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Soil Sample Survey

Oneida Co.

Samples analyzed by CNAL in 1995-2001

Farming in Oneida County

Summary compiled by

Quirine M. Ketterings, Hettie Krol, W. Shaw Reid and Jeff Miller

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

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July 18, 2003

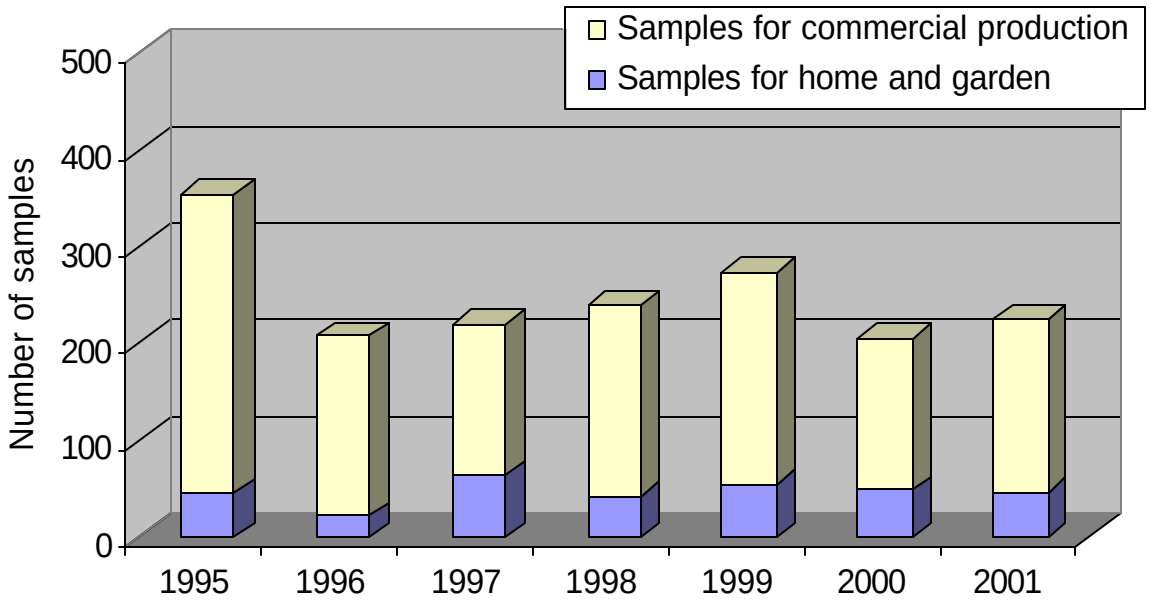
Correct Citation:

Ketterings, Q.M., H. Krol. W.S. Reid, and J. Miller (2003). Soil samples survey of Oneida County. Samples analyzed by the Cornell Nutrient Analysis Laboratory in 1995-2001. CSS Extension Bulletin E03-17. 38 pages.

Table of Content

1. General Survey Summary

This survey summarizes the soil test results from Oneida 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 1731. Of these, 1404 samples (81%) were submitted to obtain fertilizer recommendations for commercial production while 327 samples (19%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	46	1995	309	355
1996	22	1996	186	208
1997	65	1997	156	221
1998	42	1998	199	241
1999	55	1999	219	274
2000	49	2000	158	207
2001	48	2001	177	225
Total	327	Total	1404	1731

Most of the home and garden soil samples submitted in the period 1995-2001 were submitted to request fertilizer recommendations for lawns (39%), vegetable gardens (20%), garden vegetable production (20%) and perennials (12%). People submitting samples for commercial production requested fertilizer recommendations for corn silage or grain (38%) and alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (25%), while a few producers were planning on growing other crops including grass hay and grass for pasture, clover/grass mixtures, small grains and vegetables.

Home and garden samples in Oneida County were mostly silty soils belonging to soil management group 2 (39%). Twenty four percent belonged to soil management group 3. Group 4 was represented by 20% of all samples and 17% were classified as group 5 soils. 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, 36% belonged to soil management group 2. Twenty one percent were from soil management group 3. Group four and five were represented by 21 and 20% of the samples, respectively. Only one percent was

classified as a muck soil (soil management group 6). The five most common soil series were Alton (15%), Lima (10%), Howard (9%), Honeoye (8%), and Nellis (6%). These soils represent 5% (Alton), 3% (Lima), 2% (Howard), 4% (Honeoye), and 1% (Nellis) of the total 804,630 acres of the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to over 36% (muck soils) with median values ranging from 2.6 to 5.1% organic matter for home and garden samples and values ranging from 3.7 to 4.2% for samples submitted for commercial production. Fifty six percent of the home and garden samples had between 2 and 5% organic matter with 12% testing between 2 and 2.9% organic matter, 22% between 3.0 and 3.9% organic matter and 22% between 4.0 and 4.9% organic matter. Thirty five percent of the soils submitted for home and garden tested >4.9% in organic matter while 9% had less than 2% organic matter. Of the samples submitted for commercial production, 35% contained between 3 and 4% organic matter, 31% tested between 4.0 and 4.9% while 11% had organic matter concentrations of 5.0-5.9%. In total, 45% of the samples submitted for commercial production had organic matter levels between 4.0 and 6.9%.

Soil pH in water (1:1 extraction ratio) varied from pH 3.4 to 8.6 with the median for home and garden samples ranging from pH 6.8 to pH 7.5 and for samples submitted for commercial production ranging from pH 6.2 to pH 6.6. Of the home and garden samples, 77% tested between pH 6.5 and 7.9. For the samples submitted for commercial production, 47% tested between pH 6.5 and 7.9 while 31% tested between pH 6.0 and 6.4 and 21% tested between pH 5.0 and 5.9.

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

Soil test P levels of <1 lb P/acre are classified as very low. Between 1-3 lbs P/acre is low. Medium is between 4-8 lbs P/acre. High testing soils have P levels between 9 and 39 lbs P/acre and soils with >39 lbs P/acre are classified as very high. Of the home and garden samples, 15% tested low, 16% tested medium, 44% tested high and 26% tested very high. This meant that 70% of the home and garden samples tested high or very high in P.

Phosphorus levels for samples for commercial production in Oneida County were lower than the state average (approximately 50% of the soils submitted for commercial production to CNAL in 1995-2001 tested high or very high in P). Four percent of the samples tested very high in P. Twenty nine percent were low in P, 32% tested medium for P while 35% of the submitted samples were classified as high in soil test P. This means that 39% tested high or very high in P. There were no clear trends in P levels over the 6 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. For example, for soil management group 5 and 6, a soil test results of <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, 3% were classified as very low and 13% tested low in potassium. Fourteen percent tested medium, 24% high and 46% very high. For samples submitted for commercial production, 3% tested very low in K, 13% tested low, 20% were medium, 31% tested high and 32% were very high in potassium. As with phosphorus, there were no trends over the 6 years of soil sampling.

Soils test very low for magnesium if Morgan extractable Mg is less than 20 lbs Mg/acre. Low testing soils have 20-65 lbs Morgan Mg per acre. Soils with 66-100 lbs Mg/acre test medium for magnesium. High testing soils have 101-199 lbs Mg/acre while soils with more than 200 lbs Mg/acre in the Morgan extraction are classified as very high in Mg. Magnesium levels ranged from less than 10 to more than 2000 lbs Mg/acre (Morgan extraction). There were few samples that tested very low in Mg. Most soils tested high or very high for Mg (93% of the homeowner soils and 87% of the soils of the commercial growers). No more than 21 of the homeowner soils and 13% of the commercial growers' soil tested very low, low or medium in Mg.

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 95-96% in the normal range with 5% of the home and garden samples and 4% 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, 91% tested high for zinc while 9% tested medium. Of the samples for commercial production, 5% tested low in zinc, 34% tested medium while 61% was high in zinc.

In the following sections, the summary tables for each of the soil fertility indicators described above are given. The appendix contains the crop codes used in section 2.

Reference

- Morgan, M.F. 1941. Chemical soil diagnosis by the universal soil testing system. Connecticut Agricultural Experimental Station. Bulletin 450.

2. Cropping Systems

2.1 Samples for Home and Garden

Crops for which recommendations are requested by homeowners:

	1995	1996	1997	1998	1999	2000	2001	Total	%
ALG	1	0	0	0	0	0	0	1	0
ATF	2	1	2	5	3	3	5	21	6
BLU	2	1	0	0	1	0	0	4	1
CEM	0	0	0	0	4	0	0	4	1
FAR	0	0	0	0	0	10	0	10	3
FLA	0	0	1	1	0	0	0	2	1
GEN	9	1	6	0	0	0	10	26	8
HRB	1	0	0	0	0	0	0	1	0
LAW	12	8	35	19	23	14	15	126	39
MVG	8	9	9	11	14	10	6	67	20
OTH	0	1	0	0	1	1	0	3	1
PER	4	1	9	3	6	7	9	39	12
PRK	0	0	1	0	0	0	0	1	0
ROD	0	0	1	0	0	2	0	3	1
ROS	0	0	0	1	0	0	0	1	0
RSP	1	0	0	0	2	0	0	3	1
SAG	6	0	1	0	1	2	3	13	4
SBP	0	0	0	1	0	0	0	1	0
TRF	0	0	0	1	0	0	0	1	0
Total	46	22	65	42	55	49	48	327	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	4	8	3	0	4	0	0	19	1
AGE/AGT	81	46	23	26	42	30	35	283	20
ALE/ALT	18	1	7	4	11	10	0	51	4
APP	3	0	1	0	0	0	0	4	0
BCE/BCT	1	0	0	0	0	0	0	1	0
BGE/BGT	4	4	1	3	0	0	0	12	1
BLB	1	0	0	0	0	0	4	5	0
BNS	1	0	0	0	0	0	0	1	0
BSP	0	0	2	0	0	7	0	9	1
BUK	1	0	0	0	0	0	0	1	0
CGE/CGT	5	2	4	10	3	4	3	31	2
CKP	0	0	0	0	0	1	0	1	0
CLE/CLT	1	0	0	0	1	1	0	3	0
COG/COS	82	94	72	60	89	60	78	535	38
GIE/GIT	1	3	0	2	1	0	0	7	0
GRE/GRT	2	8	12	33	13	2	3	73	5
IDL	0	1	3	0	0	0	0	4	0
MIL	0	0	0	0	0	0	1	1	0
MIX	4	1	1	1	5	1	0	13	1
OAS	34	6	4	4	4	4	2	58	4
OAT	3	2	3	2	3	0	1	14	1
OTH	2	0	2	6	0	1	0	11	1
PEP	0	0	0	0	0	1	0	1	0
PGE/PGT	29	0	0	1	0	2	3	35	2
PIE/PIT	9	0	4	2	22	0	2	39	3
PLE/PLT	3	1	1	26	0	1	0	32	2
PNE/PNT	3	0	2	8	1	0	0	14	1
POT	3	0	0	1	0	0	0	4	0
PSL	1	0	0	0	0	0	0	1	0
PUM	1	2	1	2	1	2	0	9	1
RSS	0	0	1	0	0	0	0	1	0
RYC	0	1	0	0	0	0	0	1	0
RYS	0	0	0	0	0	1	0	1	0
SOF	0	0	1	0	0	0	0	1	0
SOY	1	0	4	4	0	0	11	20	1

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
SQW	1	0	0	0	0	0	0	1	0
SSH	0	0	0	1	0	0	1	2	0
STS	0	0	0	1	0	0	0	1	0
SWC	1	2	0	0	7	6	0	16	1
TOM	0	0	0	0	1	0	0	1	0
TRE/TRT	5	1	1	0	5	3	2	17	1
TRP	0	0	2	2	2	0	0	6	0
WHS	0	0	0	0	0	1	0	1	0
WHT	3	1	0	0	1	0	1	6	0
Unknown	1	2	1	0	3	20	30	57	4
Total	309	186	156	199	219	158	177	1404	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)	10	1	40	10	19	25	23	128
SMG 3 (silt loam)	13	8	10	19	10	3	16	79
SMG 4 (sandy loam)	13	7	9	8	12	11	6	66
SMG 5 (sandy)	10	6	6	5	14	10	3	54
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	46	22	65	42	55	49	48	327

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Adams	5	0	0	1	0	0	3	0	4
Alton	5	42	19	30	25	44	34	15	209
Amenia	4	0	28	11	1	14	5	0	59
Appleton	2	3	9	6	3	22	3	0	46
Aurora	2	0	0	0	1	0	0	0	1
Berkshire	5	0	0	0	1	0	0	0	1
Bice	5	8	0	2	10	0	0	0	20
Camroden	3	11	1	2	0	1	0	0	15
Canadaigua	3	1	0	0	0	1	0	1	3
Castile	4	2	0	1	0	3	2	3	11
Cazenovia	2	25	12	7	11	4	2	16	77
Chadakoin	3	0	0	1	0	2	6	1	10
Chenango	3	1	3	3	0	11	1	3	22
Colosse	4	3	0	2	0	0	0	0	5
Conesus	2	8	8	5	5	5	3	7	41
Covert	4	0	8	1	0	5	1	6	21
Croghan	5	0	0	1	0	0	0	0	1
Empeyville	4	7	0	0	1	1	1	1	11
Farmington	3	2	0	1	0	0	0	0	3
Fredon	4	1	0	0	1	1	0	0	3
Galway	4	0	0	4	1	0	0	0	5
Greene	3	0	1	0	1	0	0	0	2
Hamlin	2	0	0	0	0	0	1	2	3
Herkimer	3	1	0	0	1	0	0	0	2
Honeoye	2	35	18	23	14	5	2	16	113
Howard	3	23	5	11	14	13	18	47	131
Jebavy	5	0	0	0	0	0	12	0	12
Kalurah	4	0	0	2	11	4	0	1	18
Kendaia	2	8	4	4	11	4	2	1	34
Knickerboc	5	1	0	1	6	6	2	0	16
Lansing	2	12	2	2	9	9	0	1	35
Lima	2	30	39	5	34	18	4	8	138
Lyons	2	0	1	0	0	1	0	0	2
Malone	4	0	6	0	8	2	0	0	16
Manlius	3	0	0	0	1	1	0	0	2
Marcy	3	0	0	1	0	2	0	0	3

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Mardin	3	1	0	0	0	0	0	0	1
Minoa	4	1	1	0	0	0	0	0	2
Mongaup	3	1	0	0	0	0	0	0	1
Muck	6	0	1	0	0	0	0	0	1
Naumburg	5	0	0	0	0	0	0	1	1
Nellis	4	14	2	7	8	16	40	1	88
Niagara	3	10	0	0	0	2	0	3	15
Otego	2	0	1	0	0	2	0	3	6
Otsego	3	0	0	0	0	0	2	0	2
Ovid	2	4	0	0	0	0	0	1	5
Phelps	3	1	6	8	0	1	0	10	26
Pinckney	3	23	4	6	6	9	0	0	48
Pittsfield	4	2	0	0	2	2	0	19	25
Pyrities	4	0	0	3	3	0	0	1	7
Raynham	3	0	1	1	0	0	0	0	2
Rhinebeck	2	0	0	1	0	0	0	1	2
Schoharie	1	2	1	0	0	0	2	1	6
Scio	3	0	1	1	0	2	0	0	4
Unadilla	3	0	0	0	0	2	0	0	2
Venango	3	1	0	0	0	0	0	0	1
Wakeville	3	0	0	0	1	0	0	0	1
Wareham	5	0	0	1	0	0	0	0	1
Wayland	2	0	0	0	0	0	1	1	2
Wenonah	4	0	3	1	0	3	0	0	7
Westbury	4	3	0	0	0	0	0	0	3
Windsor	5	4	1	0	6	1	0	5	17
Worth	4	18	0	0	1	0	0	0	19
Unknown	-	0	0	0	2	0	11	1	14
total	-	309	186	156	199	219	158	177	1404

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	8	5	6	8	11	5	3	46
1996	2	6	4	7	3	0	0	0	22
1997	0	6	7	12	11	18	9	2	65
1998	1	0	5	12	8	7	4	5	42
1999	1	1	7	16	11	10	2	7	55
2000	2	2	6	11	9	6	4	9	49
2001	1	0	4	7	22	4	3	7	48
Total	7	23	38	71	72	56	27	33	327

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.2	0.7	1.1	0.8	0.9	0.1	0.7	
Highest:	18.0	4.8	8.9	10.4	11.8	17.9	15.0	
Mean:	4.4	2.6	4.4	4.8	4.7	5.1	5.1	
Median:	4.4	2.6	4.6	4.1	4.2	4.5	4.4	

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	0	17	11	13	17	24	11	7	100
1996	9	27	18	32	14	0	0	0	100
1997	0	9	11	18	17	28	14	3	100
1998	2	0	12	29	19	17	10	12	100
1999	2	2	13	29	20	18	4	13	100
2000	4	4	12	22	18	12	8	18	100
2001	2	0	8	15	46	8	6	15	100
Total	2	7	12	22	22	17	8	10	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	1	1	34	104	109	44	8	8	309
1996	3	8	30	66	55	22	2	0	186
1997	0	4	11	50	58	26	3	4	156
1998	0	0	20	62	64	37	11	5	199
1999	2	16	31	73	65	15	8	9	219
2000	1	3	34	53	45	12	3	7	158
2001	1	5	39	85	38	3	1	5	177
Total	8	37	199	493	434	159	36	38	1404

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.4	0.8	1.7	2.1	0.6	0.7	0.3	
Highest:	14.5	6.6	9.8	11.1	8.5	36.1	17.6	
Mean:	4.2	3.7	4.2	4.3	3.9	4.2	3.7	
Median:	4.0	3.8	4.1	4.2	3.8	3.7	3.5	

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	0	0	11	34	35	14	3	3	100
1996	2	4	16	35	30	12	1	0	100
1997	0	3	7	32	37	17	2	3	100
1998	0	0	10	31	32	19	6	3	100
1999	1	7	14	33	30	7	4	4	100
2000	1	2	22	34	28	8	2	4	100
2001	1	3	22	48	21	2	1	3	100
Total	1	3	14	35	31	11	3	3	100

5. pH

5.1 Samples for Home and Garden

Number of home and garden samples within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	1	2	4	3	9	11	14	1	1	46
1996	0	0	1	1	5	4	5	6	0	0	22
1997	0	2	0	1	5	10	41	4	2	0	65
1998	0	1	1	7	3	10	10	10	0	0	42
1999	0	3	3	8	5	5	15	16	0	0	55
2000	0	0	2	3	0	5	14	21	3	1	49
2001	1	0	0	1	3	5	22	14	1	1	48
Total	1	7	9	25	24	48	118	85	7	3	327

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.9	5.3	4.6	4.5	4.9	5.0	3.9	
Highest:	8.5	7.8	8.2	7.7	7.9	8.6	8.6	
Mean:	-	-	-	-	-	-	-	
Median:	7.2	7.0	7.1	6.8	7.2	7.5	7.3	

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	2	4	9	7	20	24	30	2	2	100
1996	0	0	5	5	23	18	23	27	0	0	100
1997	0	3	0	2	8	15	63	6	3	0	100
1998	0	2	2	17	7	24	24	24	0	0	100
1999	0	5	5	15	9	9	27	29	0	0	100
2000	0	0	4	6	0	10	29	43	6	2	100
2001	2	0	0	2	6	10	46	29	2	1	100
Total	0	2	3	8	7	15	36	26	2	1	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	10	45	90	104	52	6	2	0	309
1996	0	0	10	24	76	53	19	40	0	0	186
1997*	0	0	11	28	58	38	10	1	0	0	146
1998	1	0	9	47	59	41	38	4	0	0	199
1999	0	2	15	46	69	61	22	4	0	0	219
2000	4	2	10	11	35	47	39	10	0	0	158
2001	4	0	3	25	40	59	31	15	0	0	177
Total	9	4	68	226	427	403	211	44	2	0	1394

*Ten were not analyzed for pH in 1997.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.2	5.0	5.0	4.4	4.8	3.7	3.4	
Highest:	8.1	7.7	7.5	7.9	7.7	7.8	7.7	
Mean:	-	-	-	-	-	-	-	
Median:	6.5	6.3	6.2	6.3	6.3	6.6	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	3	15	29	34	17	2	1	0	100
1996	0	0	5	13	41	28	10	2	0	0	100
1997	0	0	8	19	40	26	7	1	0	0	100
1998	1	0	5	24	30	21	19	2	0	0	100
1999	0	1	7	21	32	28	10	2	0	0	100
2000	3	1	6	7	22	30	25	6	0	0	100
2001	2	0	2	14	23	33	18	8	0	0	100
Total	1	0	5	16	31	29	15	3	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	11	6	15	3	4	1	1	2	3	46
1996	0	9	7	4	0	1	0	1	0	0	22
1997	0	5	6	38	5	2	2	1	1	5	65
1998	0	6	9	18	3	1	3	1	0	1	42
1999	0	7	13	22	2	2	2	3	1	3	55
2000	0	2	7	21	4	1	4	2	1	7	49
2001	0	8	5	26	1	1	0	5	1	1	48
Total	0	48	53	144	18	12	12	14	6	20	327

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	2	1	1	1	1	
Highest:	601	135	392	336	300	650	235	
Mean:	56	16	46	33	42	94	36	
Median:	19	4	17	15	13	27	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	24	13	33	7	9	2	2	4	7	100
1996	0	41	32	18	0	5	0	5	0	0	100
1997	0	8	9	58	8	3	3	2	2	8	100
1998	0	14	21	43	7	2	7	2	0	2	100
1999	0	13	24	40	4	4	4	5	2	5	100
2000	0	4	14	43	8	2	8	4	2	14	100
2001	0	17	10	54	2	2	0	10	2	2	100
Total	0	15	16	44	6	4	4	4	2	6	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	130	86	87	3	0	0	0	1	2	309
1996	0	62	54	63	7	0	0	0	0	0	186
1997	0	43	48	55	5	2	0	1	2	0	156
1998	0	45	78	67	4	1	3	1	0	0	199
1999	0	48	75	92	3	0	0	0	0	1	219
2000	0	39	55	57	2	1	3	0	1	0	158
2001	0	44	48	72	9	3	1	0	0	0	177
Total	0	411	444	493	33	7	7	2	4	3	1404

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:	411	53	187	143	708	187	85	
Mean:	10	10	13	11	13	14	13	
Median:	5	6	7	7	8	7	8	

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	42	28	28	1	0	0	0	0	1	100
1996	0	33	29	34	4	0	0	0	0	0	100
1997	0	28	31	35	3	1	0	1	1	0	100
1998	0	23	39	34	2	1	2	1	0	0	100
1999	0	22	34	42	1	0	0	0	0	0	100
2000	0	25	35	36	1	1	2	0	0	0	100
2001	0	25	27	41	5	2	1	0	0	0	100
Total	0	29	32	35	2	0	0	0	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	0	0	1	3	6	10
1996	0	0	0	1	0	1
1997	0	2	3	3	32	40
1998	0	0	0	4	6	10
1999	0	0	0	7	12	19
2000	0	2	2	7	14	25
2001	0	2	2	6	13	23
Total (#)	0	6	8	31	83	128
Total (%)	0	5	6	24	65	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	2	4	6	13
1996	0	4	1	2	1	8
1997	0	2	1	1	6	10
1998	0	1	3	3	12	19
1999	0	0	1	2	7	10
2000	0	0	1	0	2	3
2001	1	5	6	2	2	16
Total (#)	1	13	15	14	36	79
Total (%)	1	16	19	18	46	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	2	1	5	5	13
1996	1	1	3	1	1	7
1997	0	4	1	4	0	9
1998	0	0	1	2	5	8
1999	0	2	1	6	3	12
2000	0	1	1	0	9	11
2001	0	0	1	1	4	6
Total (#)	1	10	9	19	27	66
Total (%)	2	15	14	29	41	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	2	1	0	4	3	10
1996	3	2	1	0	0	6
1997	0	3	1	1	1	6
1998	0	0	2	3	0	5
1999	1	5	5	2	1	14
2000	3	0	4	3	0	10
2001	0	2	0	1	0	3
Total (#)	9	13	13	14	5	54
Total (%)	17	24	24	26	9	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	2	4	4	16	20	46
1996	4	7	5	4	2	22
1997	0	11	6	9	39	65
1998	0	1	6	12	23	42
1999	1	7	7	17	23	55
2000	3	3	8	10	25	49
2001	1	9	9	10	19	48
Total #	11	42	45	78	151	327

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	40	38	59	68	29	3	31	
Highest:	1898	369	528	955	975	5899	598	
Mean:	311	117	208	260	241	387	190	
Median:	188	91	219	219	173	194	155	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	4	9	9	35	43	100
1996	18	32	23	18	9	100
1997	0	17	9	14	60	100
1998	0	2	14	29	55	100
1999	2	13	13	31	42	100
2000	6	6	16	20	51	100
2001	2	19	19	21	40	100
Grand Total	3	13	14	24	46	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	2	0	2
1996	1	0	0	0	0	1
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	1	1	2
2001	0	1	0	0	0	1
Total (#)	1	1	0	3	1	6
Total (%)	17	17	0	50	17	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	6	29	49	41	125
1996	1	12	19	35	27	94
1997	0	2	7	14	30	53
1998	0	1	14	26	47	88
1999	1	1	7	30	31	70
2000	0	1	6	4	7	18
2001	1	4	8	20	24	57
Total (#)	3	27	90	178	207	505
Total (%)	1	5	18	35	41	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	10	20	14	22	10	76
1996	1	3	6	8	4	22
1997	0	2	11	12	10	35
1998	0	1	4	6	13	24
1999	1	3	10	14	19	47
2000	0	0	1	12	14	27
2001	0	6	17	14	28	65
Total (#)	12	35	63	88	98	296
Total (%)	4	12	21	30	33	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	5	4	11	8	23	51
1996	1	10	11	16	10	48
1997	0	7	11	7	7	32
1998	0	7	14	7	9	37
1999	0	4	15	19	13	51
2000	0	13	8	12	16	49
2001	1	7	5	9	10	32
Total (#)	7	52	75	78	88	300
Total (%)	2	17	25	26	29	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	4	9	9	14	19	55
1996	3	6	4	6	1	20
1997	2	13	8	11	2	36
1998	0	11	13	15	9	48
1999	3	8	10	22	8	51
2000	0	14	9	18	10	51
2001	8	4	2	5	2	21
Total (#)	20	65	55	91	51	282
Total (%)	7	23	20	32	18	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	1	0	0	0	1
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	1	0	0	0	1
Total (%)	0	100	0	0	0	100

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

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	19	39	63	95	93	0	309
1996	7	32	40	65	42	0	186
1997	2	24	37	44	49	0	156
1998	0	20	45	54	78	2	199
1999	5	16	42	85	71	0	219
2000	0	28	24	47	48	11	158
2001	10	22	32	48	64	1	177
Grand Total	43	181	283	438	445	14	1404

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	23	34	40	62	28	60	12	
Highest:	2023	679	1243	1333	1416	623	756	
Mean:	191	156	187	212	200	194	188	
Median:	139	133	142	169	164	165	155	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	6	13	20	31	30	0	100
1996	4	17	22	35	23	0	100
1997	1	15	24	28	31	0	100
1998	0	10	23	27	39	1	100
1999	2	7	19	39	32	0	100
2000	0	18	15	30	30	7	100
2001	6	12	18	27	36	1	100
Grand Total	3	13	20	31	32	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	1	1	2	7	35	46
1996	0	3	0	5	14	22
1997	0	1	0	8	56	65
1998	0	1	4	8	29	42
1999	1	2	2	10	40	55
2000	0	2	0	7	40	49
2001	0	0	1	11	36	48
Total	2	10	9	56	250	327

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	18	42	58	54	10	24	87	
Highest:	2114	663	1927	736	1188	1819	999	
Mean:	435	294	423	349	357	478	433	
Median:	408	277	422	338	267	437	435	

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	2	2	4	15	76	100
1996	0	14	0	23	64	100
1997	0	2	0	12	86	100
1998	0	2	10	19	69	100
1999	2	4	4	18	73	100
2000	0	4	0	14	82	100
2001	0	0	2	23	75	100
Total	1	3	3	17	76	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	2	23	21	96	167	309
1996	0	10	17	48	111	186
1997	0	7	15	30	103	156
1998	0	6	11	47	135	199
1999	1	15	22	49	132	219
2000	0	3	11	45	99	158
2001	1	7	12	37	120	177
Total	5	71	109	352	867	1404

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	9	29	14	38	9	28	10	
Highest:	1647	1217	754	1130	1850	993	913	
Mean:	285	285	285	310	277	273	300	
Median:	212	244	274	282	237	246	273	

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	1	7	7	31	54	100
1996	0	5	9	26	60	100
1997	1	4	10	19	66	100
1998	0	3	6	24	68	100
1999	0	7	10	22	60	100
2000	0	2	7	28	63	100
2001	1	4	7	21	68	100
Total	0	5	8	25	62	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	43	3	46
1996	18	4	22
1997	63	2	65
1998	38	4	42
1999	53	2	55
2000	49	0	49
2001	47	1	48
Total	311	16	327

Percentages:

0-49	>49	Total
Normal	Excessive	
93	7	100
82	18	100
97	3	100
90	10	100
96	4	100
100	0	100
98	2	100
95	5	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	2	2	1	1	1	1	
Highest:	94	137	240	130	209	42	507	
Mean:	13	26	13	15	14	8	15	
Median:	6	11	6	6	7	4	3	

9. 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	302	7	309
1996	180	6	186
1997	155	1	156
1998	189	10	199
1999	210	9	219
2000	150	8	158
2001	168	9	177
Total	1354	50	1404

Percentages:

0-49	>49	Total
Normal	Excessive	
98	2	100
97	3	100
99	1	100
95	5	100
96	4	100
95	5	100
95	5	100
96	4	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	89	104	54	178	120	219	337	
Mean:	10	10	9	13	12	14	14	
Median:	7	6	6	7	7	5	4	

10. Manganese

10.1 Samples for Home and Garden

Manganese (lbs Mn/acre Morgan extraction) in samples for home and garden:

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
1995	42	4	46
1996	19	3	22
1997	58	7	65
1998	39	3	42
1999	52	3	55
2000	46	3	49
2001	47	1	48
Total	303	24	327

Percentages:

0-99	>99	Total
Normal	Excessive	
91	9	100
86	14	100
89	11	100
93	7	100
95	5	100
94	6	100
98	2	100
93	7	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	3	5	10	2	4	3	7	
Highest:	155	152	193	131	779	214	113	
Mean:	45	44	57	44	59	42	41	
Median:	33	30	48	40	41	34	35	

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	306	3	309
1996	182	4	186
1997	155	1	156
1998	195	4	199
1999	216	3	219
2000	147	11	158
2001	176	1	177
Total	1377	27	1404

Percentages:

0-99	>99	Total
Normal	Excessive	
99	1	100
98	2	100
99	1	100
98	2	100
99	1	100
93	7	100
99	1	100
98	2	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	3	6	5	6	4	8	5	
Highest:	182	134	107	113	147	505	119	
Mean:	31	36	39	36	38	46	34	
Median:	28	34	35	33	34	34	33	

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	8	38	46
1996	0	6	16	22
1997	0	0	65	65
1998	0	4	38	42
1999	0	6	49	55
2000	0	3	46	49
2001	0	4	44	48
Total	0	31	296	327

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	17	83	100
0	27	73	100
0	0	100	100
0	10	90	100
0	11	89	100
0	6	94	100
0	8	92	100
0	9	91	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.6	0.8	1.3	0.5	0.6	0.6	0.5	
Highest:	56.0	11.4	149.5	61.7	90.7	74.2	32.0	
Mean:	6.5	2.7	7.1	7.1	8.1	8.2	4.5	
Median:	4.2	1.9	3.7	2.9	3.0	3.1	3.0	

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	22	111	176	309
1996	7	84	95	186
1997	4	52	100	156
1998	6	73	120	199
1999	14	63	142	219
2000	5	48	105	158
2001	9	50	118	177
Total	67	481	856	1404

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
7	36	57	100
4	45	51	100
3	33	64	100
3	37	60	100
6	29	65	100
3	30	66	100
5	28	67	100
5	34	61	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.2	0.3	0.3	0.1	0.1	0.1	
Highest:	69.7	7.3	29.5	27.9	21.0	14.5	75.8	
Mean:	2.5	1.4	1.9	1.9	1.6	2.2	2.2	
Median:	1.2	1.1	1.2	1.2	1.3	1.4	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
ATF	Athletic Field

Crop Code	Crop Description
ASP	Asparagus
BDR/BND	Beans-dry
BLU/BLB	Blueberries
BNS	Beans, Snap
BSP	Barley, Spring
CEM	Cemetery
CKP	Cucumber, Transplanted
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
ONS	Onion-seeded
OTH	Other
PAR	Pears
PEP	Peppers
PER	Perennials
POP	Popcorn
POT/PTO	Potatoes
PRK	Park
PSL	Parsley
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
SPB	Spring flowering bulbs
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
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing