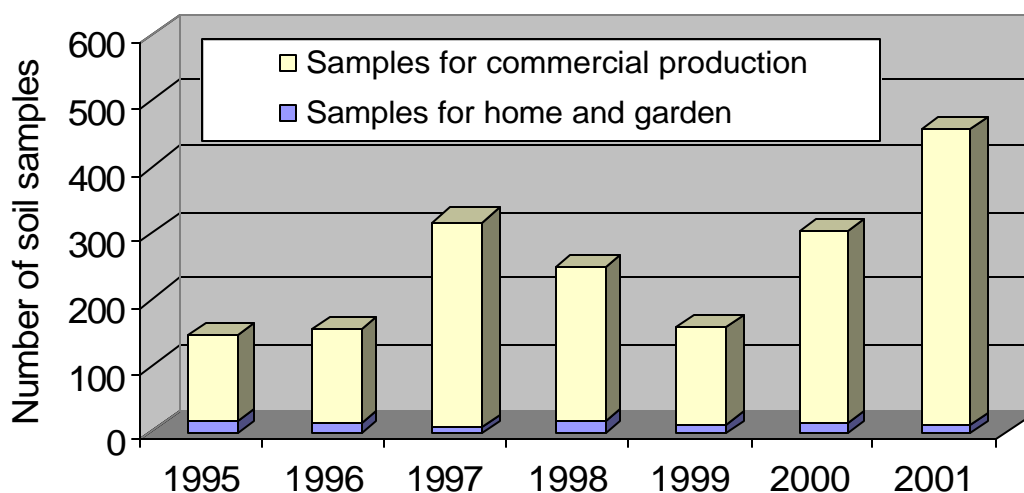
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1. General Survey Summary

This survey summarizes the soil test results from Chenango 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 1785. Of these 1785 samples, 1699 (95%) were submitted to obtain fertilizer recommendations for commercial production while 86 samples (5%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	16	1995	131	147
1996	13	1996	140	153
1997	7	1997	311	318
1998	17	1998	231	248
1999	11	1999	147	158
2000	12	2000	291	303
<u>2001</u>	<u>10</u>	<u>2001</u>	<u>448</u>	<u>458</u>
Total	86	Total	1699	1785

Many of the home and garden (44%) were submitted to request fertilizer recommendations for mixed vegetable gardens while 15% of the samples were submitted to obtain recommendations for lawns. People submitting samples for commercial production requested fertilizer recommendations for corn silage or grain production (33%), alfalfa or alfalfa/grass/trefoil mixtures (27%), grass/clover hay production (24%) while fewer samples were submitted for other crops including small grains, pasture, vegetables and potatoes.

Home and garden samples in Monroe County were silty (29%), silt loams (26%), sandy loams (37%) or sandy (8%) belonging to soil management group 2, 3, 4, and 5, respectively. The table below gives descriptions of each of the soil management groups.

Soil Management Groups for New York.

1	Fine-textured soils developed from clayey lake sediments and medium- to fine-textured soils developed from lake sediments.
2	Medium- to fine-textured soils developed from calcareous glacial till and medium-textured to moderately fine-textured soils developed from slightly calcareous glacial till mixed with shale and medium-textured soils developed in recent alluvium.
3	Moderately coarse textured soil developed from glacial outwash and recent alluvium and medium-textured acid soil developed on glacial till.
4	Coarse- to medium-textured soils formed from glacial till or glacial outwash.
5	Coarse- to very coarse-textured soils formed from gravelly or sandy glacial outwash or glacial lake beach ridges or deltas.
6	Organic or muck soils with more than 80% organic matter.

Of the samples submitted for commercial production, 87% belonged to soil management group 3. Ten percent belonged to soil management group 2 while 2% were classified as group 4 soils. The five most common soil series were Mardin (19%), Chenango (12%),

Howard (12%), Lordstown (9%), and Volusia (9%). These soils represent 24% (Mardin), 4% (Chenango), 2% (Howard), 20% (Lordstown), and 18% (Volusia) of the 582,220 acres of land area in the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to 32% with median values ranging from 3.6 to 6.7% organic matter for home and garden samples and 4.5 to 5.1% for samples submitted for commercial production. Thirty-seven percent of the home and garden samples had between 2.0 and 4.9% organic matter with 16% between 3.0 and 3.9% organic matter, and 17% between 4.0 and 4.9% organic matter. Fifty-two percent of the soils submitted for home and garden tested >4.9% in organic matter while 10% had less than 2% organic matter. Of the samples submitted for commercial production 7% had between 2.0 and 2.9% organic matter, 21% contained between 3.0 and 3.9% organic matter, while 24% had 4.0-4.9% organic matter. In total, 71% of the samples had less than 4.0% organic matter.

Soil pH in water (1:1 extraction ratio) varied from pH 4.0 to 6.0 with the median for home and garden samples ranging from pH 5.8 to pH 7.5 and for samples submitted for commercial production ranging from pH 6.0 to pH 6.3. Of the home and garden samples, 72% had a pH of 6.0 or higher. For the samples submitted for commercial production, this was 66% while 23% 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, 17% tested low, 21% tested medium, 26% tested high and 36% tested very high. This meant that 62% of the home and garden samples tested high or very high in P. Of the commercial production samples, 12% tested very high in P, 44% were high, 23% were medium and 20% were classified as low in P. This means that 56% 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, 13% were classified as very low or low in potassium. Thirteen percent tested medium, 21% high and 53% very high. For samples submitted for commercial production, 1% tested very low in K, 9% tested low, 16% tested medium, 25% tested high and 47% 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 26 to 3747 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 95% of the soils of the commercial growers). None of the

homeowner soils and only 2% of the commercial growers' soil tested low in Mg while for homeowner soils only 4 samples and for the commercial samples only about 4% tested medium in magnesium. Thus, magnesium deficiency is not likely to occur in Chenango 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 88-95% in the normal range with 10 of the home and garden samples and 5% of the samples for commercial production testing excessive for Fe. Similarly, most soils (93-98%) 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, 87% tested high for zinc while 8% tested medium and 5% was low in zinc. Of the samples for commercial production, 3% tested low in zinc, 23% tested medium while 73% 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	0	0	0	3	0	0	3	3
ATF	1	3	0	0	0	0	0	4	5
BLU	0	0	0	2	0	0	0	2	2
FLA	2	0	0	2	0	0	2	6	7
HRB	1	0	0	0	0	0	0	1	1
LAW	4	0	0	3	4	2	0	13	15
MVG	7	8	3	7	2	7	4	38	44
OTH	0	0	2	1	0	0	0	3	3
PER	0	2	1	2	0	0	2	7	8
PTO	0	0	0	0	0	1	0	1	1
SAG	1	0	1	0	0	2	2	6	7
TRF	0	0	0	0	2	0	0	2	2
Total	16	13	7	17	11	12	10	86	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	8	9	1	10	1	12	8	49	3
AGE/AGT	39	35	75	39	18	48	86	340	20
ALE/ALT	8	9	15	7	1	22	11	73	4
APP	2	1	1	2	0	1	0	7	0
BCE/BCT	0	0	0	1	1	2	0	4	0
BGE/BGT	3	4	1	5	2	0	0	15	1
BLB	0	0	4	0	0	0	0	4	0
BSP	0	1	0	0	1	0	0	2	0
BTE	0	0	0	0	0	0	1	1	0
CGE/CGT	6	10	13	23	28	60	31	171	10
CLE/CLT	2	1	0	0	1	1	3	8	0
COG/COS	41	37	121	94	55	73	141	562	33
CSE/CST	0	0	0	0	0	0	1	1	0
GIE/GIT	0	1	6	0	0	0	20	27	2
GRE/GRT	11	14	26	25	21	28	79	204	12
IDL	0	0	1	0	0	0	3	4	0
LET	0	0	0	0	0	1	0	1	0
MIX/MVG	1	0	0	1	8	1	3	14	1
OAS	0	0	0	2	0	9	2	13	1
OAT	2	2	2	0	0	3	10	19	1
OTH	0	0	1	0	1	1	0	3	0
PEA	0	0	0	0	1	0	0	1	0
PGE/PGT	0	3	0	1	2	0	10	16	1
PIE/PIT	4	5	21	1	0	11	0	42	2
PLE/PLT	0	3	6	5	1	6	17	38	2
PNE/PNT	2	2	4	4	0	0	1	13	1
POT	2	0	0	3	0	4	0	9	1
PUM	0	0	0	0	0	0	1	1	0
RSS	0	0	0	1	0	0	0	1	0
RYC	0	0	1	0	0	0	0	1	0
RYS	0	0	1	0	0	0	2	3	0
SOG	0	0	0	0	2	0	0	2	0
SOY	0	0	5	0	0	0	9	14	1
SQS	0	0	0	0	2	0	1	3	0
STE	0	0	1	0	0	0	0	1	0

