Soil Sample Survey

Albany Co.

Samples analyzed by CNAL in 1995-2001



Summary compiled by

Quirine M. Ketterings, Hettie Krol, W. Shaw Reid, Tom Gallagher, and Terry Lavigne



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

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1. General Survey Summary

Albany County is located on the west side of the Hudson River in the eastern part of New York State about 140 miles north of New York City. The county is rectangular in shape being 20 miles wide east to west and 35 miles deep north to south. The county contains two major physiographic regions; the northeastern half of the county lies within the Hudson-Mohawk lowlands, and the southwestern half lies within the Helderberg Mountain section of the Appalachian uplands. Elevations range from mean sea level along the Hudson River at the Port of Albany to 2,180 feet above sea level at Cheese Hill.

The total area of Albany County is 527 square miles or 339,840 acres. About 17% of the land area of the county or 56,782 acres is in farms. There are three cities located in the County one of which is the City of Albany, which is both the County seat and the Capital of New York State.

Over the past few decades both the number of farms and the land being farmed has decreased. Dairy farming has decreased considerably but is still economically important to the county. Part-time and small farms have increased in recent years to produce products to meet the many niche markets in the area. Specialty crops such as sweet corn, vegetables and fruits are grown on large acreage of alluvial soils and in the sand and clay deposits of Old Lake Albany.

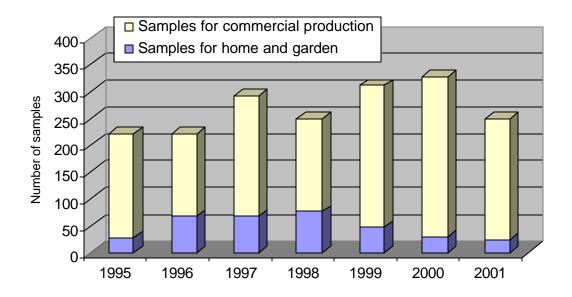
The horticulture industry has been the major growth industry for agriculture in the County with a two fold expansion over the past decade.

Farms and farmland continue to play a vital role in Albany County's communities. Agriculture has many attributes that make it a necessary and a desirable part of a community. Farms contribute to local and regional food supplies, are an important component of the area's tourism industry, contribute to the local and regional economy and are a critical component of the rural character and the quality of life in the county.

In recognition of the important role agriculture plays in the economic and cultural life of many of the residents of Albany County, the Agriculture and Farmland Protection Board has developed an Agriculture and Farmland Protection plan to protect, preserve and

enhance farming in the county. This plan through its long term goals and objectives will help to stabilize and sustain a valuable industry in Albany County.

This survey summarizes the soil test results from Albany 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 1872. Of these 1872 samples, 1532 (82%) were submitted to obtain fertilizer recommendations for commercial production while 340 samples (18%) were submitted as home and garden samples.



Homeowners								
1995	28							
1996	68							
1997	68							
1998	76							
1999	47							
2000	30							
<u>2001</u>	<u>23</u>							
Total	340							

Commercial									
1995	193								
1996	154								
1997	224								
1998	174								
1999	264								
2000	297								
2001	<u>226</u>								
Total	$1\overline{532}$								

Total	
221 222 292 250 311 327 249 1872	

Twenty-seven percent of the home and garden soil samples were submitted to request fertilizer recommendations for lawns. Twenty-one percent of the samples came from athletic fields while 16% asked for recommendations for home garden vegetable production. People submitting samples for commercial production requested fertilizer recommendations for alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (37%), corn silage or grain production (30%), or hay (9%), while a few producers were planning on growing other crops including sweet corn, clover/grass mixtures, small grains and vegetables.

Home and garden samples in Albany County were silty (25%), silt loams (23%), sandy loams (19%), and sandy soils (32%) 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, 55% belonged to soil management group 2. Twenty-four percent were from soil management group 3. Less than 1% belonged to either group 1 or group 6. Eleven percent were classified group 4 and 4% belonged to soil management group 5. The five most common soil series were Nunda

(27%), Burdett (13%), Wassaic (8%), Valois (5%), and Rhinebeck (5%). These soils represent 15% (Nunda), 9% (Burdett), 1% (Wassaic and Valois), and 3% (Rhinebeck) of acres in the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to almost 50% with median values ranging from 2.3 to 3.0% organic matter for home and garden samples and from 3.4 to 3.9 for samples submitted for commercial production. Forty-eight percent of the home and garden samples had between 2.0 and 4.9% organic matter with 23% testing between 2 and 2.9% organic matter, 15% between 3.0 and 3.9% organic matter and 10% 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 29% had less than 2% organic matter. Of the samples submitted for commercial production, 64% contained between 3 and 4% organic matter, 23% tested between 4.0 and 4.9% while 9% had organic matter concentrations of 5.0-5.9%. In total, 37% of the samples had organic matter levels between 4.0 and 6.9% while 63% had less than 4% organic matter.

Soil pH in water (1:1 extraction ratio) varied from pH 4.2 to 8.8 with the median for home and garden samples ranging from pH 6.8 to pH 7.3 and for samples submitted for commercial production ranging from pH 6.2 to pH 6.8. Of the home and garden samples, 53% tested between pH 6.0 and 7.4 while 28% had a pH of 7.5 or higher. For the samples submitted for commercial production, 83% had a pH of 6.0 greater.

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, 10% tested low, 12% tested medium, 41% tested high and 37% tested very high. This meant that 78% tested high or very high in P. Phosphorus levels for samples for commercial production in Albany County were skewed towards low and medium classifications. Twelve percent of the samples tested very high in P. Thirty-eight percent were low in P, 25% tested medium for P while 27% of the submitted samples were

classified as high in soil test P. This means that 38% of the samples submitted for commercial production tested high or very high in phosphorus. There were no clear trends in phosphorus 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. 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	Very low Low Medium High Very H									
1 2 3 4 5 and 6	<35 <40 <45 <55 <60	35-64 40-69 45-79 55-99 60-114	65-94 70-99 80-119 100-149 115-164	95-149 100-164 120-199 150-239 165-269	>149 >164 >199 >239 >269						

Of the home and garden samples, 20% was classified as very low or low in potassium. Sixteen percent tested medium, 24% high and 40% very high. For samples submitted for commercial production, 3% tested very low in K, 19% tested low, 22% tested medium, 26% tested high and 24% tested very high in potassium while the remainder was of unknown classification. 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 almost 9000 lbs Mg/acre (Morgan extraction). There were only five samples that tested very low in Mg. Most soils tested high or very high for Mg (91% of the homeowner soils and 96% of the soils of the commercial growers). No more than 32 of the homeowner soils and 68 of the commercial growers' soil tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Albany 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 95-99% in the normal range with 5% of the home and garden samples and 1% of the samples for commercial production testing excessive for Fe. Similarly, most soils (94-99%) 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 lbs Zinc per acre in the Morgan extraction are classified as low in Zn. Medium testing soils have between 0.5 and 1 lbs 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 zinc. For the home and garden samples, 87% tested high for zinc while 18% tested medium and 4% of the samples were low in zinc. Of the samples for commercial production, 14% tested low in zinc, 46% tested medium while 40% 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:

Crops for which recommendations are requested by noncowners.									
	1995	1996	1997	1998	1999	2000	2001	Total	%
ALG	2	1	2	0	0	0	2	7	2
ATF	0	21	6	17	7	11	8	70	21
BLU	1	0	2	3	0	0	0	6	2
CEM	0	1	0	0	1	0	0	2	1
FAR	0	6	0	2	0	0	0	8	2
FLA	1	2	1	2	2	1	0	9	3
GEN	0	0	1	0	0	0	0	1	0
HRB	3	2	0	0	0	0	0	5	1
IDL	0	0	0	0	0	2	0	2	1
LAW	9	8	14	22	20	11	8	92	27
MVG	5	12	14	11	4	5	3	54	16
OTH	0	0	0	2	1	0	0	3	1
PER	3	7	12	6	4	0	0	32	9
PRK	0	0	0	2	0	0	0	2	1
ROD	0	1	0	0	0	0	0	1	0
ROS	0	0	4	1	0	0	0	5	1
ROU	0	0	1	0	0	0	0	1	0
SAG	2	4	6	8	8	0	2	30	9
SPB	0	0	2	0	0	0	0	2	1
SUB	0	0	1	0	0	0	0	1	0
TRF	1	0	1	0	0	0	0	2	1
Unknown	1	3	1	0	0	0	0	5	1
Total	28	68	68	76	47	30	23	340	100

Notes:

See Appendix for Cornell crop codes.

Crops for which recommendations are requested for commercial production:

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
ABE/ABT	1	0	0	1	1	1	5	9	1
AGE/AGT	86	40	73	60	89	107	79	534	35
ALE/ALT	5	1	0	0	2	7	0	15	1
ASP	0	0	0	0	0	0	2	2	0
BCE/BCT	0	2	0	0	4	2	1	9	1
BGE/BGT	1	1	0	5	1	0	0	8	1
BLB	0	1	0	0	0	0	1	2	0
BNS	0	0	0	0	0	0	1	1	0
BUK	0	0	4	0	0	0	3	7	0
BWS	0	0	0	0	2	0	0	2	0
CBP	0	0	0	0	1	0	0	1	0
CBS	0	0	0	0	0	2	0	2	0
CGE/CGT	0	3	0	3	3	4	4	17	1
CKP	0	1	0	0	0	0	0	1	0
CLE/CLT	0	0	1	1	0	0	0	2	0
COG/COS	39	39	98	57	96	60	74	463	30
GIE/GIT	0	0	2	0	0	14	12	28	2
GPA	0	0	1	0	0	0	0	1	0
GRE/GRT	8	4	9	23	32	36	26	138	9
IDL	0	0	2	0	1	1	2	6	0
LET	0	0	0	0	0	1	0	1	0
MIX	12	3	11	0	7	7	1	41	3
MML	0	1	0	0	0	0	0	1	0
OAS	0	6	1	0	5	2	2	16	1
OAT	1	0	0	0	0	0	0	1	0
ONP	0	1	0	0	0	0	0	1	0
ONS	0	0	0	0	0	1	1	2	0
OTH	0	1	0	2	0	0	1	4	0
PEP	0	1	0	0	0	0	0	1	0
PGE/PGT	1	1	2	0	1	6	1	12	1
PIE/PIT	0	14	0	0	0	0	0	14	1
PLE/PLT	2	0	0	1	0	0	0	3	0
PLM	0	2	0	0	0	0	0	2	0
PNE/PNT	8	8	0	0	0	1	1	18	1
POT	0	1	0	0	0	1	1	3	0

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Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
PUM	5	3	0	1	2	3	1	15	1
RSF	0	1	0	1	0	1	0	3	0
RSS	0	0	1	0	1	2	0	4	0
RYC	0	0	1	0	0	0	1	2	0
RYS	0	0	0	3	0	5	0	8	1
SOY	0	0	2	0	1	0	0	3	0
SQS	0	0	0	0	0	0	2	2	0
SQW	0	0	0	0	0	1	1	2	0
SSH	0	0	0	0	1	0	0	1	0
STS	4	6	2	5	0	7	0	24	2
SWC	17	7	14	10	13	19	0	80	5
TOM	0	2	0	0	0	1	2	5	0
TME	1	0	0	0	0	0	0	1	0
TRE/TRT	0	1	0	0	0	0	0	1	0
WAT	0	1	0	0	0	0	0	1	0
Unknown	2	2	0	1	1	5	1	12	1
Total	193	154	224	174	264	297	226	1532	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)	3	14	17	21	20	9	2	86
SMG 3 (silt loam)	6	13	17	23	10	4	6	79
SMG 4 (sandy loam)	7	15	13	15	6	2	7	65
SMG 5 (sandy)	12	26	21	17	11	15	8	110
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	28	68	68	76	47	30	23	340

Soil series for samples submitted for commercial production:

		500111100	101 00.		Produc				
Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Allis	3	0	1	0	0	0	0	0	1
Angola	2	4	4	4	0	4	3	6	25
Arnot	3	2	0	0	0	0	0	0	22
Burdett	2	33	13	30	24	37	40	24	201
Busti	3	1	0	3	0	0	0	0	4
Castile	4	0	2	0	0	0	2	2	6
Chautauqua	3	7	2	10	0	1	0	0	20
Chenango	3	0	4	10	2	10	2	10	38
Claverack	4	1	1	0	3	0	0	0	5
Colonie	5	14	7	4	0	5	9	12	51
Cosad	4	3	0	0	1	0	0	0	4
Elmridge	5	0	0	1	0	1	0	0	2
Elnora	5	0	1	1	0	0	0	0	2
Farmington	3	4	8	9	7	16	5	11	60
Hamlin	2	1	3	6	5	5	13	6	39
Hornell	2	0	0	4	0	3	0	0	7
Howard	3	4	0	4	1	4	0	4	17
Hudson	2	8	3	1	2	4	3	5	26
Ilion	2	0	0	0	1	4	1	0	6
Kearsarge	3	0	0	1	3	0	3	1	8
Lordstown	3	5	1	1	5	2	0	6	20
Madalin	1	1	0	2	3	0	1	0	7
Manlius	3	1	0	4	1	6	0	0	12
Medihemists	6	0	0	0	0	1	0	0	1
Middlebury	3	0	1	0	0	0	0	2	3
Morris	3	0	0	0	0	1	0	0	1
Nassau	4	0	0	0	0	0	1	0	1
Nunda	2	54	39	52	69	65	73	68	420
Raynham	3	0	0	0	1	0	4	1	6
Rhinebeck	2	4	10	9	9	17	12	19	80
Riverhead	4	2	2	2	1	7	9	0	23
Scio	3	11	0	6	7	11	10	5	50
Sudbury	4	1	2	0	0	0	0	0	3
Teel	2	1	6	1	1	12	7	3	31
Tioga	3	0	1	0	1	2	3	6	13
Tuller	3	0	7	0	1	0	0	0	8

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Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Unadilla	3	2	1	2	0	0	0	0	5
Valois	3	10	2	10	11	17	23	8	81
Wakeland	3	0	0	1	0	0	1	0	2
Wassaic	4	14	10	32	12	4	32	20	124
Wayland	2	0	2	0	0	1	4	0	7
Wellsboro	3	0	0	2	0	2	0	0	4
Unknown	-	5	21	12	3	22	36	7	106
total	-	193	154	224	174	264	297	226	1532

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	1	4	5	3	2	2	2	9	28
1996	5	8	19	12	12	5	2	5	68
1997	5	20	10	7	6	6	3	11	68
1998	5	19	14	16	11	7	1	3	76
1999	5	9	12	9	1	4	3	4	47
2000	4	7	12	3	1	3	0	0	30
2001	2	4	6	2	1	4	1	3	23
Total	27	71	78	52	34	31	12	35	340

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.6	0.3	0.2	0.1	0.2	0.5	0.1	
Highest:	37.5	45.7	31.6	42.7	12.0	5.6	23.1	
Mean:	7.6	4.9	4.3	4.1	3.4	2.4	4.6	
Median:	4.2	3.0	2.9	3.0	2.8	2.3	2.8	

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	4	14	18	11	7	7	7	32	100
1996	7	12	28	18	18	7	3	7	100
1997	7	29	15	10	9	9	4	16	100
1998	7	25	18	21	17	9	1	4	100
1999	11	19	26	19	2	9	6	9	100
2000	13	23	40	10	3	10	0	0	100
2001	9	17	26	9	4	17	4	13	100
Total	8	21	23	15	10	9	4	10	100

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	3	12	19	72	45	24	8	10	193
1996	6	9	25	63	28	13	5	5	154
1997	1	9	41	80	64	20	5	4	224
1998	0	5	29	82	31	17	6	4	174
1999	3	10	57	106	53	20	11	4	264
2000	2	2	58	149	58	16	4	8	297
2001	2	3	31	80	70	31	8	1	226
Total	17	50	260	632	349	141	47	36	1532

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.8	0.6	0.9	1.1	0.6	0.4	0.4	
Highest:	9.4	22.6	10.5	9.7	8.4	49.3	9.4	
Mean:	4.0	3.7	3.8	3.9	3.7	3.9	4.0	
Median:	3.8	3.5	3.7	3.6	3.4	3.5	3.9	

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	2	6	10	37	23	12	4	5	100
1996	4	6	16	41	18	8	3	3	100
1997	0	4	18	36	29	9	2	2	100
1998	0	3	17	47	18	10	3	2	100
1999	1	4	22	40	20	8	4	2	100
2000	1	1	20	50	20	5	1	3	100
2001	1	1	14	35	31	14	4	0	100
Total	1	3	17	41	23	9	3	2	100

5. pH

5.1 Samples for Home and Garden

Number of home and garden samples within each pH range:

	<4.5	4.5- 4.9	5.0- 5.4	5.5- 5.9	6.0- 6.4	6.5- 6.9	7.0- 7.4	7.5- 7.9	8.0- 8.4	>8.4	Total
1995	0	1	1	1	6	6	4	6	2	1	28
1996	0	0	8	8	5	10	13	22	2	0	68
1997	0	0	3	6	11	14	17	17	0	0	68
1998	2	2	5	8	11	12	28	2	5	1	76
1999	0	0	1	4	3	6	18	15	0	0	47
2000	0	1	3	4	1	4	6	9	2	0	30
2001	1	0	4	0	2	2	4	8	2	0	23
Total	3	4	25	31	39	54	90	79	13	2	340

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.8	5.0	5.3	4.0	5.1	4.5	1.9	
Highest:	8.8	8.3	7.9	8.5	7.9	8.1	8.2	
Mean:	-	-	-	-	-	-	-	
Median:	6.9	7.1	7.0	6.8	7.3	7.1	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	4	4	4	21	21	14	21	7	4	100
1996	0	0	12	12	7	15	19	32	3	0	100
1997	0	0	4	9	16	21	25	25	0	0	100
1998	3	3	7	11	14	16	37	3	7	1	100
1999	0	0	2	9	6	13	38	32	0	0	100
2000	0	3	10	13	3	13	20	30	7	0	100
2001	4	0	17	0	9	9	17	35	9	0	100
Total	1	1	7	9	11	16	26	23	4	1	100

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	2	6	28	55	71	25	6	0	0	
1996*	1	2	5	21	46	57	15	4	1	0	
1997*	1	2	14	47	81	62	5	2	0	0	
1998	0	0	4	17	65	66	21	1	0	0	
1999	0	0	14	42	92	85	29	2	0	0	
2000	0	0	1	18	65	111	91	11	0	0	
2001	1	0	4	24	78	80	32	7	0	0	
Total	3								1	0	

^{*} Two and ten samples were not analyzed for pH in 1996 and in 1997, respectively.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.9	4.2	4.4	5.0	5.0	5.3	4.4	
Highest:	7.8	8.3	7.6	7.7	7.5	7.9	7.9	
Mean:	-	-	-	-	-	-	-	
Median:	6.5	6.4	6.2	6.5	6.3	6.8	6.5	

Percent of samples for commercial production within each pH range:

	<4.5	4.5- 4.9	5.0- 5.4	5.5- 5.9	6.0- 6.4	6.5- 6.9	7.0- 7.4	7.5- 7.9	8.0- 8.4	>8.4	Total
1995	0	1	3	15	28	37	13	3	0	0	100
1996	1	1	3	14	30	38	10	3	1	0	100
1997	0	1	7	22	38	29	2	1	0	0	100
1998	0	0	2	10	37	38	12	1	0	0	100
1999	0	0	5	16	35	32	11	1	0	0	100
2000	0	0	0	6	22	37	31	4	0	0	100
2001	0	0	2	11	35	35	14	3	0	0	100
Total	0	0	3	13	32	35	14	2	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	Н	VH	VH	VH	VH	VH	VH	
1995	0	1	4	11	0	0	1	3	0	8	28
1996	0	9	8	24	10	1	4	5	1	6	68
1997	0	6	7	26	13	6	1	2	2	5	68
1998	0	4	10	35	10	3	4	1	4	5	76
1999	0	6	5	20	5	4	2	2	1	2	47
2000	0	2	3	18	5	0	1	0	0	1	30
2001	0	6	3	7	0	1	1	0	2	3	23
Total	0	34	40	141	43	15	14	13	10	30	340

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	1	1	3	1	2	1	
Highest:	1425	1109	569	818	416	244	435	
Mean:	205	90	62	66	50	32	78	
Median:	33	22	29	26	30	20	14	

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	Н	VH	VH	VH	VH	VH	VH	
1995	0	4	14	39	0	0	4	11	0	29	100
1996	0	13	12	35	15	1	6	7	1	9	100
1997	0	9	10	38	19	9	1	3	3	7	100
1998	0	5	13	46	13	4	5	1	5	7	100
1999	0	13	11	43	11	9	4	4	2	4	100
2000	0	7	10	60	17	0	3	0	0	3	100
2001	0	26	13	30	0	4	4	0	9	13	100
Total	0	10	12	41	13	4	4	4	3	9	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	Н	VH	VH	VH	VH	VH	VH	
1995	0	79	41	52	8	5	3	1	0	4	193
1996	0	50	36	50	7	4	2	3	1	1	154
1997	0	74	66	59	10	3	3	4	2	3	224
1998	0	59	45	48	9	7	2	1	0	3	174
1999	0	99	70	80	6	5	3	0	0	1	264
2000	0	100	71	79	22	14	5	2	2	2	297
2001	0	114	47	45	8	5	5	1	0	1	226
Total	0	575	376	413	70	43	23	12	5	15	1532

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:	531	246	355	313	220	783	463	
Mean:	21	18	18	19	12	21	13	
Median:	5	7	6	6	5	6	3	

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	Н	VH	VH	VH	VH	VH	VH	
1995	0	41	21	27	4	3	2	1	0	2	100
1996	0	32	23	32	5	3	1	2	1	1	100
1997	0	33	29	26	4	1	1	2	1	1	100
1998	0	34	26	28	5	4	1	1	0	2	100
1999	0	38	27	30	2	2	1	0	0	0	100
2000	0	34	24	27	7	5	2	1	1	1	100
2001	0	50	21	20	4	2	2	0	0	0	100
Total	0	38	25	27	5	3	2	1	0	1	100

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

7. Potassium

7.1 Samples for Home and Garden

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

Soil Management Group 1										
	<35	35-64	65-94	95-149	>149	Total				
	Very Low	Low	Medium	High	Very High					
1995	0	0	0	0	0	0				
1996	0	0	0	0	0	0				
1997	0	0	0	0	0	0				
1998	0	0	0	0	0	0				
1999	0	0	0	0	0	0				
2000	0	0	0	0	0	0				
2001	0	0	0	0	0	0				
Total (#)	0	0	0	0	0	0				
Total (%)	-	-	-	-	-	-				
		Soil M	lanagement (Group 2						
	<40	40-69	70-99	100-164	>164	Total				
	Very Low	Low	Medium	High	Very High					
1995	0	0	0	0	3	3				
1996	0	0	5	5	4	14				
1997	0	1	1	2	13	17				
1998	0	0	4	5	12	21				
1999	0	1	0	6	13	20				
2000	0	0	2	1	6	9				
2001	0	1	0	0	1	2				
Total (#)	0	3	12	19	52	86				
Total (%)	0	3	14	22	60	100				
		Soil M	Ianagement C	Group 3						
	<45	45-79	80-119	120-199	>199	Total				
	Very Low	Low	Medium	High	Very High					
1995	0	0	1	0	5	6				
1996	1	0	2	4	6	13				
1997	0	1	1	8	7	17				
1998	0	1	0	11	11	23				
1999	1	1	1	1	6	10				
2000	0	2	1	0	1	4				
2001	0	0	1	0	5	6				
Total (#)	2	5	7	24	41	79				
Total (%)	3	6	9	30	52	100				

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		Soil M	Ianagement C	Group 4		
	<55	55-99	100-149	150-239	>239	Total
	Very	Low	Medium	High	Very	
	Low				High	
1995	0	0	1	2	4	7
1996	0	3	2	2	8	15
1997	5	0	0	4	4	13
1998	1	3	2	3	6	15
1999	1	1	0	1	3	6
2000	0	0	0	0	2	2
2001	1	2	1	1	2	7
Total (#)	8	9	6	13	29	65
Total (%)	12	14	9	20	45	100
			Ianagement (
	<60	60-114	115-164	165-269	>269	Total
	Very	Low	Medium	High	Very	
	Low				High	
1995	2	4	3	2	1	12
1996	3	7	7	7	2	26
1997	2	7	6	4	2	21
1998	1	7	6	1	2	17
1999	1	1	2	6	1	11
2000	0	3	4	4	4	15
2001	4	1	2	0	1	8
Total (#)	13	30	30	24	13	110
Total (%)	12	27	27	22	12	100
,			Ianagement C			
	<60	60-114	115-164	165-269	>269	Total
	Very	Low	Medium	High	Very	
	Low				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	5	4	13	28
1996	4	10	16	18	20	68
1997	7	9	8	18	26	68
1998	2	11	12	20	31	76
1999	3	4	3	14	23	47
2000	0	5	7	5	13	30
2001	5	4	4	1	9	23
Total #	23	47	55	80	135	340

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	46	30	7	43	10	45	30	
Highest:	27778	2217	5972	8519	853	676	3393	
Mean:	2735	285	311	556	230	217	370	
Median:	203	154	171	157	210	173	131	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	7	14	18	14	46	100
1996	6	15	24	26	29	100
1997	10	13	12	26	38	100
1998	3	14	16	26	41	100
1999	6	9	6	30	49	100
2000	0	17	23	17	43	100
2001	22	17	17	4	39	100
Grand Total	7	14	16	24	40	100

Number of samples submitted for commercial production within each potassium (lbs K/acre Morgan extraction) range:

	zan extraction	<u>, </u>	Ianagement C	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	0	2	2
1998	0	0	0	0	3	3
1999	0	0	0	0	0	0
2000	0	0	0	0	1	1
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	7	7
Total (%)	0	0	0	0	100	100
		Soil M	Ianagement C	Group 2		
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	7	16	48	34	105
1996	0	12	20	24	24	80
1997	2	23	28	40	14	107
1998	0	7	23	52	29	111
1999	12	34	36	46	24	152
2000	6	34	39	28	49	156
2001	1	40	44	30	16	131
Total (#)	21	157	206	268	190	842
Total (%)	2	19	24	32	23	100
		Soil M	Ianagement C	Group 3		
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	3	12	16	16	47
1996	0	6	8	7	7	28
1997	0	14	15	17	17	63
1998	1	0	7	12	20	40
1999	5	13	19	20	15	72
2000	1	17	8	5	20	51
2001	3	15	13	9	14	54
Total (#)	10	68	82	86	109	355
Total (%)	3	19	23	24	31	100

