

Soil Sample Survey

Livingston Co.

Samples analyzed by CNAL in 1995-2001



Application of manure at proper agronomic rates starts with regular soil testing. This Livingston County dairy farmer uses direct injection of liquid manure at rates developed by his certified nutrient management planner. Proper application rates and methods minimize the risk of nutrient losses to the environment and maximize recycling of dairy manure nutrients. Fields are soil tested at least once every three years.

Summary compiled by

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Nathan Herendeen and David Thorp**



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

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1. General Survey Summary

Livingston County is located in the western Finger Lakes area of New York, south of Rochester. It contains over 404,000 acres of land area. Roughly 55% of the area is used for farm production.

The northern two-thirds of the county lies in the Ontario Lowlands with transition to the Appalachian Uplands in the south. The Ontario Lowlands begin at Lake Ontario, about 25 miles to the north where the elevation is 246 feet above sea level. In Livingston County, the Lowlands are under 600 feet elevation in the north extending to about 1000 in the middle of the county. At the Appalachian interface, the elevation transitions quickly from 1000 to over 1500 feet. The exception is in the Genesee Valley that dissects the county in a north-south transect.

The pre-glacial Genesee Valley flood plain extends from Dansville in the south to the border of Monroe County in the north. The valley floor is about 600 feet above sea level for the entire distance. The narrow post-glacial valley enters the valley floor at Mt. Morris. It extends from there to the southwest as a 600 – 800 foot deep ravine that is the major feature of Letchworth State Park. At Portageville, it rejoins the upper, broad flood plain valley in Allegany County at just over 1000 feet. On the east side of the county, the Conesus and Hemlock Lake watersheds drain northward into the Genesee.

Livingston County soils are extremely diverse. The soils in the northern parts of the county are dominated by high carbonate materials developed from the limestone parent material. This was spread southward by the last glacial action that covered the county. In the south, soils formed from the low carbonate Devonian shale deposits. In the Genesee Valley area, soils formed from recent alluvium.

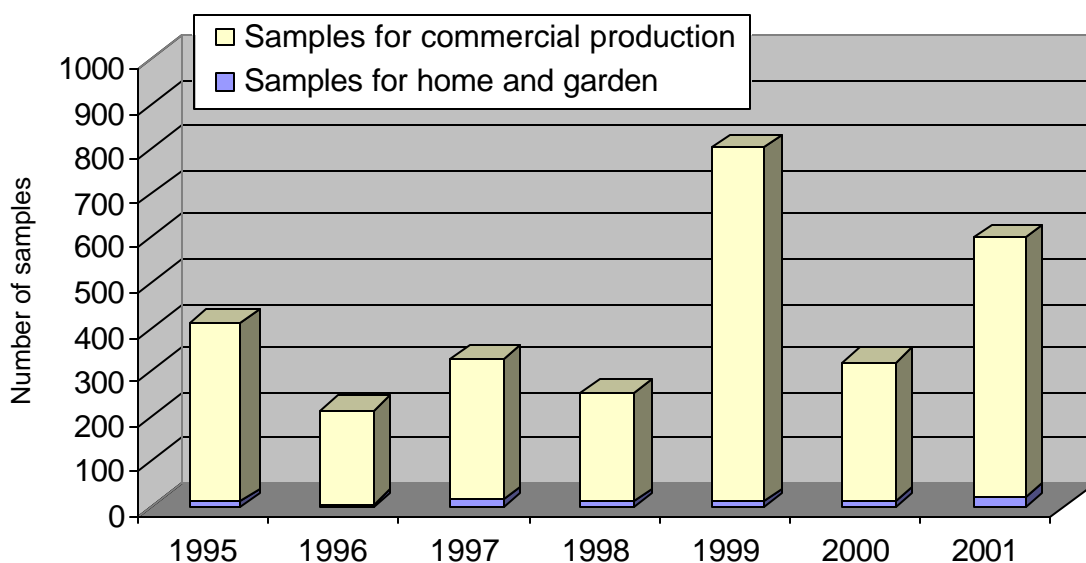
The agriculture of Livingston County is diverse. Dairy farming is the largest single generator of farm income. Livestock farmers produce and market beef, hogs and sheep from Livingston County. Thousands of acres are devoted to field and forage crops to support the dairy and livestock industry. Processing vegetable crops comprise the next largest segment of the agricultural economy. Crops grown for processing include peas, snap beans, sweet corn, red beets, kidney beans, cabbage, carrots, onions and potatoes.

