

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoe (2004). Montgomery County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-10. 38 pages.

Soil Sample Survey

Montgomery Co.

Samples analyzed by CNAL in 1995-2001



Summary compiled by

Quirine M. Ketterings, Hettie Krol, W. Shaw Reid and Kevin Ganoe



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

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoë (2004). Montgomery County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-10. 38 pages.

Soil Sample Survey

Montgomery Co.

Samples analyzed by CNAL in 1995-2001

Summary compiled by

Quirine Ketterings and Hettie Krol
Nutrient Management Spear Program
Department of Crop and Soil Sciences
817 Bradfield Hall, Cornell University
Ithaca NY 14853

W. Shaw Reid
Professor Emeritus
Department of Crop and Soil Sciences

Kevin Ganoë
Field Crops Educator
Central New York Area Dairy, Livestock and Field Crops Program

February 26, 2004

Correct Citation:

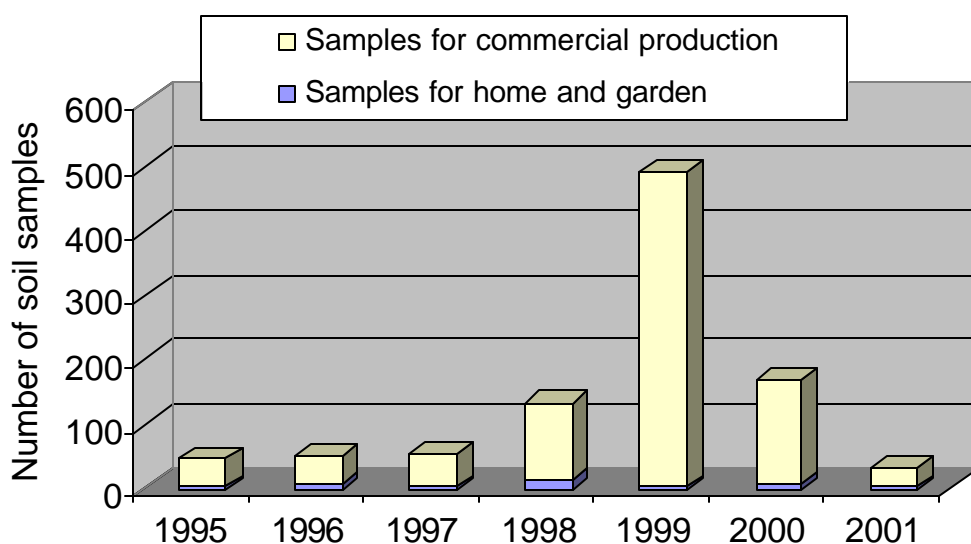
Ketterings, Q.M., H. Krol, W.S. Reid, and K. Ganoë (2004). Soil samples survey of Montgomery County. Samples analyzed by the Cornell Nutrient Analysis Laboratory in 1995-2001. CSS Extension Bulletin E04-10. 38 pages.

Table of Content

1. General Survey Summary.....	4
2. Cropping Systems	9
2.1 Samples for Home and Garden.....	9
2.2 Samples for Commercial Production.....	10
3. Soil Types	12
3.1 Samples for Home and Garden.....	12
3.2 Samples for Commercial Production.....	13
4. Organic Matter	15
4.1 Samples for Home and Garden.....	15
4.2 Samples for Commercial Production.....	16
5. pH	17
5.1 Samples for Home and Garden.....	17
5.2 Samples for Commercial Production.....	18
6. Phosphorus.....	19
6.1 Samples for Home and Garden.....	19
6.2 Samples for Commercial Production.....	20
7. Potassium	21
7.1 Samples for Home and Garden.....	21
7.2 Samples for Commercial Production.....	24
8. Magnesium	27
8.1 Samples for Home and Garden.....	27
8.2 Samples for Commercial Production.....	28
9. Iron.....	29
9.1 Samples for Home and Garden.....	29
9.2 Samples for Commercial Production.....	30
10. Manganese	31
10.1 Samples for Home and Garden.....	31
10.2 Samples for Commercial Production.....	32
11. Zinc	33
11.1 Samples for Home and Garden.....	33
11.2 Samples for Commercial Production.....	34
Appendix: Cornell Crop Codes	35

1. General Survey Summary

This survey summarizes the soil test results from Montgomery 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 975. Of these 975 samples, 941 samples (97%) were submitted to obtain fertilizer recommendations for commercial production while 34 samples (3%) were submitted as home and garden samples.



Homeowners		Commercial		Total
1995	3	1995	43	46
1996	6	1996	43	49
1997	2	1997	51	53
1998	13	1998	121	134
1999	3	1999	491	494
2000	5	2000	164	169
<u>2001</u>	<u>2</u>	<u>2001</u>	<u>28</u>	<u>30</u>
Total	34	Total	941	975

Seventy-one percent of the home and garden samples were submitted to request fertilizer recommendations for mixed vegetable gardens. Eighteen percent of the samples came from lawns while a few additional samples were sent in to request recommendations for potatoes, raspberries, and ornamentals. People submitting samples for commercial production requested fertilizer recommendations for alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (37%), corn silage or grain production (34%), or hay (13%), while a few producers were planning on growing other crops including apples, birdsfoot trefoil clover or grass mixes, clover and grass mixtures, and oats.

Home and garden samples in Montgomery County were silty (44%), silt loams (21%), sandy loams (26%), or sandy (9%), 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, 79% belonged to soil management group 2. Two percent were from soil management group 1. None of the samples belonged to group 6 while 11% was classified group 3, 4% belonged to soil management group 4

and 2% were classified as management group 5. The five most common soil series, all belonging to soil management group 2, were Darien (19%), Lansing (11%), Burdett (9%), Palatine (9%) and Appleton (7%). These soils represent 11% (Darien), 14% (Lansing), 10% (Burdett), 4% (Palatine), and 7% (Appleton) of the total 262,800 acres in the county.

Organic matter levels, as measured by loss on ignition, ranged from 1% to over 40% with median values ranging from 3.2 to 5.4% organic matter for home and garden samples and from 3.5 to 4.6% for samples submitted for commercial production. Seventy-nine percent of the home and garden samples had between 2.0 and 4.9% organic matter with 12% testing between 2.0 and 2.9% organic matter, 35% between 3.0 and 3.9% organic matter and 32% between 4.0 and 4.9% organic matter. Twenty-one percent of the soils submitted for home and garden tested >4.9% in organic matter while none of the samples had less than 2.0% organic matter. Of the samples submitted for commercial production, 30% contained between 3.0 and 3.9% organic matter, 39% tested between 4.0 and 4.9% while 15% had organic matter concentrations of 5.0-5.9%. Ten percent had less than 3.0% organic matter while 7% of the samples had 6.0% or more organic matter. In total, 58% of the samples had organic matter levels between 4.0 and 6.9%.

Soil pH in water (1:1 extraction ratio) varied from pH 4.7 to 8.1 with the median for home and garden samples ranging from pH 6.2 to pH 7.5 and for samples submitted for commercial production ranging from pH 6.3 to pH 6.8. Of the home and garden samples, 80% tested between pH 6.0 and 7.4. For the samples submitted for commercial production, this was 82% while 16% tested between pH 5.0 and 5.9.

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

Soil test P levels of <1 lbs P/acre are classified as very low. Between 1-3 lbs P/acre is low. Medium is between 4-8 lbs P/acre. High testing soils have P levels between 9 and 39 lbs P/acre and soils with >39 lbs P/acre are classified as very high. Of the home and garden samples, 15% tested low, 18% tested medium, 35% tested high and 32% tested very high. This meant that 67% tested high or very high in P.

Of the samples submitted for commercial production, 46% tested low in P. Twenty-seven percent were medium in P, 22% tested high while 5% of the samples were very high in P. This means that 27% tested high or very high in P. There were no clear trends in P levels over the 7 years.

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

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

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

Of the home and garden samples, 21% was classified as very low or low in potassium. Twelve percent tested medium, 21% high and 47% very high. For samples submitted for commercial production, 8% tested low, 22% tested medium, 35% tested high and 32% tested very high in potassium while the remainder was of unknown K classification. As with phosphorus, there were no trends over the 7 years of soil sampling.

Soils test very low for magnesium if Morgan extractable Mg is less than 20 lbs Mg/acre. Low testing soils have 20-65 lbs Morgan Mg per acre. Soils with 66-100 lbs Mg/acre test

medium for magnesium. High testing soils have 101-199 lbs Mg/acre while soils with more than 200 lbs Mg/acre in the Morgan extraction are classified as very high in Mg. Magnesium levels ranged from 32 to slightly over 1400 lbs Mg/acre (Morgan extraction). There were no samples that tested very low in Mg. Most soils tested high or very high for Mg (100% of the homeowner soils and 98% of the soils of the commercial growers). None of the home and garden samples and no more than 17 of the commercial growers' soils tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Montgomery 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. All home and garden samples were classified as normal in Fe while only 12 of the commercial samples tested excessive for Fe. Similarly, almost all soils with the exception of 3 commercial samples 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, one samples tested low for zinc while 6 tested medium and 27 tested high for zinc. Of the samples for commercial production, 13% tested low in zinc, 42% tested medium while 45% of the samples were high in zinc.

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

Reference

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

2. Cropping Systems

2.1 Samples for Home and Garden

Crops for which recommendations are requested by homeowners:

	1995	1996	1997	1998	1999	2000	2001	Total	%
LAW	1	3	1	0	0	1	0	6	18
MVG	2	2	1	11	3	3	2	24	71
PTO	0	0	0	0	0	1	0	1	3
RSP	0	1	0	0	0	0	0	1	3
SAG	0	0	0	1	0	0	0	1	3
Unknown	0	0	0	1	0	0	0	1	3
Total	3	6	2	12	3	5	2	34	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	3	2	4	14	2	0	29	3
AGE/AGT	11	24	12	50	121	63	12	293	31
ALE/ALT	0	0	1	4	18	1	0	24	3
APP	0	2	0	3	0	0	0	5	1
BCE/BCT	0	0	0	0	11	6	0	17	2
BGE/BGT	0	1	0	1	12	0	0	14	1
BLB	0	0	0	0	1	0	0	1	0
BUK	0	0	0	0	0	0	1	1	0
CGE/CGT	1	2	3	0	2	8	1	17	2
CLE/CLT	0	0	1	0	0	0	1	2	0
COG/COS	14	3	21	41	182	50	7	318	34
CSE/CST	0	0	0	0	6	2	0	8	1
GIE/GIT	0	0	2	1	4	0	2	9	1
GRE/GRT	4	0	0	11	72	20	3	110	12
IDL	0	0	0	0	2	1	0	3	0
MIX	1	0	0	0	0	1	0	2	0
OAS	2	0	0	0	9	0	0	11	1
OAT	0	0	0	1	5	0	0	6	1
ONP	0	0	0	0	0	1	0	1	0
OTH	0	0	2	0	2	0	0	4	0
PGE/PGT	1	0	0	1	0	0	0	2	0
PIE/PIT	0	2	7	1	13	0	0	23	2
PLE/PLT	0	0	0	0	3	2	0	5	1
PNE/PNT	0	0	0	3	2	3	0	8	1
POT	0	1	0	0	0	0	0	1	0
PUM	0	0	0	0	2	0	0	2	0
RSF	0	2	0	0	0	0	0	2	0
RSS	0	0	0	0	1	0	0	1	0
RYC	1	0	0	0	0	0	0	1	0
RYS	0	0	0	0	2	0	1	3	0
SOY	1	0	0	0	2	0	0	3	0
SQW	1	0	0	0	0	0	0	1	0
STS	0	3	0	0	0	0	0	3	0
SUD	0	0	0	0	3	1	0	4	0
SWC	2	0	0	0	1	0	0	3	0

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoe (2004). Montgomery County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-10. 38 pages.

Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
TOM	0	0	0	0	0	1	0	1	0
Unknown	0	0	0	0	1	2	0	3	0
Total	43	43	51	121	491	164	28	941	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)	2	1	1	5	2	2	2	15
SMG 3 (silt loam)	1	4	1	1	0	0	0	7
SMG 4 (sandy loam)	0	1	0	5	1	2	0	9
SMG 5 (sandy)	0	0	0	2	0	1	0	3
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	3	6	2	13	3	5	2	34

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Alton	5	0	0	0	0	6	0	0	6
Angola	2	4	1	0	4	12	1	0	22
Appleton	2	4	0	6	12	36	7	0	65
Arnot	3	0	0	0	2	2	0	0	4
Broadalbin	4	0	0	0	0	3	0	0	3
Brockport	1	0	1	0	0	1	0	0	2
Burdett	2	6	6	2	9	42	8	11	84
Churchville	2	4	0	1	7	19	17	0	48
Copake	4	0	0	0	0	2	0	0	2
Darien	2	4	1	8	8	98	53	8	180
Farmington	3	1	0	0	8	9	2	0	20
Fonda	2	0	0	0	0	2	0	0	2
Fredon	4	0	2	0	4	6	0	1	13
Hamlin	2	9	0	0	1	8	1	0	19
Herkimer	3	0	0	0	0	1	9	0	10
Hornell	2	0	0	0	3	5	0	0	8
Howard	3	1	1	0	6	11	2	0	21
Hudson	2	0	0	0	0	6	1	0	7
Ilion	2	1	0	0	1	10	3	0	15
Joliet	4	0	0	0	0	1	0	0	1
Lansing	2	5	5	5	11	67	15	0	108
Lordstown	3	0	0	0	1	0	0	0	1
Madalin	1	1	0	0	2	14	1	0	18
Manheim	2	0	0	2	3	5	3	0	13
Manlius	3	1	3	2	1	0	0	0	7
Mardin	3	0	0	0	6	0	0	0	6
Mohawk	2	0	7	3	11	16	9	0	46
Mosherville	4	0	1	0	0	0	0	0	1
Nellis	4	0	1	0	0	1	0	0	2
Nunda	2	0	1	0	3	7	2	4	17
Palatine	2	1	4	21	3	40	14	0	83
Palmyra	3	0	0	0	0	4	0	0	4
Phelps	3	0	5	0	4	16	0	2	27
Plainfield	5	0	0	0	0	8	1	0	9
Rhinebeck	2	0	0	0	4	6	0	0	10
Scio	3	0	0	0	0	1	2	0	3

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoë (2004). Montgomery County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-10. 38 pages.

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Teel	2	0	0	0	2	9	1	1	13
Varick	2	0	0	0	0	3	0	0	3
Wassaic	4	1	1	0	0	10	4	0	16
Wayland	2	0	0	0	0	1	0	1	2
Unknown	-	0	3	1	5	3	8	0	20
Total	-	43	43	51	121	491	164	28	941

4. Organic Matter

4.1 Samples for Home and Garden

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	0	0	0	1	1	0	0	1	3
1996	0	0	1	2	2	1	0	0	6
1997	0	0	0	2	0	0	0	0	2
1998	0	0	0	6	5	1	0	1	13
1999	0	0	1	0	2	0	0	0	3
2000	0	0	1	0	1	2	0	0	5
2001	0	0	1	1	0	0	1	0	2
Total	0	0	4	12	11	4	1	2	34

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	3.0	2.5	3.1	3.0	2.1	2.0	2.9	
Highest:	11.2	5.0	3.2	41.1	4.7	6.5	3.7	
Mean:	6.2	3.9	3.2	6.7	3.8	4.7	3.3	
Median:	4.4	3.9	3.2	4.1	4.7	5.4	3.3	

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	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Total	0	0	12	35	32	12	3	6	100

4.2 Samples for Commercial Production

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	0	1	2	12	19	8	0	1	43
1996	0	0	9	12	10	10	2	0	43
1997	0	2	10	18	14	3	2	2	51
1998	0	0	6	27	43	26	8	11	121
1999	0	13	32	152	207	66	14	7	491
2000	0	0	16	58	63	21	5	1	164
2001	0	0	0	4	15	5	2	2	28
Total	0	16	75	283	371	139	33	24	941

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.9	2.1	1.9	2.0	1.0	2.3	3.7	
Highest:	7.2	6.1	7.4	9.9	8.9	9.2	7.2	
Mean:	4.3	4.1	3.8	4.8	4.2	4.1	4.8	
Median:	4.3	4.0	3.5	4.6	4.1	4.0	4.5	

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	2	5	28	44	19	0	2	100
1996	0	0	21	28	23	23	5	0	100
1997	0	4	20	35	27	6	4	4	100
1998	0	0	5	22	36	21	7	9	100
1999	0	3	7	31	42	13	3	1	100
2000	0	0	10	35	38	13	3	1	100
2001	0	0	0	14	54	18	7	7	100
Total	0	2	8	30	39	15	4	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	0	0	0	0	1	2	0	0	0	3
1996	0	0	0	0	1	2	3	0	0	0	6
1997	0	0	0	0	0	0	1	1	0	0	2
1998	0	0	1	0	2	3	6	1	0	0	13
1999	0	0	0	0	1	0	2	0	0	0	3
2000	0	0	1	0	0	0	2	2	0	0	5
2001	0	0	0	1	0	1	0	0	0	0	2
Total	0	0	2	1	4	7	16	4	0	0	34

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6.6	6.4	7.3	5.4	6.0	5.4	5.6	
Highest:	7.0	7.4	7.7	7.8	7.2	7.9	6.7	
Mean:	-	-	-	-	-	-	-	
Median:	7.0	7.1	7.5	7.0	7.2	7.4	6.2	

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	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Total	0	0	6	3	12	21	47	12	0	0	100

5.2 Samples for Commercial Production

Number of samples for commercial production within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	0	2	6	12	17	6	0	0	0	43
1996	0	1	3	13	11	10	5	0	0	0	43
1997*	0	0	1	13	15	9	11	0	1	0	50
1998	0	0	5	12	39	46	17	2	0	0	121
1999	1	1	15	62	123	199	73	16	1	0	491
2000	0	1	0	7	29	79	45	3	0	0	164
2001	0	0	0	5	15	8	0	0	0	0	28
Total	1	3	26	118	244	368	157	21	2	0	940

*One sample was not analyzed for pH in 1997.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.3	4.7	5.3	5.3	4.2	4.9	5.6	
Highest:	7.2	7.2	8.0	7.6	8.1	7.8	7.4	
Mean:	-	-	-	-	-	-	-	
Median:	6.5	6.2	6.3	6.5	6.5	6.8	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	0	0	5	14	28	40	14	0	0	0	100
1996	0	2	7	30	26	23	12	0	0	0	100
1997	0	0	2	26	30	18	22	0	2	0	100
1998	0	0	4	10	32	38	14	2	0	0	100
1999	0	0	3	13	25	41	15	3	0	0	100
2000	0	1	0	4	18	48	27	2	0	0	100
2001	0	0	0	18	54	29	0	0	0	0	100
Total	0	0	3	13	26	39	17	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	H	VH	VH	VH	VH	VH	VH	
1995	0	0	0	2	0	0	0	0	0	1	3
1996	0	1	2	2	0	0	0	1	0	0	6
1997	0	0	1	0	0	0	0	0	0	1	2
1998	0	2	2	5	1	1	0	1	0	1	13
1999	0	0	0	2	0	0	0	0	0	1	3
2000	0	1	0	1	1	1	0	0	0	1	5
2001	0	1	1	0	0	0	0	0	0	0	2
Total	0	5	6	12	2	2	0	2	0	5	34

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	18	3	4	3	12	1	1	
Highest:	404	136	376	1254	281	345	4	
Mean:	147	32	190	122	110	98	2	
Median:	19	8	190	11	38	49	2	

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	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Total	0	15	18	35	6	6	0	6	0	15	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	25	8	9	0	1	0	0	0	0	43
1996	0	23	10	8	2	0	0	0	0	0	43
1997	0	29	7	10	3	1	0	1	0	0	51
1998	0	30	52	32	5	1	0	1	0	0	121
1999	0	224	124	117	12	7	1	5	1	0	491
2000	0	87	39	30	3	1	2	0	1	1	164
2001	0	11	13	4	0	0	0	0	0	0	28
Total	0	429	253	210	25	11	3	7	2	1	941

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:	69	58	107	106	151	290	24	
Mean:	9	9	11	11	10	11	6	
Median:	3	3	3	6	4	3	5	

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	58	19	21	0	2	0	0	0	0	100
1996	0	53	23	19	5	0	0	0	0	0	100
1997	0	57	14	20	6	2	0	2	0	0	100
1998	0	25	43	26	4	1	0	1	0	0	100
1999	0	46	25	24	2	1	0	1	0	0	100
2000	0	53	24	18	2	1	1	0	1	1	100
2001	0	39	46	14	0	0	0	0	0	0	100
Total	0	46	27	22	3	1	0	1	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	0	0	2	2
1996	0	0	0	1	0	1
1997	0	0	0	1	0	1
1998	0	0	0	1	4	5
1999	0	0	0	0	2	2
2000	0	0	0	0	2	2
2001	0	1	1	0	0	2
Total (#)	0	1	1	3	10	15
Total (%)		7	7	20	67	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	1	1
1996	0	0	1	2	1	4
1997	0	0	0	0	1	1
1998	0	0	0	0	1	1
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	1	2	4	7
Total (%)	0	0	14	29	57	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	1	1
1997	0	0	0	0	0	0
1998	1	1	2	1	0	5
1999	0	1	0	0	0	1
2000	0	0	0	1	1	2
2001	0	0	0	0	0	0
Total (#)	1	2	2	2	2	9
Total (%)	11	22	22	22	22	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	2	0	0	0	2
1999	0	0	0	0	0	0
2000	0	1	0	0	0	1
2001	0	0	0	0	0	0
Total (#)	0	3	0	0	0	3
Total (%)	0	100	0	0	0	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	0	0	0	3	3
1996	0	0	1	3	2	6
1997	0	0	0	1	1	2
1998	1	3	2	2	5	13
1999	0	1	0	0	2	3
2000	0	1	0	1	3	5
2001	0	1	1	0	0	2
Total #	1	6	4	7	16	34

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	209	117	111	48	76	75	45	
Highest:	957	458	301	11003	342	552	71	
Mean:	495	231	206	379	240	327	58	
Median:	319	159	206	111	303	369	58	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Grand Total	3	18	12	21	47	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	0	1	1
1996	0	0	0	1	0	1
1997	0	0	0	0	0	0
1998	0	0	0	1	1	2
1999	0	0	3	5	7	15
2000	0	1	0	0	0	1
2001	0	0	0	0	0	0
Total (#)	0	1	3	7	9	20
Total (%)	0	5	15	35	45	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	2	9	13	14	38
1996	0	2	3	12	8	25
1997	0	8	15	16	9	48
1998	0	4	12	40	26	82
1999	2	20	84	155	131	392
2000	0	12	29	46	48	135
2001	0	2	3	13	7	25
Total (#)	2	50	155	295	243	745
Total (%)	0	7	21	40	33	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	2	1	0	3
1996	0	1	4	3	1	9
1997	0	0	0	0	2	2
1998	0	1	4	8	15	28
1999	0	2	17	6	19	44
2000	0	2	3	5	5	15
2001	0	0	0	0	2	2
Total (#)	0	6	30	23	44	103
Total (%)	0	6	29	22	43	100

Ketterings, Q.M., H. Krol, W.S. Reid and K. Ganoë (2004). Montgomery County Soil Sample Survey 1995-2001. CSS Extension Bulletin E04-10. 38 pages.

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	1	0	1
1996	0	1	2	0	2	5
1997	0	0	0	0	0	0
1998	0	1	0	1	2	4
1999	1	9	9	3	1	23
2000	1	3	0	0	0	4
2001	0	0	0	1	0	1
Total (#)	2	14	11	6	5	38
Total (%)	5	37	29	16	13	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	4	4	2	4	14
2000	0	0	0	1	0	1
2001	0	0	0	0	0	0
Total (#)	0	4	4	3	4	15
Total (%)	0	27	27	20	27	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

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

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	2	11	15	15	0	43
1996	0	4	9	16	11	3	43
1997	0	8	15	16	11	1	51
1998	0	6	16	50	44	5	121
1999	3	35	117	171	162	3	491
2000	1	18	32	52	53	8	164
2001	0	2	3	14	9	0	28
Grand Total	4	75	203	334	305	20	941

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	60	55	44	47	30	47	63	
Highest:	492	569	872	1068	1768	1224	429	
Mean:	175	184	151	181	180	170	133	
Median:	126	133	105	146	128	130	133	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	5	26	35	35	0	100
1996	0	9	21	37	26	7	100
1997	0	16	29	31	22	2	100
1998	0	5	13	41	36	4	100
1999	1	7	24	35	33	1	100
2000	1	11	20	32	32	5	100
2001	0	7	11	50	32	0	100
Grand Total	0	8	22	35	32	2	100

8. Magnesium

8.1 Samples for Home and Garden

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	3	3
1996	0	0	0	0	6	6
1997	0	0	0	0	2	2
1998	0	0	0	2	11	13
1999	0	0	0	0	3	3
2000	0	0	0	0	5	5
2001	0	0	0	0	2	2
Total	0	0	0	2	32	34

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	360	272	338	172	514	223	236	
Highest:	1287	856	600	3375	519	667	289	
Mean:	688	560	469	685	516	447	263	
Median:	416	539	469	498	517	399	263	

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	100
1996	100
1997	100
1998	100
1999	100
2000	100
2001	100
Total	0	0	0	6	94	100

8.2 Samples for Commercial Production

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	5	38	43
1996	0	0	0	6	37	43
1997	0	0	0	2	49	51
1998	0	0	1	3	117	121
1999	0	6	8	44	433	491
2000	0	0	2	9	153	164
2001	0	0	0	1	27	28
Total	0	6	11	70	854	941

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	150	105	185	77	32	84	171	
Highest:	693	842	998	1280	1409	1080	870	
Mean:	344	423	474	467	429	462	456	
Median:	325	371	456	435	414	447	450	

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	12	88	100
1996	0	0	0	14	86	100
1997	0	0	0	4	96	100
1998	0	0	1	2	97	100
1999	0	1	2	9	88	100
2000	0	0	1	5	93	100
2001	0	0	0	4	96	100
Total	0	1	1	7	91	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	3	0	3
1996	6	0	6
1997	2	0	2
1998	13	0	13
1999	3	0	3
2000	5	0	5
2001	2	0	2
Total	34	0	34

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	.	.	100
	100	0	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	4	1	12	1	1	2	8	
Highest:	10	11	13	43	6	42	49	
Mean:	6	5	13	9	4	11	28	
Median:	5	5	13	5	4	3	28	

9.2 Samples for Commercial Production

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
1995	42	1	43
1996	43	0	43
1997	51	0	51
1998	119	2	121
1999	484	7	491
2000	162	2	164
2001	28	0	28
Total	929	12	941

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	1	1	1	1	1	2	
Highest:	66	48	49	75	91	140	39	
Mean:	13	14	9	10	8	10	10	
Median:	7	10	6	5	5	6	8	

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	3	0	3
1996	6	0	6
1997	2	0	2
1998	13	0	13
1999	3	0	3
2000	5	0	5
2001	2	0	2
Total	34	0	34

Percentages:

0-99	>99	Total
Normal	Excessive	
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
100	0	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	27	10	71	6	9	22	15	
Highest:	47	37	80	63	18	54	20	
Mean:	34	24	76	26	15	33	17	
Median:	28	25	76	24	17	32	17	

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	42	1	43
1996	43	0	43
1997	51	0	51
1998	121	0	121
1999	491	0	491
2000	163	1	164
2001	28	0	28
Total	939	2	941

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	9	10	10	12	6	6	17	
Highest:	132	88	82	65	80	137	42	
Mean:	31	32	31	27	25	32	29	
Median:	26	25	28	25	24	29	30	

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:					Percentages:				
	<0.5	0.5-1.0	>1	Total	<0.5	0.5-1.0	>1	Total	
	Low	Medium	High		Low	Medium	High		
1995	0	1	2	3	.	.	.	100	
1996	0	1	5	6	.	.	.	100	
1997	0	0	2	2	.	.	.	100	
1998	1	3	9	13	.	.	.	100	
1999	0	0	3	3	.	.	.	100	
2000	0	0	5	5	.	.	.	100	
2001	0	1	1	2	.	.	.	100	
Total	1	6	27	34	3	18	79	100	

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.0	1.0	1.6	0.2	1.7	4.7	0.6	
Highest:	29.6	48.0	2.8	12.6	6.7	16.9	1.8	
Mean:	11.2	9.4	2.2	3.9	3.7	9.0	1.2	
Median:	3.0	1.5	2.2	2.6	2.6	5.9	1.2	

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	1	20	22	43
1996	2	21	20	43
1997	4	29	18	51
1998	14	59	48	121
1999	87	204	200	491
2000	13	53	98	164
2001	3	10	15	28
Total	124	396	421	941

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	47	51	100
5	49	47	100
8	57	35	100
12	49	40	100
18	42	41	100
8	32	60	100
11	36	54	100
13	42	45	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.4	0.4	0.3	0.1	0.1	0.1	0.2	
Highest:	40.5	2.9	5.6	6.3	122.5	91.6	5.0	
Mean:	2.9	1.2	1.2	1.2	1.4	1.9	1.6	
Median:	1.1	1.0	0.9	0.9	0.9	1.2	1.4	

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
GRA	Grapes
GEN	Green
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
NUR	Nursery
ONP	Onion, Transplanted
ONS	Onion, Seeded
OTH	Other
PAR	Pears
PCH	Peaches
PEP	Peppers
PER	Perennials
POP	Popcorn
PRK	Park
POT/PTO	Potatoes
PUM	Pumpkins
ROD	Roadside
ROS	Roses
ROU	Rough
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5
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