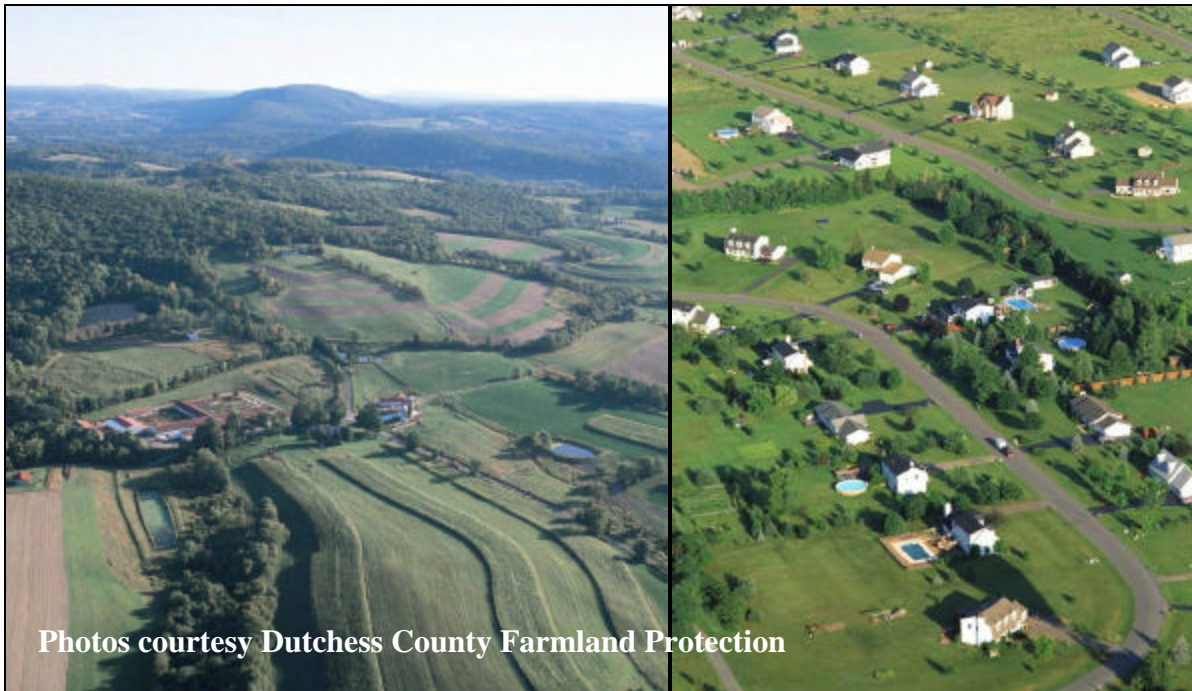


Soil Sample Survey

Dutchess Co.

Samples analyzed by CNAL in 1995-2001



Summary compiled by

Quirine M. Ketterings, Hettie Krol, W. Shaw Reid, Stephanie D. Mallozzi



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

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Table of Content

1. County Introduction.....	4
2. General Survey Summary.....	6
3. Cropping Systems	11
3.1 Samples for Home and Garden.....	11
3.2 Samples for Commercial Production.....	12
4. Soil Types	14
4.1 Samples for Home and Garden.....	14
4.2 Samples for Commercial Production.....	15
5. Organic Matter	16
5.1 Samples for Home and Garden.....	16
5.2 Samples for Commercial Production.....	17
6. pH	18
6.1 Samples for Home and Garden.....	18
6.2 Samples for Commercial Production.....	19
7. Phosphorus.....	20
7.1 Samples for Home and Garden.....	20
7.2 Samples for Commercial Production.....	21
8. Potassium	22
8.1 Samples for Home and Garden.....	22
8.2 Samples for Commercial Production.....	25
9. Magnesium	28
9.1 Samples for Home and Garden.....	28
9.2 Samples for Commercial Production.....	29
10. Iron.....	30
10.1 Samples for Home and Garden.....	30
10.2 Samples for Commercial Production.....	31
11. Manganese	32
11.1 Samples for Home and Garden.....	32
11.2 Samples for Commercial Production.....	33
12. Zinc	34
12.1 Samples for Home and Garden.....	34
12.2 Samples for Commercial Production.....	35
Appendix: Cornell Crop Codes	36

1. County Introduction

Dutchess County is in the easternmost part of the mid-Hudson Valley in New York State. It is bounded to the north by Columbia County, to the west by the Hudson River, to the south by Putnam County and to the east by the state of Connecticut. The county covers 514,600 acres (804 square miles). The city of Poughkeepsie is the county seat located in the west-central portion along the Hudson River. Dutchess County is divided into two major physiographic units: the Valley and Ridge Province, and the New England Province. The Valley and Ridge Province includes the Hudson Lowlands and the Low Taconics. The New England Province includes the High Taconics, the Housatonic Highlands, and the Hudson Highlands.