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		Soil M	Ianagement C	Group 4		
	<55	55-99	100-149	150-239	>239	Total
	Very	Low	Medium	High	Very	10111
	Low	Low.	Wiediani	111611	High	
1995	2	10	4	2	3	21
1996		6	3	3	4	17
1997	0	11	10	3	10	34
1998	1	6	5	5	0	17
1999	0	0	1	3	7	11
2000	4	11	10	4	15	44
2001	6	7	1	1	7	22
Total (#)	14	51	34	21	46	166
Total (%)	8	31	20	13	28	100
			Ianagement C			
	<60	60-114	115-164	165-269	>269	Total
	Very	Low	Medium	High	Very	
	Low			_	High	
1995	0	4	1	8	1	14
1996	0	2	3	2	1	8
1997	2	1	2	1	0	6
1998	0	0	0	0	0	0
1999	0	1	2	3	0	6
2000	0	2	2	1	4	9
2001	0	1	1	2	8	12
Total (#)	2	11	11	17	14	55
Total (%)	4	20	20	31	25	100
		Soil M	Ianagement C			
	<60	60-114	115-164	165-269	>269	Total
	Very	Low	Medium	High	Very	
	Low				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	1	0	1
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	1	0	1
Total (%)	0	0	0	100	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	2	24	33	74	55	5	193
1996	1	26	34	36	36	21	154
1997	4	49	55	61	43	12	224
1998	2	13	35	69	52	3	174
1999	17	48	58	73	46	22	264
2000	11	64	59	38	89	36	297
2001	10	63	59	42	45	7	226
Grand Total	47	287	333	393	366	106	1532

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	44	28	32	44	4	30	34	
Highest:	980	721	651	1184	581	6592	729	
Mean:	194	162	146	194	136	213	143	
Median:	139	126	111	133	109	111	91	

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

% summary	Very Low	Low	Medium	High	Very High	Un- known	Total
1995	1	12	17	38	28	3	100
1996	1	17	22	23	23	14	100
1997	2	22	25	27	19	5	100
1998	1	7	20	40	30	2	100
1999	6	18	22	28	17	8	100
2000	4	22	20	13	30	12	100
2001	4	28	26	19	20	3	100
Grand Total	3	19	22	26	24	7	100

8. Magnesium

8.1 Samples for Home and Garden

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

		1		<i>U U V</i>	<u> </u>	•
	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	1	0	3	5	19	28
1996	0	1	4	14	49	68
1997	0	2	1	16	49	68
1998	0	2	9	5	60	76
1999	0	2	0	8	37	47
2000	0	0	4	10	16	30
2001	1	2	0	2	18	28
Total	2	9	21	60	248	340

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	8	42	41	33	24	86	19	
Highest:	8960	7652	1784	6589	1012	822	1819	
Mean:	1083	540	371	534	375	282	481	
Median:	310	272	285	354	328	247	370	

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

	<20	20-65	66-100	101-199	>199	Total
	Very	Low	Medium	High	Very	
	Low				High	
1995	4	0	11	18	68	100
1996	0	1	6	21	72	100
1997	0	3	1	24	72	100
1998	0	3	12	7	79	100
1999	0	4	0	17	79	100
2000	0	0	13	33	53	100
2001	4	9	0	9	78	100
Total	1	3	6	18	73	100

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	5	3	82	103	193
1996	2	9	3	39	101	154
1997	0	4	3	79	138	224
1998	0	1	4	48	121	174
1999	1	4	17	78	164	264
2000	0	1	4	77	215	297
2001	0	1	6	80	139	226
Total	3	25	40	483	981	1532

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	28	8	24	58	14	55	20	
Highest:	1075	1117	902	993	880	2457	1457	
Mean:	241	255	264	287	281	323	258	
Median:	208	240	238	253	244	282	226	

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	3	2	42	53	100
1996	1	6	2	25	66	100
1997	0	2	1	35	62	100
1998	0	1	2	28	70	100
1999	0	2	6	30	62	100
2000	0	0	1	26	72	100
2001	0	0	3	35	62	100
Total	0	2	3	32	64	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:

		1	
	0-49	>49	Total
	Normal	Excessive	
1995	28	0	28
1996	63	5	68
1997	66	2	68
1998	72	4	76
1999	45	2	47
2000	27	3	30
2001	22	1	23
Total	323	17	340

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	3	2	2	2	1	2	1	
Highest:	45	112	70	152	58	81	4045	
Mean:	12	18	11	15	12	16	187	
Median:	8	8	6	8	7	9	7	

Iron (lbs Fe/acre Morgan extraction) in samples submitted for commercial production:

Total number of samples:

	1					
	0-49	>49	Total			
	Normal	Excessive				
1995	189	4	193			
1996	152	2	154			
1997	219	5	224			
1998	172	2	174			
1999	261	3	264			
2000	295	2	297			
2001	225	1	226			
Total	1513	19	1532			

0-49	>49	Total
Normal	Excessive	
98	2	100
99	1	100
98	2	100
99	1	100
99	1	100
99	1	100
100	0	100
99	1	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	98	50	250	71	105	54	51	
Mean:	8	8	8	6	7	5	6	
Median:	4	5	3	4	5	3	3	

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	25	3	28
1996	64	4	68
1997	64	4	68
1998	73	3	76
1999	44	3	47
2000	28	2	30
2001	22	1	28
Total	320	20	340

0-99	>99	Total
Normal	Excessive	
89	11	100
94	6	100
94	6	100
96	4	100
94	6	100
93	7	100
96	4	100
94	6	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	7	7	10	5	6	6	3	
Highest:	217	221	256	129	172	132	388	
Mean:	43	41	47	37	42	36	56	
Median:	24	35	40	31	36	24	39	

Manganese (lbs Mn/acre Morgan extraction) in samples for commercial production:

Total number of samples:

		1	
	0-99	>99	Total
	Normal	Excessive	
1995	192	1	193
1996	153	1	154
1997	222	2	224
1998	173	1	174
1999	260	4	264
2000	293	4	297
2001	226	0	226
Total	1519	13	1532

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4	1	5	8	5	4	7	
Highest:	117	111	124	122	576	198	79	
Mean:	22	24	25	23	33	21	28	
Median:	19	22	21	19	28	16	27	

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	1	3	24	28
1996	3	15	50	68
1997	5	8	55	68
1998	0	14	62	76
1999	1	12	34	47
2000	2	4	24	30
2001	3	5	15	23
Total	15	61	264	340

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
4	11	86	100
4	22	74	100
7	12	81	100
0	18	82	100
2	26	72	100
7	13	80	100
13	22	65	100
4	18	78	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.4	0.3	0.3	0.6	0.2	0.3	0.3	
Highest:	15.7	103.4	143.6	127.0	155.7	30.6	55.6	
Mean:	6.5	6.2	10.9	8.3	8.3	4.0	7.4	
Median:	5.4	2.3	4.5	2.5	2.5	1.8	2.7	

Zinc (lbs Zn/acre Morgan extraction) in samples for commercial production:

Total number of samples:

			1	
	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	32	74	87	193
1996	25	70	59	154
1997	33	107	84	224
1998	36	88	50	174
1999	24	108	132	264
2000	46	125	126	297
2001	26	126	74	226
Total	222	698	612	1532

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
17	38	45	100
16	45	38	100
15	48	38	100
21	51	29	100
9	41	50	100
15	42	42	100
12	56	33	100
14	46	40	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.8	0.1	0.1	0.1	0.1	0.1	
Highest:	77.3	136.5	9.6	14.3	14.6	49.8	9.4	
Mean:	2.1	3.1	1.1	1.1	1.4	1.4	1.1	
Median:	0.9	0.9	0.9	0.8	1.0	0.9	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
	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	
ASP	Apples
ASF	Asparagus

Crop Code Cr	rop Description
ATF	Athletic Field
BDR/BND	Beans-dry
BLU/BLB	Blueberries
CBP	Cabbage, Transplanted
CBS	Cabbage, Seeded
CEM	Cemetery
CKP	Cucumber, Transplanted
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GPA	Grapes, American
GRA	Grapes (homeowners)
GEN	Green
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
ONP	Onions, Transplanted
ONS	Onions, Seeded
OTH	Other
PAR	Pears
PEP	Peppers
PER	Perennials
PLM	Plums
POP	Popcorn
POT/PTO	Potatoes
PRK	Park
PUM	Pumpkins
ROD	Roadside
ROS	Roses
ROU	Rough
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5
SQS	Squash, Summer
SQW	Squash, Winter

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