

Soil Sample Survey

Steuben County

Samples analyzed by CNAL (2002-2006)



Steuben County (photo credit: Carl Albers, CCE of Steuben County).

Summary compiled by

Renuka Rao, Carl Albers, Quirine M. Ketterings, and Hettie Krol



Cornell Nutrient Analysis Laboratory
<http://www.css.cornell.edu/soiltest/newindex.asp>

&

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



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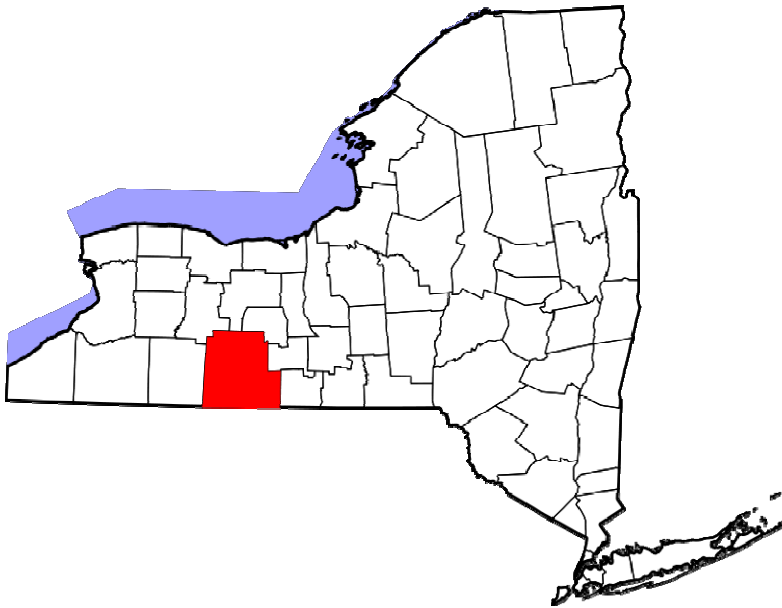


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1. County Introduction

Steuben County is a rural county in the Southern Tier of New York which enjoys a mix of agricultural fields, woodland, rolling hills and scenic lakes such as Keuka Lake. Agriculture, manufacturing and tourism are important components of the local economy.



Dairy farming comprises the largest segment of the agricultural economy, followed by wine and grapes, potatoes, beef cattle, cash crops, and evergreens sold for Christmas trees and to the landscape industry.

The topography is rolling, with wide plateaus on many hilltops and broad, valleys through much of the county. The soil

drainage on land in farming varies from well-drained to somewhat poorly drained, with textures from silty clay loams to gravels. Dairy farms include smaller Amish farms milking roughly 12 cows to several farms milking close to a thousand head each in state-of-the-art facilities. Corn grown for grain and silage is a common sight during the growing season, as over thirty thousand acres are grown. Alfalfa-grass and red clover-grass mixtures, along with mostly grass stands make up the majority of hay acreage grown. Steuben County is the number one oat producing county in New York State, with over 10,000 acres grown for grain and straw. Steuben is also the number one cow-calf county in New York State, with black cattle, primarily Angus and Angus crosses being most often found on local farms. Pasture-based agriculture is an important segment of Steuben County agriculture with many dairy, beef, horse, and other livestock farms obtaining a significant percentage of their feed from pasture. Vineyards and small wineries dot the hillsides surrounding Keuka Lake and the number of small wineries has steadily risen in recent years.

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Steuben County is also known as a top spot for deer hunting as our mix of agricultural and woodland is ideal for whitetail deer populations. The wild turkey population has also been on the rebound in recent years and this stately game bird attracts both hunters and bird lovers of all types.

With good road access from Route 390 from the north, I-86 from east and west, and Route 15 from Pennsylvania, competitive land prices and our access to major Northeast markets, the future looks bright for agriculture in Steuben County. There is no doubt that dairy farming will remain as the foundation of Steuben County agriculture for many years to come, with major contributions from livestock-based enterprises, grain, hay, and vegetable cash crops, vineyards and small wineries, and evergreens grown for Christmas trees and landscaping.

Carl Albers

Agricultural & Natural Resources Program Leader

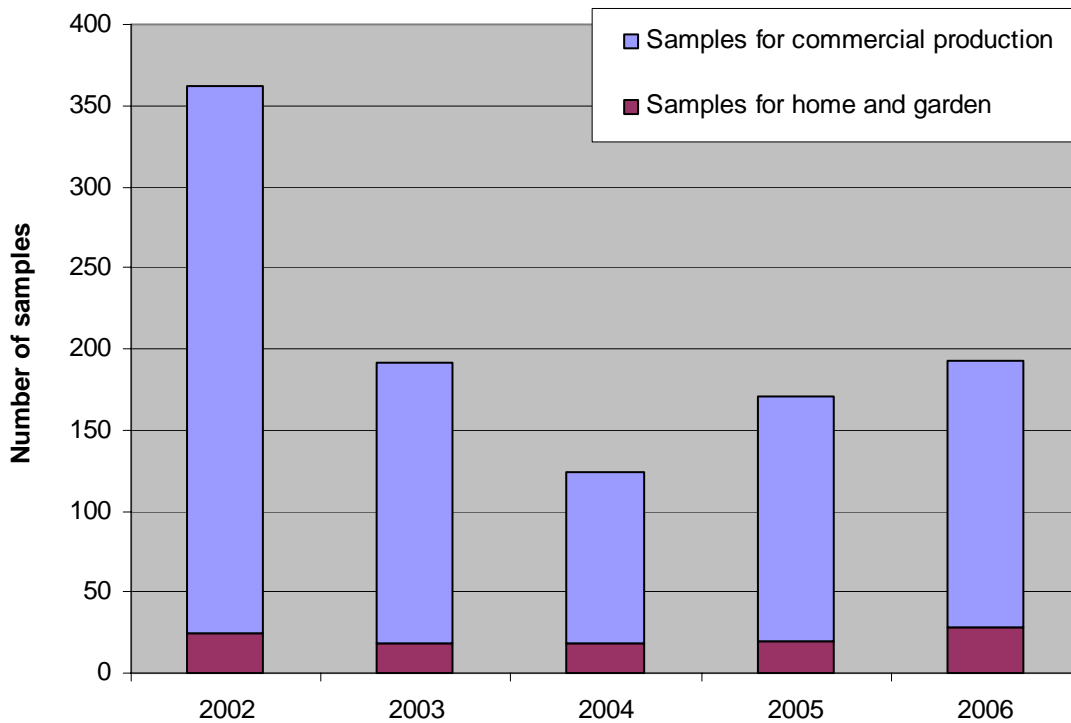
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Steuben County (photo credit: Carl Albers, CCE of Steuben County).

2. General Survey Summary

This survey summarizes the soil test results from grower (identified as “commercial samples”) and homeowner samples from Steuben County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) during 2002 and 2006. The total number of samples analyzed in these years amounted to 1040. Of these 930 samples (89%) were submitted by commercial growers while 110 samples (11%) were submitted by homeowners.



Homeowners		Commercial		Total
2002	25	2002	337	262
2003	19	2003	172	191
2004	18	2004	106	124
2005	20	2005	150	170
<u>2006</u>	<u>28</u>	<u>2006</u>	<u>165</u>	<u>193</u>
Total	110	Total	930	1040

The majority (74%) of the homeowners that submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 requested fertilizer recommendations for lawns (34%) or for home garden vegetable production (32%). Commercial growers submitted samples mostly to grow corn silage or grain (24%), clover mixes (18%), alfalfa or alfalfa/grass mixes (11%), and grass hay production (11%).

Soils tested for home and garden in Steuben County were classified as belonging to soil management group 2 (28%), group 3 (33%), group 4 (35%), or group 5 (4%). A description of the different management groups is given below.

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 by commercial growers, the majority (78%) belonged to soil management group 3. Seventeen percent belonged to group 2. Group 4 was represented by 1% of the samples while 2% belonged to group 5 and 1% to group 6 (organic soils). Mardin was the most common soil series (28% of all samples), followed by Volusia (18%), Howard (14%), Bath (6%) and Lordstown (6%).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to almost 50% (organic soil). For homeowners 55% of the samples had between 2 and 5% organic matter. Of the samples submitted by commercial growers, 77% contained between 2 and 5% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from less than 4.2 to 8.1. For home and garden samples 67% tested between 6.0 and 7.4 for pH while 29% had a pH between 7.0 and 7.9. For the commercial samples, the highest pH was 8.1 and 54% tested between pH 6.0 and 7.4 while 41% 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 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 anything higher is classified as very high. For homeowners, 15% tested low, 19% were medium, 29% tested high and 37% tested very high. This meant that 66% tested high or very high in P. For commercial growers, only 7% tested very high. In total 34% were low in P, 27% tested medium for P while 32% of the samples were classified as high in soil test P. This means that 39% tested high or very high in P.

Classifications for potassium depend on soil management group. The fine textured soils (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 medium, 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 Table below).

Potassium classifications for Steuben County soils varied from very low or low (9% of the homeowner soils and 8% of the commercial growers' soils) to very high (56% of the homeowner soils and 34% of the commercial growers' soils). For homeowners, 12% tested medium, and 23% tested high for potassium. For commercial growers' soils, 21% tested medium and 36% tested high in potassium.

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 29 to 6111 lbs Mg/acre (Morgan extraction). There were no soils that tested very low for Mg. Most soils tested very high or very high for Mg (95% of the homeowner soils and 99% of the soils of the commercial growers). In total 5% of the homeowner soils and 1% of the commercial growers' soil tested low or medium in Mg.

Soils with more than 50 lbs Morgan extractable Fe per acre test excessive for Fe. Anything lower than 50 lbs Fe/acre is considered normal. Iron levels fell for 87-89% in the normal range with 11% of the homeowner soils and 13% of the commercial grower soils testing excessive for Fe. Similarly, most soils (91-94%) 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 Zn 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 homeowner soils, 91% tested high while 8% tested medium. Of the commercial growers' samples, 10% tested low, 27% tested medium while 63% were high in Zn.

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 3.

3. Cropping Systems

3.1 Homeowner Samples

Crops for which recommendations are requested by homeowners:

	2002-2006	%
ATF	4	4
BLU	1	1
CEM	1	1
FLA	3	3
GEN	2	2
GRA	1	1
LAW	37	34
MVG	35	32
OTH	9	8
PER	3	3
RSP	2	2
SAG	9	8
STR	1	1
TRF	2	2
Total	110	100

See Appendix for Cornell crop codes.

3.2 Commercial Samples

Crops for which recommendations are requested in commercial samples:

Current year crop	2002	2003	2004	2005	2006	Total	%
ABE/ABT	1	0	6	0	0	7	1
AGE/AGT	45	5	9	8	5	72	8
ALE/ALT	7	5	4	2	4	22	2
APP	0	2	2	1	2	7	1
BCE	0	0	1	1	3	5	1
BDR	1	0	0	0	0	1	0
BGE/BGT	10	43	7	0	4	64	7
BLB	0	5	1	2	0	8	1
BND	1	0	0	0	0	1	0
BSP	0	0	1	0	0	1	0
BSS	1	0	0	0	0	1	0
BUK	5	2	2	4	5	18	2
CGE/CGT	52	30	11	27	23	143	15
CLE/CLT	8	2	1	9	12	32	3
COG/COS	119	30	12	39	26	226	24
CSE	7	0	0	0	1	8	1
GIE/GIT	2	0	0	0	0	2	0
GPA	0	5	5	0	0	10	1
GPF	0	0	1	3	3	7	1
GPV	5	2	4	3	12	26	3
GRE/GRT	21	7	13	10	18	69	7
MIX	0	3	0	0	1	4	0
OAS	11	1	7	7	7	33	4
OAT	15	4	0	1	4	24	3
OTH	0	6	4	2	0	12	1
PGE/PGT	0	0	0	2	4	6	1
PIT	0	0	0	2	3	5	1
PLE/PLT	2	0	3	5	8	18	2
PNT	0	4	0	0	1	5	1
POT	1	4	2	0	2	9	1
RYC	3	0	0	0	0	3	0
RYS	0	0	1	0	1	2	0
SOG	0	0	0	2	5	7	1
SOY	0	0	0	1	1	2	0
SSH	0	0	1	1	0	2	0
STS	0	1	0	1	0	2	0

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Current year crop	2002	2003	2004	2005	2006	Total	%
SWC	0	1	3	0	0	4	0
TRE	1	7	1	2	3	14	2
TRT	7	0	3	8	1	19	2
TUR	0	0	0	4	4	8	1
WHS	0	1	0	3	0	4	0
WHT	0	1	1	0	2	4	0
Unknown	12	1	0	0	0	13	1
Total	337	172	106	150	165	930	100

See Appendix for Cornell crop codes.



Steuben County (photo credit: Carl Albers, CCE of Steuben County).

4. Soil Types

4.1 Homeowner Samples

Soil types (soil management groups) for homeowner samples:

	2002-2006	%
SMG 1 (clayey)	0	0
SMG 2 (silty)	31	28
SMG 3 (silt loam)	36	33
SMG 4 (sandy loam)	39	35
SMG 5 (sandy)	4	4
SMG 6 (mucky)	0	0
Total	110	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002	2003	2004	2005	2006	Total	%
Alluvial lands	3	0	0	0	1	0	1	0
Alton	5	3	9	1	1	1	15	2
Arnot	3	10	3	4	6	3	26	3
Bath	3	31	19	2	0	6	58	6
Blasdell	3	0	1	0	0	0	1	0
Braceville	4	5	0	0	0	0	5	1
Bridgeton	3	0	1	0	0	0	1	0
Canandaigua	3	1	0	0	0	0	1	0
Carlisle	6	0	0	3	0	0	3	0
Chenango	3	8	1	4	4	5	22	2
Chippewa	3	1	1	0	0	0	2	0
Erie	3	1	0	0	0	0	1	0
Fredon	4	1	0	0	0	0	1	0
Fremont	2	8	8	0	4	15	35	4
Hamlin	2	0	1	1	0	0	2	0
Hornell	2	13	2	4	12	5	36	4
Howard	3	66	9	18	24	13	130	14
Kanona	2	1	1	0	2	2	6	1
Kendaia	2	1	0	0	0	0	1	0
Lackawanna	3	3	0	0	0	1	4	0
Langford	3	1	3	0	0	0	4	0
Lansing	2	0	1	0	0	0	1	0
Lordstown	2	11	7	11	15	8	52	6
Madrid	4	2	0	1	1	0	4	0
Mardin	3	87	54	34	40	41	256	28
Markey	6	2	0	0	0	0	2	0
Middlebury	3	4	3	2	1	3	13	1
Morris	3	0	0	0	3	1	4	0
Oquaga	3	5	0	0	1	1	7	1
Ovid	2	2	5	0	2	0	9	1
Palms	6	2	0	0	0	0	2	0
Red Hook	4	3	0	0	0	0	3	0
Scio	3	0	0	0	1	2	3	0
Teel	2	0	0	2	2	0	4	0
Tioga	3	1	2	1	0	5	9	1
Tuller	3	4	0	2	0	2	8	1

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Name	SMG	2002	2003	2004	2005	2006	Total	%
Unadilla	3	1	7	0	0	0	8	1
Vly	3	0	1	0	0	0	1	0
Volusia	3	50	31	13	28	42	164	18
Warners	3	2	0	0	0	0	2	0
Wayland	2	4	1	0	0	2	7	1
Wellsboro	3	2	1	0	0	0	3	0
unknown	-	1	0	3	2	7	13	1
Total	-	337	172	106	150	165	930	100

5 Organic Matter

5.1 Homeowner Samples

Organic matter (loss-on-ignition method) in homeowner samples:

	<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
Total	4	10	17	16	28	11	11	13	110
%	4	9	15	15	25	10	10	12	100

	2002-2006
Lowest:	0.6
Highest:	15.7
Mean:	4.7
Median:	4.3

5.2 Commercial Samples

Organic matter (loss-on-ignition method) in commercial samples (number):

	<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
2002	0	9	56	138	82	31	9	12	337
2003	0	2	23	73	45	20	6	3	172
2004	0	2	20	37	27	14	2	4	106
2005	0	6	11	48	43	21	12	9	150
2006	5	9	20	51	48	16	12	4	165
Total	5	28	130	347	245	102	41	32	930

	2002	2003	2004	2005	2006
Lowest:	1.1	1.6	1.2	1.5	0.4
Highest:	33.5	9.8	49.3	9.1	11.1
Mean:	4.0	3.9	4.9	4.3	4.0
Median:	3.6	3.8	3.8	4.1	3.9

Organic matter commercial samples (% of total number of samples):

	<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
2002	0	3	17	41	24	9	3	4	100
2003	0	1	13	42	26	12	3	2	100
2004	0	2	19	35	25	13	2	4	100
2005	0	4	7	32	29	14	8	6	100
2006	3	5	12	31	29	10	7	2	100
Total	1	3	14	37	26	11	4	3	100

6. pH

6.1 Homeowner Samples

pH of homeowner samples:

	<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
Total	0	1	10	11	30	24	20	12	2	0	110
%	0	1	9	10	27	22	18	11	2	0	100

	2002-2006
Lowest:	4.9
Highest:	8.4
Mean:	-
Median:	6.5

6.2 Commercial Samples

pH of commercial samples (number):

	<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
2002	1	6	32	91	105	70	32	0	0	0	
2003	1	11	17	36	52	40	13	2	0	0	
2004	2	3	20	31	31	14	3	0	2	0	106
2005	1	5	32	55	33	22	2	0	0	0	150
2006	0	4	22	47	57	24	9	1	1	0	165
Total	5	29	123	260	278	170	59	3	3	0	930

	2002	2003	2004	2005	2006
Lowest:	4.4	4.2	4.1	4.4	4.5
Highest:	7.4	7.6	8.0	7.1	8.1
Mean:	-	-	-	-	-
Median:	6.1	6.2	5.9	5.8	6.1

pH of commercial samples (% of total number of samples):

	<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
2002	0	2	9	27	31	21	9	0	0	0	100
2003	1	6	10	21	30	23	8	1	0	0	100
2004	2	3	19	29	29	13	3	0	2	0	100
2005	1	3	21	37	22	15	1	0	0	0	100
2006	0	2	13	28	35	15	5	1	1	0	100
Total	1	3	13	28	30	18	6	0	0	0	100

7. Phosphorus

7.1 Homeowner Samples

Phosphorus (lbs/acre Morgan P) in homeowner samples (numbers):

	<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	
Total	0	16	21	32	6	7	5	5	5	13	110
%	0	15	19	29	5	6	5	5	5	12	100

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

	2002-2006
Lowest:	1
Highest:	606
Mean:	76
Median:	18

7.2 Commercial Samples

Phosphorus (lbs P/acre Morgan extraction) for commercial samples (number):

	<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	
2002	0	100	88	129	3	4	0	2	0	11	337
2003	0	52	46	58	8	1	1	1	1	4	172
2004	0	24	35	35	7	1	1	2	0	1	106
2005	0	70	30	39	4	2	1	3	0	1	150
2006	0	74	48	38	2	1	1	1	0	0	165
Total	0	320	247	299	24	9	4	9	1	17	930

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

	2002	2003	2004	2005	2006
Lowest:	1	1	1	1	1
Highest:	351	502	259	225	149
Mean:	21	23	18	13	8
Median:	7	8	7	4	4

Phosphorus in commercial samples (% of total number of samples):

	<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	
2002	0	30	26	38	3	1	0	1	0	3	100
2003	0	30	27	34	4	1	1	1	1	2	100
2004	0	23	33	33	7	1	1	2	0	1	100
2005	0	47	20	26	3	1	1	2	0	1	100
2006	0	45	29	23	1	1	1	1	0	0	100
Total	0	34	27	32	3	1	0	1	0	2	100

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

8. Potassium

8.1 Homeowner Samples

Potassium (lbs K/acre Morgan extraction) in homeowner samples (number):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
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	
Total (#)	0	1	3	10	17	31
Total (%)	0	3	10	32	55	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	4	1	8	23	36
Total (%)	0	11	3	22	64	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	4	9	6	20	39
Total (%)	0	10	23	15	51	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	1	0	1	2	4
Total (%)	0	25	0	25	50	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	0	0	0
Total (%)	-	-	-	-	-	-

Rao, R., C. Albers, Q.M. Ketterings, and H. Krol (2007). Steuben Soil Sample Survey (2002-2006). CSS Extension Bulletin E07-8. 34 pages.

Potassium classification summary for homeowners:

Summary (#)	Very Low	Low	Medium	High	Very High	Total
Total	0	10	13	25	62	110
%	0	9	12	23	56	100

	2002-2006
Lowest:	55
Highest:	1246
Mean:	314
Median:	233

8.2 Commercial Samples

Potassium (lbs K/acre Morgan extraction) in commercial samples (number):

Soil Management Group 1						
	<35	35-64	65-94	95-149	>149	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	0	0	0
2003	0	0	0	0	0	0
2004	0	0	0	0	0	0
2005	0	0	0	0	0	0
2006	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	
2002	0	2	6	14	18	40
2003	0	4	4	6	12	26
2004	0	0	1	3	3	7
2005	0	0	0	10	12	22
2006	0	0	3	12	9	24
Total (#)	0	6	14	45	54	119
Total (%)	0	5	12	38	45	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	1	15	84	105	76	281
2003	4	22	28	44	48	146
2004	0	6	12	36	37	91
2005	0	9	21	49	45	124
2006	0	9	30	52	42	133
Total (#)	5	61	175	286	248	775
Total (%)	1	8	23	37	32	100

Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	4	1	6	11
2003	0	0	0	0	0	0
2004	0	0	0	0	1	1
2005	0	0	0	1	0	1
2006	0	0	0	0	0	0
Total (#)	0	0	4	2	7	13
Total (%)	0	0	31	15	54	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	0	0	0	0	0	0
2003	0	0	0	0	0	0
2004	0	0	0	1	0	1
2005	0	0	0	1	0	1
2006	0	1	0	0	0	1
Total (#)	0	1	0	2	0	3
Total (%)	0	33	0	67	0	100
Soil Management Group 6						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
2002	0	1	0	2	1	4
2003	0	0	0	0	0	0
2004	0	0	0	0	3	3
2005	0	0	0	0	0	0
2006	0	0	0	0	0	0
Total (#)	0	1	0	2	4	7
Total (%)	0	14	0	29	57	100

Potassium classification summary for commercial samples.

Summary (#)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	1	18	94	122	101	1	337
2003	4	26	32	50	60	0	172
2004	0	6	13	40	44	3	106
2005	0	9	21	61	57	2	150
2006	0	10	33	64	51	7	165
Grand Total	5	69	193	337	313	13	930

Summary (%)	Very Low	Low	Medium	High	Very High	Un-known	Total
2002	0	5	28	36	30	0	100
2003	2	15	19	29	35	0	100
2004	0	6	12	38	42	3	100
2005	0	6	14	41	38	1	100
2006	0	6	20	39	31	4	100
Grand Total	1	7	21	36	34	1	100

	2002	2003	2004	2005	2006
Lowest:	40	38	50	49	51
Highest:	40253	2044	2142	1284	1348
Mean:	323	210	244	216	189
Median:	154	152	186	167	157

9. Magnesium

9.1 Homeowner Samples

Magnesium (lbs Mg/acre Morgan extraction) in homeowner samples (numbers):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total	0	0	1	7	102	110
%	0	0	1	6	93	100

	2002-2006
Lowest:	67
Highest:	1725
Mean:	459
Median:	369

9.2 Commercial Samples

Magnesium (lbs Mg/acre Morgan extraction) in commercial samples (number):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	5	13	43	276	337
2003	0	6	9	34	123	172
2004	0	4	1	15	86	106
2005	0	2	6	28	114	150
2006	0	0	4	19	142	165
Total	0	17	33	139	741	930

	2002	2003	2004	2005	2006
Lowest:	31	44	29	38	70
Highest:	6111	1032	1543	1520	1155
Mean:	370	319	374	344	406
Median:	332	293	338	296	379

Magnesium commercial samples (% of total number of samples):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	0	1	4	13	82	100
2003	0	3	5	20	72	100
2004	0	4	1	14	81	100
2005	0	1	4	19	76	100
2006	0	0	2	12	86	100
Total	0	2	4	15	80	100

10. Iron

10.1 Homeowner Samples

Iron (lbs Fe/acre Morgan extraction) in homeowner samples:

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
Total	98	12	110

Percentages:

0-49	>49	Total
Normal	Excessive	
89	11	100

	2002-2006
Lowest:	1
Highest:	108
Mean:	17
Median:	8

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
2002	315	22	337
2003	143	29	172
2004	84	22	106
2005	116	34	150
2006	148	17	165
Total	806	124	930

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	93	7	100
	83	17	100
	79	21	100
	77	23	100
	90	10	100
	87	13	100

	2002	2003	2004	2005	2006
Lowest:	1	1	5	2	2
Highest:	178	171	388	194	231
Mean:	18	27	43	37	24
Median:	9	14	23	27	16

11. Manganese

11.1 Homeowner Samples

Manganese (lbs Mn/acre Morgan extraction) in homeowner samples:

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
Total	100	10	110

Percentages:

0-99	>99	Total
Normal	Excessive	
91	9	100

	2002-2006
Lowest:	13
Highest:	409
Mean:	55
Median:	44

11.2 Commercial Samples

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

Total number of samples:			Percentages:			
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
2002	328	9	337	97	3	100
2003	164	8	172	95	5	100
2004	97	9	106	92	8	100
2005	132	18	150	88	12	100
2006	155	10	165	94	6	100
Total	876	54	930	94	6	100

	2002	2003	2004	2005	2006
Lowest:	7	5	16	13	12
Highest:	249	156	186	253	275
Mean:	35	39	50	54	46
Median:	28	29	42	44	34

12. Zinc

12.1 Homeowner Samples

Zinc (lbs Zn/acre Morgan extraction) in homeowner samples:

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
Total	1	9	100	110

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
1	8	91	100

	2002-2006
Lowest:	0.3
Highest:	302.8
Mean:	14.6
Median:	3.9

12.2 Commercial Samples

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

Total number of samples:

	<0.5	0.5-1.0	>1	Total
	Low	Medium	High	
2002	11	100	226	337
2003	16	47	109	172
2004	2	26	78	106
2005	19	38	93	150
2006	43	41	81	165
Total	91	252	587	930

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
3	30	67	100
9	27	63	100
2	25	74	100
13	25	62	100
26	25	49	100
10	27	63	100

	2002	2003	2004	2005	2006
Lowest:	0.1	0.1	0.1	0.1	0.1
Highest:	60.1	128.6	18.8	121.9	609.1
Mean:	2.2	3.6	2.5	2.7	5.0
Median:	1.3	1.4	1.5	1.3	1.0

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
CVE	Crownvetch, Establishment
CVT	Crownvetch, Established
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
RYC	Rye cover crop
RYS	Rye seed production
	Small grains
MIL	Millet
OAS	Oats with legume
OAT	Oats
SOF	Sorghum forage
SOG	Sorghum grain
SOY	Soybeans
SSH	Sorghum sudan hybrid
SUD	Sudangrass
WHS	Wheat with legume
WHT	Wheat
	Others
ALG	Azalea
APP	Apples
ATF	Athletic field
BDR/DND	Beans-dry

Crop Code	Crop Description
BLU	Blueberries
CEM	Cemetery
FAR	Fairway
FLA	Flowering annuals
GRA	Grapes
GEN	Green
HRB	Herbs
IDL	Idle land
LAW	Lawn
MIX/MVG	Mixed vegetables
PER	Perennials
PRK	Park
POT/PTO	Potatoes
PUM	Pumpkins
ROD	Roadside
ROS	Roses
RSF	Raspberries, Fall
RSP	Raspberries (homeowners)
RSS	Raspberries, Summer
SAG	Ornamentals adapted to pH 6.0 to 7.5
SQW	Squash, Winter
STE	Strawberries, Ever
STR	Strawberries (homeowners)
STS	Strawberries, Spring
SUN	Sunflowers
SWC	Sweet corn
TOM	Tomatoes
TRE	Christmas trees, Established
TRF	Turf
TRT	Christmas trees, Topdressing