Winters are cold and summers are warm in Dutchess County. In most years, precipitation is near normal and it is usually adequate for most crops. Generally, the first frost occurs around October 1st and that last frost occurs around May 15th. Winter temperatures average 26°F (average daily minimum temperature is 16°F) and summer temperatures average 68°F (average highest temperatures is 80°F).

Dutchess County has an adequate supply of groundwater and surface water supplied by numerous streams, wetlands, aquifers, and ponds. Water uses include agricultural, industrial, commercial, municipal and domestic. The largest source of water is the Hudson River.

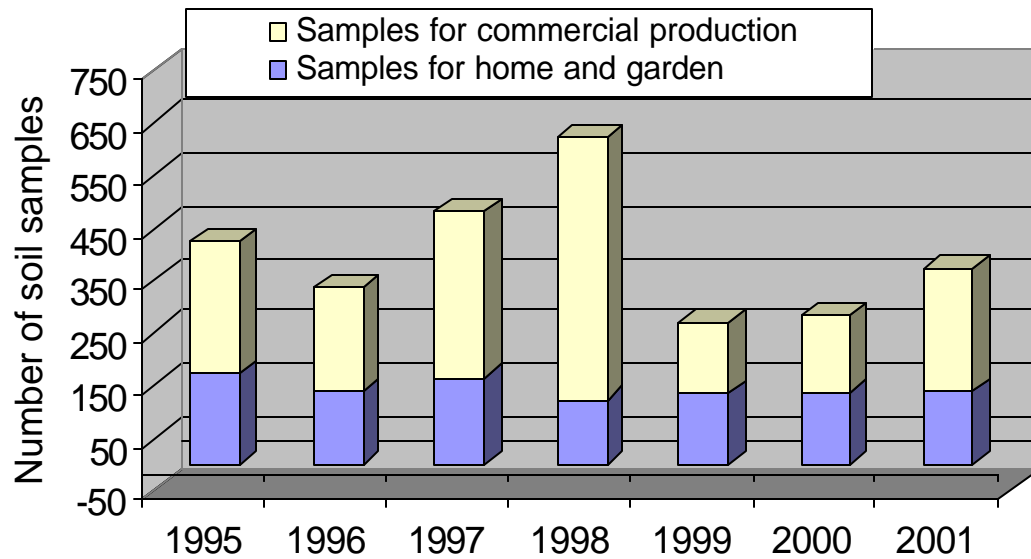
Soil units found in Dutchess County include ten major types. They vary from moderately well drained to very poorly drained and can be sandy to clay. According to the US Department of Agriculture Soil Survey, Dutchess County contains about 65,621 acres of prime farmland. This is about 12% of the total acreage. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland can be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. Another 50,000 plus acres are farmed on marginal or less than prime farmland. The top five agricultural commodities in the County include: dairy products, nursery and greenhouse crops, horses and ponies, vegetables, and cattle and calves.

Ketterings, Q.M., H. Krol, W.S. Reid and Stephanie D. Mallozzi (2004). Dutchess County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-24. 39 pages.

With a population of almost 250,000 people, Dutchess County is a county in transition. Whereas farmland was the predominant form of land use as little as 50 years ago, today the county struggles to maintain and preserve existing farmland. According to the Dutchess County Agricultural and Farmland Protection Board, there were 275 dairy farms in 1972. Today there are less than 40. With close proximity to urban centers such as New York City and Westchester County, the southern part of Dutchess County has become very suburban/urban, while the northern parts of the county remain somewhat rural. Throughout the county however, housing developments have sprouted with alarming frequency and thus the county is faced with many issues such as water quality, soil erosion, deterioration of open space, poor planning, traffic congestion and overcrowded schools.

2. General Survey Summary

This survey summarizes the soil test results from Dutchess 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 2794. Of these 2794 samples, 1774 (63%) were submitted to obtain fertilizer recommendations for commercial production while 1020 samples (37%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	173	1995	250	423
1996	140	1996	198	338
1997	167	1997	316	483
1998	124	1998	498	622
1999	136	1999	135	271
2000	138	2000	145	283
<u>2001</u>	<u>142</u>	<u>2001</u>	<u>232</u>	<u>374</u>
Total	1020	Total	1774	2794

Twenty-seven percent of the home and garden samples were submitted to request fertilizer recommendations for lawns while another 23% came from mixed vegetable gardens. Other samples were sent in to request recommendations for azaleas, apricots, athletic fields, flowering annuals, greens, herbs, grapes, roses, ornamentals adapted to pH 6.0 to pH 7.5, and tree fruits. People submitting samples for commercial production requested fertilizer recommendations for alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (26%), corn silage or grain production (24%), pasture (14%), and hay production (12%), while the remainder of the samples was sent to the laboratory to request recommendations for other crops including apples, clover/grass or clover/legume mixtures, grapes, small grains, and sweet corn.