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Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
STS	0	2	0	0	0	0	0	2	0
SUD	0	0	2	0	0	0	0	2	0
SWC	0	0	3	0	0	2	3	8	0
TME	0	0	0	1	0	0	0	1	0
TRE/TRT	0	1	0	1	0	0	0	2	0
TRP	0	0	0	1	0	1	0	2	0
Unknown	0	0	0	4	1	5	5	15	1
Total	131	140	311	231	147	291	448	1699	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)	7	2	0	6	2	5	3	25
SMG 3 (silt loam)	1	5	5	5	2	2	2	22
SMG 4 (sandy loam)	8	5	1	6	6	4	2	32
SMG 5 (sandy)	0	1	1	0	1	1	3	7
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	16	13	7	17	11	12	10	86

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Arkport	4	0	0	0	0	1	0	0	1
Arnot	3	1	0	1	0	0	1	0	3
Atherton	3	0	0	0	0	5	2	1	8
Bath	3	7	4	6	17	3	7	17	61
Canandaigua	3	0	0	1	1	0	0	1	3
Canaseraga	3	0	1	0	0	0	0	2	3
Castile	4	3	1	3	2	2	3	2	16
Chenango	3	18	28	19	31	19	40	47	202
Chippewa	3	0	0	0	0	1	2	0	3
Greene	3	0	1	0	1	2	6	2	12
Hamlin	2	5	11	24	8	9	9	22	88
Howard	3	16	9	43	28	12	36	57	201
Lackawanna	3	4	2	28	10	1	11	16	72
Lansing	2	1	0	19	18	0	9	17	64
Lordstown	3	7	15	32	14	16	26	49	159
Mardin	3	30	27	50	41	32	66	72	318
Morris	3	0	1	5	7	0	4	2	19
Oquaga	3	2	3	3	3	0	2	0	13
Phelps	3	1	0	0	1	1	1	3	7
Raynham	3	1	0	2	0	0	1	0	4
Riverhead	4	0	0	4	0	0	0	4	8
Scio	3	1	0	13	0	1	3	13	31
Teel	3	2	2	5	5	6	1	10	31
Trestle	3	1	1	0	1	1	1	1	6
Tuller	3	0	0	0	0	0	1	0	1
Unadilla	3	4	1	1	1	9	1	27	44
Valois	3	6	11	12	13	4	16	26	88
Volusia	3	16	19	24	10	15	22	39	145
Wayland	2	1	2	2	1	1	1	4	12
Wellsboro	3	2	1	14	12	0	13	10	52
Unknown	-	2	0	0	6	6	6	4	24
Total	-	131	140	311	231	147	291	448	1699

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	2	5	0	2	2	0	3	2	16
1996	0	0	1	5	0	1	3	3	13
1997	0	0	1	1	2	0	0	3	7
1998	0	0	1	1	6	3	1	5	17
1999	0	1	0	4	1	3	0	2	11
2000	0	0	0	1	2	1	3	5	12
2001	0	1	0	0	2	4	1	2	10
Total	2	7	3	14	15	12	11	22	86

