

# Soil Sample Survey

# Schenectady Co.

Samples analyzed by CNAL in 1995-2001

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Summary compiled by

Quirine M. Ketterings, Hettie Krol, W. Shaw Reid and Chris A. Logue

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

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# 1. County Introduction

Schenectady County is the second smallest of the upstate counties covering approximately 208 square miles in east central New York and lies at the east end of the Mohawk Valley just west of the confluence of the Mohawk and Hudson Rivers in Cohoes, Albany County. Schenectady County is considered an urban county with the majority of the population concentrated in the eastern half of the county in the townships of Niskayuna, Glenville, Rotterdam and the City of Schenectady. The western portion of the county comprised of Duanesburg, Delanson and Princetown is rural in nature.

Land close to the Mohawk River is flat while the areas away from the river tend to be rolling in nature. The maximum elevation in the county is 1,426 feet. The most productive soils from an agricultural standpoint lie along the Mohawk River in the northeast portion of the county and the Schoharie Creek in the western portion of the county.

The Great Flats Aquifer, a major source of drinking water is located in the county making agricultural and other practices that can maintain and protect water resources an important focus.

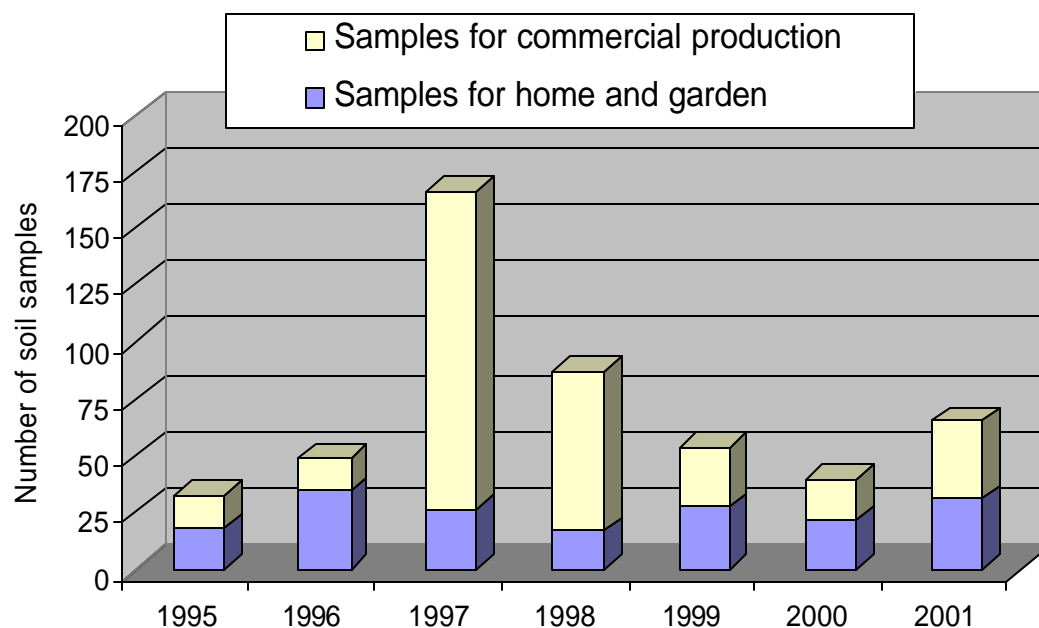
The greenhouse and nursery industry is the most significant aspect of agriculture in the county in terms of sales. Currently there are eight dairy farms in operation in the county; a decrease of 58% since 1982. All of the dairy farms are concentrated in the rural areas in the western portion of the county. Other aspects of agricultural production also contribute significantly to the economy of the county and the maintenance of open space including hay and field crop production, fresh fruits and vegetables and livestock other than dairy.

Approximately 15,095 acres of land are in agricultural production encompassing a total of 157 farms. These operations help to preserve open space and a rural feeling in the county. Development pressure is increasing in most parts of the county and preservation of farm and forest land is an important issue for agricultural producers as well as the general public.

Christopher A. Logue  
Schenectady County Extension Team Coordinator

## 2. General Survey Summary

This survey summarizes the soil test results from Schenectady 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 494. Of these 494 samples, 316 (64%) were submitted to obtain fertilizer recommendations for commercial production while 178 samples (36%) were submitted as home and garden samples.



<b>Homeowners</b>		<b>Commercial</b>		<b>Total</b>
1995	18	1995	15	33
1996	35	1996	14	49
1997	27	1997	139	166
1998	17	1998	70	87
1999	28	1999	26	54
2000	22	2000	18	40
<u>2001</u>	<u>31</u>	<u>2001</u>	<u>34</u>	<u>65</u>
<b>Total</b>	<b>178</b>	<b>Total</b>	<b>316</b>	<b>494</b>

Forty-seven percent of the home and garden samples were submitted to request fertilizer recommendations for lawns while another 20% came from mixed vegetable gardens. Other samples were sent in to request recommendations for azaleas, athletic fields, cemeteries, fairways, flowering annuals, greens, perennials, roses, raspberries, ornamentals adapted to pH 6.0 to 7.5, and tree fruits. People submitting samples for commercial production requested fertilizer recommendations for alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (35%), corn silage or grain production (28%), hay production (20%), pasture (6%), while the remainder of the samples was sent to the laboratory to request recommendations for other crops including apples and sweet corn.

Home and garden samples in Tompkins County were silty (16%), silt loams (18%), sandy loams (26%), or sandy (40%), belonging to soil management groups 2, 3, 4, and 5, respectively. The table below gives descriptions of each of the soil management groups.

Soil Management Groups for New York

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

Of the samples submitted for commercial production, 82% belonged to soil management group 2, 8% were organic soils belonging to management group 3, 2% were from group 4

while the remainder was of unknown classification. The five most common soil series were Burdett (44%), Lansing (14%), Honeoye (12%), Nunda (4%), and Colonie (3%).

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to 42% in one of the organic soils with median values ranging from 2.1 to 3.8% organic matter for home and garden samples and from 3.0 to 5.5% for samples submitted for commercial production. Forty-nine percent of the home and garden samples had between 2.0 and 4.9% organic matter with 22% testing between 2.0 and 2.9% organic matter, 16% between 3.0 and 3.9% organic matter and 11% between 4.0 and 4.9% organic matter. Twenty-three percent of the soils submitted for home and garden tested >4.9% in organic matter while 28% of the samples had less than 2.0% organic matter. Of the samples submitted for commercial production, 29% contained between 3.0 and 3.9% organic matter, 34% tested between 4.0 and 4.9% while 17% had organic matter concentrations of 5.0-5.9%. Fourteen percent had less than 3.0% organic matter while 40% of the samples had 6.0% or more organic matter.

Soil pH in water (1:1 extraction ratio) varied from pH 4.7 to pH 8.8 with the median for home and garden samples ranging from pH 6.5 to pH 7.1 and for samples submitted for commercial production ranging from pH 5.9 to pH 6.5. Of the home and garden samples, 71% tested between pH 6.0 and 7.4. For the samples submitted for commercial production, this was 75% while 22% 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, 11% tested low, 14% tested medium, 40% tested high and 35% tested very high. This meant that 75% tested high or very high in P. Of the samples submitted for commercial production, 40% tested low in P. Twenty-eight percent were medium in P, 27% tested high while almost 4% of the samples were very high in P. In total, 32% of the samples tested high or very high in P. There were no clear trends over the 7 years.

Classifications for potassium depend on soil management group. The fine-textured soils of soil management group 1 have a greater K supplying capacity than the coarse textured sandy soils (soil management group 5). Classification for each of the management groups in the above table represent very low, low, medium, high and very high. So for example for soil management group 5 and 6, <60 lbs K/acre means the soil is very low in K, between 60 and 114 lbs K/acre is low, 115-164 lbs K/acre is medium, 165-269 lbs K/acre is high and >269 lbs K/acre is classified as very high (see the table below).

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

Soil Management Group	Potassium Soil Test Value (Morgan extraction in lbs K/acre)				
	Very low	Low	Medium	High	Very High
1	<35	35-64	65-94	95-149	>149
2	<40	40-69	70-99	100-164	>164
3	<45	45-79	80-119	120-199	>199
4	<55	55-99	100-149	150-239	>239
5 and 6	<60	60-114	115-164	165-269	>269

Of the home and garden samples, 6% were classified as very low, 17% were low in potassium, 24% tested medium, another 14% were high and 38% were very high in potassium. For samples submitted for commercial production, 1% tested very low, 17% were low, 23% tested medium, 29% tested high and 26% tested very high in potassium while the remainder was of unknown K classification. As with phosphorus, there were no trends over the 7 years of soil sampling.

Soils test very low for magnesium if Morgan extractable Mg is less than 20 lbs Mg/acre. Low testing soils have 20-65 lbs Morgan Mg per acre. Soils with 66-100 lbs Mg/acre test medium for magnesium. High testing soils have 101-199 lbs Mg/acre while soils with more than 200 lbs Mg/acre in the Morgan extraction are classified as very high in Mg. Magnesium levels ranged from 384 to 7120 lbs Mg/acre (Morgan extraction). There were only 6 samples in the combined datasets that tested very low or low in Mg. Most soils



tested high or very high for Mg (93% of the homeowner soils and 96% of the soils of the commercial growers).

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. Ninety-eight percent of the home and garden samples were classified as normal in Fe while 96% of the commercial samples tested in the normal range for Fe. Similarly, almost all soils (98% of the home and garden samples and 99% of the commercial samples) tested normal for manganese. Anything less than 100 lbs Mn per acre is classified as normal. Soils with more than 100 lbs Morgan extractable Mn per acre are classified as excessive in Mn. 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, less than 2% tested low for zinc while 20% tested medium and almost 79% tested high for zinc. Of the samples for commercial production, 14% tested low in zinc, 49% tested medium while 36% 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.

### 3. Cropping Systems

#### 3.1 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	1	1	1	3	2
ATF	0	0	4	0	0	0	1	5	3
CEM	0	0	0	0	2	0	0	2	1
FAR	0	2	0	0	0	0	0	2	1
FLA	0	0	1	1	1	0	0	3	2
GEN	2	0	0	0	0	0	0	2	1
IDL	0	1	0	1	0	0	0	2	1
LAW	7	11	13	7	11	12	22	83	47
MVG	7	5	5	4	8	4	2	35	20
OTH	0	0	0	0	4	0	0	4	2
PER	1	2	2	2	1	5	3	16	9
ROS	0	13	1	0	0	0	0	14	8
ROU	1	0	0	0	0	0	0	1	1
RSP	0	0	1	0	0	0	0	1	1
SAG	0	0	0	2	0	0	1	3	2
TRF	0	1	0	0	0	0	1	2	1
Total	18	35	27	17	28	22	31	178	100

Notes:

See Appendix for Cornell crop codes.

### 3.2 Samples for Commercial Production

Crops for which recommendations are requested for commercial production:

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
ABE/ABT	0	0	0	1	0	0	0	1	0
AGE/AGT	9	6	47	25	9	4	7	107	34
ALE/ALT	0	0	0	2	0	0	0	2	1
APP	0	4	0	0	0	0	0	4	1
BCE/BCT	1	0	0	0	0	0	0	1	0
BGE/BGT	0	2	0	0	6	1	0	9	3
BLB	0	0	0	1	0	0	0	1	0
COG/COS	0	1	40	23	8	6	11	89	28
GIE/GIT	0	0	0	0	0	1	2	3	1
GRE/GRT	1	0	49	8	3	0	0	61	19
MIX	2	0	1	0	0	0	1	4	1
OTH	1	0	0	0	0	0	0	1	0
PGE/PGT	0	0	1	4	0	0	0	5	2
PNE/PNT	0	0	0	3	0	0	10	13	4
PUM	0	0	0	1	0	0	0	1	0
SWC	0	0	0	2	0	5	3	10	3
TME	0	1	0	0	0	0	0	1	0
TOM	1	0	0	0	0	0	0	1	0
Unknown	0	0	1	0	0	1	0	2	1
Total	15	14	139	70	26	18	34	316	100

Notes:

See Appendix for Cornell crop codes.

## 4. Soil Types

### 4.1 Samples for Home and Garden

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

	1995	1996	1997	1998	1999	2000	2001	Total	%
SMG 1 (clayey)	0	0	0	0	0	0	0	0	0
SMG 2 (silty)	1	7	4	5	5	5	2	29	16
SMG 3 (silt loam)	7	5	4	1	8	3	4	32	18
SMG 4 (sandy loam)	3	6	11	5	5	6	10	46	26
SMG 5 (sandy)	7	17	8	6	10	8	15	71	40
SMG 6 (mucky)	0	0	0	0	0	0	0	0	0
Total	18	35	27	17	28	22	31	178	100

## 4.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total	%
Arnot	3	1	0	0	0	2	0	0	3	1
Brockport	1	1	0	0	0	0	0	0	1	0
Burdett	2	8	5	91	27	4	1	3	139	44
Colonie	5	1	0	1	0	0	4	4	10	3
Darien	2	0	0	0	2	1	1	0	4	1
Elnora	5	0	1	0	0	0	0	0	1	0
Farmington	3	0	0	0	0	0	0	2	2	1
Fredon	4	0	0	1	1	0	0	0	2	1
Hamlin	2	0	0	1	0	0	0	0	1	0
Honeoye	2	0	2	12	6	10	5	4	39	12
Hornell	2	1	1	3	0	0	0	0	5	2
Howard	3	0	0	0	1	0	1	3	5	2
Ilion	2	0	0	5	0	0	0	0	5	2
Lansing	2	0	1	10	8	8	5	12	44	14
Madalin	1	0	0	1	0	0	0	0	1	0
Manlius	3	0	0	0	0	1	0	0	1	0
Mardin	3	0	0	0	1	0	0	0	1	0
Mohawk	2	0	0	0	4	0	0	0	4	1
Nunda	2	0	0	1	8	0	0	5	14	4
Odessa	2	0	0	5	0	0	0	0	5	2
Otisville	4	0	0	0	0	0	1	0	1	0
Palatine	2	0	0	0	2	0	0	0	2	1
Phelps	3	1	0	1	0	0	0	0	2	1
Scio	3	0	0	2	0	0	0	0	2	1
Tuller	3	0	0	1	0	0	0	0	1	0
Unadilla	3	0	0	2	3	0	0	0	5	2
Wassaic	4	0	0	0	2	0	0	1	3	1
Wayland	2	1	0	0	0	0	0	0	1	0
Unknown	-	2	3	2	5	0	0	0	12	4
Total	-	15	14	139	70	26	18	34	316	100

## 5. Organic Matter

### 5.1 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	1	2	6	5	1	1	2	0	18
1996	0	7	12	9	4	2	1	0	35
1997	4	9	4	2	0	4	1	3	27
1998	3	2	1	3	3	2	2	1	17
1999	5	6	6	1	4	4	0	2	28
2000	3	2	3	6	2	1	3	2	22
2001	3	3	7	3	5	1	4	5	31
Total	19	31	39	29	19	15	13	13	178

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.4	1.1	0.4	0.2	0.3	0.3	0.4	
Highest:	6.8	6.5	42.2	11.0	13.3	10.6	17.1	
Mean:	3.3	3.0	5.1	3.9	3.2	3.9	4.6	
Median:	3.0	2.9	2.1	3.7	2.4	3.3	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	6	11	33	28	6	6	11	0	100
1996	0	20	34	26	11	6	3	0	100
1997	15	33	15	7	0	15	4	11	100
1998	18	12	6	18	18	12	12	6	100
1999	18	21	21	4	14	14	0	7	100
2000	14	9	14	27	9	5	14	9	100
2001	10	10	23	10	16	3	13	16	100
Total	11	17	22	16	11	8	7	7	100

## 5.2 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	0	3	8	2	0	1	15
1996	0	1	0	0	4	7	1	1	14
1997	0	2	5	31	69	25	7	0	139
1998	1	2	11	24	20	8	2	2	70
1999	0	0	1	16	5	4	0	0	26
2000	0	5	4	8	0	0	0	1	18
2001	0	4	6	10	3	7	2	2	34
Total	1	15	27	92	109	53	12	7	316

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.8	1.8	1.7	0.3	2.8	1.4	1.1	
Highest:	13.1	10.1	6.9	7.8	5.8	7.3	8.0	
Mean:	4.9	5.4	4.4	3.9	3.9	3.0	3.9	
Median:	4.5	5.5	4.3	3.9	3.7	3.0	3.6	

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	7	0	20	53	13	0	7	100
1996	0	7	0	0	29	50	7	7	100
1997	0	1	4	22	50	18	5	0	100
1998	1	3	16	34	29	11	3	3	100
1999	0	0	4	62	19	15	0	0	100
2000	0	28	22	44	0	0	0	6	100
2001	0	12	18	29	9	21	6	6	100
Total	0	5	9	29	34	17	4	2	100

## 6. pH

### 6.1 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	3	4	3	6	0	1	1	18
1996	0	0	1	1	6	7	17	3	0	0	35
1997	0	0	2	1	4	9	6	1	3	1	27
1998	0	2	1	3	2	5	4	0	0	0	17
1999	0	0	2	2	3	5	11	5	0	0	28
2000	0	0	0	1	1	9	7	2	2	0	22
2001	0	1	0	5	4	6	8	6	1	0	31
Total	0	3	6	16	24	44	59	17	7	2	178

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.6	5.3	5.0	4.8	5.1	5.9	4.9	
Highest:	8.8	7.8	8.7	7.4	7.7	8.1	8.1	
Mean:	-	-	-	-	-	-	-	
Median:	6.9	7.0	6.9	6.5	7.1	6.9	6.8	

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	17	22	17	33	0	6	6	100
1996	0	0	3	3	17	20	49	9	0	0	100
1997	0	0	7	4	15	33	22	4	11	4	100
1998	0	12	6	18	12	29	24	0	0	0	100
1999	0	0	7	7	11	18	39	18	0	0	100
2000	0	0	0	5	5	41	32	9	9	0	100
2001	0	3	0	16	13	19	26	19	3	0	100
Total	0	2	3	9	13	25	33	10	4	1	100



## 6.2 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	0	2	2	3	7	0	0	0	15
1996	0	3	2	5	1	3	0	0	0	0	14
1997	0	0	5	27	43	56	8	0	0	0	139
1998	0	0	2	6	24	34	1	2	1	0	70
1999	0	0	4	5	9	6	1	1	0	0	26
2000	0	0	2	2	5	8	1	0	0	0	18
2001	0	1	2	5	9	16	1	0	0	0	34
Total	0	5	17	52	93	126	19	3	1	0	316

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.7	4.7	5.0	5.1	5.1	5.2	4.9	
Highest:	7.2	6.8	7.3	8.0	7.7	7.0	7.0	
Mean:	-	-	-	-	-	-	-	
Median:	6.5	5.9	6.4	6.5	6.2	6.5	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	7	0	13	13	20	47	0	0	0	100
1996	0	21	14	36	7	21	0	0	0	0	100
1997	0	0	4	19	31	40	6	0	0	0	100
1998	0	0	3	9	34	49	1	3	1	0	100
1999	0	0	15	19	35	23	4	4	0	0	100
2000	0	0	11	11	28	44	6	0	0	0	100
2001	0	3	6	15	26	47	3	0	0	0	100
Total	0	2	5	16	29	40	6	1	0	0	100

## 7. Phosphorus

### 7.1 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	1	7	1	1	2	1	1	0	18
1996	0	2	5	10	5	3	2	0	5	3	35
1997	0	4	5	13	1	1	0	1	0	2	27
1998	0	3	0	9	2	0	1	0	1	1	17
1999	0	0	5	9	5	4	2	1	1	1	28
2000	0	0	5	8	0	2	2	2	1	2	22
2001	0	6	4	16	0	1	0	1	0	3	31
Total	0	19	25	72	14	12	9	6	9	12	178

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	2	1	2	4	5	1	
Highest:	159	306	1873	211	454	532	314	
Mean:	39	76	137	47	60	81	44	
Median:	19	40	22	25	39	33	18	

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	22	6	39	6	6	11	6	6	0	100
1996	0	6	14	29	14	9	6	0	14	9	100
1997	0	15	19	48	4	4	0	4	0	7	100
1998	0	18	0	53	12	0	6	0	6	6	100
1999	0	0	18	32	18	14	7	4	4	4	100
2000	0	0	23	36	0	9	9	9	5	9	100
2001	0	19	13	52	0	3	0	3	0	10	100
Total	0	11	14	40	8	7	5	3	5	7	100

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

## 7.2 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	6	0	8	0	0	1	0	0	0	15
1996	0	10	0	3	1	0	0	0	0	0	14
1997	0	71	38	24	5	0	1	0	0	0	139
1998	0	21	20	23	1	2	1	1	0	1	70
1999	0	9	12	5	0	0	0	0	0	0	26
2000	0	2	6	10	0	0	0	0	0	0	18
2001	0	7	14	13	0	0	0	0	0	0	34
Total	0	126	90	86	7	2	3	1	0	1	316

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:	92	60	85	230	35	36	37	
Mean:	18	10	8	18	7	15	10	
Median:	17	1	3	6	5	10	6	

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	0	53	0	0	7	0	0	0	100
1996	0	71	0	21	7	0	0	0	0	0	100
1997	0	51	27	17	4	0	1	0	0	0	100
1998	0	30	29	33	1	3	1	1	0	1	100
1999	0	35	46	19	0	0	0	0	0	0	100
2000	0	11	33	56	0	0	0	0	0	0	100
2001	0	21	41	38	0	0	0	0	0	0	100
Total	0	40	28	27	2	1	1	0	0	0	100

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

## 8. Potassium

### 8.1 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	0	0	1
1996	0	0	1	1	5	7
1997	0	0	2	2	0	4
1998	0	0	0	1	4	5
1999	0	1	0	0	4	5
2000	0	0	2	0	3	5
2001	0	1	0	0	1	2
Total (#)	0	2	6	4	17	29
Total (%)	0	7	21	14	59	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	3	3	7
1996	0	0	1	1	3	5
1997	0	2	2	0	0	4
1998	1	0	0	0	0	1
1999	0	2	2	3	1	8
2000	1	1	1	0	0	3
2001	0	1	3	0	0	4
Total (#)	2	6	10	7	7	32
Total (%)	6	19	31	22	22	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	0	1	3
1996	1	0	1	1	3	6
1997	1	2	5	0	3	11
1998	0	0	0	0	5	5
1999	0	2	2	0	1	5
2000	0	0	1	2	3	6
2001	1	0	3	2	4	10
Total (#)	3	5	13	5	20	46
Total (%)	7	11	28	11	43	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	3	0	0	4	7
1996	2	2	3	2	8	17
1997	1	3	2	2	0	8
1998	1	2	3	0	0	6
1999	0	3	0	1	6	10
2000	1	2	0	1	4	8
2001	1	3	6	3	2	15
Total (#)	6	18	14	9	24	71
Total (%)	8	25	20	13	34	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	4	3	3	8	18
1996	3	2	6	5	19	35
1997	2	7	11	4	3	27
1998	2	2	3	1	9	17
1999	0	8	4	4	12	28
2000	2	3	4	3	10	22
2001	2	5	12	5	7	31
Total #	11	31	43	25	68	178

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	66	37	38	16	51	18	43	
Highest:	556	625	19059	779	2376	1341	1744	
Mean:	210	263	1517	224	290	261	238	
Median:	147	273	108	189	157	170	144	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	0	22	17	17	44	100
1996	9	6	17	14	54	100
1997	7	26	41	15	11	100
1998	12	12	18	6	53	100
1999	0	29	14	14	43	100
2000	9	14	18	14	45	100
2001	6	16	39	16	23	100
Grand Total	6	17	24	14	38	100

## 8.2 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	1	1
1996	0	0	0	0	0	0
1997	0	0	0	1	0	1
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	1	1	2
Total (%)	0	0	0	50	50	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	1	0	9	10
1996	0	0	3	6	0	9
1997	3	35	27	37	26	128
1998	0	9	13	16	19	57
1999	0	1	8	8	6	23
2000	0	2	5	3	2	12
2001	0	4	8	6	6	24
Total (#)	3	51	65	76	68	263
Total (%)	1	19	25	29	26	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	0	0	0	1
1996	0	0	0	0	1	1
1997	0	0	0	4	2	6
1998	0	0	1	0	4	5
1999	0	0	1	2	0	3
2000	0	0	0	0	1	1
2001	0	0	2	3	0	5
Total (#)	0	1	4	9	8	22
Total (%)	0	5	18	41	36	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	1	0	1
1998	0	1	2	0	0	3
1999	0	0	0	0	0	0
2000	0	0	1	0	0	1
2001	0	0	0	0	1	1
Total (#)	0	1	3	1	1	6
Total (%)	0	17	50	17	17	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	1	1
1996	0	0	0	0	1	1
1997	0	0	0	0	1	1
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	1	2	1	4
2001	0	0	1	3	0	4
Total (#)	0	0	2	5	4	11
Total (%)	0	0	18	45	36	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-



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

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	1	1	0	11	2	15
1996	0	0	3	6	2	3	14
1997	3	35	27	43	29	2	139
1998	0	10	16	16	23	5	70
1999	0	1	9	10	6	0	26
2000	0	2	7	5	4	0	18
2001	0	4	11	12	7	0	34
Grand Total	3	53	74	92	82	12	316

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	77	54	38	52	66	43	45	
Highest:	475	630	889	1089	853	319	598	
Mean:	291	167	138	176	159	138	149	
Median:	366	128	101	121	116	119	131	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	7	7	0	73	13	100
1996	0	0	21	43	14	21	100
1997	2	25	19	31	21	1	100
1998	0	14	23	23	33	7	100
1999	0	4	35	38	23	0	100
2000	0	11	39	28	22	0	100
2001	0	12	32	35	21	0	100
Grand Total	1	17	23	29	26	4	100

## 9. Magnesium

### 9.1 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	15	18
1996	0	0	0	5	30	35
1997	0	1	0	6	20	27
1998	0	1	2	2	12	17
1999	0	1	3	3	21	28
2000	0	1	1	4	16	22
2001	0	1	0	6	24	31
Total	0	5	7	28	138	178

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	67	109	41	55	56	61	58	
Highest:	478	730	7120	1165	1908	1043	1539	
Mean:	279	399	695	375	449	407	404	
Median:	249	401	269	373	258	366	320	

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	11	83	100
1996	0	0	0	14	86	100
1997	0	4	0	22	74	100
1998	0	6	12	12	71	100
1999	0	4	11	11	75	100
2000	0	5	5	18	73	100
2001	0	3	0	19	77	100
Total	0	3	4	16	78	100

## 9.2 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	2	13	15
1996	0	1	1	5	7	14
1997	0	0	2	22	115	139
1998	0	0	2	11	57	70
1999	0	0	4	9	13	26
2000	0	0	3	10	5	18
2001	0	0	1	14	19	34
Total	0	1	13	73	229	316

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	170	36	88	87	75	81	90	
Highest:	471	894	842	807	596	384	777	
Mean:	367	391	406	409	235	170	272	
Median:	398	230	426	429	200	141	242	

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	7	7	36	50	100
1997	0	0	1	16	83	100
1998	0	0	3	16	81	100
1999	0	0	15	35	50	100
2000	0	0	17	56	28	100
2001	0	0	3	40	56	100
Total	0	0	4	23	72	100

## 10. Iron

### 10.1 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	18	0	18
1996	34	1	35
1997	26	1	27
1998	15	2	17
1999	28	0	28
2000	22	0	22
2001	31	0	31
Total	174	4	178

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	97	3	100
	96	4	100
	88	12	100
	100	0	100
	100	0	100
	100	0	100
	98	2	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	2	2	1	1	
Highest:	26	54	63	105	46	40	22	
Mean:	8	14	15	16	8	9	7	
Median:	4	10	11	9	4	6	6	

## 10.2 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	13	2	15
1996	9	5	14
1997	137	2	139
1998	68	2	70
1999	25	1	26
2000	18	0	18
2001	34	0	34
Total	304	12	316

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	87	13	100
	64	36	100
	99	1	100
	97	3	100
	96	4	100
	100	0	100
	100	0	100
	96	4	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	3	2	1	1	1	1	2	
Highest:	247	113	54	113	71	28	39	
Mean:	30	46	9	9	12	5	8	
Median:	9	31	5	4	9	3	5	

## 11. Manganese

### 11.1 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	18	0	18	100	0	100
1996	33	2	35	94	6	100
1997	27	0	27	100	0	100
1998	16	1	17	94	6	100
1999	28	0	28	100	0	100
2000	22	0	22	100	0	100
2001	31	0	31	100	0	100
Total	175	3	178	98	2	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	11	10	9	11	10	7	9	
Highest:	83	221	89	145	99	60	79	
Mean:	27	43	35	38	31	27	33	
Median:	21	32	28	29	26	24	29	

## 11.2 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	14	1	15
1996	13	1	14
1997	139	0	139
1998	68	2	70
1999	26	0	26
2000	18	0	18
2001	34	0	34
Total	312	4	316

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	93	7	100
	93	7	100
	100	0	100
	97	3	100
	100	0	100
	100	0	100
	100	0	100
	99	1	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	8	7	6	5	12	5	4	
Highest:	225	241	62	135	81	35	64	
Mean:	29	36	20	24	25	16	23	
Median:	13	10	17	19	22	16	23	

## 12. Zinc

### 12.1 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	0	5	13	18	0	28	72	100	
1996	0	5	30	35	0	14	86	100	
1997	0	6	21	27	0	22	78	100	
1998	0	2	15	17	0	12	88	100	
1999	0	3	25	28	0	11	89	100	
2000	1	3	18	22	5	14	82	100	
2001	2	11	18	31	6	35	58	100	
Total	3	35	140	178	2	20	79	100	

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.6	0.5	0.6	0.8	0.6	0.4	0.3	
Highest:	37.1	62.2	88.2	64.3	197.0	81.8	27.4	
Mean:	11.4	4.6	8.3	8.4	13.7	13.8	5.4	
Median:	4.3	2.6	1.8	3.5	3.4	8.0	2.2	



## 12.2 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	2	12	15
1996	0	6	8	14
1997	10	84	45	139
1998	16	30	24	70
1999	5	18	3	26
2000	8	2	8	18
2001	5	14	15	34
Total	45	156	115	316

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
7	13	80	100
0	43	57	100
7	60	32	100
23	43	34	100
19	69	12	100
44	11	44	100
15	41	44	100
14	49	36	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.2	0.7	0.3	0.1	0.2	0.1	0.1	
Highest:	7.3	6.0	9.3	8.5	1.6	2.5	3.8	
Mean:	2.8	2.2	1.1	1.2	0.7	0.9	1.1	
Median:	2.9	1.6	0.8	0.9	0.6	0.8	0.8	

## 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
	<b>Corn</b>
COG	Corn grain
COS	Corn silage
	<b>Grasses, pastures, covercrops</b>
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
	<b>Small grains</b>
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
	<b>Others</b>
ALG	Azalea
APP	Apples
APR	Apricots

Crop Code	Crop Description
ASP	Asparagus
ATF	Athletic Field
BDR/BND	Beans-dry
BLU/BLB	Blueberries
CEM	Cemetery
EGG	Eggplants
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GPA	Grapes, American
GPF	Grapes, French-American
GPV	Grapes, Vinifera
GEN	Green
GRA	Grapes
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
NUR	Nursery
ONS	Onion-seeded
OTH	Other
PAR	Pears
PCH	Peaches
PEA	Peas
PEP	Peppers
PER	Perennials
POP	Popcorn
PRK	Park
POT/PTO	Potatoes
PUM	Pumpkins
ROD	Roadside
ROS	Roses
ROU	Rough
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5

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