Home and garden samples in Tompkins County were silty (18%), silt loams (22%), sandy loams (46%), or sandy (14%), 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, 66% belonged to soil management group 4 while 25% were classified group 3, 1% was from soil management group 2 and only 3 samples belonged to soil management group 5. The remainder was of unknown classification. The five most common soil series were Stockbridge (21%), Dutchess (16%), Bernardston (13%), Pittstown (7%), and Hoosic (7%). These soils represent 9% (Stockbridge), 15% (Dutchess), 3% (Bernardston), 1% (Pittstown) and 6% (Hoosic) of the 514,600 acres in the county. Stockbridge, Dutchess, Bernardston, and Pittstown are silt loam soils that are classified as prime farmland in the county.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to almost 60% (most likely an organic soil or amendment) with median values ranging from 3.5 to 4.8% organic matter for home and garden samples and from 3.6 to 3.8% for samples submitted for commercial production. Fifty-five percent of the home and garden samples had between 2.0 and 4.9% organic matter with 16% testing between 2.0 and 2.9% organic matter, 20% between 3.0 and 3.9% organic matter and another 20% between 4.0 and 4.9% organic matter. Thirty-eight percent of the soils submitted for home and garden tested >4.9% in organic matter while 7% of the samples had less than 2.0% organic matter. Of the samples submitted for commercial production, 44% contained between 3.0 and 3.9% organic matter, 27% tested between 4.0 and 4.9% while 8% had organic matter concentrations of 5.0-5.9%. Sixteen percent had less than 3.0% organic matter while 5% of the samples had 6.0% or more organic matter. In total, 85% of the samples had organic matter levels between 2.0 and 4.9%.

Soil pH in water (1:1 extraction ratio) varied from pH 4.0 to pH 8.4 with the median for home and garden samples ranging from pH 6.4 to pH 6.8 and for samples submitted for commercial production ranging from pH 6.3 to pH 6.4. Of the home and garden samples, 66% tested between pH 6.0 and pH 7.4. For the samples submitted for commercial production, this was 74% while 23% tested between pH 5.0 and pH 5.9.

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

Soil test P levels of <1 lb P/acre are classified as very low. Between 1-3 lbs P/acre is low. Medium is between 4-8 lbs P/acre. High testing soils have P levels between 9 and 39 lbs P/acre and soils with >39 lbs P/acre are classified as very high. Of the home and garden samples, 10% tested low, 14% tested medium, 34% tested high and 42% tested very high. This meant that 76% tested high or very high in P. Of the samples submitted for commercial production, 24% tested low in P. Thirty percent were medium in P, 40% tested high while 6% of the samples were very high in P. In total, 46% of the samples tested high or very high in P. There were no clear trends over the 7 years.

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

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

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

Of the home and garden samples, 2% were classified as very low, 11% were low in potassium, 16% tested medium, another 23% were high and 49% were very high in potassium. For samples submitted for commercial production, 3% tested very low, 14% tested low, 20% were medium, 26% tested high and 34% tested very high in potassium while the remainder was of unknown K fertility 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 8 to 8403 lbs Mg/acre (Morgan extraction) with the median for home and garden samples ranging from 396 to 529 lbs Mg/acre and the median for commercial samples ranging from 370 to 462 lbs Mg/acre. There were only 5 samples in the combined datasets that tested very low in Mg. Most soils tested high or very high for magnesium (97% of the homeowner soils and 98% of the soils of the commercial growers). Thus magnesium deficiency is not likely to occur given the 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. Ninety-eight percent of the home and garden samples were classified as normal in Fe while 99% of the commercial samples tested in the normal range for Fe. Similarly, almost all soils (90% of the home and garden samples and 98% of the commercial samples) tested normal for manganese. Anything less than 100 lbs Mn per acre is classified as normal. Soils with more than 100 lbs Morgan extractable Mn per acre are classified as excessive in Mn. Two percent of the commercial samples and 10% of the home and garden samples were excessive in Mn. Soils with less than 0.5 lb zinc per acre in the Morgan extraction are classified as low in Zn. Medium testing soils have between 0.5 and 1 lb of Morgan extractable Zn per acre. If more than 1 lb of Zn/acre is extracted with the Morgan solution, the soil tests high in Zn. For the home and garden samples, 2% tested low for zinc while 11% tested medium and 87% tested high for zinc. Of the samples for commercial production, 5% tested low in zinc, 26% tested medium while 69% of the samples were high in zinc.

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

Reference

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

3. Cropping Systems

3.1 Samples for Home and Garden

Crops for which recommendations are requested by homeowners:

	1995	1996	1997	1998	1999	2000	2001	Total	%
ALG	21	7	2	7	10	7	5	59	6
APR	0	5	0	0	1	0	1	7	1
ATF	10	2	3	2	6	10	5	38	4
BLU	1	0	0	1	0	1	0	3	0
FLA	1	7	8	2	11	0	0	29	3
GEN	0	0	0	1	0	0	0	1	0
GRA	0	0	2	1	1	1	2	7	1
HRB	1	2	2	0	0	1	1	7	1
LAW	41	41	45	36	33	51	29	276	27
MVG	30	33	53	33	29	22	35	235	23
OTH	17	7	3	1	4	3	6	41	4
PER	22	12	13	7	15	14	24	107	10
PTO	0	1	0	0	0	0	0	1	0
ROS	9	2	5	5	5	4	8	38	4
RSP	0	1	0	1	0	0	2	4	0
SAG	20	19	30	25	17	24	20	155	15
SPB	0	0	0	0	1	0	0	1	0
SUB	0	0	0	0	1	0	0	1	0
TOM	0	0	1	0	0	0	0	1	0
TRF	0	1	0	2	2	0	3	8	1
Unknown	0	0	0	0	0	0	1	1	0
Total	173	140	167	124	136	138	142	1020	100

Notes:

See Appendix for Cornell crop codes.

3.2 Samples for Commercial Production

Crops for which recommendations are requested for commercial production:

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
ABE/ABT	2	0	0	2	0	1	1	6	0
AGE/AGT	47	55	99	134	26	27	51	439	25
ALE/ALT	2	2	0	3	4	1	6	18	1
APP	37	0	0	14	1	0	5	57	3
ASP	1	0	0	1	0	0	0	2	0
BCE/BCT	0	0	0	1	1	0	0	2	0
BGE/BGT	6	1	0	0	1	0	2	10	1
BLB	0	1	0	0	0	0	2	3	0
BSP	0	0	2	0	0	0	0	2	0
BUK	0	0	3	1	0	0	0	4	0
BWI	0	0	0	2	0	0	0	2	0
CGE/CGT	0	0	11	8	5	2	2	28	2
CLE/CLT	0	0	3	1	1	1	8	14	1
COG/COS	40	17	90	172	27	32	53	431	24
GIE/GIT	0	0	0	1	1	0	0	2	0
GPA	0	0	0	3	0	1	0	4	0
GPF	0	0	0	0	2	2	0	4	0
GPV	0	0	7	2	5	0	0	14	1
GRE/GRT	19	22	29	48	22	34	44	218	12
IDL	0	4	0	1	1	1	0	7	0
MIX	12	3	8	7	3	9	4	46	3
OAS	0	7	1	1	0	5	0	14	1
OAT	0	8	11	5	1	0	0	25	1
ONP	0	0	0	0	1	0	0	1	0
OTH	17	0	1	4	0	0	0	22	1
PAR	2	0	0	0	0	0	0	2	0
PCH	0	0	0	0	0	0	4	4	0
PEP	0	0	0	0	0	0	1	1	0
PGE/PGT	16	44	8	26	10	17	24	145	8
PIE/PIT	0	4	5	4	0	0	1	14	1
PLE/PLT	12	4	6	7	6	1	6	42	2
PNE/PNT	20	9	7	14	2	2	7	61	3
POT	2	3	0	0	0	0	0	5	0
PUM	1	0	0	2	0	2	1	6	0
RSF	0	0	0	0	1	0	0	1	0

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
RSP	0	0	0	0	0	1	0	1	0
RSS	1	0	0	0	0	0	0	1	0
RYC	0	0	4	3	0	1	1	9	1
RYS	0	0	1	4	0	0	0	5	0
SOF	0	1	0	2	0	0	0	3	0
SOG	2	0	2	0	2	0	0	6	0
SOY	0	0	0	1	0	0	2	3	0
SSH	0	3	1	2	0	0	0	6	0
STS	0	0	1	2	0	0	0	3	0
SUN	0	0	0	1	0	0	0	1	0
SWC	9	1	1	13	3	1	1	29	2
TOM	0	0	0	1	0	0	1	2	0
TRE/TRT	1	3	7	3	0	0	0	14	1
WAT	0	0	0	0	0	0	1	1	0
WPT	0	0	0	0	1	0	0	1	0
WHT	0	4	2	0	0	0	0	6	0
Unknown	1	2	6	2	8	4	4	27	2
Total	250	198	316	498	135	145	232	1774	100

Notes:

See Appendix for Cornell crop codes.

4. Soil Types

4.1 Samples for Home and Garden

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

	1995	1996	1997	1998	1999	2000	2001	Total	%
SMG 1 (clayey)	0	0	0	0	0	0	0	0	0
SMG 2 (silty)	16	28	35	28	17	27	28	179	18
SMG 3 (silt loam)	36	25	39	29	38	24	35	226	22
SMG 4 (sandy loam)	99	67	74	50	63	63	54	470	46
SMG 5 (sandy)	22	20	19	17	18	24	25	145	14
SMG 6 (mucky)	0	0	0	0	0	0	0	0	0
Total	173	140	167	124	136	138	142	1020	100

4.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total	%
Bernardston	4	64	28	31	35	19	13	35	225	13
Canandaigua	3	6	0	0	2	0	0	0	8	0
Charlton	4	9	2	6	14	0	0	1	32	2
Chatfield	4	0	1	1	3	0	0	0	5	0
Copake	4	28	13	9	18	5	25	4	102	6
Dutchess	4	33	20	38	105	38	6	41	281	16
Farmington	3	0	0	0	2	1	0	1	4	0
Fredon	4	0	2	2	1	1	2	1	9	1
Galway	4	13	25	4	0	1	0	0	43	2
Georgia	4	11	9	35	22	4	8	17	106	6
Halsey	4	0	0	0	0	1	0	0	1	0
Haven	4	0	0	2	0	4	0	1	7	0
Hollis	4	11	0	0	4	1	0	0	16	1
Hoosic	4	7	16	17	32	6	24	18	120	7
Hudson	2	0	1	0	0	0	0	3	4	0
Knickerbocker	5	0	0	0	0	0	0	3	3	0
Linlithgo	3	0	13	4	0	5	10	7	39	2
Massena	4	0	5	6	2	5	5	5	28	2
Nassau	4	9	1	19	22	10	0	9	70	4
Pawling	4	0	1	0	2	0	1	1	5	0
Pittstown	4	5	36	24	9	8	9	30	121	7
Punsit	3	0	0	0	1	0	8	0	9	1
Raynham	3	0	0	0	3	0	0	0	3	0
Rhinebeck	2	4	0	0	0	1	0	6	11	1
Stockbridge	3	25	10	105	168	14	22	36	380	21
Sun	4	0	0	1	1	0	0	0	2	0
Wayland	2	0	1	1	1	2	4	2	11	1
Unknown	-	25	14	11	51	9	8	11	129	7
Total	-	250	198	316	498	135	145	232	1774	100

5. Organic Matter

5.1 Samples for Home and Garden

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	1	8	29	40	31	26	15	23	173
1996	1	5	22	21	40	21	12	18	140
1997	1	11	24	27	36	24	19	25	167
1998	4	10	19	27	23	15	8	18	124
1999	0	4	18	25	34	18	13	24	136
2000	3	18	28	34	18	12	6	19	138
2001	2	8	19	27	17	19	12	38	142
Total	12	64	159	201	199	135	85	165	1020

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.8	0.9	0.5	0.6	1.0	0.8	0.4	
Highest:	28.6	31.4	30.3	57.8	22.4	37.2	41.0	
Mean:	4.8	4.9	4.9	5.0	5.3	4.6	6.0	
Median:	4.1	4.3	4.6	4.1	4.5	3.5	4.8	

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	1	5	17	23	18	15	9	13	100
1996	1	4	16	15	29	15	9	13	100
1997	1	7	14	16	22	14	11	15	100
1998	3	8	15	22	19	12	6	15	100
1999	0	3	13	18	25	13	10	18	100
2000	2	13	20	25	13	9	4	14	100
2001	1	6	13	19	12	13	8	27	100
Total	1	6	16	20	20	13	8	16	100

5.2 Samples for Commercial Production

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	1	9	35	116	64	15	7	3	250
1996	1	2	26	83	67	11	7	1	198
1997	0	5	25	153	88	24	12	9	316
1998	1	13	90	211	133	33	11	6	498
1999	0	4	22	52	36	14	3	4	135
2000	0	1	14	71	39	11	6	3	145
2001	0	4	37	87	60	26	16	2	232
Total	3	38	249	773	487	134	62	28	1774

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.7	0.8	1.1	0.9	1.2	1.9	1.1	
Highest:	10.6	7.4	10.1	9.5	13.9	27.2	8.8	
Mean:	3.7	3.9	4.0	3.8	3.9	4.2	4.0	
Median:	3.6	3.8	3.8	3.6	3.6	3.7	3.8	

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	4	14	46	26	6	3	1	100
1996	1	1	13	42	34	6	4	1	100
1997	0	2	8	48	28	8	4	3	100
1998	0	3	18	42	27	7	2	1	100
1999	0	3	16	39	27	10	2	3	100
2000	0	1	10	49	27	8	4	2	100
2001	0	2	16	38	26	11	7	1	100
Total	0	2	14	44	27	8	3	2	100

6. pH

6.1 Samples for Home and Garden

Number of home and garden samples within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	3	12	14	28	37	47	30	2	0	173
1996	0	3	9	17	28	48	28	7	0	0	140
1997	5	11	16	21	41	35	30	7	1	0	167
1998	1	4	7	12	29	39	29	2	1	0	124
1999	1	4	7	18	21	33	36	15	1	0	136
2000	0	4	13	20	19	25	24	27	6	0	138
2001	1	4	8	12	25	31	37	23	1	0	142
Total	8	33	72	114	191	248	231	111	12	0	1020

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.6	4.7	4.0	4.3	4.0	4.9	4.4	
Highest:	8.3	7.9	8.2	8.3	8.3	8.4	8.0	
Mean:	-	-	-	-	-	-	-	
Median:	6.8	6.6	6.4	6.6	6.7	6.7	6.8	

Percent of home and garden samples within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	2	7	8	16	21	27	17	1	0	100
1996	0	2	6	12	20	34	20	5	0	0	100
1997	3	7	10	13	25	21	18	4	1	0	100
1998	1	3	6	10	23	31	23	2	1	0	100
1999	1	3	5	13	15	24	26	11	1	0	100
2000	0	3	9	14	14	18	17	20	4	0	100
2001	1	3	6	8	18	22	26	16	1	0	100
Total	1	3	7	11	19	24	23	11	1	0	100

6.2 Samples for Commercial Production

Number of samples for commercial production within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	3	11	13	35	68	93	20	6	1	0	250
1996	0	2	10	24	67	75	19	1	0	0	198
1997	0	3	16	76	105	94	21	1	0	0	316
1998*	0	6	25	79	175	155	43	6	0	0	489
1999	0	4	8	29	43	43	7	1	0	0	135
2000	0	2	12	18	41	54	15	3	0	0	145
2001	0	2	20	31	82	76	20	1	0	0	232
Total	3	30	104	292	581	590	145	19	1	0	1765

* Nine samples were not analyzed for pH in 1998.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4.4	4.7	4.5	4.7	4.6	4.8	4.9	
Highest:	8.3	7.5	7.8	7.7	7.5	7.9	7.6	
Mean:	-	-	-	-	-	-	-	
Median:	6.4	6.4	6.3	6.4	6.3	6.4	6.3	

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	1	4	5	14	27	37	8	2	0	0	100
1996	0	1	5	12	34	38	10	1	0	0	100
1997	0	1	5	24	33	30	7	0	0	0	100
1998	0	1	5	16	32	32	9	1	0	0	100
1999	0	3	6	21	32	32	5	1	0	0	100
2000	0	1	8	12	28	37	10	2	0	0	100
2001	0	1	9	13	35	33	9	0	0	0	100
Total	0	2	6	17	33	33	8	1	0	0	100

7. Phosphorus

7.1 Samples for Home and Garden

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

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
1995	0	31	21	59	16	9	4	13	8	12	173
1996	0	6	15	49	16	8	5	14	10	17	140
1997	0	15	18	61	31	9	6	7	3	17	167
1998	0	11	26	38	13	9	3	6	3	15	124
1999	0	8	19	46	13	9	8	10	6	17	136
2000	0	21	23	49	12	8	1	3	7	14	138
2001	0	13	18	43	10	7	7	6	7	31	142
Total	0	105	140	345	111	59	34	59	44	123	1020

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:	1452	524	802	1139	797	1592	1023	
Mean:	66	86	64	81	90	77	130	
Median:	20	40	33	22	37	21	34	

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	18	12	34	9	5	2	8	5	7	100
1996	0	4	11	35	11	6	4	10	7	12	100
1997	0	9	11	37	19	5	4	4	2	10	100
1998	0	9	21	31	10	7	2	5	2	12	100
1999	0	6	14	34	10	7	6	7	4	13	100
2000	0	15	17	36	9	6	1	2	5	10	100
2001	0	9	13	30	7	5	5	4	5	22	100
Total	0	10	14	34	11	6	3	6	4	12	100

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

7.2 Samples for Commercial Production

Number of samples submitted for commercial production within each Morgan extractable phosphorus (lbs P/acre) range:

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
1995	0	96	48	92	9	2	1	1	0	1	250
1996	0	45	69	71	11	1	0	0	0	1	198
1997	0	86	110	98	15	4	2	1	0	0	361
1998	0	69	154	241	21	5	4	1	2	1	498
1999	0	28	41	56	5	3	1	0	0	1	135
2000	0	46	43	44	6	2	1	0	2	1	145
2001	0	59	66	99	4	0	0	0	0	4	232
Total	0	429	531	701	71	17	9	3	4	9	1774

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:	389	301	105	352	283	1466	522	
Mean:	13	14	12	16	16	23	18	
Median:	6	7	6	10	8	6	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	38	19	37	4	1	0	0	0	0	100
1996	0	23	35	36	6	1	0	0	0	1	100
1997	0	27	35	31	5	1	1	0	0	0	100
1998	0	14	31	48	4	1	1	0	0	0	100
1999	0	21	30	41	4	2	1	0	0	1	100
2000	0	32	30	30	4	1	1	0	1	1	100
2001	0	25	28	43	2	0	0	0	0	2	100
Total	0	24	30	40	4	1	1	0	0	1	100