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.5	2.9	2.4	2.9	1.0	3.4	1.1	
Highest:	13.2	32.5	14.4	19.1	14.0	17.0	11.3	
Mean:	4.0	7.5	6.6	6.6	5.1	7.5	5.8	
Median:	3.6	5.8	4.8	5.0	4.4	6.7	5.4	

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	13	31	0	13	13	0	19	13	100
1996	0	0	8	38	0	8	23	23	100
1997	0	0	14	14	29	0	0	43	100
1998	0	0	6	6	35	18	6	29	100
1999	0	9	0	36	9	27	0	18	100
2000	0	0	0	8	17	8	25	42	100
2001	0	10	0	0	20	40	10	20	100
Total	2	8	3	16	17	14	13	26	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	1	10	30	36	23	23	8	131
1996	0	0	7	33	33	26	24	17	140
1997	1	2	36	74	66	77	35	20	311
1998	0	0	15	36	55	42	38	45	231
1999	0	2	10	37	26	34	18	20	147
2000	0	1	9	59	80	59	45	38	291
2001	0	2	40	93	117	115	50	31	448
Total	1	8	127	362	413	376	233	179	1699

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.8	2.0	1.0	2.0	1.7	1.9	1.3	
Highest:	8.2	11.1	9.4	11.8	18.5	15.8	11.2	
Mean:	4.8	5.0	4.6	5.4	5.0	5.2	4.8	
Median:	4.5	4.9	4.7	5.1	4.8	4.9	4.7	

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	1	8	23	27	18	18	6	100
1996	0	0	5	24	24	19	17	12	100
1997	0	1	12	24	21	25	11	6	100
1998	0	0	6	16	24	18	16	19	100
1999	0	1	7	25	18	23	12	14	100
2000	0	0	3	20	27	20	15	13	100
2001	0	0	9	21	26	26	11	7	100
Total	0	0	7	21	24	22	14	11	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	1	4	3	5	3	0	16
1996	0	0	1	0	3	2	4	3	0	0	13
1997	2	0	1	2	0	2	0	0	0	0	7
1998	0	0	4	5	4	2	1	1	0	0	17
1999	0	0	1	4	2	2	1	0	1	0	11
2000	0	0	2	0	3	1	4	2	0	0	12
2001	1	0	1	0	1	3	1	3	0	0	10
Total	3	0	10	11	14	16	14	14	4	0	86

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6.0	5.1	4.2	5.0	5.0	5.3	4.1	
Highest:	8.2	7.8	6.9	7.5	8.2	7.8	7.7	
Mean:	-	-	-	-	-	-	-	
Median:	7.5	7.2	5.8	5.9	6.1	7.0	6.7	

Percent of home and garden samples within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	0	0	0	6	25	19	31	19	0	100
1996	0	0	8	0	23	15	31	23	0	0	100
1997	29	0	14	29	0	29	0	0	0	0	100
1998	0	0	24	29	24	12	6	6	0	0	100
1999	0	0	9	36	18	18	9	0	9	0	100
2000	0	0	17	0	25	8	33	17	0	0	100
2001	10	0	10	0	10	30	10	30	0	0	100
Total	3	0	12	13	16	19	16	16	5	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	7	28	53	38	5	0	0	0	131
1996	0	2	22	42	50	22	2	0	0	0	140
1997*	1	4	22	90	116	60	6	1	0	0	300
1998*	1	0	21	42	101	47	14	1	0	0	227
1999	1	1	18	25	60	34	8	0	0	0	147
2000	2	3	15	68	123	67	12	1	0	0	291
2001	0	10	47	102	167	98	22	2	0	0	448
Total	5	20	152	397	670	366	69	5	0	0	1684

*Eleven and four samples were not analyzed for pH in 1997 and in 1998, respectively.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.1	4.7	4.0	4.4	4.3	4.0	4.7	
Highest:	7.1	7.1	7.5	7.5	7.3	7.7	7.6	
Mean:	-	-	-	-	-	-	-	
Median:	6.3	6.0	6.1	6.2	6.2	6.2	6.1	

