Soil Sample Survey

Fulton County

Samples analyzed by CNAL (2002-2006)

Fulton County (photo credit: Cristal Stewart, Cornell Cooperative Extension of Fulton County).

Summary compiled by

Renuka Rao, Crystal Stewart, Quirine M. Ketterings, and Hettie Krol

Cornell Nutrient Analysis Laboratory
http://www.css.cornell.edu/soiltest/newindex.asp
&
Nutrient Management Spear Program
http://nmsp.css.cornell.edu/

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Fulton County (photo credit: Crystal Stewart, Cornell Cooperative Extension of Fulton County).

1. County Introduction

Fulton County is known as the gateway to the Adirondacks, and includes the popular tourist destination the Great Sacandaga Lake. Half of the county is located within the Adirondack State Park and contains 44 lakes. The other half of the county contains a mixture of medium to small towns and farms.
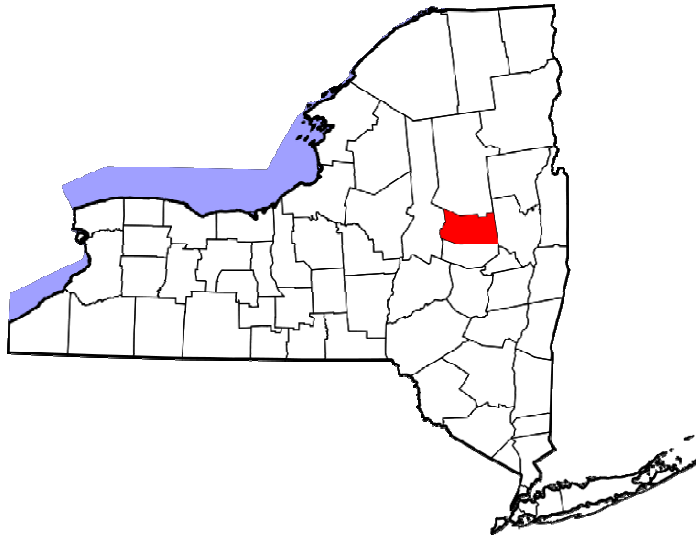
Tourism, agriculture and timber are all important facets of Fulton County's economy. Just under half of the county's acreage is considered timberland, 87% of which was privately owned as of 2002. Twelve percent of the county's land was reported as farmland in 2002. Both the amount of land being farmed and the number of farms in the county increased from the 1997 to the 2002 census. Dairies represent the strong majority of economic value among farms, followed by cow-calf operations, nurseries and greenhouses, hay and sileage, vegetable production, other livestock, and other crops.

Fulton County was once noted as a primary producer of gloves. Gloversville and Johnstown contained dozens of tanneries and glove manufacturing facilities. These plants were extremely detrimental to the environment, and most of them have been closed. This caused economic stress in the area which is still being felt today. Promising agricultural and natural resource based businesses are providing limited opportunities that will continue to be expanded upon.

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2. General Survey Summary

This survey summarizes the soil test results from grower (identified as "commercial samples") and homeowner samples from Fulton County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 95. Of these, 52 samples (55%) were submitted by commercial growers while 43 samples (45%) were submitted by homeowners.
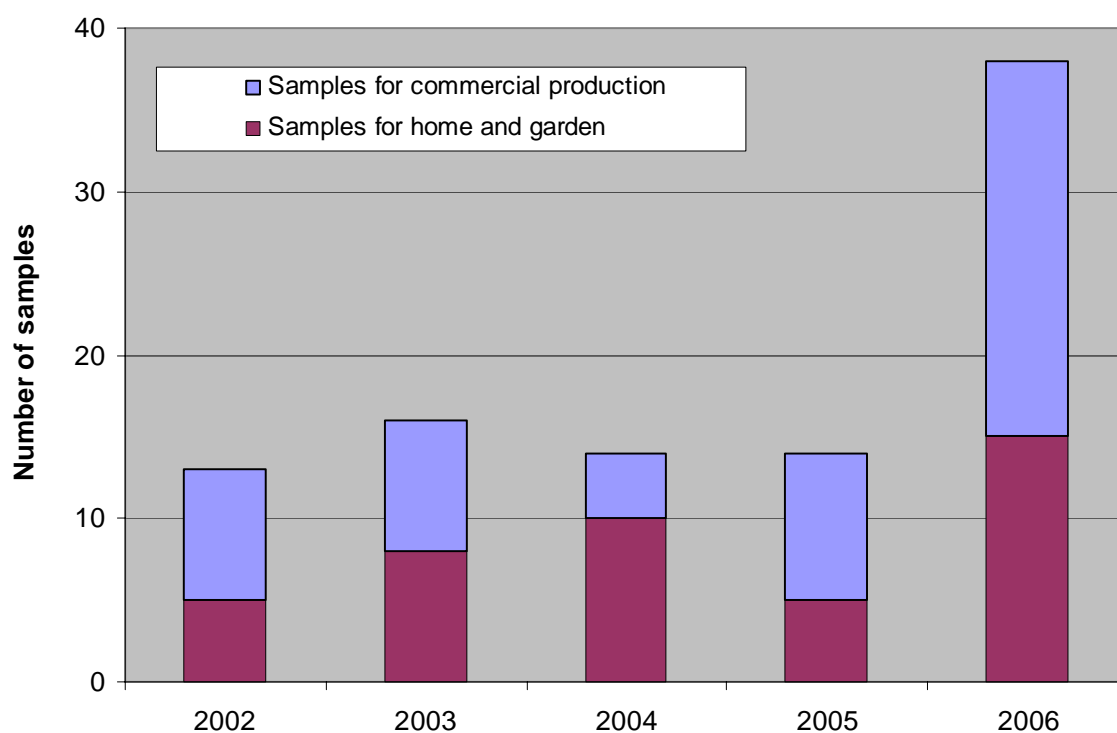
Homeowners			Commercial			Total
2002	5		2002	8		13
2003	8		2003	8		16
2004	10		2004	4		14
2005	5		2005	9		14
2006	15		2006	23		38
Total	43		Total	52		95

Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for lawns (21%) or for home garden vegetable production (21%) and athletic fields (16%). Commercial growers submitted samples primarily to grow corn silage or grain (31%), alfalfa or alfalfa/grass mixes (20%), grass hay production (14%) and sweet corn (13%).

Soils tested for home and garden in Fulton County were classified as belonging to soil management group 2 (16%), group 3 (9%), group 4 (37%), or group 5 (37%). 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, 42% belonged to soil management group 2. Groups 1 and 3 were represented by 2% of the samples while 33% belonged to group 4. Lansing was the most common soil series (19% of all samples), followed by Windsor (13%), Broadalbin (12%) and Galway, Churchville and Benson (with 6% each).

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to 15%. For homeowner samples, 53% had between 2 and 4% organic matter while 26% had between 4 and 6% organic matter. Of the samples submitted by commercial growers, 48% contained between 2 and 4% organic matter and 41% had 4 to 6% organic matter.

Soil pH in water (1:1 soil:water extraction ratio) varied from less than 4.8 to 8.2 for home and garden samples while 58% tested between 6.0 and 7.0 for pH. For the commercial samples, the highest pH was 7.0 and 63% tested between 6.0 and 7.0.

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 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, 51% of the soils tested low for P, 19% tested medium, 23% tested high and 7% tested very high. This meant that 30% tested high or very high in P. For commercial growers, none of the samples tested very high. In total 52% were low in P, 29% tested medium for P while 19% of the submitted samples were classified as high in soil test P.

Classifications for K 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.

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

Potassium classifications for Fulton County soils varied from very low (7% of the homeowner soils) to very high (19% of the homeowner soils and 27% of the commercial

growers' soils). For homeowners, 30% tested low in K, 21% tested medium, and 23% tested high for potassium. For commercial growers' soils, 15% tested low, 21% tested medium and 33% tested high in K while the remainder was of unknown soil type and could therefore not be classified.

Soils test very low for Mg 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 Mg. 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 861 lbs Mg/acre. There were no soils that tested very low for Mg. Most soils tested high or very high for Mg (79% of the homeowner soils and 92% of the soils of the commercial growers.

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 ranged from 88-94% in the normal range with 12% of the homeowner soils and 6% of the commercial grower soils testing excessive for Fe. All soils 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, 67% tested high for Zn while 30% tested medium and 2% were low in Zn. Of the commercial growers' samples, 2% tested low, 42% tested medium while 56% 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	7	16
CEM	1	2
LAW	9	21
MVG	9	21
OTH	6	14
PER	5	12
PTO	2	5
SAG	3	7
TRF	1	2
Total	43	100

3.2 Commercial Samples

Crops for which recommendations are requested in commercial samples:

Current year crop	2002-2006	%
ABT	6	12
AGE	3	6
ALT	1	2
APP	1	2
BCT	1	2
CBS	1	2
CGE	1	2
CLE	2	4
COS	16	31
GIT	1	2
GRT	6	12
OAS	2	4
OTH	2	4
RYC	2	4
SWC	7	13
Total	52	100

Note: See Appendix for Cornell crop codes.

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)	7	16
SMG 3 (silt loam)	4	9
SMG 4 (sandy loam)	16	37
SMG 5 (sandy)	16	37
SMG 6 (mucky)	0	0
Total	43	100

4.2 Commercial Samples

Soil series for commercial samples:

Name	SMG	2002-2006	%
Allagash	5	1	2
Amenia	4	2	4
Angola	2	1	2
Appleton	2	2	4
Benson	4	3	6
Broadalbin	4	6	12
Charlton	4	1	2
Churchville	2	3	6
Danley	2	2	4
Farmington	3	1	2
Galway	4	3	6
Hudson	2	1	2
Ilion	2	1	2
Lansing	2	10	19
Madalin	1	1	2
Mohawk	2	1	2
Podunk	4	2	4
Rhinebeck	2	1	2
Rumney	2	1	2
Windsor	5	7	13
Unknown	-	2	4
Total		52	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
Number	1	2	7	16	6	5	2	4	43
Percentage	2	5	16	37	14	12	5	9	100

	2002-2006
Lowest:	0.6
Highest:	15.4
Mean:	4.3
Median:	3.6

5.2 Commercial Samples

Organic matter (loss-on-ignition method) in commercial 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
Number	0	0	10	15	12	10	4	1	52
Percentage	0	0	19	29	23	19	8	2	100

	2002-2006
Lowest:	2.0
Highest:	10.2
Mean:	4.2
Median:	4.0

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
Number	0	2	2	3	10	15	5	3	3	0	43
Percentage	0	5	5	7	23	35	12	7	7	0	100

	2002-2006
Lowest:	4.8
Highest:	8.2
Mean:	-
Median:	6.6

6.2 Commercial Samples

pH of commercial 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
Number	0	2	4	12	20	13	1	0	0	0	52
Percentage	0	4	8	23	38	25	2	0	0	0	100

	2002-2006
Lowest:	4.9
Highest:	7.0
Mean:	-
Median:	6.2

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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	
Number	0	22	8	10	1	2	0	0	0	0	43
Percentage	0	51	19	23	2	5	0	0	0	0	100

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

	2002-2006
Lowest:	1
Highest:	61
Mean:	11
Median:	3

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	
Number	0	27	15	10	0	0	0	0	0	0	52
Percentage	0	52	29	19	0	0	0	0	0	0	100

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

	2002-2006
Lowest:	1
Highest:	39
Mean:	5
Median:	3

8. Potassium

8.1 Homeowner Samples

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

	<40	40-69	70-99	100-164	>164	Total
Soil Management Group 2						
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	1	2	4	7
Total (%)	0	0	14	29	57	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	1	1	1	1	0	4
Total (%)	25	25	25	25	0	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	8	2	4	2	16
Total (%)	0	50	13	25	13	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	2	4	5	3	2	16
Total (%)	13	25	31	19	13	100

Potassium classification summary for homeowners:

Summary	Very Low	Low	Medium	High	Very High	Total
Number	3	13	9	10	8	43
Percentage	7	30	21	23	19	100

	2002-2006
Lowest:	24
Highest:	506
Mean:	167
Median:	123

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	
Total (#)	0	0	0	1	0	1
Total (%)	0	0	0	100	0	100
Soil Management Group 2						
	<40	40-69	70-99	100-164	>164	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	3	7	9	4	23
Total (%)	0	13	30	39	17	100
Soil Management Group 3						
	<45	45-79	80-119	120-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	1	0	1
Total (%)	0	0	0	100	0	100
Soil Management Group 4						
	<55	55-99	100-149	150-239	>239	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	5	4	5	3	17
Total (%)	0	29	24	29	18	100
Soil Management Group 5						
	<60	60-114	115-164	165-269	>269	Total
	Very Low	Low	Medium	High	Very High	
Total (#)	0	0	0	1	7	8
Total (%)	0	0	0	20	80	100

Potassium classification summary for commercial samples.

Summary	Very Low	Low	Medium	High	Very High	Un-known	Total
Number	0	8	11	17	14	2	52
Percentage	0	15	21	33	27	4	100

	2002-2006
Lowest:	46
Highest:	699
Mean:	188
Median:	125

9. Magnesium

9.1 Homeowner Samples

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Number	0	4	5	10	24	43
Percentage	0	9	12	23	56	100

	2002-2006
Lowest:	37
Highest:	861
Mean:	299
Median:	227

9.2 Commercial Samples

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

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
Number	0	0	4	8	40	52
Percentage	0	0	8	15	77	100

	2002-2006
Lowest:	70
Highest:	777
Mean:	311
Median:	285

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	
Summary	38	5	43

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	88	12	100

	2002-2006
Lowest:	3
Highest:	89
Mean:	21
Median:	11

10.2 Commercial Samples

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

Total number of samples:

	0-49	>49	Total
	Normal	Excessive	
Total	49	3	52

Percentages:

	0-49	>49	Total
	Normal	Excessive	
	94	6	100

	2002-2006
Lowest:	2
Highest:	68
Mean:	15
Median:	10

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	
Summary	43	0	43

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	100	0	100

	2002-2006
Lowest:	4
Highest:	47
Mean:	18
Median:	15

11.2 Commercial Samples

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

Total number of samples:

	0-99	>99	Total
	Normal	Excessive	
Total	52	0	52

Percentages:

	0-99	>99	Total
	Normal	Excessive	
	100	0	100

	2002-2006
Lowest:	8
Highest:	85
Mean:	32
Median:	30

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	
Summary	1	13	29	43

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	30	67	100

	2002-2006
Lowest:	0.2
Highest:	29.9
Mean:	4.4
Median:	1.6

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	
Total	1	22	29	52

Percentages:

<0.5	0.5-1.0	>1	Total
Low	Medium	High	
2	42	56	100

	2002-2006
Lowest:	0.1
Highest:	15.0
Mean:	1.6
Median:	1.1

Appendix: Cornell Crop Codes

Crop codes used in the Cornell Nutrient Analysis 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
TRP	Triticale peas
	Small grains
MIL	Millet
OAS	Oats seeded 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

Crop Code	Crop Description
BDR/DND	Beans-dry
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, Establishment
TRF	Turf
TRT	Christmas trees, Topdressing