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Fresh vegetables produced include all the above plus cucumbers, squash, pumpkins, and cole crops. Bedding plants and ornamentals are important commodities on farms with greenhouses and nursery stock. Small fruits such as strawberries and blueberries are grown for fresh market. Christmas trees are grown on a wide range of soils, especially the acid soils on the hills in the south.

Livingston County is headquarters to several of the largest dairy farms in New York plus many smaller dairy farms and a few grass-based dairies. There is a major horse industry based on the gentle slopes adjacent to the old Genesee Valley. There are many farms that have found niche markets for a variety of products from flowers to maple products.

All the above industries rely heavily on soil testing to maintain optimum production while protecting the agricultural environment from nutrient runoff. This survey summarizes the soil test results from Livingston 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 2928. Of these 2928 samples, 2853 (97%) were submitted to obtain fertilizer recommendations for commercial production while 75 samples (3%) were submitted as home and garden samples.



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Homeowners		Commercial		Total
1995	8	1995	399	407
1996	6	1996	208	214
1997	13	1997	315	328
1998	8	1998	244	252
1999	8	1999	796	804
2000	11	2000	313	324
<u>2001</u>	<u>21</u>	<u>2001</u>	<u>578</u>	<u>599</u>
Total	75	Total	2853	2928

Most of the home and garden soil samples during 1995-2001 were submitted to request fertilizer recommendations for lawns (28%) and home garden vegetable production (25%), ornamentals (13%) or perennials (9%). People submitting samples for commercial production requested fertilizer recommendations for the production of corn silage or grain (40%), alfalfa, alfalfa/grass or alfalfa/trefoil mixtures (31%), while a few producers were planning on growing other crops including clover/grass mixtures, small grains, sweet corn and vegetables.

Home and garden samples in Livingston County were mostly silty soils belonging to soil management group 2 (37%), silt loams (19%) belonging to soil management group 3, and sandy loams (31%) of soil management group 4. Ten percent were sandy soils belonging to soil management group 5. The table on page 7 gives descriptions of each of the soil management groups.

Of the samples submitted for commercial production, 73% belonged to soil management group 2. Twenty percent were from soil management group 3. Group 1 and 4 were represented with 2% each and 3% belonged to soil management group 5. The five most common soil series were Lima (12.9%), Ontario (11.1%), Ovid (7.7%), Caneadea (5.4%), and Odessa (5.1%). These soils represent 4.3% (Lima), 7.4% (Ontario), 3.5% (Ovid), 2.5% (Caneadea), and 6.2% Odessa) of the total acres in the county.

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.

Organic matter levels, as measured by loss on ignition, ranged from less than 1% to over 20% with median values ranging from 3.8 to 4.1% organic matter for home and garden samples and values ranging from 2.5 to 3.0 for samples submitted for commercial production. Sixty-five percent of the home and garden samples had between 2 and 5% organic matter with 17% testing between 2.0 and 2.9% organic matter, 25% between 3.0 and 3.9% organic matter and 23% between 4.0 and 4.9% organic matter. Twenty percent of the soils submitted for home and garden tested >4.9% in organic matter while 14% had less than 2.0% organic matter. Of the samples submitted for commercial production, 34% contained between 3 and 4% organic matter, 9% tested between 4.0 and 4.9% while 3% had organic matter concentrations of 5.0-5.9%. In total, 13% of the samples had organic matter levels between 4.0 and 6.9%.

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Soil pH in water (1:1 extraction ratio) varied from pH 3.8 to 8.4 with the median for home and garden samples ranging from pH 6.7 to pH 7.2 and for samples submitted for commercial production ranging from pH 6.6 to pH 7.0. Of the home and garden samples, 61% tested between pH 6.0 and 7.4. For the samples submitted for commercial production, this was 78% while 10% tested between pH 5.0 and 5.9.

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

Soil test P levels of <1 lb P/acre are classified as very low. Between 1-3 lbs P/acre is low. Medium is between 4-8 lbs P/acre. High testing soils have P levels between 9 and 39 lbs P/acre and soils with >39 lbs P/acre are classified as very high. Of the home and garden samples, 9% tested low, 13% tested medium, 32% tested high and 46% tested very high. This meant that 78% tested high or very high in P.

Phosphorus levels for samples for commercial production in Livingston County were higher than the state average (50% tests high or very high in P). Seventeen percent of the samples tested very high in P. Twelve percent were low in P, 23% tested medium for P while 48% of the submitted samples were classified as high in soil test P. This means that 65% tested high or very high in P and. There were no clear trends in P levels over the 6 years.

Classifications for potassium depend on soil management group. The fine-textured soils of soil management group 1 have a greater K supplying capacity than the coarse textured sandy soils (soil management group 5). Classification for each of the management groups in the above table represent very low, low, medium, high and very high. 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 on page 9).

Of the home and garden samples, 5% was classified as low in potassium. Twelve percent tested medium, 32% high and 51% very high. For samples submitted for commercial

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production, 1% tested very low in K, 8% tested low, 18% tested medium, 35% tested high and 38% tested very high in potassium. As with phosphorus, there were no trends over the 6 years of soil sampling.

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

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 37 to almost a little over 3400 lbs Mg/acre (Morgan extraction). There were no samples that tested very low in Mg. Most soils tested high or very high for Mg (99% of the homeowner soils and 99% of the soils of the commercial growers). No more than 3 of the homeowner soils and 1% of the commercial growers' soil tested low or medium in Mg. Thus, magnesium deficiency is not likely to occur in Livingston 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 93-99% in the normal range with 7% of the home and garden samples and 1% of the samples for commercial production testing excessive for Fe. Similarly, most soils (91-99%) 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

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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, 93% tested high for zinc while 7% tested medium. Of the samples for commercial production, 5% tested low in zinc, 33% tested medium while 62% was high in zinc.

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

Reference

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

2. Cropping Systems

2.1 Samples for Home and Garden

Crops for which recommendations are requested by homeowners:

	1995	1996	1997	1998	1999	2000	2001	Total	%
ATF	0	0	8	0	0	0	0	8	11
FAR	1	0	0	0	0	0	0	1	1
FLA	0	0	0	0	0	0	1	1	1
GEN	1	0	0	0	0	0	0	1	1
HRB	1	0	0	0	0	0	0	1	1
IDL	0	0	0	1	0	0	0	1	1
LAW	1	0	1	2	1	5	11	21	28
MVG	2	3	3	1	1	2	7	19	25
OTH	0	0	0	0	1	1	1	3	4
PER	2	2	1	2	0	0	0	7	9
PRK	0	0	0	0	1	0	0	1	1
ROS	0	0	0	0	1	0	0	1	1
SAG	0	1	0	2	3	3	1	10	13
Total	8	6	13	8	8	11	21	75	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	8	0	5	2	0	0	0	15	1
ACT	0	0	1	0	0	0	0	1	0
AGE/AGT	81	14	67	28	250	65	200	705	25
ALE/ALT	25	15	13	33	7	31	31	155	5
APP	0	2	0	0	0	1	0	3	0
ASP	0	0	0	1	0	0	0	1	0
BCE/BCT	2	1	0	3	0	0	8	14	0
BGE/BGT	2	6	3	4	0	2	1	18	1
BET	0	0	3	3	4	3	5	18	1
BKB	1	0	0	0	0	0	0	1	0
BND/BDR	7	0	13	9	4	8	1	42	1
BSS	0	0	3	0	0	0	0	3	0
BNS	2	0	4	2	38	6	3	55	2
BTE	4	0	0	0	0	0	0	4	0
BUK	2	2	0	0	0	0	0	4	0
CGE/CGT	1	1	0	6	14	10	18	50	2
CLE/CLT	1	2	0	0	2	3	2	10	0
COG/COS	157	77	153	95	340	118	205	1145	40
GIE/GIT	0	0	2	0	2	2	0	6	0
GPF	0	1	0	0	0	0	4	5	0
GRE/GRT	16	0	4	4	8	5	35	72	3
IDL	1	0	0	0	1	0	0	2	0
MIX	0	0	2	1	1	1	1	6	0
OAS	0	1	2	10	1	1	10	25	1
OAT	5	3	1	2	1	4	1	17	1
ONS	2	0	0	0	0	0	0	2	0
OTH	2	0	1	1	3	0	1	8	0
PEA	12	1	2	2	1	0	4	22	1
PGE/PGT	0	0	0	2	1	0	1	4	0
PIE/PIT	1	0	1	1	1	2	0	6	0
PLE/PLT	0	3	0	0	0	1	1	5	0
PNE/PNT	0	0	0	6	0	1	5	12	0
POT	0	0	0	0	1	0	0	1	0
PUM	1	5	0	0	1	2	0	9	0
RSS	1	0	0	0	0	0	0	1	0

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Current year crop	1995	1996	1997	1998	1999	2000	2001	Total	%
RYS	4	0	0	0	0	0	0	4	0
SOG	0	0	0	0	0	0	3	3	0
SOY	7	1	0	0	11	1	1	21	1
SQW	0	0	1	0	0	0	0	1	0
SSH	0	0	0	0	1	0	1	2	0
SWC	21	11	25	17	18	31	20	143	5
TOM	0	0	0	0	1	0	0	1	0
TRE/TRT	6	5	0	0	0	1	0	12	0
WHS	0	0	0	2	1	2	2	7	0
WHT	10	12	9	10	25	9	11	86	3
Unknown	17	45	0	0	58	3	3	126	4
Total	399	208	315	244	796	313	578	2853	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)	4	2	6	5	3	4	4	28
SMG 3 (silt loam)	1	1	0	1	1	3	7	14
SMG 4 (sandy loam)	1	3	6	2	1	4	6	23
SMG 5 (sandy)	2	0	1	0	3	0	4	10
SMG 6 (mucky)	0	0	0	0	0	0	0	0
Total	8	6	13	8	8	11	21	75

3.2 Samples for Commercial Production

Soil series for samples submitted for commercial production:

Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Allis	3	0	0	0	0	0	0	2	2
Alluvial	3	0	0	0	0	0	0	1	1
Arkport	4	6	0	2	3	2	2	5	20
Aurora	2	2	2	1	16	35	13	23	92
Bath	3	6	5	3	4	10	7	1	36
Berrien	5	1	0	4	3	3	2	3	16
Braceville	4	2	0	3	0	3	3	2	13
Brockport	1	0	0	0	1	2	0	2	5
Burdett	2	8	16	7	0	14	6	7	58
Caneadea	2	30	5	28	9	38	21	24	155
Canfield	3	3	0	0	0	0	0	0	3
Cayuga	2	23	1	0	1	3	1	0	29
Cazenovia	2	8	0	3	0	9	9	7	36
Chagrin	3	0	3	0	0	2	4	13	22
Chenango	3	5	4	13	8	6	3	16	55
Chippewa	3	1	0	1	0	1	1	0	4
Conesus	2	7	10	35	5	33	12	41	143
Dunkirk	3	2	1	0	0	0	0	0	3
Eel	2	7	1	2	0	17	4	1	32
Erie	3	4	4	8	4	17	9	18	64
Farmington	3	4	0	2	0	0	1	0	7
Fredon	4	0	1	3	8	7	0	6	25
Fremont	2	0	0	0	0	0	0	33	33
Fulton	1	3	0	0	0	0	0	0	3
Genesee	2	15	0	3	2	22	2	6	50
Hilton	2	61	44	12	4	3	4	1	129
Honeoye	2	9	1	5	1	12	12	7	47
Hornell	2	0	0	0	0	0	0	1	1
Howard	3	1	1	5	2	14	3	2	28
Kendaia	2	5	0	13	6	17	7	8	56
Lakemont	1	0	2	2	0	3	1	0	8
Langford	3	17	12	22	11	4	7	22	95
Lansing	2	37	0	5	1	74	9	19	145
Lima	2	45	12	46	57	83	48	77	368
Lordstown	3	0	0	0	2	7	2	0	11
Lyons	2	2	0	2	0	2	5	8	19

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Name	SMG	1995	1996	1997	1998	1999	2000	2001	Total
Manlius	3	0	0	1	0	1	0	0	2
Mardin	3	4	3	2	4	1	17	1	32
Middlebury	3	1	0	4	0	2	0	0	7
Odessa	2	4	5	2	3	79	18	35	146
Ontario	2	52	36	44	34	56	45	49	316
Ottawa	5	2	4	0	8	28	2	15	59
Ovid	2	0	10	4	9	131	13	53	220
Palmyra	3	18	11	16	1	30	1	20	97
Poygan	1	0	1	2	0	0	1	0	4
Schoharie	1	0	1	1	6	6	2	6	22
Tioga	3	1	0	3	0	0	2	0	6
Valois	3	1	3	1	3	5	2	14	29
Volusia	3	1	5	2	14	4	12	12	50
Wallkill	3	0	0	0	0	2	0	0	2
Wayland	2	0	1	3	2	7	0	3	16
Westland	2	0	0	0	0	1	0	1	2
Woostern	3	0	1	0	12	0	0	12	25
Unknown	-	1	2	0	0	0	0	1	4
Total	-	399	208	315	244	796	313	578	2853

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	1	1	2	0	1	0	3	8
1996	0	1	0	2	2	0	1	0	6
1997	0	0	2	5	2	3	0	1	13
1998	1	0	3	3	1	0	0	0	8
1999	0	0	1	3	3	0	0	1	8
2000	0	2	2	2	4	1	0	0	11
2001	1	2	4	2	5	2	1	1	21
Total	2	9	13	19	17	7	2	6	75

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.2	1.8	2.6	0.5	2.5	1.8	0.8	
Highest:	8.6	6.1	7.9	4.3	12.4	5.1	21.6	
Mean:	5.2	4.0	4.2	2.8	4.8	3.4	4.1	
Median:	4.6	4.1	3.9	3.1	4.0	3.8	3.4	

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	0	13	13	25	0	13	0	38	100
1996	0	17	0	33	33	0	17	0	100
1997	0	0	15	38	15	23	0	8	100
1998	13	0	38	38	13	0	0	0	100
1999	0	0	13	38	38	0	0	13	100
2000	0	18	18	18	36	9	0	0	100
2001	5	24	19	10	24	10	5	5	100
Total	3	12	17	25	23	9	3	8	100

4.2 Samples for Commercial Production

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

	<1%	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	>6.9	Total
1995	1	55	172	131	31	5	0	4	399
1996	0	29	111	43	22	3	0	0	208
1997	0	29	154	112	18	2	0	0	315
1998	0	30	142	53	10	6	2	1	244
1999	1	68	301	296	78	36	10	6	796
2000	1	36	128	122	21	3	0	2	313
2001	3	32	227	205	64	42	5	0	578
Total	6	279	1235	962	244	97	17	13	2853

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.6	1.3	1.0	1.1	0.1	0.9	0.2	
Highest:	12.4	5.4	5.6	7.4	9.8	10.6	6.9	
Mean:	3.0	2.8	2.9	2.7	3.2	2.9	3.2	
Median:	2.8	2.7	2.8	2.5	3.0	2.9	3.0	

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	14	43	33	8	1	0	1	100
1996	0	14	53	21	11	1	0	0	100
1997	0	9	49	36	6	1	0	0	100
1998	0	12	58	22	4	2	1	0	100
1999	0	9	38	37	10	5	1	1	100
2000	0	12	41	39	7	1	0	1	100
2001	1	6	39	35	11	7	1	0	100
Total	0	10	43	34	9	3	1	0	100

5. pH

5.1 Samples for Home and Garden

Number of home and garden samples within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	0	0	0	1	2	2	2	1	0	8
1996	0	0	0	0	1	1	3	1	0	0	6
1997	0	0	0	0	1	1	5	5	1	0	13
1998	0	0	0	0	0	2	4	2	0	0	8
1999	0	0	3	1	0	0	1	2	1	0	8
2000	0	0	1	0	1	4	2	3	0	0	11
2001	0	1	1	1	3	3	9	2	1	0	21
Total	0	1	5	2	7	13	26	17	4	0	75

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	6.2	6.0	6.1	6.5	5.3	5.3	4.8	
Highest:	8.0	7.6	8.0	7.9	8.2	7.9	8.4	
Mean:	-	-	-	-	-	-	-	
Median:	7.2	7.1	7.3	7.1	6.7	6.9	7.0	

Percent of home and garden samples within each pH range:

	<4.5	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.4	6.5-6.9	7.0-7.4	7.5-7.9	8.0-8.4	>8.4	Total
1995	0	0	0	0	13	25	25	25	13	0	100
1996	0	0	0	0	17	17	50	17	0	0	100
1997	0	0	0	0	8	8	38	38	8	0	100
1998	0	0	0	0	0	25	50	25	0	0	100
1999	0	0	38	13	0	0	13	25	13	0	100
2000	0	0	9	0	9	36	18	27	0	0	100
2001	0	5	5	5	14	14	43	10	5	0	100
Total	0	1	7	3	9	17	35	23	5	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	4	20	48	148	132	46	1	0	399
1996	0	3	5	22	25	66	63	24	0	0	208
1997*	1	2	11	27	78	93	74	16	6	2	310
1998	1	0	9	32	43	101	51	7	0	0	244
1999	0	1	8	57	109	206	297	111	7	0	796
2000	0	4	18	27	42	79	94	46	3	0	313
2001	0	0	5	42	83	189	187	68	4	0	578
Total	2	10	60	227	428	882	898	318	21	2	2848

* Five samples were not analyzed for pH in 1997.

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	5.3	4.7	3.8	4.3	4.9	4.6	5.0	
Highest:	8.0	7.7	8.6	7.7	8.2	8.0	8.4	
Mean:	-	-	-	-	-	-	-	
Median:	6.9	6.8	6.6	6.6	7.0	6.9	6.9	

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	1	5	12	37	33	12	0	0	100
1996	0	1	2	11	12	32	30	12	0	0	100
1997	0	1	4	9	25	30	24	5	2	1	100
1998	0	0	4	13	18	41	21	3	0	0	100
1999	0	0	1	7	14	26	37	14	1	0	100
2000	0	1	6	9	13	25	30	15	1	0	100
2001	0	0	1	7	14	33	32	12	1	0	100
Total	0	0	2	8	15	31	32	11	1	0	100

6. Phosphorus

6.1 Samples for Home and Garden

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

	<1	1-3	4-8	9-39	40-60	61-80	81-100	101-150	151-200	>200	Total
	VL	L	M	H	VH	VH	VH	VH	VH	VH	
1995	0	1	3	0	0	0	0	0	2	2	8
1996	0	1	0	1	0	1	0	1	0	2	6
1997	0	0	1	6	5	0	0	0	0	1	13
1998	0	0	3	2	0	0	0	3	0	0	8
1999	0	1	1	1	1	1	0	0	0	3	8
2000	0	2	0	5	1	0	0	1	1	1	11
2001	0	2	2	9	1	1	2	1	2	1	21
Total	0	7	10	24	8	3	2	6	5	10	75

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	2	2	4	4	2	1	1	
Highest:	398	338	256	125	682	226	852	
Mean:	130	148	51	48	185	58	82	
Median:	83	109	37	14	64	17	17	

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	13	38	0	0	0	0	0	25	25	100
1996	0	17	0	17	0	17	0	17	0	33	100
1997	0	0	8	46	38	0	0	0	0	8	100
1998	0	0	38	25	0	0	0	38	0	0	100
1999	0	13	13	13	13	13	0	0	0	38	100
2000	0	18	0	45	9	0	0	9	9	9	100
2001	0	10	10	43	5	5	10	5	10	5	100
Total	0	9	13	32	11	4	3	8	7	13	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	48	71	188	35	20	8	16	4	9	399
1996	0	17	44	121	11	7	3	2	1	2	208
1997	0	27	57	167	39	11	3	9	1	1	315
1998	0	12	51	147	22	3	3	5	0	1	244
1999	0	103	222	353	45	30	12	12	9	10	796
2000	0	54	86	137	14	6	7	4	3	2	313
2001	0	86	118	258	54	26	14	14	4	4	578
Total	0	347	649	1371	220	103	50	62	22	29	2853

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:	473	368	479	291	422	319	262	
Mean:	33	24	26	23	24	20	26	
Median:	16	15	16	16	12	10	14	

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	12	18	47	9	5	2	4	1	2	100
1996	0	8	21	58	5	3	1	1	0	1	100
1997	0	9	18	53	12	3	1	3	0	0	100
1998	0	5	21	60	9	1	1	2	0	0	100
1999	0	13	28	44	6	4	2	2	1	1	100
2000	0	17	27	44	4	2	2	1	1	1	100
2001	0	15	20	45	9	4	2	2	1	1	100
Total	0	12	23	48	8	4	2	2	1	1	100

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

7. Potassium

7.1 Samples for Home and Garden

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

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	2	2	4
1996	0	0	0	1	1	2
1997	0	0	1	0	5	6
1998	0	0	0	3	2	5
1999	0	0	1	1	1	3
2000	0	0	0	2	2	4
2001	0	1	1	0	2	4
Total (#)	0	1	3	9	15	28
Total (%)	0	4	11	32	54	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	1	0	0	1
1996	0	0	0	1	0	1
1997	0	0	0	0	0	0
1998	0	0	1	0	0	1
1999	0	0	0	0	1	1
2000	0	0	1	0	2	3
2001	0	0	0	4	3	7
Total (#)	0	0	3	5	6	14
Total (%)	0	0	21	36	43	100

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Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	1	1
1996	0	0	0	0	3	3
1997	0	0	0	4	2	6
1998	0	1	0	0	1	2
1999	0	0	0	0	1	1
2000	0	0	0	1	3	4
2001	0	0	2	1	2	5
Total (#)	0	1	2	6	13	22
Total (%)	0	5	9	27	59	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	0	0	1	2
1996	0	0	0	0	0	0
1997	0	0	0	1	0	1
1998	0	0	0	0	3	3
1999	0	0	0	0	3	0
2000	0	0	0	0	0	0
2001	0	1	1	2	0	4
Total (#)	0	2	1	3	7	13
Total (%)	0	15	8	23	54	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 (%)	-	-	-	-	-	-

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Number of home and garden samples within each potassium classification:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
1995	0	1	1	2	4	8
1996	0	0	0	2	4	6
1997	0	0	1	5	7	13
1998	0	1	1	3	3	8
1999	0	0	1	1	6	8
2000	0	0	1	3	7	11
2001	0	2	4	8	7	21
Total #	0	4	9	24	38	75

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	74	111	97	75	97	81	56	
Highest:	878	639	677	473	736	475	1872	
Mean:	357	318	242	193	384	244	293	
Median:	244	319	210	126	330	246	189	

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

Summary (%)	Very Low	Low	Medium	High	Very High	Total
1995	0	13	13	25	50	100
1996	0	0	0	33	67	100
1997	0	0	8	38	54	100
1998	0	13	13	38	38	100
1999	0	0	13	13	75	100
2000	0	0	9	27	64	100
2001	0	10	19	38	33	100
Grand Total	0	5	12	32	51	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	0	0
1996	0	0	1	2	1	4
1997	0	1	0	2	2	5
1998	0	0	0	1	6	7
1999	0	0	1	6	4	11
2000	0	0	0	2	2	4
2001	0	0	0	6	2	8
Total (#)	0	1	2	19	17	39
Total (%)	0	3	5	49	44	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
1995	0	21	52	90	152	315
1996	2	10	24	66	42	144
1997	2	16	25	80	92	215
1998	0	12	25	52	61	150
1999	14	52	102	202	266	636
2000	6	34	55	84	50	229
2001	2	21	53	159	169	404
Total (#)	26	166	336	733	832	2093
Total (%)	1	8	16	35	40	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	1	16	23	32	72
1996	0	3	12	16	22	53
1997	0	6	26	33	18	83
1998	0	2	11	21	31	65
1999	2	4	25	38	37	106
2000	0	11	20	22	18	71
2001	0	5	25	42	62	134
Total (#)	2	32	135	195	220	584
Total (%)	0	5	23	33	38	100

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Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	5	3	0	8
1996	0	0	1	0	0	1
1997	0	2	3	1	2	8
1998	0	1	5	4	1	11
1999	0	2	2	3	5	12
2000	0	3	0	2	0	5
2001	0	3	4	5	1	13
Total (#)	0	11	20	18	9	58
Total (%)	0	19	34	31	16	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	1	2	3
1996	0	3	1	0	0	4
1997	0	2	2	0	0	4
1998	0	2	2	6	1	11
1999	2	8	9	8	4	31
2000	0	3	1	0	0	4
2001	0	5	1	5	7	18
Total (#)	2	23	16	20	14	75
Total (%)	3	31	21	27	19	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 (%)	-	-	-	-	-	-

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

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	22	73	117	186	1	399
1996	2	16	39	84	65	2	208
1997	2	27	56	116	114	0	315
1998	0	17	43	84	100	0	244
1999	18	66	139	257	316	0	796
2000	6	51	76	110	70	0	313
2001	2	34	83	217	241	1	578
Grand Total	30	233	509	985	1092	4	2853

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	48	33	25	55	17	24	1	
Highest:	1775	1379	861	1629	1495	950	1330	
Mean:	206	172	176	191	188	140	201	
Median:	161	141	143	163	148	116	155	

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

% summary	Very Low	Low	Medium	High	Very High	Un-known	Total
1995	0	6	18	29	47	0	100
1996	1	8	19	40	31	1	100
1997	1	9	18	37	36	0	100
1998	0	7	18	34	41	0	100
1999	2	8	17	32	40	0	100
2000	2	16	24	35	22	0	100
2001	0	6	14	38	42	0	100
Grand Total	1	8	18	35	38	0	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	8	8
1996	0	0	0	0	6	6
1997	0	0	0	0	13	13
1998	0	0	0	0	8	8
1999	0	0	0	0	8	8
2000	0	0	0	0	11	11
2001	0	1	0	2	18	21
Total	0	1	0	2	72	75

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	230	292	260	245	230	256	45	
Highest:	828	613	652	831	1501	1018	3455	
Mean:	537	432	451	492	612	502	583	
Median:	569	455	436	465	504	358	484	

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
1995	0	0	0	0	100	100
1996	0	0	0	0	100	100
1997	0	0	0	0	100	100
1998	0	0	0	0	100	100
1999	0	0	0	0	100	100
2000	0	0	0	0	100	100
2001	0	5	0	10	86	100
Total	0	1	0	3	96	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	6	24	369	399
1996	0	2	2	19	185	208
1997	0	1	5	22	287	315
1998	0	3	6	31	204	244
1999	0	1	6	31	758	796
2000	0	3	4	34	272	313
2001	0	0	2	26	550	578
Total	0	10	31	187	2625	2853

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	72	59	55	38	47	37	82	
Highest:	1227	994	1245	941	1791	1201	1437	
Mean:	446	410	440	347	528	410	464	
Median:	426	402	416	336	495	393	434	

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	2	6	92	100
1996	0	1	1	9	89	100
1997	0	0	2	7	91	100
1998	0	1	2	13	84	100
1999	0	0	1	4	95	100
2000	0	1	1	11	87	100
2001	0	0	0	4	95	100
Total	0	0	1	7	92	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	8	0	8
1996	6	0	6
1997	13	0	13
1998	7	1	8
1999	6	2	8
2000	10	1	11
2001	20	1	21
Total	70	5	75

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	100	0	100
	100	0	100
	100	0	100
	88	13	100
	75	25	100
	91	9	100
	95	5	100
	93	7	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	2	1	2	2	2	1	
Highest:	21	14	12	74	100	50	50	
Mean:	7	5	6	13	26	10	11	
Median:	4	3	7	5	10	5	6	

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	399	0	399
1996	200	8	208
1997	312	3	315
1998	243	1	244
1999	193	3	796
2000	308	5	313
2001	576	2	578
Total	2831	22	2853

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1	1	1	1	1	1	1	
Highest:	40	107	73	59	92	611	70	
Mean:	5	8	6	7	5	8	5	
Median:	3	3	4	5	3	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:				Percentages:		
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
1995	8	0	8	100	0	100
1996	6	0	6	100	0	100
1997	13	0	13	100	0	100
1998	7	1	8	88	13	100
1999	7	1	8	88	13	100
2000	10	1	11	91	9	100
2001	17	4	21	81	19	100
Total	68	7	75	91	9	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	20	26	16	19	26	12	11	
Highest:	63	41	94	151	113	103	139	
Mean:	44	32	55	50	51	37	54	
Median:	45	30	54	38	38	29	31	

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	397	2	399
1996	206	2	208
1997	308	7	315
1998	242	2	244
1999	781	15	796
2000	311	2	313
2001	572	6	578
Total	2817	36	2853

Percentages:

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

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	10	10	13	8	9	6	10	
Highest:	113	360	127	154	217	520	172	
Mean:	31	31	39	29	33	27	35	
Median:	29	28	34	27	28	22	32	

11. Zinc

11.1 Samples for Home and Garden

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

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	0	1	7	8
1996	0	0	6	6
1997	0	0	13	13
1998	0	0	8	8
1999	0	0	8	8
2000	0	2	9	11
2001	0	2	19	21
Total	0	5	70	75

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	13	88	100
0	0	100	100
0	0	100	100
0	0	100	100
0	0	100	100
0	0	100	100
0	18	82	100
0	10	90	100
0	7	93	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	1.0	1.4	1.3	1.2	1.4	0.7	0.8	
Highest:	119.9	154.6	55.0	32.0	21.7	36.5	80.3	
Mean:	29.0	29.1	6.5	9.0	9.2	6.3	8.6	
Median:	16.3	5.3	2.1	2.2	6.0	2.6	2.3	

11.2 Samples for Commercial Production

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

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
1995	21	159	219	399
1996	5	76	127	208
1997	3	116	196	315
1998	15	77	152	244
1999	65	252	479	796
2000	28	133	152	131
2001	8	122	448	578
Total	145	935	1773	2853

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
5	40	55	100
2	37	61	100
1	37	62	100
6	32	62	100
8	32	60	100
9	42	49	100
1	21	78	100
5	33	62	100

	1995	1996	1997	1998	1999	2000	2001	
Lowest:	0.1	0.3	0.4	0.2	0.1	0.1	0.3	
Highest:	45.8	24.8	45.9	17.5	9.7	69.9	13.3	
Mean:	2.0	2.0	1.8	1.6	1.6	1.7	2.1	
Median:	1.2	1.2	1.3	1.2	1.3	1.0	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	
ACT	Apricots
ALG	Azalea
APP	Apples

Crop Code	Crop Description
ATF	Athletic Field
ASP	Asparagus
BDR/BND	Beans, dry
BET	Beets
BKB	Blackberries
BLU/BLB	Blueberries
BNS	Beans, snap
CEM	Cemetery
END	Endives
FAR	Fairway
FLA	Flowering Annuals
GRA	Grapes
GEN	Green
GPF	Grapes, French-American
HRB	Herbs
IDL	Idle land
LAW	Lawn
LET	Lettuce
MIX/MVG	Mixed vegetables
MML	Muskmelon
ONS	Onion-seeded
OTH	Other
PAR	Pears
PEA	Peas
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

Ketterings, Q.M., H. Krol, W.S. Reid, N. Herendeen, and D. Thorp (2003). Livingston County Soil Sample Survey 1995-2001. CSS Extension Bulletin E03-26. 40 pages.

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