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	5	21	40	29	4	0	0	0	100
1996	0	1	16	30	36	16	1	0	0	0	100
1997	0	1	7	30	39	20	2	0	0	0	100
1998	0	0	9	19	44	21	6	0	0	0	100
1999	1	1	12	17	41	23	5	0	0	0	100
2000	1	1	5	23	42	23	4	0	0	0	100
2001	0	2	10	23	37	22	5	0	0	0	100
Total	0	1	9	24	40	22	4	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	6	1	3	0	1	0	1	0	4	16
1996	0	3	2	3	1	0	1	0	0	3	13
1997	0	1	1	4	0	1	0	0	0	0	7
1998	0	2	6	5	1	0	0	1	0	2	17
1999	0	1	4	4	1	0	0	0	0	1	11
2000	0	1	4	1	0	1	1	0	1	3	12
2001	0	1	0	2	1	1	0	0	1	4	10
Total	0	15	18	22	4	4	2	2	2	17	86

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	2	3	1	1	3	2	
Highest:	692	569	77	365	365	723	621	
Mean:	135	116	25	53	44	162	186	
Median:	10	26	16	9	9	49	116	

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	38	6	19	0	6	0	6	0	25	100
1996	0	23	15	23	8	0	8	0	0	23	100
1997	0	14	14	57	0	14	0	0	0	0	100
1998	0	12	35	29	6	0	0	6	0	12	100
1999	0	9	36	36	9	0	0	0	0	9	100
2000	0	8	33	8	0	8	8	0	8	25	100
2001	0	10	0	20	10	10	0	0	10	40	100
Total	0	17	21	26	5	5	2	2	2	20	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	36	32	51	5	2	3	1	1	0	131
1996	0	26	42	60	8	4	0	0	0	0	140
1997	0	44	68	142	42	10	1	3	1	0	311
1998	0	18	48	121	30	8	4	0	1	1	231
1999	0	43	36	54	6	4	3	1	0	0	147
2000	0	78	90	91	13	6	2	9	1	1	291
2001	0	88	98	221	26	8	4	2	1	0	448
Total	0	333	414	740	130	42	17	16	5	2	1699

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:	178	79	167	333	139	270	167	
Mean:	16	15	22	24	16	18	17	
Median:	8	9	14	15	8	7	10	

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	27	24	39	4	2	2	1	1	0	100
1996	0	19	30	43	6	3	0	0	0	0	100
1997	0	14	22	46	14	3	0	1	0	0	100
1998	0	8	21	52	13	3	2	0	0	0	100
1999	0	29	24	37	4	3	2	1	0	0	100
2000	0	27	31	31	4	2	1	3	0	0	100
2001	0	20	22	49	6	2	1	0	0	0	100
Total	0	20	24	44	8	2	1	1	0	0	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	1	1	3	1	1	7
1996	0	0	0	1	1	2
1997	0	0	0	0	0	0
1998	0	0	0	2	4	6
1999	0	0	1	0	1	2
2000	0	1	0	2	2	5
2001	0	0	0	2	1	3
Total (#)	1	2	4	8	10	25
Total (%)	4	8	16	32	40	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	1	1
1996	1	1	0	2	1	5
1997	1	0	0	0	4	5
1998	0	0	0	1	4	5
1999	0	0	1	0	1	2
2000	0	0	0	0	2	2
2001	0	0	0	2	0	2
Total (#)	2	1	1	5	13	22
Total (%)	9	5	5	23	59	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	1	1	1	1	4	8
1996	0	0	0	0	5	5
1997	0	0	0	1	0	1
1998	0	1	3	0	2	6
1999	1	0	0	2	3	6
2000	0	0	1	1	2	4
2001	0	0	0	0	2	2
Total (#)	2	2	5	5	18	32
Total (%)	6	6	16	16	56	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 home and garden samples within each potassium classification:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
1995	2	2	4	2	6	16
1996	1	1	0	3	8	13
1997	1	0	1	1	4	7
1998	0	1	3	3	10	17
1999	2	0	2	2	5	11
2000	0	1	1	3	7	12
2001	0	0	0	4	6	10
Total #	6	5	11	18	46	86

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	37	26	34	60	38	62	133	
Highest:	1553	4562	503	703	1153	1504	1209	
Mean:	350	887	265	281	340	425	456	
Median:	137	644	287	237	196	258	393	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	13	13	25	13	38	100
1996	8	8	0	23	62	100
1997	14	0	14	14	57	100
1998	0	6	18	18	59	100
1999	18	0	18	18	45	100
2000	0	8	8	25	58	100
2001	0	0	0	40	60	100
Grand Total	7	6	13	21	53	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	2	3	4	9
1996	0	2	7	3	3	15
1997	0	4	8	11	27	50
1998	0	1	4	5	22	32
1999	1	1	0	4	10	16
2000	1	6	4	4	5	20
2001	0	5	8	15	25	53
Total (#)	2	19	33	45	96	195
Total (%)	1	10	17	23	49	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	6	22	28	61	117
1996	2	8	14	32	68	124
1997	0	19	38	71	126	254
1998	2	7	13	39	130	191
1999	2	12	25	27	56	122
2000	2	35	42	81	102	262
2001	12	46	77	94	156	385
Total (#)	20	133	231	372	699	1455
Total (%)	1	9	16	26	48	100

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoie (2004). Chenango County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-8. 37 pages.

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	2	3
1996	0	0	0	1	0	1
1997	0	1	2	4	0	7
1998	0	0	0	0	2	2
1999	0	0	0	1	2	3
2000	1	1	0	1	0	3
2001	0	1	1	3	1	6
Total (#)	1	4	3	10	7	25
Total (%)	4	16	12	40	28	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	7	24	31	67	2	131
1996	2	10	21	36	71	0	140
1997	0	24	48	86	153	0	311
1998	2	8	17	44	154	6	231
1999	3	13	25	32	68	6	147
2000	4	42	46	86	107	6	291
2001	12	52	86	112	182	4	448
Grand Total	23	156	267	427	802	24	1699

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	53	39	53	33	19	33	19	
Highest:	1488	834	1472	1041	1311	2237	2743	
Mean:	268	226	243	304	251	230	228	
Median:	203	199	193	240	192	165	158	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	5	18	24	51	2	100
1996	1	7	15	26	51	0	100
1997	0	8	15	28	49	0	100
1998	1	3	7	19	67	3	100
1999	2	9	17	22	46	4	100
2000	1	14	16	30	37	2	100
2001	3	12	19	25	41	1	100
Grand Total	1	9	16	25	47	1	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	1	2	13	16
1996	0	0	1	1	11	13
1997	0	0	0	1	6	7
1998	0	0	0	6	11	17
1999	0	0	2	4	5	11
2000	0	0	0	2	10	12
2001	0	0	0	3	7	10
Total	0	0	4	19	63	86

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	78	73	129	103	86	118	120	
Highest:	1364	3747	534	713	557	1315	1004	
Mean:	388	768	286	311	241	581	419	
Median:	264	473	254	223	199	459	370	

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	6	13	81	100
1996	0	0	8	8	85	100
1997	0	0	0	14	86	100
1998	0	0	0	35	65	100
1999	0	0	18	36	45	100
2000	0	0	0	17	83	100
2001	0	0	0	30	70	100
Total	0	0	5	22	73	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	3	2	44	82	131
1996	0	4	5	46	85	140
1997	0	2	11	71	227	311
1998	0	3	10	56	162	231
1999	0	5	8	41	93	147
2000	0	1	7	73	210	291
2001	0	8	22	109	309	448
Total	0	26	65	440	1168	1699

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	36	38	56	33	47	26	29	
Highest:	2298	975	1877	936	692	1068	988	
Mean:	264	250	316	311	274	312	285	
Median:	233	229	288	285	252	288	261	

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	2	2	34	63	100
1996	0	3	4	33	61	100
1997	0	1	4	23	73	100
1998	0	1	4	24	70	100
1999	0	3	5	28	63	100
2000	0	0	2	25	72	100
2001	0	2	5	24	69	100
Total	0	2	4	26	69	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	16	0	16
1996	12	1	13
1997	5	2	7
1998	14	3	17
1999	9	2	11
2000	11	1	12
2001	9	1	10
Total	76	10	86

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	92	8	100
	71	29	100
	82	18	100
	82	18	100
	92	8	100
	90	10	100
	88	12	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	2	4	1	4	3	1	
Highest:	26	61	372	163	532	56	211	
Mean:	9	11	94	32	80	15	28	
Median:	7	6	15	13	13	10	4	

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	129	2	131
1996	134	6	140
1997	296	15	311
1998	218	13	231
1999	133	14	147
2000	273	18	291
2001	436	12	448
Total	1619	80	1699

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	98	2	100
	96	4	100
	95	5	100
	94	6	100
	90	10	100
	94	6	100
	97	3	100
	95	5	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	2	2	2	1	1	1	
Highest:	65	326	254	151	190	382	714	
Mean:	14	19	15	15	20	17	13	
Median:	10	11	8	8	10	9	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:				Percentages:		
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
1995	16	0	16	100	0	100
1996	11	2	13	85	15	100
1997	6	1	7	86	14	100
1998	15	2	17	88	12	100
1999	11	0	11	100	0	100
2000	12	0	12	100	0	100
2001	9	1	10	90	10	100
Total	80	6	86	93	7	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	14	20	20	20	13	18	20	
Highest:	97	215	127	120	48	94	127	
Mean:	48	63	67	50	33	48	53	
Median:	43	47	60	41	39	45	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	128	3	131
1996	137	3	140
1997	303	8	311
1998	222	9	231
1999	145	2	147
2000	281	10	291
2001	443	5	448
Total	1659	40	1699

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	98	2	100
	98	2	100
	97	3	100
	96	4	100
	99	1	100
	97	3	100
	99	1	100
	98	2	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6	10	8	8	8	7	7	
Highest:	119	129	155	254	427	305	291	
Mean:	33	36	39	44	37	34	35	
Median:	28	33	34	34	30	26	29	

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:					Percentages:				
	<0.5	0.5-1.0	>1	Total	<0.5	0.5-1.0	>1	Total	
	Low	Medium	High		Low	Medium	High		
1995	4	2	10	16	25	13	63	100	
1996	0	3	10	13	0	23	77	100	
1997	0	1	6	7	0	14	86	100	
1998	0	1	16	17	0	6	94	100	
1999	0	0	10	11	0	0	100	100	
2000	0	0	12	12	0	0	100	100	
2001	0	0	10	10	0	0	100	100	
Total	4	7	74	86	5	8	87	100	

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.2	0.8	0.9	0.7	0.8	1.5	1.5	
Highest:	265.7	108.6	18.8	46.8	65.3	48.0	29.8	
Mean:	21.4	17.0	7.3	12.3	8.4	9.9	11.2	
Median:	2.0	10.3	7.4	6.6	2.4	5.5	9.1	

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	43	83	131
1996	2	38	100	140
1997	0	55	256	311
1998	13	51	167	231
1999	4	28	115	147
2000	22	78	191	291
2001	8	106	334	448
Total	54	399	1246	1699

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
4	33	63	100
1	27	71	100
0	18	82	100
6	22	72	100
3	19	78	100
8	27	66	100
2	24	75	100
3	23	73	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.4	0.5	0.1	0.1	0.1	0.1	
Highest:	12.4	72.3	24.6	14.5	31.1	103.1	41.7	
Mean:	1.9	2.7	2.2	2.2	3.2	2.5	2.2	
Median:	1.3	1.5	1.8	1.7	2.0	1.4	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
CEM	Cemetery
EGG	Eggplants
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GRA	Grapes
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
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
SQS	Squash, Summer
SQW	Squash, Winter
STE	Strawberries, Ever

Crop Code	Crop Description
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TME	Tomatoes, Early
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing