# Home Owner Soil Sample Survey Nassau County

# Samples analyzed by CNAL (2002-2006)



Summary compiled by

#### Renuka Rao, Ralph Tuthill, Quirine M. Ketterings, and Hettie Krol



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



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Nassau County (Photo credit: Cornell Cooperative Extension of Nassau County).

#### **1. County Introduction**

Nassau County is located on the western portion of Long Island approximately 20 miles from New York City. There are more than 1 million residents and it is a very suburban county. Although there are a few very small areas with horses (mostly private), there



really is no agricultural land as such. Ornamental horticulture is a very large business and revolves around the homeowners. Retail garden centers are numerous and there are several commercial growers in the greenhouse industry but no "in the ground" nurseries. The biggest part of the industry is involved in the service industry. Lawns and gardens are very important to the residents

and the vast majority are cared for by landscape maintenance companies. Therefore, almost all soil samples are generally from home properties- turf areas, flower borders, landscape plantings and small vegetable gardens.

Glaciers deposited most of the soil here and it is very variable from very sandy to many areas with heavy clay. However, a large portion of the soil has been moved due to construction of homes and businesses and it is rare to find really "native" soil. County soil maps are usually not very accurate and generalizations as to the soil type in a particular area can be inaccurate because of the amount of native soil that has been disturbed or moved in one way or another. Soil sampling is very important because of this as this is the only real way to determine soil type and characteristics.

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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 Nassau County submitted to the Cornell Nutrient Analysis Laboratory (CNAL) from 2002 to 2006. The total number of samples analyzed in these years amounted to 266, all of which were submitted by homeowners.



Homeowners submitted soil samples to the Cornell Nutrient Analysis Laboratory during 2002-2006 primarily to request fertilizer recommendations for cemeteries, lawns, home garden vegetable production, athletic fields and ornamentals.

Soils tested for home and garden in Nassau County were classified as belonging to soil management group 2 (9%), group 3 (23%), group 4 (51%), or group 5 (17%). A description of the different management groups is given on page 3.

Organic matter levels, as measured by loss-on-ignition, ranged from less than 1% to greater than 35%. Forty-eight percent of the homeowner samples had between 2 and 4% organic matter while 41% had more than 4% organic matter.

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Soil	Management	Groups	for	New	York
	U	1			

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.

Soil pH in water (1:1 soil:water extraction ratio) varied from 4.2 to 8.2 for home and garden samples while 56% tested between pH 6 and 7.

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. Of the homeowner samples, 6% tested low for P, 14% tested medium, 44% tested high and 36% tested very high. This meant that 80% tested high or very high in 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 table on page 4 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 on page 4).

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

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Potassium classifications for homeowner samples from Nassau County varied from very low (3%) to very high (33%); 14% tested low in K, 19% tested medium, and 31% tested high for potassium.

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 1 to more than 4500 lbs Mg/acre. There was only one sample that tested very low for Mg. Most samples (94%) tested high or very high for 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. Of the homeowner samples, 95% tested normal in Fe. Similarly, most soils (99%) 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, 94% tested high for Zn while 6% tested medium.

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. Crops

	2002	2003	2004	2005	2006	Total	%
ALG	4	2	0	1	0	7	3
ATF	0	6	0	24	0	30	11
BLU	0	1	0	0	1	2	1
CEM	0	58	0	0	0	58	22
FLA	0	1	0	1	1	3	1
GEN	1	0	0	0	0	1	0
HRB	0	0	1	0	0	1	0
LAW	12	5	18	7	7	49	18
MVG	9	5	9	5	11	39	15
OTH	9	1	1	0	4	15	6
PER	0	1	4	2	1	8	3
PRK	9	0	0	1	0	10	4
PUM	1	2	0	0	0	3	1
ROS	0	0	1	4	0	5	2
SAG	6	9	2	4	5	26	10
SUB	0	0	0	0	2	2	1
TOM	1	0	0	0	0	1	0
TRF	2	1	0	0	0	3	1
Unknown	1	2	0	0	0	3	1
Total	55	94	36	49	32	266	100

Crops for which recommendations are requested by homeowners:

Note: See Appendix for Cornell crop codes.

#### 4. Soil Types

	2002	2003	2004	2005	2006	Total	%
SMG 1 (clayey)	0	0	0	0	0	0	0
SMG 2 (silty)	6	4	5	4	4	23	9
SMG 3 (silt loam)	14	12	8	24	4	62	23
SMG 4 (sandy loam)	16	71	18	13	17	135	51
SMG 5 (sandy)	19	7	5	8	7	46	17
SMG 6 (mucky)	0	0	0	0	0	0	0
Total	55	94	36	49	32	266	100

Soil types (soil management groups) for homeowner samples:

# 5. Organic Matter

	<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	8	3	11	7	6	3	5	12	55
2003	2	5	17	40	16	6	2	6	94
2004	0	0	2	14	7	3	1	9	36
2005	0	9	11	13	6	3	0	7	49
2006	0	1	6	7	6	3	3	6	32
Total	10	18	47	81	41	18	11	40	266

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

	2002	2003	2004	2005	2006
Lowest:	0.1	0.5	2.0	1.1	1.8
Highest:	23.2	35.7	17.2	19.3	15.9
Mean:	5.0	4.6	5.7	4.3	5.2
Median:	3.9	3.5	4.3	3.2	4.4

Organic matte	er in homeowne	er samples (%	of total	number of	samples):
- 0					

	<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	15	5	20	13	11	5	9	22	100
2003	2	5	18	43	17	6	2	6	100
2004	0	0	6	39	19	8	3	25	100
2005	0	18	22	27	12	6	0	14	100
2006	0	3	19	22	19	9	9	19	100
Total	4	7	18	30	15	7	4	15	100

## 6. pH

	<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	5	3	5	9	14	8	5	5	0	55
2003	0	4	8	11	51	16	4	0	0	0	94
2004	0	4	2	5	5	15	4	1	0	0	36
2005	0	0	3	9	7	16	10	4	0	0	49
2006	1	1	2	4	4	12	8	0	0	0	32
Total	2	14	18	34	76	73	34	10	5	0	266

pH of homeowner samples (numbers):

	2002	2003	2004	2005	2006
Lowest:	4.2	4.5	4.5	5.1	3.5
Highest:	8.2	7.4	7.5	7.7	7.4
Mean:	-	-	-	-	-
Median:	6.7	6.1	6.6	6.6	6.6

pH of homeowner of 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	2	9	5	9	16	25	15	9	9	0	100
2003	0	4	9	12	54	17	4	0	0	0	100
2004	0	11	6	14	14	42	11	3	0	0	100
2005	0	0	6	18	14	33	20	8	0	0	100
2006	3	3	6	13	13	38	25	0	0	0	100
Total	1	5	7	13	29	27	13	4	2	0	100

### 7. Phosphorus

	<1	1-3	4-8	9-39	40-60	61-80	81- 100	101- 150	151- 200	>200	Total
	VL	L	Μ	Η	VH	VH	VH	VH	VH	VH	
2002	0	5	8	16	6	1	0	3	6	10	55
2003	0	7	23	48	6	1	0	4	1	4	94
2004	0	3	4	14	5	1	1	1	0	7	36
2005	0	0	1	31	4	3	1	2	2	5	49
2006	0	2	0	8	3	5	4	4	1	5	32
Total	0	17	36	117	24	11	6	14	10	31	266

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

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

	2002	2003	2004	2005	2006
Lowest:	1	2	3	6	2
Highest:	733	883	668	549	635
Mean:	114	46	115	81	114
Median:	33	13	33	31	73

Phosphorus in homeowner 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	Μ	Н	VH	VH	VH	VH	VH	VH	
2002	0	9	15	29	11	2	0	5	11	18	100
2003	0	7	24	51	6	1	0	4	1	4	100
2004	0	8	11	39	14	3	3	3	0	19	100
2005	0	0	2	63	8	6	2	4	4	10	100
2006	0	6	0	25	9	16	13	13	3	16	100
Total	0	6	14	44	9	4	2	5	4	12	100

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

### 8. Potassium

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

	Soil Management Group 2									
	<40	40-69	70-99	100-164	>164	Total				
	Very Low	Low	Medium	High	Very High					
2002	0	0	0	0	6	6				
2003	0	0	0	0	4	4				
2004	0	1	0	2	2	5				
2005	0	0	0	3	1	4				
2006	0	0	1	0	3	4				
Total (#)	0	1	1	5	16	23				
Total (%)	0	4	4	22	70	100				
		Soil M	anagement C	Froup 3						
	<45	45-79	80-119	120-199	>199	Total				
	Very Low	Low	Medium	High	Very High					
2002	0	2	1	3	8	14				
2003	0	1	3	4	4	12				
2004	0	0	1	5	2	8				
2005	0	0	0	9	15	24				
2006	0	0	1	0	3	4				
Total (#)	0	3	6	21	32	62				
Total (%)	0	5	10	34	52	100				
		Soil M	anagement C	Broup 4						
	<55	55-99	100-149	150-239	>239	Total				
	Very Low	Low	Medium	High	Very High					
2002	0	1	1	6	8	16				
2003	1	14	21	31	4	71				
2004	0	3	3	6	6	18				
2005	0	1	3	3	6	13				
2006	0	3	6	1	7	17				
Total (#)	1	22	34	47	31	135				
Total (%)	1	16	25	35	23	100				
		Soil M	anagement C	Froup 5						
	<60	60-114	115-164	165-269	>269	Total				
	Very Low	Low	Medium	High	Very High					
2002	5	4	5	4	1	19				
2003	1	2	3	1	0	7				
2004	1	3	0	0	1	5				
2005	0	1	1	2	4	8				
2006	0	2	1	2	2	7				
Total (#)	7	12	10	9	8	46				
Total (%)	15	26	22	20	17	100				

Summary (#)	Very Low	Low	Medium	High	Very High	Total
2002	5	7	7	13	23	55
2003	2	17	27	36	12	94
2004	1	7	4	13	11	36
2005	0	2	4	17	26	49
2006	0	5	9	3	15	32
Grand Total	8	38	51	82	87	266

Potassium classification summary for homeowners:

Summary (%)	Very Low	Low	Medium	High	Very High	Total
2002	9	13	13	24	42	100
2003	2	18	29	38	13	100
2004	3	19	11	36	31	100
2005	0	4	8	35	53	100
2006	0	16	28	9	47	100
Grand Total	3	14	19	31	33	100

	2002	2003	2004	2005	2006
Lowest:	15	30	36	93	66
Highest:	8197	1813	780	825	584
Mean:	418	188	230	274	220
Median:	187	150	178	225	219

### 9. Magnesium

	· · ·					
	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	1	0	5	16	33	55
2003	0	2	2	11	79	94
2004	0	3	0	4	29	36
2005	0	0	2	6	41	49
2006	0	0	2	4	26	32
Total	1	5	11	41	208	266

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

	2002	2003	2004	2005	2006
Lowest:	8	63	25	87	69
Highest:	4502	1571	1750	2191	1715
Mean:	517	350	481	420	510
Median:	302	309	352	261	363

Magnesium in homeowner samples (% of total number of samples):

	<20	20-65	66-100	101-199	>199	Total
	Very Low	Low	Medium	High	Very High	
2002	2	0	9	29	60	100
2003	0	2	2	12	84	100
2004	0	8	0	11	81	100
2005	0	0	4	12	84	100
2006	0	0	6	13	81	100
Total	0	2	4	15	78	100

Total

### 10. Iron

	Total number		Percentages:			
	0-49	>49	Total		0-49	>49
	Normal	Excessive			Normal	Excessive
2002	55	0	55		100	0
2003	91	3	94		97	3
2004	32	4	36		89	11
2005	47	2	49		96	4
2006	29	3	32		91	9
Total	254	12	266		95	5
				-		

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

	2002	2003	2004	2005	2006
Lowest:	2	3	1	3	3
Highest:	31	137	58	73	588
Mean:	9	12	16	16	35
Median:	7	8	7	12	9

#### 11. Manganese

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

Total number of samples:			Percentages:			
	0-99	>99	Total	0-99	>99	Total
	Normal	Excessive		Normal	Excessive	
2002	55	0	55	100	0	100
2003	92	2	94	98	2	100
2004	35	1	36	97	3	100
2005	49	0	49	100	0	100
2006	32	0	32	100	0	100
Total	263	3	266	99	1	100

	2002	2003	2004	2005	2006
Lowest:	3	3	5	8	4
Highest:	74	179	116	72	54
Mean:	22	15	29	28	19
Median:	16	7	22	28	17

### 12. Zinc

Total number of samples.				
	< 0.5	0.5-1.0	>1	Total
	Low	Medium	High	
2002	0	1	54	55
2003	0	14	80	94
2004	0	0	36	36
2005	0	0	49	49
2006	0	0	32	32
Total	0	15	251	266

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

	1		
< 0.5	0.5-1.0	>1	Total
Low	Medium	High	
0	2	98	100
0	15	85	100
0	0	100	100
0	0	100	100
0	0	100	100
0	6	94	100

Eine (105 En dere Worgan extraction)	in nomeo wher sumples.
Total number of samples.	Percentages.

	2002	2003	2004	2005	2006
Lowest:	0.7	0.6	1.2	1.1	1.1
Highest:	111.6	137.3	59.0	67.7	69.8
Mean:	24.5	10.7	15.2	13.4	16.5
Median:	14.4	1.9	11.5	8.0	11.0

#### Appendix: Cornell Crop Codes

Crop codes used in the Cornell Nutrient Analysis Laboratory.

Code	Description
ALG	Ornamentals adapted to pH 4.5 to 6.0
ATF	Athletic field
BLU	Blueberries
CEM	Cemetery
FLA	Flowering annuals
GEN	Green
HRB	Herbs
LAW	Lawn
MIX/MVG	Mixed vegetables
OTH	Other
PER	Perennials
PRK	Park
PUM	Pumpkins
ROS	Roses
SAG	Ornamentals adapted to pH 6.0 to 7.5
SUB	Summer flowering bulbs
TOM	Tomatoes
TRF	Tree Fruits