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

8. Potassium

8.1 Samples for Home and Garden

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

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	2	4	1	9	16
1996	0	3	2	4	19	28
1997	0	1	1	8	25	35
1998	0	3	0	3	22	28
1999	0	1	3	6	7	17
2000	0	3	4	7	13	27
2001	1	3	4	3	17	28
Total (#)	1	16	18	32	112	179
Total (%)	1	9	10	18	63	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	3	10	10	13	36
1996	1	4	1	5	14	25
1997	1	2	3	10	23	39
1998	0	3	8	5	13	29
1999	0	3	4	9	22	38
2000	0	2	5	6	11	24
2001	0	0	2	7	26	35
Total (#)	2	17	33	52	122	226
Total (%)	1	8	15	23	54	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	6	18	24	51	99
1996	1	5	13	20	28	67
1997	1	8	17	16	32	74
1998	0	6	10	17	17	50
1999	1	6	7	12	37	63
2000	4	9	11	11	28	63
2001	1	4	9	11	29	54
Total (#)	8	44	85	111	222	470
Total (%)	2	9	18	24	47	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	4	3	11	4	22
1996	0	3	5	3	9	20
1997	0	3	1	2	13	19
1998	1	6	1	3	6	17
1999	3	4	3	6	2	18
2000	1	6	8	4	5	24
2001	1	5	6	10	3	25
Total (#)	6	31	27	39	42	145
Total (%)	4	21	19	27	29	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

Number of home and garden samples within each potassium classification:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
1995	0	15	35	46	77	173
1996	2	15	21	32	70	140
1997	2	14	22	36	93	167
1998	1	18	19	28	58	128
1999	4	14	17	33	68	136
2000	5	20	28	28	57	138
2001	3	12	21	31	75	142
Total #	17	108	163	234	498	1020

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	58	28	10	45	11	29	32	
Highest:	7774	3059	1779	2099	5371	7873	3376	
Mean:	323	349	293	297	369	318	420	
Median:	198	206	235	195	231	178	248	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	0	9	20	27	45	100
1996	1	11	15	23	50	100
1997	1	8	13	22	56	100
1998	1	15	15	23	47	100
1999	3	10	13	24	50	100
2000	4	14	20	20	41	100
2001	2	8	15	22	53	100
Grand Total	2	11	16	23	49	100

8.2 Samples for Commercial Production

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

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	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	4	3	7
1996	0	0	1	0	1	2
1997	0	0	1	0	0	1
1998	0	2	1	5	7	15
1999	0	0	1	3	1	5
2000	2	1	0	0	2	5
2001	0	1	5	2	3	11
Total (#)	2	4	9	14	17	46
Total (%)	4	9	20	30	37	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	3	2	5	22	32
1996	0	2	4	11	6	23
1997	1	11	19	36	47	114
1998	0	11	41	52	97	201
1999	0	2	6	7	8	23
2000	1	5	7	11	10	34
2001	1	5	3	18	17	44
Total (#)	3	39	82	140	207	471
Total (%)	1	8	17	30	44	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	5	35	38	55	57	190
1996	4	32	40	50	33	159
1997	14	39	45	36	61	195
1998	0	33	60	64	113	270
1999	0	9	26	37	31	103
2000	12	17	21	21	30	101
2001	5	36	30	45	47	163
Total (#)	40	201	260	308	372	1181
Total (%)	3	17	22	26	31	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	1	0	0	0	1
1998	0	0	0	0	1	1
1999	0	0	0	0	0	0
2000	0	0	0	1	0	1
2001	0	0	0	1	2	3
Total (#)	0	1	0	2	3	6
Total (%)	0	17	0	33	50	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

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

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	5	38	40	64	82	21	250
1996	4	34	45	61	40	14	198
1997	15	51	65	72	108	5	316
1998	0	46	102	121	218	11	498
1999	0	11	33	47	40	4	135
2000	15	23	28	33	42	4	145
2001	6	42	38	66	69	11	232
Grand Total	45	245	351	464	599	70	1774

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	37	27	36	58	59	18	32	
Highest:	1322	1179	1188	971	848	6783	1011	
Mean:	228	192	199	228	217	247	196	
Median:	180	156	158	197	182	154	160	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	2	15	16	26	33	8	100
1996	2	17	23	31	20	7	100
1997	5	16	21	23	34	2	100
1998	0	9	20	24	44	2	100
1999	0	8	24	35	30	3	100
2000	10	16	19	23	29	3	100
2001	3	18	16	28	30	5	100
Grand Total	3	14	20	26	34	4	100

9. Magnesium

9.1 Samples for Home and Garden

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	1	16	155	173
1996	0	0	3	9	128	140
1997	0	8	2	21	136	167
1998	0	1	2	12	109	124
1999	0	1	3	10	122	136
2000	0	4	3	21	110	138
2001	0	0	6	10	126	142
Total	0	15	20	99	886	1020

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	47	93	27	63	46	48	67	
Highest:	4364	2244	3836	1855	3914	8405	2276	
Mean:	562	549	489	501	641	570	616	
Median:	423	492	396	468	529	420	513	

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	1	1	9	90	100
1996	0	0	2	6	91	100
1997	0	5	1	13	81	100
1998	0	1	2	10	88	100
1999	0	1	2	7	90	100
2000	0	3	2	15	80	100
2001	0	0	4	7	89	100
Total	0	1	2	10	87	100

9.2 Samples for Commercial Production

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	4	10	4	22	210	250
1996	0	3	3	15	177	198
1997	0	1	3	23	289	316
1998	0	4	6	54	434	498
1999	0	2	2	14	117	135
2000	0	2	4	15	124	145
2001	1	3	2	21	205	232
Total	5	25	24	164	1556	1774

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	8	41	35	34	39	20	17	
Highest:	1832	2333	1221	1048	1112	5933	1122	
Mean:	393	507	393	387	419	448	420	
Median:	395	462	391	370	405	414	417	

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	2	4	2	9	84	100
1996	0	2	2	8	89	100
1997	0	0	1	7	91	100
1998	0	1	1	11	87	100
1999	0	1	1	10	87	100
2000	0	1	3	10	86	100
2001	0	1	1	9	88	100
Total	0	1	1	9	88	100

10. Iron

10.1 Samples for Home and Garden

Iron (lbs Fe/acre Morgan extraction) in samples for home and garden:

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
1995	171	2	173
1996	138	2	140
1997	156	11	167
1998	123	1	124
1999	135	1	136
2000	135	3	138
2001	137	5	142
Total	995	25	1020

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	99	1	100
	99	1	100
	93	7	100
	99	1	100
	99	1	100
	98	2	100
	96	4	100
	98	2	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	89	63	178	55	57	180	118	
Mean:	8	8	14	7	7	10	10	
Median:	4	4	5	4	5	4	5	

10.2 Samples for Commercial Production

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
1995	244	6	250
1996	196	2	198
1997	315	1	316
1998	498	0	498
1999	132	3	135
2000	144	1	145
2001	231	1	232
Total	1760	14	1774

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	98	2	100
	99	1	100
	100	0	100
	100	0	100
	98	2	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:	207	63	63	39	227	57	71	
Mean:	9	6	5	4	9	5	5	
Median:	4	3	3	3	5	3	3	

11. Manganese

11.1 Samples for Home and Garden

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
1995	158	15	173
1996	133	7	140
1997	145	22	167
1998	118	6	124
1999	125	11	136
2000	122	16	138
2001	121	21	142
Total	922	98	1020

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	91	9	100
	95	5	100
	87	13	100
	95	5	100
	92	8	100
	88	12	100
	85	15	100
	90	10	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	13	10	14	4	3	7	9	
Highest:	636	291	284	279	367	330	653	
Mean:	52	48	67	44	53	51	71	
Median:	37	38	55	34	41	37	51	

11.2 Samples for Commercial Production

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
1995	242	8	250
1996	193	5	198
1997	310	6	316
1998	493	5	498
1999	131	4	135
2000	140	5	145
2001	229	3	232
Total	1738	36	1774

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4	11	9	8	15	10	13	
Highest:	454	183	350	160	391	217	145	
Mean:	42	41	31	38	46	36	42	
Median:	33	35	25	34	41	28	39	

12. Zinc

12.1 Samples for Home and Garden

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

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	2	30	141	173
1996	3	8	129	140
1997	1	16	150	167
1998	0	16	108	124
1999	3	10	123	136
2000	7	24	107	138
2001	1	13	128	142
Total	17	117	886	1020

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	17	82	100
2	6	92	100
1	10	90	100
0	13	87	100
2	7	90	100
5	17	78	100
1	9	90	100
2	11	87	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.2	0.2	0.4	0.5	0.3	0.1	0.2	
Highest:	149.1	130.9	140.9	285.5	202.1	353.1	120.8	
Mean:	9.2	9.3	9.0	12.3	14.7	10.1	9.4	
Median:	3.2	4.3	3.9	3.6	3.9	3.0	3.9	

12.2 Samples for Commercial Production

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

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	20	59	171	250
1996	9	54	135	198
1997	12	121	183	316
1998	19	119	360	498
1999	5	40	90	135
2000	12	37	96	145
2001	5	30	197	232
Total	82	460	1232	1774

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
8	24	68	100
5	27	68	100
4	38	58	100
4	24	72	100
4	30	67	100
8	26	66	100
2	13	85	100
5	26	69	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.3	0.1	0.1	0.1	0.1	0.2	
Highest:	40.9	20.0	35.4	28.2	151.9	24.3	15.8	
Mean:	2.1	1.9	2.0	2.1	2.8	1.9	2.1	
Median:	1.4	1.4	1.2	1.5	1.3	1.4	1.7	

Appendix: Cornell Crop Codes

Crop codes are used in the Cornell Nutrient Analyses Laboratory.

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

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

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

Crop Code	Crop Description
SAG	Ornamentals adapted to pH 6.0 to 7.5
SPB	Spring flowering bulbs
SQS	Squash, Summer
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUB	Summer flowering bulbs
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TRE	Christmas trees, Established
TRF	Tree fruits
TRT	Christmas trees, Topdressing
WAT	Watermelons
WPT	Waterways, pond dikes