

# Soil Sample Survey

# Seneca Co.

Samples analyzed by CNAL in 1995-2001

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Picture by Mike Dennis.

Corn harvest in Seneca County.

Summary compiled by

Quirine M. Ketterings, Hettie Krol, W. Shaw Reid and Mike Dennis

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

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Ketterings, Q.M., H. Krol, W.S. Reid and M. Dennis (2004). Seneca County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-4. 38 pages.

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**Quirine Ketterings and Hettie Krol**

Nutrient Management Spear Program

Department of Crop and Soil Sciences

817 Bradfield Hall, Cornell University

Ithaca NY 14853

**W. Shaw Reid**

Professor Emeritus

Department of Crop and Soil Sciences

**Mike Dennis**

Field Crops Educator

Cornell Cooperative Extension of Seneca County

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# 1. General Survey Summary

Seneca County lies in the heart of the New York Finger Lakes region. Specifically, the county lies between the two largest lakes: Lake Seneca and Lake Cayuga. The county is 35 miles north to south and approximately 8-10 miles east to west (about 330 square miles). The geography of the county lends itself well to production agriculture with 66% of the land area used as farmland.

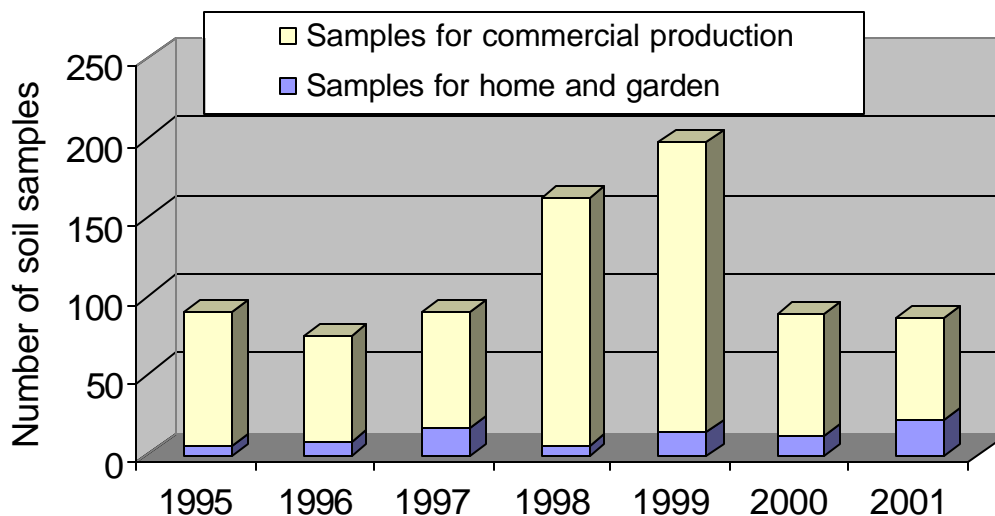
Several soil associations describe the soil characteristics within the county. These associations are categorized as high lime soils, medium lime soils, and low lime soils. Soils were developed in glacial till and glacial lake sediments. A portion of the county is classified as a marsh association containing muck and peat. This area is known as the Montezuma National Wildlife Refuge.

Production agriculture in the county is quite diverse. The primary farming enterprise is row crop and hay production. Dairy, beef, and hog enterprises exist throughout the county and there are numerous “non-conventional” farms including pastured livestock operations, certified organic crop and dairy farms, and small vegetable farms. Within the county there are three Mennonite and two Amish farm communities. For the most part their farms tend to be dairy farms but several are diversified with other enterprises such as vegetables. Farms range in size from several hundred acre grain farms to small part-time livestock farms, all contributing to the farm economy of the county.

Soil sampling and analysis by county farmers is a very sound way to manage land from both an economic and environmental standpoint. Soil maps give a fairly good description of soil properties and characteristics. However soil analysis of individual fields gives the producer a better picture of what may be lacking or in abundance within that area. It allows for planning based on the intended land use. A comprehensive soil sampling and analysis program built around an individual farm will benefit the farmer in many ways for years to come.

This survey summarizes the soil test results from Seneca 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 786. Of these 786 samples,

701 (89%) were submitted to obtain fertilizer recommendations for commercial production while 85 samples (11%) were submitted as home and garden samples.



<b>Homeowners</b>		<b>Commercial</b>		<b>Total</b>
1995	6	1995	84	90
1996	9	1996	65	74
1997	17	1997	73	90
1998	5	1998	157	162
1999	14	1999	182	196
2000	12	2000	76	88
<u>2001</u>	<u>22</u>	<u>2001</u>	<u>64</u>	<u>86</u>
<b>Total</b>	<b>85</b>	<b>Total</b>	<b>701</b>	<b>786</b>

Thirty-four percent of the homeowner samples were submitted to obtain recommendation for growing mixed vegetables. Recommendations for ornamentals, other perennials, lawns and roses were requested too. People submitting samples for commercial production requested fertilizer recommendations for corn silage or grain (22%), grapes (21%), soybeans (12%), alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (8%), while a few

producers were planning on growing other crops including clover/grass mixtures, small grains, apples and vegetables.

Of the home and garden samples in Seneca County 38% were sandy loam soils belonging to soil management group 4. Twenty-three percent belonged to soil management group 2. Group 3 was represented by 21% of all samples and 18% of the samples 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, 73% belonged to soil management group 2. Eight percent of the samples were from soil management group 1 while 15% of the samples were classified group 3 and only 1% of the samples belonged to group 4. The five most common soil series, all belonging to soil management group 2, were Lansing (12%), Honeoye (11%), Cazenovia (8%), Conesus (8%), and Darien (8%). These soils represent 2% (Lansing), 4% (Honeoye), 5% (Cazenovia), 3% (Conesus) and 10% (Darien) of the total 262,900 acres in Seneca County.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to almost 15% with median values ranging from 2.8 to 6.1% organic matter for home and garden samples and values ranging from 2.7 to 3.5% for samples submitted for commercial production. Forty-nine of the 85 home and garden samples had between 2 and 5% organic matter with 12 testing between 2 and 2.9% organic matter, 18 between 3.0 and 3.9% organic matter and 19 between 4.0 and 4.9% organic matter. Thirty of the soils submitted for home and garden tested >4.9% in organic matter while 6 samples had less than 2% organic matter. Of the samples submitted for commercial production, 32% contained between 3 and 4% organic matter, 10% tested between 4.0 and 4.9% while 3% had organic matter concentrations of 5.0-5.9%. In total, 14% of the samples had organic matter levels of 4.0% or higher while 74% tested between 2.0 and 3.9% organic matter.

Soil pH in water (1:1 extraction ratio) varied from pH 4.1 to 8.1 with the median for home and garden samples ranging from pH 7.0 to pH 7.6 and for samples submitted for commercial production ranging from pH 6.3 to pH 6.7. Of the home and garden samples, 51 of the 85 samples tested between pH 6.0 and pH 7.4. For the samples submitted for commercial production, this was 77% while 13% tested between pH 5.0 and 5.9.

Extractable nutrients such as phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), iron (Fe), manganese (Mn), and zinc (Zn) were measured using the Morgan solution and extraction method (Morgan, 1941). This solution contains sodium acetate buffered at a pH of 4.8.

Soil test P levels of <1 lbs 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 samples tested low, nine were medium, 24 tested high and 46 samples tested very high in phosphorus. This meant that 82% tested high or very high in P. Phosphorus levels for samples for commercial production in Seneca County were skewed to low and medium classifications. Five percent of the samples tested very high in P. Twenty-six percent were high in P, 42% tested medium for P while 27% of the submitted samples were classified as low in soil test P. This means that 31% 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, 6 samples were classified as very low or low in potassium. Eight tested medium, 9 tested high and 62 (73%) tested very high in potassium. For samples submitted for commercial production, 1% tested very low in K, 6% tested low, 17% tested medium, 42% 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 16 to over 2000 lbs Mg/acre (Morgan extraction). There was only one sample 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 1 of the homeowner soils and 3% of the commercial growers' soil tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Seneca 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 97-99% in the normal range with only one of the home and garden samples and 20 of the samples for commercial production testing excessive for Fe. Similarly, most soils (96-99%) 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 13% tested medium. Of the samples for commercial production, 10% tested low in zinc, 46% tested medium while 44% 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	1	0	0	1	1
ATF	1	0	0	0	0	0	0	1	1
BLU	0	0	0	1	0	0	0	1	1
FLA	0	0	0	0	2	0	0	2	2
GRA	0	1	0	0	0	0	0	1	1
LAW	2	1	3	0	1	0	3	10	12
MVG	0	6	4	3	5	5	6	29	34
OTH	0	0	1	0	0	0	1	2	2
PER	0	0	3	0	1	4	3	11	13
ROS	0	0	4	0	1	1	1	7	8
SAG	3	0	2	1	3	2	5	16	19
TRF	0	1	0	0	0	0	2	3	4
Unknown	0	0	0	0	0	0	1	1	1
Total	6	9	17	5	14	12	22	85	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	0	1	3	1	0	0	0	5	1
AGE/AGT	4	4	3	4	19	0	1	35	5
ALE/ALT	1	1	4	2	2	3	1	14	2
APP	3	2	0	0	0	0	0	5	1
ASP	0	0	0	0	1	0	0	1	0
BCE/BCT	0	0	2	0	0	0	0	2	0
BLB	0	0	0	3	0	0	0	3	0
BND	4	0	0	0	0	0	0	4	1
BNS	1	0	0	0	0	0	0	1	0
BSP	1	0	0	0	0	0	0	1	0
BUK	0	0	0	1	0	0	0	1	0
CGE/CGT	0	0	1	0	0	1	0	2	0
CLE/CLT	0	0	0	0	4	0	5	9	1
COG/COS	27	19	9	42	42	3	13	155	22
GIE/GIT	0	0	0	0	0	2	0	2	0
GPA	0	0	10	12	2	0	0	24	3
GPF	0	0	0	23	0	8	0	31	4
GPV	1	6	10	7	24	38	13	99	14
GRA	0	0	1	0	0	0	0	1	0
GRE/GRT	2	14	9	1	11	1	0	38	5
HRB	0	1	0	0	0	0	0	1	0
IDL	0	0	0	0	3	0	0	3	0
MIX	2	0	2	0	3	0	0	7	1
MML	1	0	0	0	0	0	0	1	0
OAS	0	1	0	0	0	0	0	1	0
OAT	0	1	0	0	15	2	0	18	3
ONP	1	1	0	0	0	0	0	2	0
OTH	0	0	2	0	1	0	4	7	1
PEA	7	2	0	23	0	0	0	32	5
PEP	1	0	0	0	0	0	0	1	0
PGE/PGT	0	0	0	0	0	2	0	2	0
PIE/PIT	6	0	3	0	1	0	1	11	2
PLE/PLT	0	0	1	0	3	0	0	4	1
PLM	0	1	0	0	0	0	0	1	0
PNE/PNT	2	0	0	0	1	8	1	12	2

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Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
POT	1	0	0	0	0	0	0	1	0
PRN	0	1	0	0	0	0	0	1	0
PUM	0	0	1	0	0	0	0	1	0
RSF	3	2	0	0	1	0	2	8	1
RSS	0	0	0	2	0	0	0	2	0
RYC	0	1	0	0	0	0	0	1	0
SOG	1	0	0	0	0	0	0	1	0
SOY	10	6	9	17	27	5	7	81	12
SWC	0	1	0	0	0	2	0	3	0
TME	1	0	0	0	0	0	0	1	0
TRE/TRT	0	0	1	2	3	0	0	6	1
WHS	1	0	0	2	1	0	5	9	1
WHT	3	0	2	2	16	1	1	25	4
Unknown	0	0	0	13	2	0	10	25	4
Total	84	65	73	157	182	76	64	701	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)	0	1	4	4	2	5	4	20
SMG 3 (silt loam)	2	0	2	0	5	2	7	18
SMG 4 (sandy loam)	2	6	8	1	6	5	4	32
SMG 5 (sandy)	2	2	3	0	1	0	7	15
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	6	9	17	5	14	12	22	85

### 3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Angola	2	5	0	0	1	4	0	6	16
Appleton	2	3	0	0	1	6	0	0	10
Arkport	4	0	0	0	0	2	1	0	3
Aurora	2	2	0	0	1	5	0	8	16
Cazenovia	2	2	8	9	14	15	0	11	59
Claverack	4	0	0	1	0	2	0	0	3
Collamer	3	9	3	1	14	0	1	0	28
Conesus	2	8	2	5	11	20	9	3	58
Darien	2	9	2	1	9	25	1	10	57
Dunkirk	3	0	18	1	0	1	0	2	22
Erie	3	0	0	6	2	2	6	1	17
Honeyoe	2	4	8	1	16	13	35	2	79
Howard	3	0	4	4	0	0	1	0	9
Ilion	2	0	0	0	1	6	0	1	8
Lakemont	1	0	0	0	1	1	0	2	4
Lamson	4	0	0	0	0	0	1	0	1
Langford	3	3	1	12	5	4	1	1	27
Lansing	2	2	6	1	19	40	13	1	82
Lima	2	7	2	0	20	11	1	7	48
Madalin	1	3	1	0	4	1	0	0	9
Odessa	2	2	1	15	6	5	0	1	30
Ontario	2	8	3	2	1	0	1	0	15
Ovid	2	3	1	4	2	14	2	2	28
Palmyra	3	0	0	1	0	0	0	0	1
Romulus	2	0	0	0	1	0	0	0	1
Schoharie	1	12	3	4	14	4	2	2	41
Varick	2	0	1	2	0	1	0	2	6
Wallkill	3	0	1	0	0	0	0	0	1
Unknown	-	2	0	3	14	0	1	2	22
Total	-	84	65	73	157	182	76	64	701

## 4. Organic Matter

### 4.1 Samples for Home and Garden

Number of home and garden samples within each % organic matter range:

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	0	0	3	1	1	0	0	1	6
1996	1	0	1	4	2	0	0	1	9
1997	0	1	3	4	4	2	0	3	17
1998	0	0	3	1	0	0	0	1	5
1999	0	1	0	2	4	2	1	4	14
2000	0	0	0	4	1	0	3	4	12
2001	0	3	2	2	7	0	0	8	22
Total	1	5	12	18	19	4	4	22	85

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2.0	0.8	1.7	2.0	1.7	3.0	1.7	
Highest:	10.3	7.3	14.2	7.3	8.5	12.4	14.3	
Mean:	4.1	3.7	4.6	3.6	5.3	6.0	6.1	
Median:	2.8	3.4	4.1	2.9	5.2	6.1	4.7	

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	0	50	17	17	0	0	17	100
1996	11	0	11	44	22	0	0	11	100
1997	0	6	18	24	24	12	0	18	100
1998	0	0	60	20	0	0	0	20	100
1999	0	7	0	14	29	14	7	29	100
2000	0	0	0	33	8	0	25	33	100
2001	0	14	9	9	32	0	0	36	100
Total	1	6	14	21	22	5	5	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	2	24	33	16	6	2	1	84
1996	0	12	32	16	5	0	0	0	65
1997	2	11	22	27	8	3	0	0	73
1998	1	12	73	51	15	4	1	0	157
1999	1	17	95	58	8	2	0	1	182
2000	0	12	35	16	7	5	1	0	76
2001	0	10	14	26	11	2	0	1	64
Total	4	76	295	227	70	22	4	3	701

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.9	1.0	0.3	0.9	0.9	1.2	1.2	
Highest:	7.8	4.3	5.4	6.3	7.0	6.6	7.9	
Mean:	3.6	2.7	2.9	3.0	2.9	3.0	3.1	
Median:	3.5	2.7	3.0	2.9	2.8	2.6	3.2	

Percent of samples for commercial production within each % organic matter range:

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	0	2	29	39	19	7	2	1	100
1996	0	18	49	25	8	0	0	0	100
1997	3	15	30	37	11	4	0	0	100
1998	1	8	46	32	10	3	1	0	100
1999	1	9	52	32	4	1	0	1	100
2000	0	16	46	21	9	7	1	0	100
2001	0	16	22	41	17	3	0	2	100
Total	1	11	42	32	10	3	1	0	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	0	1	1	4	0	0	6
1996	0	0	0	0	1	2	4	2	0	0	9
1997	0	0	0	2	2	3	5	4	1	0	17
1998	0	0	0	1	0	1	2	1	0	0	5
1999	0	0	0	0	2	4	5	3	0	0	14
2000	0	0	0	0	1	4	2	5	0	0	12
2001	0	0	2	2	1	5	5	5	2	0	22
Total	0	0	2	5	7	20	24	24	3	0	85

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6.6	6.4	5.6	5.9	6.3	6.4	5.3	
Highest:	7.8	7.8	8.0	7.5	7.6	7.8	8.0	
Mean:	-	-	-	-	-	-	-	
Median:	7.6	7.3	7.1	7.0	7.1	7.2	7.0	

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	0	17	17	67	0	0	100
1996	0	0	0	0	11	22	44	22	0	0	100
1997	0	0	0	12	12	18	29	24	6	0	100
1998	0	0	0	20	0	20	40	20	0	0	100
1999	0	0	0	0	14	29	36	21	0	0	100
2000	0	0	0	0	8	33	17	42	0	0	100
2001	0	0	9	9	5	23	23	23	9	0	100
Total	0	0	2	6	8	24	28	28	4	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	2	3	22	30	26	1	0	0	84
1996	0	0	1	4	21	17	16	6	0	0	65
1997	0	2	5	10	20	25	9	2	0	0	73
1998*	12	9	14	6	24	41	42	7	1	0	156
1999	2	0	5	18	46	61	38	11	1	0	182
2000	0	4	4	10	25	22	7	4	0	0	76
2001	0	2	4	7	14	19	11	6	1	0	64
Total	14	17	35	58	172	215	149	37	3	0	700

\*One sample was not analyzed for pH in 1998.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.3	5.2	4.8	3.8	4.1	4.5	4.9	
Highest:	7.6	7.7	7.6	8.0	8.1	7.7	8.0	
Mean:	-	-	-	-	-	-	-	
Median:	6.7	6.3	6.4	6.6	6.7	6.3	6.6	

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	2	4	26	36	31	1	0	0	100
1996	0	0	2	6	32	26	25	9	0	0	100
1997	0	3	7	14	27	34	12	3	0	0	100
1998	8	6	9	4	15	26	27	4	1	0	100
1999	1	0	3	10	25	34	21	6	1	0	100
2000	0	5	5	13	33	29	9	5	0	0	100
2001	0	3	6	11	22	30	17	9	2	0	100
Total	2	2	5	8	25	31	21	5	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	1	1	1	0	0	1	1	0	1	6
1996	0	0	2	2	0	2	0	0	1	2	9
1997	0	4	0	3	1	2	0	2	1	4	17
1998	0	0	0	2	1	0	1	0	1	0	5
1999	0	0	1	7	2	1	1	0	0	2	14
2000	0	1	2	2	1	0	0	2	0	4	12
2001	0	1	3	7	0	2	3	2	0	4	22
Total	0	7	9	24	5	7	6	7	3	17	85

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	5	1	23	6	1	1	
Highest:	626	523	785	170	345	567	704	
Mean:	150	127	148	71	78	181	128	
Median:	59	70	61	55	35	83	50	

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	17	17	17	0	0	17	17	0	17	100
1996	0	0	22	22	0	22	0	0	11	22	100
1997	0	24	0	18	6	12	0	12	6	24	100
1998	0	0	0	40	20	0	20	0	20	0	100
1999	0	0	7	50	14	7	7	0	0	14	100
2000	0	8	17	17	8	0	0	17	0	33	100
2001	0	5	14	32	0	9	14	9	0	18	100
Total	0	8	11	28	6	8	7	8	4	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	27	33	19	1	2	0	1	1	0	84
1996	0	21	24	15	2	1	0	0	0	2	65
1997	0	19	27	20	6	0	0	0	0	1	73
1998	0	24	71	57	4	0	0	0	0	1	157
1999	0	43	85	47	3	1	0	0	0	3	182
2000	0	36	26	12	1	0	0	0	1	0	76
2001	0	17	25	15	3	3	1	0	0	0	64
Total	0	187	291	185	20	7	1	1	2	7	701

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:	203	389	232	459	436	170	87	
Mean:	13	19	14	13	15	8	14	
Median:	5	5	6	8	6	4	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	32	39	23	1	2	0	1	1	0	100
1996	0	32	37	23	3	2	0	0	0	3	100
1997	0	26	37	27	8	0	0	0	0	1	100
1998	0	15	45	36	3	0	0	0	0	1	100
1999	0	24	47	26	2	1	0	0	0	2	100
2000	0	47	34	16	1	0	0	0	1	0	100
2001	0	27	39	23	5	5	2	0	0	0	100
Total	0	27	42	26	3	1	0	0	0	1	100

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

## 7. Potassium

### 7.1 Samples for Home and Garden

Number of home and garden samples within each K range (lbs K/acre Morgan extraction):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	1	1
1997	0	0	0	1	3	4
1998	0	0	0	0	4	4
1999	0	0	0	0	2	2
2000	0	0	0	0	5	5
2001	0	0	0	0	4	4
Total (#)	0	0	0	1	19	20
Total (%)	0	0	0	5	95	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	2	0	0	2
1996	0	0	0	0	0	0
1997	0	0	0	1	1	2
1998	0	0	0	0	0	0
1999	0	0	0	0	5	5
2000	0	0	0	1	1	2
2001	0	1	0	1	5	7
Total (#)	0	1	2	3	12	18
Total (%)	0	6	11	17	67	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	2	2
1996	0	1	0	2	3	6
1997	0	0	1	1	6	8
1998	0	0	0	0	1	1
1999	0	0	0	0	6	6
2000	0	0	0	1	4	5
2001	1	0	0	0	3	4
Total (#)	1	1	1	4	25	32
Total (%)	3	3	3	13	78	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	2	2
1996	0	1	0	0	1	2
1997	0	1	1	0	1	3
1998	0	0	0	0	0	0
1999	0	0	1	0	0	1
2000	0	0	0	0	0	0
2001	0	1	3	1	2	7
Total (#)	0	3	5	1	6	15
Total (%)	0	20	33	7	40	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 (%)	-	-	-	-	-	-

Ketterings, Q.M., H. Krol, W.S. Reid and M. Dennis (2004). Seneca County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-4. 38 pages.

Number of home and garden samples within each potassium classification:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
1995	0	0	2	0	4	6
1996	0	2	0	2	5	9
1997	0	1	2	3	11	17
1998	0	0	0	0	5	5
1999	0	0	1	0	13	14
2000	0	0	0	2	10	12
2001	1	2	3	2	14	22
Total #	1	5	8	9	62	85

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	84	73	67	217	154	123	45	
Highest:	518	1117	1449	300	2475	2042	2070	
Mean:	317	355	400	264	564	654	420	
Median:	339	274	314	274	295	442	267	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	0	0	33	0	67	100
1996	0	22	0	22	56	100
1997	0	6	12	18	65	100
1998	0	0	0	0	100	100
1999	0	0	7	0	93	100
2000	0	0	0	17	83	100
2001	5	9	14	9	64	100
Grand Total	1	6	9	11	73	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	15	0	15
1996	0	2	1	1	0	4
1997	0	0	0	4	0	4
1998	0	0	3	16	0	19
1999	0	0	2	2	2	6
2000	0	0	0	1	1	2
2001	0	0	0	2	2	4
Total (#)	0	2	6	41	5	54
Total (%)	0	4	11	76	9	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	5	4	28	18	55
1996	0	4	6	12	12	34
1997	0	2	8	22	8	40
1998	0	1	12	45	45	103
1999	4	5	31	82	43	165
2000	0	2	1	6	53	62
2001	0	2	11	19	22	54
Total (#)	4	21	73	214	201	513
Total (%)	1	4	14	42	39	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	5	7	0	12
1996	0	6	13	5	3	27
1997	0	3	7	10	5	25
1998	0	3	12	4	2	23
1999	0	3	1	1	2	7
2000	0	0	2	6	1	9
2001	0	1	1	2	0	4
Total (#)	0	16	41	35	13	105
Total (%)	0	15	39	33	12	100



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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	1	0	0	0	0	1
1998	0	0	0	0	0	0
1999	0	2	1	1	0	4
2000	1	1	0	0	0	2
2001	0	0	0	0	0	0
Total (#)	2	3	1	1	0	7
Total (%)	29	43	14	14	0	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 (%)	0	0	0	0	0	0
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 (%)	0	0	0	0	0	0

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

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	5	9	50	18	2	84
1996	0	12	20	18	15	0	65
1997	1	5	15	36	3	3	73
1998	0	4	27	65	47	14	157
1999	4	10	35	86	47	0	182
2000	1	3	3	13	55	1	76
2001	0	3	12	23	24	2	64
Grand Total	6	42	121	291	219	22	701

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	44	41	52	39	24	38	53	
Highest:	995	1104	912	446	1769	739	437	
Mean:	174	152	152	158	182	300	175	
Median:	133	110	131	123	126	301	137	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	6	11	60	21	2	100
1996	0	18	31	28	23	0	100
1997	1	7	21	49	18	4	100
1998	0	3	17	41	30	9	100
1999	2	5	19	47	26	0	100
2000	1	4	4	17	72	1	100
2001	0	5	19	36	38	3	100
Grand Total	1	6	17	42	31	3	100

## 8. Magnesium

### 8.1 Samples for Home and Garden

Number of home and garden samples within each Mg range (lbs Morgan Mg/acre):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	6	6
1996	0	0	0	1	8	9
1997	0	0	0	1	16	17
1998	0	0	0	0	5	5
1999	0	0	0	1	13	14
2000	0	0	0	0	12	12
2001	0	0	1	2	19	22
Total	0	0	1	5	79	85

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	445	105	107	230	149	262	94	
Highest:	1448	1196	2077	465	1929	1995	1835	
Mean:	1001	634	599	360	739	831	679	
Median:	1049	560	443	352	602	691	545	

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	0	0	100	100
1996	0	0	0	11	89	100
1997	0	0	0	6	94	100
1998	0	0	0	0	100	100
1999	0	0	0	7	93	100
2000	0	0	0	0	100	100
2001	0	0	5	9	86	100
Total	0	0	1	6	93	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	5	79	84
1996	0	0	0	1	64	65
1997	1	0	3	17	52	73
1998	0	5	4	21	127	157
1999	0	2	2	13	165	182
2000	0	0	2	12	62	76
2001	0	0	1	8	55	64
Total	1	7	12	77	604	701

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	167	156	16	33	53	84	93	
Highest:	1640	786	676	1593	1143	678	736	
Mean:	412	377	323	358	355	295	394	
Median:	375	367	315	351	340	287	401	

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	6	94	100
1996	0	0	0	2	98	100
1997	1	0	4	23	71	100
1998	0	3	3	13	81	100
1999	0	1	1	7	91	100
2000	0	0	3	16	82	100
2001	0	0	2	13	86	100
Total	0	1	2	11	86	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	6	0	6
1996	9	0	9
1997	17	0	17
1998	5	0	5
1999	13	1	14
2000	12	0	12
2001	22	0	22
Total	84	1	85

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	100	0	100
	100	0	100
	100	0	100
	93	7	100
	100	0	100
	100	0	100
	99	1	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	1	1	3	1	2	2	
Highest:	15	7	14	11	85	11	24	
Mean:	7	4	5	6	12	7	8	
Median:	6	3	4	5	5	7	8	

## 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	84	0	84
1996	65	0	65
1997	72	1	73
1998	143	14	157
1999	180	2	182
2000	73	3	76
2001	64	0	64
Total	681	20	701

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	100	0	100
	99	1	100
	91	9	100
	99	1	100
	96	4	100
	100	0	100
	97	3	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	2	1	1	2	1	
Highest:	27	42	72	155	74	68	48	
Mean:	6	5	9	15	7	9	8	
Median:	4	3	5	5	5	4	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:

	0-99	>99	Total
	Normal	Excessive	
1995	6	0	6
1996	8	1	9
1997	16	1	17
1998	5	0	5
1999	14	0	14
2000	12	0	12
2001	21	1	22
Total	82	3	85

Percentages:

0-99	>99	Total
Normal	Excessive	
100	0	100
89	11	100
94	6	100
100	0	100
100	0	100
100	0	100
100	0	100
95	5	100
96	4	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	25	14	8	17	11	21	16	
Highest:	77	128	111	30	86	66	101	
Mean:	47	51	51	25	38	41	41	
Median:	39	35	51	25	32	38	26	

## 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	84	0	84
1996	65	0	65
1997	72	1	73
1998	154	3	157
1999	182	0	182
2000	76	0	76
2001	64	0	64
Total	697	4	701

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	100	0	100
	100	0	100
	99	1	100
	98	2	100
	100	0	100
	100	0	100
	100	0	100
	99	1	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	18	8	6	12	6	4	19	
Highest:	63	70	125	137	88	92	73	
Mean:	31	28	35	38	29	29	35	
Median:	29	25	30	30	28	26	31	



## 11. Zinc

### 11.1 Samples for Home and Garden

Zinc (lbs Zn/acre Morgan extraction) in samples for home and garden:

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	0	3	3	6
1996	0	1	8	9
1997	0	2	15	17
1998	0	0	5	5
1999	0	1	13	14
2000	0	3	9	12
2001	0	1	21	22
Total	0	11	74	85

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	50	50	100
0	11	89	100
0	12	88	100
0	0	100	100
0	7	93	100
0	25	75	100
0	5	95	100
0	13	87	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.9	0.5	0.6	1.6	0.6	0.8	0.5	
Highest:	92.4	28.9	202.8	56.8	12.8	12.0	41.5	
Mean:	17.2	6.6	19.3	21.2	5.5	5.5	9.2	
Median:	1.7	4.3	5.5	7.2	4.5	4.9	3.3	

## 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	20	42	22	84
1996	10	28	27	65
1997	4	25	44	73
1998	9	87	61	157
1999	23	108	51	182
2000	0	11	65	76
2001	2	22	40	64
Total	68	323	310	701

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
24	50	26	100
15	43	42	100
5	34	60	100
6	55	39	100
13	59	28	100
0	14	86	100
3	34	63	100
10	46	44	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.3	0.3	0.1	0.3	0.1	0.5	0.3	
Highest:	12.4	9.6	11.3	190.1	60.4	18.7	8.0	
Mean:	1.1	1.8	1.4	3.3	1.5	2.5	1.8	
Median:	0.6	0.9	1.1	0.9	0.7	2.0	1.3	

## Appendix: Cornell Crop Codes

Crop codes are used in the Cornell Nutrient Analyses Laboratory.

Crop Code	Crop Description
Alfalfa	
ABE	Alfalfa trefoil grass, Establishment
ABT	Alfalfa trefoil grass, Established
AGE	Alfalfa grass, Establishment
AGT	Alfalfa grass, Established
ALE	Alfalfa, Establishment
ALT	Alfalfa, Established
Birdsfoot	
BCE	Birdsfoot trefoil clover, Establishment
BCT	Birdsfoot trefoil clover, Established
BGE	Birdsfoot trefoil grass, Establishment
BGT	Birdsfoot trefoil grass, Established
BSE	Birdsfoot trefoil seed, Establishment
BST	Birdsfoot trefoil seed, Established
BTE	Birdsfoot trefoil, Establishment
BTT	Birdsfoot trefoil, Established
Barley	
BSP	Spring barley
BSS	Spring barley with legumes
BUK	Buckwheat
BWI	Winter barley
BWS	Winter barley with legumes
Clover	
CGE	Clover grass, Establishment
CGT	Clover grass, Established
CLE	Clover, Establishment
CLT	Clover, Established
CSE	Clover seed production, Establishment
CST	Clover seed production, Established

Crop Code	Crop Description
	Corn
COG	Corn grain
COS	Corn silage
	Grasses, pastures, covercrops
GIE	Grasses intensively managed, Establishment
GIT	Grasses intensively managed, Established
GRE	Grasses, Establishment
GRT	Grasses, Established
PGE	Pasture, Establishment
PGT	Pasture improved grasses, Established
PIE	Pasture intensively grazed, Establishment
PIT	Pasture intensively grazed, Established
PLE	Pasture with legumes, Establishment
PLT	Pasture with legumes, Established
PNT	Pasture native grasses
PNE	Pasture native grasses, Established
RYC	Rye cover crop
RYS	Rye seed production
TRP	Triticale peas
	Small grains
MIL	Millet
OAS	Oats with legume
OAT	Oats
SOF	Sorghum forage
SOG	Sorghum grain
SOY	Soybeans
SSH	Sorghum sudan hybrid
SUD	Sudangrass
WHS	Wheat with legume
WHT	Wheat
	Others
ALG	Azalea
APP	Apples
APR	Apricots

Crop Code	Crop Description
ASP	Asparagus
ATF	Athletic Field
BDR/BND	Beans-dry
BLU/BLB	Blueberries
CEM	Cemetery
EGG	Eggplants
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GPA	Grapes, American
GPF	Grapes, French-American
GPV	Grapes, Vinifera
GRA	Grapes
GEN	Green
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
NUR	Nursery
ONP	Onions, Planted
ONS	Onions, Seeded
OTH	Other
PAR	Pears
PCH	Peaches
PEA	Peas
PEP	Peppers
PER	Perennials
PLM	Plums
POP	Popcorn
PRK	Park
POT/PTO	Potatoes
PRN	Prunes
PUM	Pumpkins
ROD	Roadside
ROS	Roses
ROU	Rough
RSF	Raspberries, Fall

Crop Code	Crop Description
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5
SQS	Squash, Summer
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing