Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Virginia Cooperative Extension
Knowledge for the CommonWealth

VIRGINIA STATE UNIVERSITY

SOIL TEST RECOMMENDATIONS for VIRGINIA

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INTRODUCTION

The Soil Testing Laboratory at Virginia Tech began operations in 1938. It was established primarily to assist farmers and homeowners in determining the proper amounts of fertilizer and lime to apply. Since the lab opened, sample numbers have increased from 2,500 samples per year in 1938 to approximately 30,000 samples per year today. The lab was computerized in 1980, underwent significant modification in analytical technique with the addition of a simultaneous nutrient analyzer system in 1986, and the computer system was upgraded further in 1988 and 1993.

Fertilizer and lime recommendations have been revised over the years as new research information has become available. In 1993, recommendations for the major agronomic crops were thoroughly reviewed and revised, and new recommendations were developed for canola, irrigated corn, christmas trees, and the following commercial small fruit crops: grapes, strawberries, blueberries, blackberries, and raspberries. The information contained herein represents the latest thinking in this area. Additionally, work was completed on a new recommendation system for corn, soybeans, and wheat called **"VALUES"**, the Virginia Agronomic Land Use Evaluation System. The **VALUES** approach to making recommendations is presented in its entirety in **Appendix A.**

Many faculty members from the Crop and Soil Environmental Sciences, Forestry, and Horticulture Departments served as resource personnel for the various cropping areas and assisted in preparing materials for this publication. The following is a list of those contributors.

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COMPUTER CROP CODE NUMBERS

Commercial Crop Production

Field

1. Corn (Grain), No Till
2. Corn (Grain), Conventional
3. Corn (Silage), No Till
4. Corn (Silage), Conventional
5. Grain Sorghum
6. Wheat
7. Barley
8. Oats
9. Rye (Grain or Silage Only)
10. Soybeans
11. Sm Gr - Soy Double Crop Rot
12. Sm Gr - Gr Sor Double Crop Rot
13. Peanuts
14. Cotton
15. Tobacco, Flue-Cured
16. Tobacco, Dark-Fired
17. Tobacco, Sun-Cured
18. Tobacco, Burley
19. Corn - Peanut Rotation
20. Irrigated Corn
21. Canola

Forage Crops - Establishment

30. Alfalfa, Alf-Grass
31. Red Clover-Orchardgrass, Orchardgrass/Fescue - Ladino Clover, Orchardgrass, Fescue
34. Bermudagrass
35. Sorghum-Sudan, Millet, Sudan
36. Sm Gr + Wint Ann Leg - Hay, Gr

Forage Crops - Maintenance

37. Alfalfa, Alfalfa-Grass Hay
38. Red Clover-Grass Hay
40. Orchardgrass/Fescue - Clover Pasture
42. Native or Unimproved Pasture
44. Tall Grass - Hay
45. Stockpiled Tall Fescue
46. Bermudagrass - Pasture
47. Bermudagrass - Hay

Commercial Vegetable Crops

50. Asparagus - Nonhybrid Strains
51. Asparagus - New Hybrids
52. Beans, Lima
53. Beans, Snap
54. Broccoli, Cauliflower
55. Cabbage
56. Brussels Sprouts, Collards
57. Cucumbers
58. Muskmelons
59. Onions, Bulbs
60. Onions, Scallions
61. Peas
62. Peppers
63. Potatoes, White
64. Potatoes, Sweet
65. Pumpkins
66. Spinach
67. Squash
69. Sweet Corn - Fresh Market
70. Sweet Corn - Processing
71. Tomatoes - Fresh Market
72. Tomatoes - Process, Mult Harv
73. Tomatoes - Process, Mach Harv
74. Watermelons

Commercial Turf Production

80. Putting Greens, Bentgrass
81. Putting Greens, Bermudagrass
82. Tees, Bentgrass
83. Tees, Bermudagrass
84. Fairways - Bluegrass, Fescue
85. Fairways - Bermudagrass
86. Ath Fields - Bluegrass, Fescue
87. Ath Fields - Bermudagrass
88. Ind Lawns - Bluegrass, Fescue
89. Ind Lawns - Bermudagrass
90. Sod Prod - Bluegrass, Fescue
91. Sod Prod - Bermuda, Zoysia

Commercial Forest Tree & Fruit Crops

94. Grapes
95. Apples
96. Peaches
97. Strawberries
98. Blueberries
99. Blackberries, Raspberries
105. Hardwood Establishment
106. Hardwood Maintenance
107. Hardwood Nursery, Black Walnut
109. Pine Establishment
110. Pine Maintenance
111. Pine Nursery
113. Christmas Trees - Fraser Fir, Norway Spruce, Hemlock
114. Christmas Trees - White Pine, Virginia Pine, Scotch Pine
115. Christmas Trees - Blue Spruce, Red Cedar
116. Christmas Trees - Nursery
199. Other

Home Lawns, Gardens, Fruits, and Ornamentals

Lawn - Kentucky Bluegrass or Fescue

201. New Lawn Estab - Bluegr, Fescue
202. Lawn Main - Bluegrass, Fescue

Lawn - Bermudagrass or Zoysiagrass

203. New Lawn Estab - Berm, Zoysia
204. Lawn Main - Bermuda, Zoysia

Garden

210. Vegetable Garden
211. Flower Garden
212. Roses

Fruits

220. Apples
221. Blackberries
222. Blueberries
223. Currants
224. Gooseberries
225. Grapes
226. Nectarines
227. Peaches
228. Pears
229. Plums
230. Quince
231. Raspberries
232. Sour Cherry
233. Strawberries
234. Sweet Cherry

Shrubs & Trees

240. Azaleas
241. Andromedas
242. Camellias
243. Laurel
244. Rhododendron
245. Shrubs, Non Acid-Loving
246. Trees

Other Plant Species

250. Potted House Plants
299. Other

Commercial Greenhouse and Nursery Production

Cut Flowers

301. Carnations
302. Chrysanthemums (Cut Flowers)
303. Snapdragons

Pot Plants

310. Azaleas
311. Chrysanthemums (Pot Plants)
312. Lilies
313. Poinsettias

Other Plants

320. Bedding Plants
321. Foliage Plants
322. Hanging Baskets
323. Vegetable Transplants
351. Field Grown - Acid-Lov Pl
352. Field Grown - Non Acid-Lov Pl
353. Cont Grown - Acid-Lov Pl
354. Cont Grown - Non Acid-Lov Pl
399. Other

Surface Mined Areas

Field Crops

401. Corn (Grain), No Till
402. Corn (Grain), Conventional
403. Corn (Silage), No Till
404. Corn (Silage), Conventional
405. Grain Sorghum
406. Wheat
407. Barley
408. Oats
409. Rye (grain or Silage Only)
410. Soybeans
411. Sm Gr - Soy Double Crop Rot
412. Sm Gr - Gr Sor Double Crop Rot

Grass-Legume - Establishment

420. Erosion Control Mixtures
421. Hay and Pasture Mixtures
422. Critical Areas Mixtures
423. Temporary Cover Mixtures

Forage Production - Maintenance

437. Alfalfa, Alfalfa - Grass Hay
438. Red Clover-Grass Hay
440. Orchardgrass/Fescue-Clover Past.
444. Tall Grass - Hay
445. Stockpiled Tall Fescue

Commercial Vegetable Crops

457. Cucumbers
458. Muskmelons
462. Pepers
463. Potatoes, White
464. Potatoes, Sweet
465. Pumpkins
467. Squash
469. Sweet Corn - Fresh Market
471. Tomatoes - Fresh Market

Other Crops

488. Industrial Lawns
495. Apples
496. Peaches
499. Other

EXTENSION UNIT CODE LIST

CODE	UNIT	CODE	UNIT	CODE	UNIT
001	Accomack	093	Isle of Wight	191	Washington
003	Albemarle	095	James City	193	Westmorelan
005	Alleghany	097	King and Queen	195	Wise
007	Amelia	099	King George	197	Wythe
009	Amherst	101	King William	199	York
011	Appomattox	103	Lancaster		
013	Arlington	105	Lee	City of:	
015	Augusta	107	Loudoun	510	Alexandria
017	Bath	109	Louisa	540	Charlottesville
019	Bedford	111	Lunenburg	550	Chesapeake
021	Bland	113	Madison	590	Danville
023	Botetourt	115	Mathews	620	Franklin
025	Brunswick	117	Mecklenburg	650	Hampton
027	Buchanan	119	Middlesex	680	Lynchburg
029	Buckingham	121	Montgomery	700	Newport News
031	Campbell	125	Nelson	710	Norfolk
033	Caroline	127	New Kent	730	Petersburg
035	Carroll	131	Northampton	740	Portsmouth
036	Charles City	133	Northumberland	760	Richmond
037	Charlotte	135	Nottoway	780	Roanoke
041	Chesterfield	137	Orange	800	Suffolk
043	Clarke	139	Page	810	Virginia Beach
045	Craig	141	Patrick		
047	Culpeper	143	Pittsylvania		
049	Cumberland	145	Powhatan	Agricultural Research & Extension	
051	Dickenson	147	Prince Edward	Centers:	
053	Dinwiddie	149	Prince George	911	Virginia Tech Campus
057	Essex	153	Prince William	912	Southern Piedmont
059	Fairfax	155	Pulaski	913	Tidewater
061	Fauquier	157	Rappahannock	914	Eastern Virginia
063	Floyd	159	Richmond	915	Northern Piedmont
065	Fluvanna	161	Roanoke	921	Shenandoah Valley
067	Franklin	163	Rockbridge	922	Southwest Virginia
069	Frederick	165	Rockingham	924	VCIA Foundation Seed Farm
071	Giles	167	Russell	925	Hampton Roads
073	Gloucester	169	Scott	931	Eastern Shore
075	Goochland	171	Shenandoah		
077	Grayson	173	Smyth		
079	Green	175	Southampton		
081	Greensville	177	Spotsylvania		
083	Halifax	179	Stafford		
085	Hanover	181	Surry		
087	Henrico	183	Sussex		
089	Henry	185	Tazewell		
091	Highland	187	Warren		

TESTS OFFERED BY THE SOIL TESTING LABORATORY, METHODS USED, AND SOIL TEST CALIBRATIONS

Tests Offered

The procedures used in the Soil Testing Laboratory were established in the early 1950's (Rich, C. I. 1955. Rapid soil testing procedures used at Virginia Polytechnic Institute. Virginia Agr. Exp. Sta. Bull 475, 8 p.). Although the basic chemical principles have not changed, procedures have been revised in recent years to utilize advances in instrumentation which allow more accurate and rapid chemical determinations. Test procedures currently used for the various analyses are reported in Publication 452-881, *Laboratory Procedures*, Virginia Tech Soil Testing and Plant Analysis Laboratory, Revised March 1994.

In the testing program, a routine test consisting of 10 separate analyses is performed on all samples. In addition, 3 special tests are offered on a request basis. These tests are applicable only under certain conditions for which research and calibration work have been conducted. The routine and special tests consist of the following:

Routine Tests	Special Tests
pH	nitrate-nitrogen
phosphorus (P)	organic matter
potassium (K)	soluble salts
calcium (Ca)	
magnesium (Mg)	
zinc (Zn)	
manganese (Mn)	
copper (Cu)	
Iron (Fe)	
Boron (B)	
Aluminum (Al) {reported on research samples only}	

Extensive research has been and continues to be conducted for those essential plant elements for which soil tests are not presently offered. Calibration of the various soil tests offered by the laboratory, where this information is available, as well as critical soil test levels for each of the tests, are presented on the following pages.

Phosphorus (P), Potassium (K), Calcium (Ca), and Magnesium (Mg)
Soil Test Calibration

Ext. P	P - lb/A	P - ppm	$P_2 0_5$ - lb/A
L-	0-3	0-2	0-7
L	4-8	2-4	9-18
L+	9-11	5-6	21-25
M-	12-20	6-10	28-46
M	21-30	11-15	48-69
M+	31-35	16-18	71-80
H-	36-55	18-28	82-126
H	56-85	28-43	128-195
H+	86-110	43-55	197-252
VH	110+	55+	252+

Ext. K	K - lb/A	K - ppm	$K_2 0$ - lb/A
L-	0-15	0-8	0-18
L	16-55	8-28	19-66
L+	56-75	28-38	68-90
M-	76-100	38-50	92-121
M	101-150	51-75	122-181
M+	151-175	76-88	182-211
H-	176-210	88-105	212-253
H	211-280	106-140	254-337
H+	281-310	141-155	339-373
VH	310+	155+	373+

Ext. Ca	Ca - lb/A	Ca - ppm	CaO - lb/A
L-	0-240	0-120	0-336
L	241-480	121-240	337-672
L+	481-720	241-360	673-1007
M-	721-960	361-480	1009-1343
M	961-1200	481-600	1344-1679
M+	1201-1440	601-720	1680-2015
H-	1441-1680	721-840	2016-2350
H	1681-1920	841-960	2352-2686
H+	1921-2160	961-1080	2688-3022
VH	2161-2400+	1081-1200+	3023-3358+

Ext. Mg	Mg - lb/A	Mg - ppm	MgO - lb/A
L-	0-24	0-12	0-40
L	25-48	13-24	42-80
L+	49-72	25-36	81-119
M-	73-96	37-48	121-159
M	97-120	49-60	161-199
M+	121-144	61-72	201-239
H-	145-168	73-84	240-279
H	169-192	85-96	280-318
H+	193-216	97-108	320-358
VH	217-240+	109-120+	360-398+

Zinc (Zn) Soil Test Calibration

The following equation describes the relationship between zinc, soil pH, and phosphorus in the soil and whether or not zinc fertilizer will be needed.

$$\text{Zinc Availability Index} = 780.2 + [68.8 \times \text{Zn (ppm)}] - [101.3 \times \text{pH}] - [0.2 \times \text{P (lb/A)}]$$

The critical zinc availability index, developed from research data on Virginia soils, is 135. Below 135, zinc fertilizer will be needed. The following table provides information on whether zinc will be recommended using the above equation.

Examples of Zinc Soil Test Calibration Using the Mehlich 1 Procedure

Zinc Recommended	Zinc Availability Index	Zinc Soil Test (ppm)	Soil pH	P Soil Test (lb/A)
No	153	1.0	6.8	36†
No	146	0.9	6.8	36
No	139	0.8	6.8	36
Yes	132	0.7	6.8	36
Yes	125	0.6	6.8	36
Yes	119	0.5	6.8	36
No	193	0.7	6.2	36
No	186	0.6	6.2	36
No	179	0.5	6.2	36
No	173	0.4	6.2	36
No	166	0.3	6.2	36
No	159	0.2	6.2	36
No	322	0.8	5.0	36
No	271	0.8	5.5	36
No	221	0.8	6.0	36
No	170	0.8	6.5	36
No	160	0.8	6.6	36
No	150	0.8	6.7	36
No	140	0.8	6.8	36
Yes	130	0.8	6.9	36
Yes	119	0.8	7.0	36
No	145	0.8	6.8	6 (L)
No	141	0.8	6.8	26 (M)
No	137	0.8	6.8	46 (H)
Yes	124	0.8	6.8	112 (VH)

† Phosphorus soil test level of 36 lb/A is the separation point between Medium (M) and High (H).

Manganese (Mn) Soil Test Calibration

Manganese Calibration - Soybeans	
Soil Test Manganese ppm	Recommend Manganese If The Soil pH Is Equal To Or Greater Than The Following
0.0 - 0.4	5.1
0.5 - 0.9	5.2
1.0 - 1.4	5.3
1.5 - 1.6	5.4
1.7 - 1.9	5.5
2.0 - 2.4	5.6
2.5 - 2.9	5.7
3.0 - 3.4	5.8
3.5 - 3.9	5.9
4.0 - 4.4	6.0
4.5 - 4.9	6.1
5.0 - 5.1	6.2
5.2 - 5.4	6.3
5.5 - 5.9	6.4
6.0 - 6.4	6.5
6.5 - 6.9	6.6
7.0 - 7.4	6.7
7.5 - 7.9	6.8
8.0 - 8.4	6.9
8.5 -	7.0

Manganese Calibration - Peanuts	
Soil Test Manganese Ppm	Recommend Manganese If The Soil pH Is Equal To Or Greater Than The Following
0.0 - 0.9	5.8
1.0 - 1.9	5.9
2.0 - 2.9	6.0
3.0 - 3.9	6.1
4.0 - 4.9	6.2
5.0 - 5.9	6.3
6.0 - 6.9	6.4
7.0 - 7.9	6.5
8.0 - 8.9	6.6
9.0 - 9.9	6.7
10.0 - 10.9	6.8
11.0 - 11.9	6.9
12.0 - 12.9	7.0

Nitrate-Nitrogen (NO_3-N) and Organic Matter (OM) Soil Test Calibration

Nitrate-Nitrogen†		Organic Matter	
Level	ppm	Level	%
L	0 - 35	L	0.0 - 0.9
M	36 - 55	M	1.0 - 1.9
H	56 - 85	H	2.0 - 2.9
VH	>85	VH	>2.9

† Greenhouse crop calibration

Soluble Salt (SS) Soil Test Calibration

Rating	Soil, Soil-Lightwt. Mixes	Soil-less Mixes	Greenhouse, Nursery Interpretation	Computer Comment No.
	——— ppm ———			
L	0-422	0-640	Low soluble salts indicate that fertilizer is needed.	671
M	423-844	641-1280	Soluble salts approaching optimum level.	672
H	845-1664	1281-2240	Soluble salts are in desirable range. No fertilizer is needed, but light applications can be made.	673
VH	1665-2240	2241-3200	Soluble salts are OK for established plants. For seedlings and cuttings, salts are approaching borderline - partial leaching is recommended.	674
VH	2241-2560	3201-3520	Soluble salts are OK for established plants. For seedlings and cuttings, salts are too high and should be leached.	675
EH	>2560	>3520	Soluble salts are in critical range. Leach media.	676
	Soil -- ppm --		Field Crop Interpretation	
	0-844		Soluble salts are not high enough to cause salt injury.	677
	>844		Soluble salts are high and may, under certain conditions, cause problems with plant growth. See your Extension Agent.	678

Critical Soil Test Levels

Soil Test	Critical Level†	Comments
pH	5.0 - 5.5	Non-leguminous agronomic crops. Critical level varies depending on Al content of soil.
	6.5 - 7.0	Legumes. While pH's below 6.5 will not necessarily cause stand failure, reduced growth and vigor for some legumes such as alfalfa will occur.
P	<12 lbs/A	<12 = L+, L, L- soil test categories.
K	<56 lbs/A	<56 = L, L- soil test categories. In loamy sands and deep sandy loams, K tends to move downward and accumulate in the subsoil. For these soils, an L or L- test of the plow layer does not necessarily indicate a problem since plant roots can reach the subsoil K.
Ca	<241 lbs/A	<241 = L- soil test category. At this level, Ca is not necessarily deficient for plant growth except for peanuts. However, the soil pH is normally too low for optimum growth. Either regular Ag lime, dolomitic or calcitic can be used to increase pH.
Mg	<25 lbs/A	<25 = L- soil test category and is the critical level for Coastal Plain Soils.
	<49 lbs/A	<49 = L-, L soil test categories and is the critical level for Piedmont and Appalachian soils. To correct problem, recommend dolomitic lime if pH is low. If pH is optimum, recommend 30 lbs Mg fertilizer/A.
Zn	Variable--depending on soil pH	Applicable for corn, small grains and grain sorghum. The soil test Zn requirement has not been determined for other crops but would be expected to be rather low.
Mn	Variable--depending on soil pH	See Soil Test Calibration. Applicable for soybeans and peanuts only.
SS	1000+ ppm	Critical level depends on crop, soil type, and soil moisture. For most crops under normal soil moisture conditions, salts have to be in excess of 1000 ppm before injury begins to occur.
OM	<1%	This level does not necessarily indicate that plant growth will be limited but points to the possibility of soil compaction and other soil physical problems.
$N0_3$-N	--	Correlation data limited.

† The critical levels above are valid only for Virginia Tech lab procedures.

FERTILIZER RECOMMENDATIONS - GENERAL

How Recommendations are Made

Although information on making and customizing fertilizer recommendations is presented in other sections of this publication, it was felt that a brief discussion on how the computer makes fertilizer recommendations would be pertinent.

The computer calculates fertilizer recommendations based on the following factors (inputs):

1. Crop to be grown
2. Previous crop
3. Previous crop's yield
4. Major soils in field
5. Field yield estimate
6. Soil test level for nutrients analyzed

The crop to be grown has its own individual nutrient requirements. The previous crop and previous crop's yield are used to determine if any allowance should be made for the amount of nitrogen contributed by this crop. Major soils in field or Field Yield Estimate are used to determine the productive potential of the soil so that recommendations can be adjusted accordingly. In the absence of this information, the computer will select the appropriate yield potential for that particular county or city. Lastly, soil test level indicates the amount of nutrients that the soil will be able to contribute to the crop. Manures are considered only insofar as whether or not a farmer requires information on the nutrients contributed by manures for adjustment of his own recommendation. This information is provided to him in the form of a Soil Test Note. This has the advantage that the fertilizer recommendation can be used whether or not the farmer decides to use manure; ie., it would not have to be adjusted later on if the farmer decided not to apply manure to that particular field.

Nitrogen (N) Allowance For Use of Legume in Rotation

If a legume was the previous crop in the rotation, an adjustment can be made in the recommendation for the amount of nitrogen contributed by the legume. The first step in making the adjustment is to determine the amount of nitrogen contributed by the particular legume under good growing conditions. The following table provides this information.

Previous Crop	N Supplied to Following Crop Under Good Growing Conditions lbs/A
Soybeans	½ lb N/bu
Peanuts (vines)	30
Alfalfa	90
Red Clover	80
Ladino Clover	60

The second step is to rate the actual yield of the previous crop; i.e., high, average, or low. Yields for the various legume crops and their ratings are found in the following table.

Crop†	Previous Yield Per Acre‡ High	Average	Low
Soybeans	>30 bu	25-30 bu	<25 bu
Peanuts	-	-	-
Alfalfa	>4 T	3-4 T	<3 T
Red Clover	>4 T	3-4 T	<3 T
Ladino Clover	-	-	-

† For hay or pasture where legumes are grown in combination with grass, the legume should make up >25% of the stand before an adjustment is made.

‡ For alfalfa and red clover, "High" is equivalent to >50% stand, "Medium" = 25-50% stand, and "Low" = <25% stand.

The third step is to adjust the amount of N supplied by the legume crop according to the actual yields observed. The following table contains this information.

Previous Yield	N Allowance, %
High	100
Average	75
Low	50

Example: If the previous crop was red clover, a good crop would supply about 80 lbs of N per acre. Actual yield for the red clover was 3 tons per acre or an "average" rating. Calculations: 80 lbs of N per acre X 0.75 (75%) = 60 lbs of N supplied by the red clover. This value is subtracted from the basic N recommendations.

FERTILIZER RECOMMENDATIONS - N, P, K - BY CROP

Crop: Corn for Grain (No-till, Conventional)

Crop Code: 1, 2, 401, 402

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	1 lb. of N/Bu of expected yield	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: Corn - peanut rotation.

Comment **107**: Important--apply the total amount of N, P_2O_5, and K_2O recommended for corn and peanuts to the corn crop for best results.

Situation: Corn - soybean rotation.

Comment **108**: The total amount of N, P_2O_5, & K_2O recommended for both corn and soybeans may be applied to the corn crop.

Situation: Soil tests high in P and/or K.

Comment 7**01**: The most effective method of application of low rates of phosphate and potash is in a starter (planter) fertilizer placed in a band 2 inches to one side and 2 inches below the seed. Total amount of nitrogen plus potash should not exceed 80 lbs/A.

Situation: Soils with leaching indices of 15 or greater.

Comment **702**: Potassium can be lost through leaching on these soils. You can apply up to 50 lb/acre of K_20 in a starter fertilizer and sidedress the remainder when the corn is 18 inches tall.

(Continued on next page.)

Situation: Soil Management Group = A, B, C, D, G, H, I, J, K, L, M, N, O, P, V, W, X, AA, BB and CC and the previous crop was a legume (or grass-clover stand with >25% legume) and/or there is a history of manure application.

Comment **703**: Significant amounts of nitrogen may be present in the soil. For best results, apply 30 lb N per acre in a starter (planter) fertilizer. Test the soil for nitrate when the corn is about 12 inches tall to determine if sidedressing is needed.

Situation: Soil Management Group = W, BB.

Comment **704**: Fragipans in these soils will limit depth of root penetration and increase the probability of nitrogen being moved beyond the reach of the plant root system. Apply 30 lb/acre of N in a starter fertilizer and sidedress the remainder of the total application when the corn is 18 inches tall.

Situation: Soil Management Group = FF, GG, JJ.

Comment **705**: These shallow soils limit the depth of root penetration which increases the likelihood of nitrogen being moved beyond the reach of the plant root system. To avoid this, apply 30 lb/acre of N in a starter (planter) fertilizer and sidedress the remainder of the total application when the corn is about 18 inches tall.

Situation: Soil Management Group = C, H, P.

Comment **706**: Nitrogen can be lost through denitrification and to surface waters through the drainage system. To reduce the likelihood of this happening, apply 30 lb N per acre in a starter (planter) fertilizer and sidedress the remainder of the total application when the corn is about 18 inches tall.

Situation: Soils with leaching indices of 15 or greater.

Comment **707**: Because these are highly leachable soils, total nitrogen application should be split between an at-planting and a sidedressing application. Apply 30 lb N/acre in a starter (planter) fertilizer and the remainder when the corn is about 18 inches tall.

Situation: Soil Management Group = BB, CC, DD, EE, FF, GG, HH, II, JJ, KK, LL and MM.

Comment **708**: Because these soils have such low yield potentials for corn, it is doubtful you can recover your variable cost of production. Consideration of an alternative crop or cropping sequence is recommended.

Situation: Soil Management Group = NN, OO, PP, QQ.

Comment **709**: Attempted production of corn on these soils is not recommended because of the low yield potential.

Crop: Corn for Silage (No-till, Conventional)

Crop Code: 3, 4, 403, 404

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	1.1 lb. of N/Bu of expected yield	80 - 120	160 - 240
M		40 - 80	80 - 160
H		20 - 40	40 - 80
VH		0	0

Comments to Accompany Recommendations:

Situation: Corn - peanut rotation.

Comment **107**: Important--apply the total amount of N, P_2O_5, and K_2O recommended for corn and peanuts to the corn crop for best results.

Situation: Corn - soybean rotation.

Comment **108**: The total amount of N, P_2O_5, & K_2O recommended for both corn and soybeans may be applied to the corn crop.

Situation: Soil tests high in P and/or K.

Comment 7**01**: The most effective method of application of low rates of phosphate and potash is in a starter (planter) fertilizer placed in a band 2 inches to one side and 2 inches below the seed. Total amount of nitrogen plus potash should not exceed 80 lbs/A.

Situation: Soils with leaching indices of 15 or greater.

Comment 7**02**: Potassium can be lost through leaching on these soils. You can apply up to 50 lb/acre of K_20 in a starter fertilizer and sidedress the remainder when the corn is 18 inches tall.

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Situation: Soil Management Group = A, B, C, D, G, H, I, J, K, L, M, N, O, P, V, W, X, AA, BB and CC and the previous crop was a legume (or grass-clover stand with >25% legume) and/or there is a history of manure application.

Comment 7**03**: Significant amounts of nitrogen may be present in the soil. For best results, apply 30 lb N per acre in a starter (planter) fertilizer. Test the soil for nitrate when the corn is about 12 inches tall to determine if sidedressing is needed.

Situation: Soil Management Group = W, BB.

Comment 7**04**: Fragipans in these soils will limit depth of root penetration and increase the probability of nitrogen being moved beyond the reach of the plant root system. Apply 30 lb/acre of N in a starter fertilizer and sidedress the remainder of the total application when the corn is 18 inches tall.

Situation: Soil Management Group = FF, GG, JJ.

Comment 8**05**: These shallow soils limit the depth of root penetration which increases the likelihood of nitrogen being moved beyond the reach of the plant root system. To avoid this, apply 30 lb/acre of N in a starter (planter) fertilizer and sidedress the remainder of the total application when the corn is about 18 inches tall.

Situation: Soil Management Group = C, H, P.

Comment **706**: Nitrogen can be lost through denitrification and to surface waters through the drainage system. To reduce the likelihood of this happening, apply 30 lb N per acre in a starter (planter) fertilizer and sidedress the remainder of the total application when the corn is about 18 inches tall.

Situation: Soils with leaching indices of 15 or greater.

Comment **707**: Because these are highly leachable soils, total nitrogen application should be split between an at-planting and a sidedressing application. Apply 30 lb N/acre in a starter (planter) fertilizer and the remainder when the corn is about 18 inches tall.

Situation: Soil Management Group = BB, CC, DD, EE, FF, GG, HH, II, JJ, KK, LL and MM.

Comment **708**: Because these soils have such low yield potentials for corn, it is doubtful you can recover your variable cost of production. Consideration of an alternative crop or cropping sequence is recommended.

Situation: Soil Management Group = NN, OO, PP, QQ.

Comment **709**: Attempted production of corn on these soils is not recommended because of the low yield potential.

Crop: Grain Sorghum

Crop Code: 5, 405

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	1 lb. of N/Bu of expected yield	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: Grain sorghum - soybean rotation.

Comment **108**: The total amount of N, P_2O_5, & K_2O recommended for both grain sorghum and soybeans may be applied to the grain sorghum crop.

Situation: Soil tests high in P and/or K.

Comment **701**: The most effective method of application of low rates of phosphate and potash is in a starter (planter) fertilizer placed in a band 2 inches to one side and 2 inches below the seed. Total amount of nitrogen plus potash should not exceed 80 lbs/A.

Situation: Soils with leaching indices of 15 or greater.

Comment **702**: Potassium can be lost through leaching on these soils. You can apply up to 50 lb/acre of K_20 in a starter fertilizer and sidedress the remainder when the grain sorghum is 18 inches tall.

Situation: Soil Management Group = A, B, C, D, G, H, I, J, K, L, M, N, O, P, V, W, X, AA, BB and CC and the previous crop was a legume (or grass-clover stand with >25% legume) and/or there is a history of manure application.

Comment **703**: Significant amounts of nitrogen may be present in the soil. For best results, apply 30 lb N per acre in a starter (planter) fertilizer. Test the soil for nitrate when the grain sorghum is about 12 inches tall to determine if sidedressing is needed.

(Continued on next page.)
Grain Sorghum (Continued)

Situation: Soil Management Group = W, BB.

Comment **704**: Fragipans in these soils will limit depth of root penetration and increase the probability of nitrogen being moved beyond the reach of the plant root system. Apply 30 lb/acre of N in a starter fertilizer and sidedress the remainder of the total application when the grain sorghum is 18 inches tall.

Situation: Soil Management Group = FF, GG, JJ.

Comment **705**: These shallow soils limit the depth of root penetration which increases the likelihood of nitrogen being moved beyond the reach of the plant root system. To avoid this, apply 30 lb/acre of N in a starter (planter) fertilizer and sidedress the remainder of the total application when the grain sorghum is about 18 inches tall.

Situation: Soil Management Group = C, H, P.

Comment **706**: Nitrogen can be lost through denitrification and to surface waters through the drainage system. To reduce the likelihood of this happening, apply 30 lb N per acre in a starter (planter) fertilizer and sidedress the remainder of the total application when the grain sorghum is about 18 inches tall.

Situation: Soils with leaching indices of 15 or greater.

Comment **707**: Because these are highly leachable soils, total nitrogen application should be split between an at-planting and a sidedressing application. Apply 30 lb N/acre in a starter (planter) fertilizer and the remainder when the grain sorghum is about 18 inches tall.

Situation: Soil Management Group = BB, CC, DD, EE, FF, GG, HH, II, JJ, KK, LL and MM.

Comment **708**: Because these soils have such low yield potentials for grain sorghum, it is doubtful you can recover your variable cost of production. Consideration of an alternative crop or cropping sequence is recommended.

Situation: Soil Management Group = NN, OO, PP, QQ.

Comment **709**: Attempted production of grain sorghum on these soils is not recommended because of the low yield potential.

Crop: Wheat, Barley

Crop Code: 6, 7, 406, 407

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: N Recommendations.

Comment **710**: At Planting: apply 25-30 lbs N/A. If in-field nitrate test was run and NO_3^- in top 6" is greater than 14 ppm, no N is needed.

December - January: if October - December rainfall was heavy, there are less than 3 tillers/plant, crop is pale green and there are several days in Jan-Feb with temperatures greater than 50EF, apply 30 lb N/A. Otherwise, apply no N.

February - early March, Single N Application: Count your tillers. If there are less than 100 tillers/sq. ft., apply 80 lb N/A. If there are more than 100 tillers/sq. ft., apply 30-40 lb N/A.

February - early March, Split N Application: This requires plant tissue test. In February, count your tillers. If there are less than 60 tillers/sq. ft., apply 60 lb N/A. For 60-100 tillers/sq. ft., apply 40 lb N/A. For greater than 100 tillers/sq. ft., apply no N. March: tissue test and follow lab's recommendations.

Situation: Soil Management Group = KK, LL, MM, NN, OO, PP and QQ.

Comment **711**: These soils are not suited for production of small grains. Although recommendations have been provided, we would suggest that you consider another crop.

Situation: Soils with leaching indices greater than 15.

Comment **712**: These soils are highly leachable because of thick sandy surfaces. We suggest that you follow the February - early March Split N Application Program above.

Crop: Oats, Rye for Grain or Silage

Crop Code: 8, 9, 408, 409

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: N Recommendations.

Comment **713**: At planting, apply 25-30 lb N/A. The following February, apply 45 lb N/A for grain production or 75 lb N/A for silage.

Crop: Soybeans

Crop Code: 10, 410

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Crop: Small Grain - Soybean Double Cropping Rotation

Crop Code: 11, 411

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comments Below	160 - 240	160 - 240
M		80 - 160	80 - 160
H		40 - 80	40 - 80
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **102**: Fertilizer recommendations are for both crops. Apply P_2O_5 and K_2O to the small grain.

SEE WHEAT/BARLEY SECTION FOR ADDITIONAL COMMENTS.

Crop: Small Grain - Grain Sorghum Double Cropping Rotation

Crop Code: 12, 412

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	For Grain Sorghum: 1 lb. of N/Bu of expected yield	160 - 240	160 - 240
M		80 - 160	80 - 160
H		40 - 80	40 - 80
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **103**: P_2O_5 and K_2O recommendations are for both crops in the double-cropping rotation and should be applied to the small grain. The N recommendation in the table is for grain sorghum. For the small grain crop, see N recommendation below.

SEE WHEAT/BARLEY SECTION FOR ADDITIONAL COMMENTS.

Crop: Peanuts

Crop Code: 13

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	100 - 200	80 - 120
M		55 - 85	0
H		0 - 40	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Soils with leaching indices of 15 or greater.

Comment **714**: Potassium can be lost through leaching. To insure an adequate supply for the peanut crop, apply that needed for the peanuts just before land preparation and plow it down.

Crop: Cotton

Crop Code: 14

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	†	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

† For Soil Management Groups F, Q, R, S, T, DD, II: 60-90 lbs N/A. For all other groups: 50-60 lbs N/A.

Comments to Accompany Recommendations:

Situation: Soil Management Group = P, Z, BB, CC, EE, FF, HH, JJ, KK, LL, MM, NN, OO, PP, QQ.

Comment **715**: Soils in this field are not suited for cotton production. If at all possible, select another field.

Situation: Cotton to be grown.

Comment **716**: To avoid possible stimulation of excessive vegetative growth and loss of unneeded nitrogen through leaching, apply only one-third of the planned nitrogen application rate at planting in a starter (planter) fertilizer. The remainder of the nitrogen should be applied at first square formation (about 45 days after planting).

Situation: Soil Management Group = F, Q, S, T, DD, II.

Comment **717**: Nitrogen can be lost through leaching when rainfall in excess of the water holding capacity of the soil occurs within a period of 5 days or less. For 2" of excess water, add 1/3 more N. For 3"+ of excess water, add 1/2 to 3/4 more N. Note: do not add more N after the third week of blooming.

Crop: Tobacco, Flue-Cured

Crop Code: 15

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	60 - 70	290 - 330	150 - 175
M		60 - 100	100 - 150
H		40	100
VH		40	100

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **110**: The N recommendation is based on a topsoil depth of 12-18". If topsoil depth is less than 12", reduce the N rate by 10 lbs per acre; if the topsoil depth is greater than 18", increase the N rate by 10 lbs per acre.

Crop: Tobacco, Dark-Fired

Crop Code: 16

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	135	290 - 330	150 - 175
M		60 - 100	100 - 150
H		40	100
VH		40	100

Crop: Tobacco, Sun-Cured

Crop Code: 17

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	110	290 - 330	150 - 175
M		60 - 100	100 - 150
H		40	100
VH		40	100

Crop: Tobacco, Burley

Crop Code: 18

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	175	290 - 330	250 - 350
M		60 - 100	200 - 250
H		40	100 - 200
VH		40	100

Crop: Corn - Peanut Rotation

Crop Code: 19

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	1 lb. of N/Bu of expected Yield	180 - 320	160 - 240
M		95 - 165	40 - 80
H		20 - 80	20 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **107**: Important--apply the total amount of N, P_2O_5, and K_2O recommended for corn and peanuts to the corn crop.

SEE CORN, PEANUTS SECTIONS FOR ADDITIONAL COMMENTS.

Crop: Irrigated Corn

Crop Code: 20

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	1 lb. of N/Bu of expected yield		
M			
H			
VH			

Crop: Canola

Crop Code: 21

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: Soils with leaching index of 15 or less.

Comment **721**: N Recommendations: At planting, broadcast and disk in 30-40 lb N/A. In late February just before spring growth begins, apply 90-120 lb N/A.

Situation: Soils with leaching index greater than 15.

Comment **722**: N Recommendations: At planting, broadcast and disk in 30-40 lb N/A. In late February just before spring growth begins, apply 45-60 lb N/A. Four weeks later, apply a second 45-60 lb N/A.

Crop: Alfalfa, Alfalfa - Grass Establishment

Crop Code: 30

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	150 - 170	150 - 170
M		120 - 140	120 - 140
H		50 - 110	50 - 110
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **121**: P_2O_5 and K_2O recommendations will supply the needed nutrients for establishment and one harvest year's growth.

Crop: Red Clover - Orchardgrass, Orchardgrass/Fescue - Ladino Clover, Orchardgrass and Fescue Establishment

Crop Code: 31

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	40	150 - 170	150 - 170
M		120 - 140	120 - 140
H		40 - 110	40 - 110
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **121**: P_2O_5 and K_2O recommendations will supply the needed nutrients for establishment and one harvest year's growth.

Situation: Standard Statement.

Comment **723**: Apply the nitrogen at the time the grass is seeded in late summer, early fall or early spring. Overseed the grass with clover the following February.

Crop: Bermudagrass Establishment

Crop Code: 34

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	70	100 - 120	100 - 120
M		70 - 90	70 - 90
H		40 - 60	40 - 60
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **121**: P_2O_5 and K_2O recommendations will supply the needed nutrients for establishment and one harvest year's growth.

Situation: Standard Statement.

Comment **128**: Apply another 40 to 60 lbs of N per acre after plants start spreading.

Crop: Sorghum - Sudan, Millet, Sudan Establishment

Crop Code: 35

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	70	100 - 120	100 - 120
M		70 - 90	70 - 90
H		40 - 60	40 - 60
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **129**: Apply the recommended N before seeding. After each cutting, apply 40 to 60 lbs of N per acre for maximum production.

Crop: Small Grains with Winter Annual Legume for Hay or Grazing Establishment

Crop Code: 36

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	15-20	60 - 80	60 - 80
M		40 - 60	40 - 60
H		10 - 40	10 - 40
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **130**: Apply the recommended N at seeding. If small grains are to be established alone (without a legume), topdress with 50 to 60 lbs of N per acre in late winter or early spring.

Crop: Alfalfa, Alfalfa - Grass Hay Maintenance

Crop Code: 37, 437

Soil Productivity Group I

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	100 - 120	390 - 450
M		70 - 90	300 - 360
H		40 - 60	40 - 210
VH		0	0

Soil Productivity Group II

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	100 - 120	280 - 330
M		70 - 90	220 - 270
H		40 - 60	60 - 200
VH		0	0

Soil Productivity Group III

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	70 - 90	200 - 240
M		40 - 60	160 - 185
H		40	40 - 145
VH		0	0

Comments to Accompany Recommendations:

Situation: K Recommendation greater than 200 lb/A.

Comment **724**: Split the application, applying 1/2 in the fall and 1/2 in the spring. If field sampled in spring, apply 1/2 in early spring and 1/2 after the first cutting.

Crop: Red Clover - Grass Hay Maintenance

Crop Code: 38, 438

Soil Productivity Groups I, II

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	100 - 120	200 - 240
M		70 - 90	160 - 185
H		40 - 60	40 - 145
VH		0	0

Soil Productivity Groups III, IV

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	70 - 90	120 - 145
M		40 - 60	85 - 110
H		40 - 40	40 - 75
VH		0	0

Crop: Orchardgrass/Fescue - Clover Pasture Maintenance

Crop Code: 40, 440

Soil Productivity Groups I, II

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comments Below	100 - 120	100 - 120
M		40 - 90	40 - 90
H		0	0
VH		0	0

Soil Productivity Groups III, IV

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comments Below	40 - 60	60 - 80
M		30 - 30	30 - 50
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **725**: If stand contains less than 25% clover, apply 40-60 lbs N/A.

Situation: Standard Statement.

Comment **131**: If additional production is needed later on, apply 40 to 60 lbs/A of N after each cutting. If you are planning to overseed a legume into the stand, omit the N recommendation.

Situation: Standard Statement.

Comment **122**: P_2O_5 and K_2O recommendations are for annual application. However, rates can be doubled and applied every other year if desired.

Crop: Native or Unimproved Pasture

Crop Code: 42

Soil Productivity Groups I, II

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comments Below	150 - 200	150 - 200
M		75 - 125	75 - 125
H		0	0
VH		0	0

Soil Productivity Groups III, IV

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comments Below	100 - 120	100 - 120
M		40 - 90	40 - 90
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **725**: If stand contains less than 25% clover, apply 40-60 lbs N/A.

Situation: Standard Statement.

Comment **131**: If additional production is needed later on, apply 40 to 60 lbs/A of N after each cutting. If you are planning to overseed a legume into the stand, omit the N recommendation.

Situation: Standard Statement.

Comment **123**: P_2O_5 and K_2O recommendations are for single applications made every 3 to 4 years.

Crop: Tall Grass - Hay Maintenance

Crop Code: 44, 444

Soil Productivity Groups I, II

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	80 - 100	100 - 120	200 - 240
M		70 - 90	160 - 185
H		40 - 60	40 - 145
VH		0	0

Soil Productivity Groups III, IV

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	60 - 80	70 - 90	120 - 145
M		40 - 60	85 - 110
H		40 - 40	40 - 70
VH		0	0

Comments to Accompany Recommendations:

Situation: Soil Productivity Group = 1, 2

Comment **726**: The N recommendation is for a March application. If additional hay production is needed, apply 80 lbs N/acre after each cutting. Do not apply more than 250 lbs N/acre per year.

Situation: Soil Productivity Group = 3, 4

Comment **727**: The N recommendation is for a March application. For additional fall hay production, apply 60-80 lbs N/acre in late August/early September. Do not apply more than 160 lbs N/acre per year.

Crop: Stockpiled Tall Fescue Maintenance

Crop Code: 45, 445

Soil Productivity Groups I, II

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50 - 90	100 - 120	100 - 120
M		40 - 90	40 - 90
H		0	0
VH		0	0

Soil Productivity Groups III, IV

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	40 - 60	40 - 60	60 - 80
M		30	30 - 50
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **133**: Apply the N in August. Where clover makes up more than 25% of the stand, use the lower N rate. If clover is not present and you desire maximum production, use the higher N rate.

Crop: Bermudagrass Pasture Maintenance

Crop Code: 46

All Soil Productivity Groups

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	175 - 225	100 - 120	100 - 120
M		40 - 90	40 - 90
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **134**: The N recommendation represents the total amount of N to be applied during the season. Split the N into three applications - April, June and July.

Crop: Bermudagrass Hay Maintenance

Crop Code: 47

All Soil Productivity Groups

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	240 - 300	100 - 120	235 - 275
M		70 - 90	185 - 225
H		40 - 60	40 - 165
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **135**: Apply the N in 3 split applications - early spring, after 1st cut, and after 2nd cut (but no later than early August). Do not apply more than 120 lbs/A of N per application.

Crop: Asparagus - Nonhybrid Strains

Crop Code: 50

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50	150	200
M		100	150
H		50	100
VH		25	50

Crop: Asparagus - New Hybrids

Crop Code: 51

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	75	200	300
M		150	225
H		100	150
VH		50	75

Crop: Beans, Lima

Crop Code: 52

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	75 - 100	120	160
M		80	120
H		40	80
VH		20	40

Crop: Beans, Snap

Crop Code: 53

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	40 - 80	80	80
M		60	60
H		40	40
VH		20	20

Crop: Broccoli, Cauliflower

Crop Code: 54

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	150 - 200	200	200
M		100	100
H		50	50
VH		25	25

Crop: Cabbage

Crop Code: 55

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 125	200	200
M		100	100
H		50	50
VH		25	25

Crop: Brussels Sprouts, Collards

Crop Code: 56

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	75 - 125	150	150
M		100	100
H		50	50
VH		25	25

Crop: Cucumbers

Crop Code: 57, 457

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 125	150	200
M		100	150
H		50	100
VH		25	50

Crop: Muskmelons

Crop Code: 58, 458

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	85 - 100	150	200
M		100	150
H		50	100
VH		25	50

Crop: Onions, Bulbs

Crop Code: 59

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	75 - 100	200	200
M		100	100
H		50	50
VH		25	25

Crop: Onions, Scallions

Crop Code: 60

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	150 - 200	200	200
M		100	100
H		50	50
VH		25	25

Crop: Peas

Crop Code: 61

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	80 - 120	120	120
M		80	80
H		40	40
VH		20	20

Crop: Peppers

Crop Code: 62, 462

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 130	200	200
M		150	150
H		100	100
VH		50	50

Crop: Potatoes, White

Crop Code: 63, 463

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	125 - 150	200	300
M		150	200
H		100	100
VH		50	50

Crop: Potatoes, Sweet

Crop Code: 64, 464

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50 - 75	200	300
M		100	200
H		50	100
VH		25	50

Crop: Pumpkins

Crop Code: 65, 465

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50 - 75	150	200
M		100	150
H		50	100
VH		25	50

Crop: Spinach

Crop Code: 66

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 125	200	200
M		150	150
H		100	100
VH		50	50

Crop: Squash

Crop Code: 67, 467

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	75 - 100	150	200
M		100	150
H		50	100
VH		25	50

Crop: Sweet Corn - Fresh Market

Crop Code: 69, 469

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	125 - 150	160	160
M		120	120
H		80	80
VH		40	40

Crop: Sweet Corn - Processing

Crop Code: 70

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	110 - 130	120	120
M		80	80
H		40	40
VH		20	20

Crop: Tomatoes - Fresh Market

Crop Code: 71, 471

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50 - 80	200	300
M		150	200
H		100	100
VH		50	50

Crop: Tomatoes - Processing, Multiple Harvests

Crop Code: 72

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 130	250	300
M		150	200
H		100	100
VH		50	50

Crop: Tomatoes - Processing, Machine Harvest

Crop Code: 73

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	25 - 50	200	250
M		150	150
H		100	100
VH		50	50

Crop: Watermelons

Crop Code: 74

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	80 - 100	150	200
M		100	150
H		50	100
VH		25	50

Crop: Putting Greens, Bentgrass; Tees, Bentgrass

Crop Code: 80, 82

Fertilizer Recommendations

Soil Test Level	P_2O_5		K_2O	
	lbs/1000 sq. ft.	Time To Apply	lbs/1000 sq. ft.	Time To Apply
L	3	Aug To Dec	2 2	Aug to Dec Mar To June
M	2 - 2.5	Aug To Dec	1.5 - 2 1.5	Aug to Dec Mar To June
H	0 - 1.5	Aug To Dec	1 - 1.5 1	Aug to Dec Mar To June
VH	0 - 1	Aug To Dec	0 - 1 0 - 1	Aug to Dec Mar To June

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **161**: For N recommendation, see enclosed Note.

Crop: Putting Greens, Bermudagrass; Tees, Bermudagrass

Crop Code: 81, 83

Fertilizer Recommendations

Soil Test Level	P_2O_5		K_2O	
	lbs/1000 sq. ft.	Time To Apply	lbs/1000 sq. ft.	Time To Apply
L	3	Aug To Oct	2 2	Aug to Oct Mar To June
M	2 - 2.5	Aug To Oct	1.5 - 2 1.5	Aug to Oct Mar To June
H	0 - 1.5	Aug To Oct	1 - 1.5 1	Aug to Oct Mar To June
VH	0 - 1	Aug To Oct	0 - 1 0 - 1	Aug to Oct Mar To June

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **161**: For N recommendation, see enclosed Note.

Crop: Fairways - Kentucky Bluegrass, Fescue, Bermudagrass;
Athletic Fields - Kentucky Bluegrass, Fescue, Bermudagrass;
Industrial Lawns - Kentucky Bluegrass, Fescue, Bermudagrass.

Crop Code: 84, 85, 86, 87, 88, 89, 488

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	80 - 120	80 - 120
M		60 - 80	60 - 80
H		40 - 60	40 - 60
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **161**: For N recommendations see enclosed Note.

Situation: Crop = 84, 85, 88, 89 or 488 and soil test P = Low and Soil test K = Low.

Comment **162**: The preferred time for P_2O_5 and K_2O application is late summer or fall. However, because of the large amounts needed, apply 1/2 of the P_2O_5 and K_2O in late summer and the remaining half 30 to 60 days later. Do not apply more than 80 lbs of K_2O in one application.

Situation: Crop = 84, 85, 88, 89 or 488 and soil test P = Low.

Comment **163**: The preferred time for P_2O_5 and K_2O application is late summer or fall. However, because of the large amount of P_2O_5 needed, apply 1/2 in late summer and the remaining half 30 to 60 days later.

Situation: Crop = 84, 85, 88, 89 or 488 and soil test K = Low.

Comment **164**: The preferred time for P_2O_5 and K_2O application is late summer or fall. However, because of the large amount of K_2O needed, apply 1/2 in late summer and the remaining half 30 to 60 days later. Do not apply more than 80 lbs of K_2O in one application.

Situation: Crop = 84, 85, 88, 89 or 488.

Comment **165**: The preferred time for P_2O_5 and K_2O application is late summer or early fall. May be applied in single or multiple application.

(Continued on next page.)

Situation: Crop = 86 and soil test P = Low and soil test K = Low.

Comment **166**: The preferred time for P_2O_5 and K_2O application is August. However, because of the large amounts needed, apply 1/2 of the P_2O_5 and K_2O in August and 1/2 in December. Do not apply more than 80 of K_2O in one application.

Situation: Crop = 86 and soil test P = Low.

Comment **167**: The preferred time for P_2O_5 and K_2O application is August. However, because of the large amount of P_2O_5 needed, apply 1/2 in August and 1/2 in December.

Situation: Crop = 86 and soil test K = Low.

Comment **168**: The preferred time for P_2O_5 and K_2O application is August. However, because of the large amount of K_2O needed, apply 1/2 in August and 1/2 in December. Do not apply more than 80 lbs of K_2O in one application.

Situation: Crop = 86.

Comment **169**: The preferred time for P_2O_5 and K_2O application is August. However, half of the fertilizer may be applied at this time and the remaining half applied during another season if so desired.

Situation: Crop = 87 and soil test P = Low and soil test K = Low.

Comment **170**: The preferred time for P_2O_5 and K_2O application is August. However, because of the large amounts needed, apply 1/2 of the P_2O_5 and K_2O in August and 1/2 in early spring. Do not apply more than 80 lbs of K_2O in one application.

Situation: Crop = 87 and soil test P = Low.

Comment **171**: The preferred time for P_2O_5 and K_2O application is August. However, because of the large amount of P_2O_5 needed, apply 1/2 in August and 1/2 in early spring.

Situation: Crop = 87 and soil test K = Low.

Comment **172**: The preferred time for P_2O_5 and K_2O application is August. However, because of the large amount of K_2O needed, apply 1/2 in August and 1/2 in early spring. Do not apply more than 80 lbs. of K_2O in one application.

Situation: Crop = 87.

Comment **173**: The preferred time for P_2O_5 and K_2O application is August. However, half of the fertilizer may be applied at this time and the remaining half applied during another season if it is so desired.

Crop: Sod Production - Kentucky Bluegrass, Fescue, Bermudagrass, Zoysiagrass

Crop Code: 90, 91

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	200 - 300	150 - 200
M		100 - 200	100 - 150
H		100	100
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **161**: For N recommendations see enclosed Note.

Situation: Crop = 90 - 91.

Comment **174**: Do not apply the above P_2O_5 and K_2O recommendations to established sod. For more information on fertilization for sod production, see VPI & SU Extension Publication MA-130.

Crop: Grapes

Crop Code: 94

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	150	150
M		75	75
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **728**: Apply 150 lb N/Acre of fertilized band.

Crop: Apples

Crop Code: 95, 495

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **181**: FERTILIZER RECOMMENDATIONS: See Note 10 (Enclosed).

Crop: Peaches

Crop Code: 96, 496

Comments to Accompany Recommendations:

Situation: Soil test P = Low and soil test K = Low.

Comment **182**: FERTILIZER RECOMMENDATIONS: N, P_2O_5, and K_2O fertilizer is needed for optimum peach production. For rates and times of fertilizer application, see Note 11 (enclosed).

Situation: Soil test P = Low and soil test K = Medium - Very High.

Comment **183**: FERTILIZER RECOMMENDATIONS: N and P_2O_5 fertilizer is needed for optimum peach production. For rates and times of fertilizer application, see Note 11 (enclosed).

Situation: Soil test P = Medium - Very High and soil test K = Low.

Comment **184**: FERTILIZER RECOMMENDATIONS: N and K_2O fertilizer is needed for optimum peach production. For rates and times of fertilizer application, see Note 11 (enclosed).

Situation: Soil test P = Medium - Very High and soil test K = Medium - Very High.

Comment **185**: FERTILIZER RECOMMENDATIONS: Nitrogen-only fertilizer is needed. For rates and times of fertilizer application, see Note 11 (enclosed).

Crop: Strawberries

Crop Code: 97

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	150	150
M		75	75
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **729**: N Fertilization Table

Age of Spring Planted Field	Time to Apply	Amount to Apply in 14" to 18" Wide Band	
		Total Lbs Actual N/Acre	Lbs N/1000 Ft of Bed
Less 13 months	2-3 wks after planting	25 to 40	2.0 to 3.2
	Early to mid-August	40 to 60	3.2 to 4.8
	Late Feb. to early March; only on very sandy sites	16 to 20	1.3 to 1.6
Over 13 months	Immediately after harvest (during renovation)	40 to 70	3.2 to 5.6
	Early to mid-August; only on very sandy sites	40 to 80	3.2 to 6.4
	Late Feb. to early March, only on very sandy sites	16 to 20	1.3 to 1.6

Crop: Blueberries

Crop Code: 98

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	150	150
M		75	75
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **730**: Apply a total 150 lb N/Acre of fertilized band in three applications beginning in early April (75 lb/A) with subsequent applications (37.5 lb/A + 37.5 lb/A) at 5 week intervals.

Crop: Blackberries, Raspberries

Crop Code: 99

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	See Comment Below	150	150
M		75	75
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **731**: Apply 185 lb N/Acre of fertilized band.

Crop: Hardwood Establishment

Crop Code: 105

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	50 - 70	40 - 80
M		10 - 50	10 - 40
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **186**: See Note 12 for further information on fertilization and liming.

Crop: Hardwood Maintenance

Crop Code: 106

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50 - 100	50 - 70	40 - 80
M		10 - 50	10 - 40
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **186**: See Note 12 for further information on fertilization and liming.

Crop: Hardwood Nursery, Black Walnut

Crop Code: 107

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	60 - 80	80 - 110	40 - 80
M		40 - 80	10 - 40
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **186**: See Note 12 for further information on fertilization and liming.

Crop: Pine Establishment

Crop Code: 109

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	0	50 - 70	40 - 80
M		10 - 50	10 - 40
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **186**: See Note 12 for further information on fertilization and liming.

Crop: Pine Maintenance

Crop Code: 110

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50 - 100	50 - 70	40 - 80
M		10 - 50	10 - 40
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **186**: See Note 12 for further information on fertilization and liming.

Crop: Pine Nursery

Crop Code: 111

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	60 - 80	80 - 110	40 - 80
M		40 - 80	10 - 40
H		0	0
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **186**: See Note 12 for further information on fertilization and liming.

Crop: Christmas Trees - Fraser Fir, Norway Spruce, Hemlock

Crop Code: 113

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 120	160 - 300	150 - 250
M		60 - 160	60 - 150
H		30 - 60	30 - 60
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **732**: The above recommendation is for broadcast application at establishment. The corresponding maintenance "per tree" application is: ___ oz. N, ___ oz. P_2O_5, oz. K_2O and ___ oz. lime.

Crop: Christmas Trees - White Pine, Virginia Pine, Scotch Pine

Crop Code: 114

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 120	90 - 150	100 - 160
M		40 - 90	50 - 100
H		30 - 40	30 - 50
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **732**: The above recommendation is for broadcast application at establishment. The corresponding maintenance "per tree" application is: ___ oz. N, ___ oz. P_2O_5, oz. K_2O and ___ oz. lime.

Crop: Christmas Trees - Blue Spruce, Red Cedar

Crop Code: 115

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	100 - 120	160 - 300	150 - 250
M		60 - 160	60 - 150
H		30 - 60	30 - 60
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **732**: The above recommendation is for broadcast application at establishment. The corresponding maintenance "per tree" application is: ___ oz. N, ___ oz. P_2O_5, oz. K_2O and ___ oz. lime.

Crop: Christmas Trees - Nursery

Crop Code: 116

Soil Test Level	Fertilizer Recommendations (lb/1000 Sq. Ft.)		
	N	P_2O_5	K_2O
L	2.5	6 - 9	3.5 - 6.5
M		3.5 - 6	1 - 3.5
H		1 - 3.5	0 - 1
VH		0	0

Comments to Accompany Recommendations:

Situation: Standard Statement.

Comment **733**: Apply 2.5 lbs N, ___ lbs P_2O_5, and ___ lbs K_2O per 1000 sq. ft.

Crop: New Lawn Establishment - Kentucky Bluegrass, Fescue, Bermudagrass, Zoysiagrass

Crop Code: 201, 203

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L-M	L-H	*201	FERTILIZER RECOMMENDATIONS: Apply a 1-2-1 ratio fertilizer (examples of grades to use are 5-10-5, 15-30-15, etc.) using the rate listed in the "2.5" lb. nitrogen column in Table 3 in the enclosed Note on lawn fertilization. Be sure to incorporate the fertilizer into the soil (along with lime, if needed) to a depth of 4 to 6 inches. After the turf has been established (6 to 8 weeks) follow one of the maintenance fertilization programs described in the Note.
L-M	VH	*202	FERTILIZER RECOMMENDATIONS: Apply 10 lbs. of 0-46-0 per 1000 sq. ft. to correct a shortage of phosphate in the soil. Also apply a nitrogen-only fertilizer (examples are 31-0-0, 33.5-0-0, 38-0-0, 46-0-0, etc.) using the rate listed in the "2.5" lb. nitrogen column in Table 3 in the enclosed Note on lawn fertilization. Be sure to incorporate the fertilizer into the soil (along with lime, if needed) to a depth of 4 to 6 inches. After the turf has been established (6 to 8 weeks) follow one of the maintenance fertilization programs described in the Note. OPTIONAL PROGRAM. If 0-46-0 or a nitrogen-only fertilizer is not available, they can both be replaced by using a complete fertilizer with a 1-2-1 ratio (examples of grades to use are 5-10-5, 15-30-15, etc.) using the rate listed in the "2.5" lb. nitrogen column in Table 3 in the enclosed Note on lawn fertilization. Note - this optional program, while meeting the turf's nutrient needs, provides extra potash which is not necessary for optimum growth.
(Continued on next page.)			

H-VH	L-M	*203	FERTILIZER RECOMMENDATIONS: Apply 5 lbs. of 0-0-50 or 4 lbs. of 0-0-60 per 1000 sq. ft. to correct a shortage of potash in the soil. Also apply a nitrogen-only fertilizer (examples of grades to use are 31-0-0, 33.5-0-0, 38-0-0, 46-0-0, etc.) using the rate listed in the "2.5" lb. nitrogen column in Table 3 in the enclosed Note on lawn fertilization. Be sure to incorporate the fertilizer into the soil (along with lime, if needed) to a depth of 4 to 6 inches. After the turf has been established (6 to 8 weeks) follow one of the maintenance fertilization programs described in the note. OPTIONAL PROGRAM: If the above fertilizer materials cannot be found, they can all be replaced by using a complete fertilizer with a 2-1-2 ratio (examples of grades to use are 14-7-14, etc.) using the rate listed in the "2.5" lb. nitrogen column in Table 3 in the enclosed Note on lawn fertilization. Note - this optional program, while meeting the turf's nutrient needs, provides extra phosphate which is not necessary for optimum growth.
H-VH	H-VH	*204	FERTILIZER RECOMMENDATIONS: Apply a nitrogen-only fertilizer (examples of grades to use are 31-0-0, 33.5-0-0, 46-0-0, etc.) using the rate listed in the "2.5" lb. nitrogen column in Table 3 in the enclosed Note on lawn fertilization. Be sure to incorporate the fertilizer into the soil (along with lime, if needed) to a depth of 4 to 6 inches. After the turf has been established (6 to 8 weeks) follow one of the maintenance fertilization programs described in the note.

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Crop: Lawn Maintenance, Repair of Bare Spots - Kentucky Bluegrass, Fescue, Bermudagrass, Zoysiagrass

Crop Code: 202, 204

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L	L	*205	FERTILIZER RECOMMENDATIONS: Apply a 1-1-1, 1-2-2 or 2-1-1 ratio fertilizer (examples of grades to use are 10-10-10, 5-10-10, 10-20-20, 16-8-8, etc.) according to the instructions in the enclosed Note on Lawn Fertilization.
L	M-VH	*206	FERTILIZER RECOMMENDATIONS: Apply a 1-2-1 or 2-1-1 ratio fertilizer (examples of grades to use are 5-10-5, 15-30-15, 16-8-8, etc.) according to the instructions in the enclosed Note on lawn fertilization.
M-VH	L	*207	FERTILIZER RECOMMENDATIONS: Apply a 3-1-2 or 4-1-2 ratio fertilizer (examples of grades to use are 12-4-8, 16-4-8, etc.) according to the instructions in the enclosed Note on lawn fertilization.
M-VH or M-H	M-H or M-VH	*208	FERTILIZER RECOMMENDATIONS: Use any complete "turf-type" fertilizer according to the instructions in the enclosed Note on lawn fertilization. (A complete fertilizer contains the nutrients nitrogen, phosphorus and potassium.)
VH	VH	*209	FERTILIZER RECOMMENDATIONS: Apply a nitrogen-only fertilizer according to the instructions in the enclosed Note on lawn fertilization.

Crop: Vegetable Garden, Flower Garden, Roses

Crop Code: 210 - 212

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L-M	L-M	*221	FERTILIZER RECOMMENDATIONS: Apply 4 lbs of 5-10-10 per 100 sq. ft. For additional information on fertilization, see Note 19 (Enclosed).
L-M	H-VH	*222	FERTILIZER RECOMMENDATIONS: Apply 4 lbs of 5-10-5 per 100 sq. ft. For additional information on fertilization, see Note 19 (Enclosed).
H-VH	L-VH	*223	FERTILIZER RECOMMENDATIONS: Apply 2 lbs of 10-10-10 per 100 sq. ft. For additional information on fertilization, see Note 19 (Enclosed).

Crop: Home Fruit Trees - Apples, Nectarines, Peaches, Pears, Plums, Quince, Sour Cherry, Sweet Cherry

Crop Code: 220, 226-230, 232, 234

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L	L	*243	FERTILIZER RECOMMENDATIONS: Complete Fertilizer Needed - See Note 21.
L	M-VH	*243	FERTILIZER RECOMMENDATIONS: Complete Fertilizer Needed - See Note 21.
M-VH	L	*243	FERTILIZER RECOMMENDATIONS: Complete Fertilizer Needed - See Note 21.
M-VH	M-VH	*244	FERTILIZER RECOMMENDATIONS: Nitrogen-only Fertilizer Needed - See Note 21.

Crop: Small Fruits for Home Use - Blackberries, Blueberries, Currants, Gooseberries, Grapes, Raspberries, Strawberries

Crop Code: 221-225, 231, 233

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L	L	*241	FERTILIZER RECOMMENDATIONS: Complete Fertilizer Needed - See Note 22.
L	M-VH	*241	FERTILIZER RECOMMENDATIONS: Complete Fertilizer Needed - See Note 22.
M-VH	L	*241	FERTILIZER RECOMMENDATIONS: Complete Fertilizer Needed - See Note 22.
M-VH	M-VH	*242	FERTILIZER RECOMMENDATIONS: Nitrogen-only Fertilizer Needed - See Note 22.

Crop: Azaleas, Andromedas, Camellias, Laurel, Rhododendron

Crop Code: 240, 241, 242, 243, 244

Comment No.	Fertilizer Recommendations
*261	FERTILIZER RECOMMENDATIONS: See Note 20 (Enclosed).

Crop: Shrubs, Non Acid-Loving

Crop Code: 245

Comment No.	Fertilizer Recommendations
*261	FERTILIZER RECOMMENDATIONS: See Note 20 (Enclosed).

Crop: Trees

Crop Code: 246

Comment No.	Fertilizer Recommendations
*261	FERTILIZER RECOMMENDATIONS: See Note 20 (Enclosed).

Crop: Potted House Plants

Crop Code: 250

Comment No.	Fertilizer Recommendations
*281	FERTILIZER RECOMMENDATIONS: See Note 19 (Enclosed).

Crop: Greenhouse Production - Carnations, Chrysanthemums, Snapdragons, Azaleas, Lilies, Poinsettias, Bedding Plants, Foliage Plants, Hanging Baskets, Vegetable Transplants; Nursery Production - Container-Grown Acid-Loving Plants, Container-Grown Non-Acid-Loving Plants (See also Crops 351-352)

Crop Code: 301-323, 353-354

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L-M	L-VH	*301	FERTILIZER RECOMMENDATIONS: Apply 1/2 to 3/4 lbs of 20-20-20 per 100 sq. ft. or per 25 gal of water.
H	L-VH	*302	FERTILIZER RECOMMENDATIONS: Apply 1/2 to 3/4 lbs of 20-5-30 per 100 sq. ft. or per 25 gal of water.
VH	L-H	*302	FERTILIZER RECOMMENDATIONS: Apply 1/2 to 3/4 lbs of 20-5-30 per 100 sq. ft. or per 25 gal of water.
VH	VH	*303	FERTILIZER RECOMMENDATIONS: Only supplemental N fertilizer is needed. Apply 1/2 lb of calcium nitrate per 100 sq. ft. (or 1/4 lb of calcium nitrate per 25 gal of water.)

Crop: Nursery Production - Field Grown Non-Acid-Loving Plants, Field Grown Acid-Loving Plants (See Also Crops 353-354)

Crop Code: 351-352

Soil Test Level		Comment No.	Fertilizer Recommendations
P_2O_5	K_2O		
L-M	L-VH	*321	FERTILIZER RECOMMENDATIONS: Apply 2000 lbs of 5-10-5 per acre.
H	L-VH	*322	FERTILIZER RECOMMENDATIONS: Apply 1000 lbs of 10-10-10 per acre.
VH	L-VH	*323	FERTILIZER RECOMMENDATIONS: Apply 150 lbs of ammonium nitrate per acre in early spring.

Crop: Surface - Mined Areas: Erosion Control Mixtures, Hay and Pasture Mixtures, Critical Area Mixtures, Temporary Cover Mixtures

Crop Code: 420, 421, 422, 423

Soil Test Level	Fertilizer Recommendations (lb/A)		
	N	P_2O_5	K_2O
L	50	90 - 120	60 - 90
M		60 - 90	30 - 60
H		30 - 60	30
VH		0	0

FERTILIZER RECOMMENDATIONS - SECONDARY PLANT NUTRIENTS

Calcium (Ca), magnesium (Mg), and sulfur (S) are usually referred to as the secondary elements since these are required in lesser amounts than N, P, and K. The following is a discussion of fertilizer recommendations for each of these elements.

Calcium (CA)

Calcium is a secondary element normally supplied to the plant in the form of limestone. The calcium level is rarely low enough to cause deficiencies in crops other than peanuts and some vegetables. In most situations where the Ca test is low, the soil pH is also low and the lime application recommended to correct the pH will add ample amounts of calcium to the soil. Either calcitic limestone or dolomitic limestone can be used because both contain ample amounts of calcium.

Regarding peanuts, gypsum or landplaster (CaS04) is recommended to suppress excess uptake of potassium by the peanut peg. The rates recommended are: broadcast - 900 lbs per acre, or banded in the row - 600 lbs per acre. The gypsum that is used should contain at least 90% calcium sulfate. Calcium is not recommended for any other crops.

Magnesium (Mg)

Magnesium is another secondary element that is normally supplied to the plant in the form of limestone. Deficiencies of this element may occur when the Mg test level is Low or Low-. At these levels, the soil pH is also usually low and dolomitic limestone, which contains ample amounts of magnesium, should be recommended. In situations where the soil pH is optimum and no lime is needed but Mg tests Low or Low-, a separate magnesium fertilizer will be required. The recommended rate is: 30 lbs of magnesium (Mg) per acre in a soluble form such as magnesium sulfate, sulfate of potash magnesia, or promesium. Magnesium can also be applied as a foliar spray using magnesium sulfate at the rate of 3-4 lbs of actual magnesium per acre.

Sulfur (S)

Sulfur is the third of the secondary elements that is required by plants for optimum growth. It is normally supplied to plants in the form of rainfall containing sulfur gases from the atmosphere and sulfur-containing fertilizers. Sulfur crop needs were evaluated in Virginia in the mid 1950's, initiated again in the late 1960's, and continued up to the present time. Crop response to sulfur has been inconsistent and more research is needed before this element can be put on the recommendation list for Virginia crops.

FERTILIZER RECOMMENDATIONS - MICRONUTRIENTS

Crop Micronutrient Needs

Micronutrients are those elements that are required by plants in small amounts. They are sometimes referred to as trace elements and consist of zinc (Zn), manganese (Mn), boron (B), molybdenum (Mo), copper (Cu), iron (Fe), and chorine (Cl). The primary source of micronutrients for plants is the soil. However, under certain conditions and for certain soils in Virginia, one or more micronutrients may be needed by certain crops for optimum growth. Extensive research has been conducted in Virginia over the past 2 decades on micronutrients. Two of these elements, zinc and manganese, have been found to be deficient for certain major agronomic crops grown in Virginia, and soil tests, calibrated for Virginia soils, have been successfully developed for these crops. A third element, boron, has also been found to be deficient for certain Virginia crops, but efforts to develop a soil test have not been successful because of the unique properties of boron in the soil. For those crops that require supplementary boron for optimum growth and for which deficiencies have been observed, a general boron recommendation is made. A fourth micronutrient, molybdenum, is deficient for certain crops under conditions of low soil pH and recommendations are made accordingly to correct the deficiency. The remaining three micronutrients - copper, iron, and chlorine have not normally been found to be deficient on crops in Virginia and are not recommended.

The following is information on fertilizer recommendations for trace elements found to be deficient in Virginia.

Zinc (Zn)

Zinc deficiency has been found on corn, small grains, and grain sorghum in Virginia. The critical zinc soil test level depends on soil pH (See Soil Test Calibration section). Zinc recommendations depend on application method. Recommendations for the above three crops are:

1. **Broadcast and disked-in or plowed-down**. For **Coastal Plain** soils - apply 10 to 12 pounds of elemental zinc per acre when using zinc sulfate or zinc oxide as the source, or 2 to 3 pounds of elemental zinc per acre when using the zinc chelates, such as zinc EDTA, as the source. For **Piedmont, Appalachian Region** soils - apply 20 to 25 pounds of elemental zinc per acre when using zinc sulfate or zinc oxide as the source. Zinc chelates are not economical sources when zinc is broadcast on Piedmont or Appalachian Region soils. Research to date indicates broadcast applications of the above rates will correct deficiencies for a period of 3 to 5 years. The most feasible way of broadcasting the zinc would be to have it mixed with a fertilizer that is to be spread.

2. **Seed contact placement**. Zinc can be applied in contact with the seed at planting time as part of a fertilizer application being made with a grain drill or with fertilizer attachments on the planters. Care should be used in the rate of application of the pop-up fertilizer for corn and grain sorghum to avoid germination injury. If this method of application is used, apply 1/2 pound of elemental zinc per acre using the zinc chelates as the source, or 1 pound per acre using zinc sulfate as the source. This method of application will not correct the deficiency in succeeding crops and would need to be applied each year these crops are planted.

3. **Sideband placement for corn and grain sorghum**. Zinc can be applied with the starter fertilizer at planting time. Where this method is used, apply 6 to 8 pounds of elemental zinc per acre using either zinc sulfate or zinc oxide as the source, or 1 to 2 pounds per acre when the zinc chelates are used as the source. This method of application will not correct the deficiency for succeeding crops, but would need to be applied each year these crops are grown.

4. **Foliar application**. Zinc can be supplied to crops through zinc-containing sprays applied directly to the leaves and stalks. If this method is used, apply 1/2 pound of elemental zinc per acre per application using the zinc chelates as the source, or 1 pound per acre per application using zinc sulfate or zinc oxide (micronized) as the source. Usually, the best time of application for corn and grain sorghum is when plants are 6 to 8 inches high. Use enough water to wet the plants.

Manganese (Mn)

Manganese deficiency has been found on soybeans and peanuts grown in Virginia. The critical manganese soil test level depends on soil pH (See Soil Test Calibration section). Recommendations for these crops depend on method of application and are as follows:

1. **Foliar application**. Apply 3/4 to 1 pound of elemental manganese per acre in enough water to wet the entire plant. Manganese sulfate, manganese oxide (micronized), and manganese chelates may be used as sources of manganese. If the chelates are used, use the 3/4 pound rate. Repeat the application if deficiency symptoms reappear (i.e., from 1 to 3 applications). Make all applications before August 15.

   Manganese can be applied with pesticides if the manganese source and the pesticide are compatible, if applying them as a mixture does not violate label restrictions on the pesticide, and if it does not violate state or federal regulations.

2. **Sideband placement**. If a starter fertilizer is to be applied at the time the crop is being planted, manganese can be added with the fertilizer. If this method is used, apply 8 to 10 pounds of elemental manganese per acre using manganese sulfate, manganese oxide, or manganese chelates as the source. Starter fertilizers should be placed 2 inches to one side and 2 inches below seed level to avoid salt injury to the germinating seed.

3. **Seed contact placement**. Important-- for peanuts only! This method of application may damage soybeans! Manganese can be applied in contact with the peanut seed at planting time with fertilizer attachments on the planters. Care should be used in the rate of application to avoid germination injury. If this method of application is used, apply 3 to 5 pounds of elemental manganese per acre using an available granular manganese fertilizer source. This method of application will only correct the deficiency in the immediate crop and would need to be applied each year the peanuts are planted.

4. **Broadcast application**. Broadcast application is not practical in a system of indirect fertilization. If manganese is to be broadcast, it should be applied within two to three weeks of the time the crop will be planted because of the short residual effect of broadcast applications. Apply 25 to 30 pounds of elemental manganese using manganese sulfate or manganese oxide as the source.

Boron (B)

Boron deficiency has been found on alfalfa, apples, cotton, peanuts, and on several commercial vegetable crops grown in Virginia. The following are suggested rates and methods of boron application (for boron fertilization of apples, refer to Soil Test Note 10):

1. **Alfalfa**. Apply 2 to 4 pounds of elemental boron per acre per year with a broadcast fertilizer.

2. **Asparagus**. Apply 2 pounds of elemental boron per acre every 3 years with a broadcast fertilizer.

3. **Broccoli, Cauliflower, Cabbage**. Apply 2 to 3 pounds of elemental boron per acre with a broadcast fertilizer.

4. **Brussels Sprouts, Collards, Muskmelons, Onions, Peas, Peppers, White Potatoes**. Apply 1 to 2 pounds of elemental boron per acre with a broadcast fertilizer.

5. **Cotton**. Apply 1/2 pound of elemental boron per acre per year in a compatible labeled pesticide spray or dust or as a separate foliar application.

6. **Peanuts**. Apply 1/2 pound of elemental boron per acre per year at early bloom stage in compatible labeled pesticide spray or dust or as a separate foliar application. Information on specific boron sprays and dusts are found in the 1994 Peanut Production Guide (Tidewater Agric. Res. & Ext. Center Information Series No. 275. December, 1993).

Molybdenum (Mo)

Molybdenum deficiency has been found on alfalfa, soybeans, and on certain commercial vegetable crops grown in Virginia. Recommendations are based on soil pH (See Soil Test Calibration section). If molybdenum is needed, the following are suggested rates and methods of application for the particular crop to be grown.

1. **Alfalfa**. Molybdenum may be applied as a foliar spray at the rate of 1/2 pound of elemental molybdenum per acre or as a seed treatment at the rate of 1 ounce of elemental molybdenum per acre. Important - molybdenum is toxic to livestock! Do not graze forage if molybdenum is sprayed on foliage until after a soaking rain.

2. **Broccoli, Cauliflower**. Apply 1/4 pound of elemental molybdenum per acre with a broadcast fertilizer.

3. **Soybeans**. Molybdenum may be applied as a foliar spray at the rate of 1/2 pound of elemental molybdenum per acre or as a seed treatment at the rate of 1 ounce of elemental molybdenum per acre.

LIME RECOMMENDATIONS

How Recommendations Are Made

Lime recommendations are based on the following factors:

1. Crop to be Grown
2. Soil pH (determined in water)
3. Soil Buffering Capacity
4. Credit For Previous Lime Application

The following is a discussion of each of these factors:

1. **Crop to be Grown**. The optimum soil pH for the crop to be grown is considered in making the recommendation. Optimum pH for the various crops, listed according to crop code number, is found in the following table.

Optimum pH†	Crop Code No.‡
4.5-5.0	420, 422, 423, 463, 464
5.2	63, 64, 100-106, 109-112, 351, 240-244, 222, 353, 310, 313
5.6-6.2	401-412,421,437-462,465-496
5.8	15-18, 107-108
6.2	1-14, 31-36, 38-47, 50-62, 65-74, 80-81
6.5	82-83, 84-91, 95-96, 201-204, 210-212, 220, 221, 312, 320, 352, 354
6.8	30, 37

† Optimum pH is for mineral soils. For organic soils, the optimum pH is 5.2 (All Crops).
‡ For a list of crop names corresponding to the numbers in this table, refer to the Crop Code table that is listed in the table of contents.

2. **Soil pH**. Soil pH measures the activity of the soil solution. However, it is not used solely to make the lime recommendation. A measure or indication of reserve acidity (buffering capacity or resistance to change in pH) is also necessary.

3. **Soil Buffering Capacity**. Buffering Capacity provides an indication of reserve acidity and has an important effect on the lime recommendation. In general, sandy soils have little reserve acidity while clay soils have much more reserve acidity. For this reason, it takes considerably more lime to raise the pH of a clay soil than it does a sandy soil. For the purpose of making lime recommendations, samples are placed into one of three categories: sandy, loamy, or clayey.

4. **Credit For Previous Lime Application**. Limestone has a residual effect in the soil; i.e., it will remain in the soil and affect acidity for 2 to 3 or more years. Because of this, recent lime applications that were made before a soil sample was collected for analysis should be considered when making a lime recommendation.

The following allowances for previous lime applications made within the past 2 years are used to adjust the lime recommendation for the crop to be grown:

Last Lime Application, Months	Allowance For Previous Amount Applied, %
1. None applied	0
2. 1 - 6	75
3. 6 - 12	50
4. 12 - 18	25
5. > 18	0

According to the table, if a person applied two tons/A of lime 12 months ago, he/she would be credited for one ton of lime/A, i.e., one ton/A would be subtracted from the recommendations.

This relationship is based on research conducted in Virginia by Moeschler (VPI & SU Tech. Bull.159, 1962) where lime effects were studied on 11 soil types. For 9 of the 11 soils, the pH reached its maximum in 2 years. On the remaining 2 soils, it took between 2 1/2 to 3 years to reach the maximum. If 2 years is assumed to be the cutoff point for complete reaction, then at one year 50% of the lime would have reacted and, hence, the 50% allowance. Also, the lime on the market today is most likely finer than the lime Moschler used in his study and would probably react faster.

Lime Recommendations For Virginia Crops

Lime Recommendations - Commercial Crop Production (Except Commercial Turf, Surface-Mined Area Crops, Greenhouse, and Nursery Production)

pH Desired - 6.8

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, T/A		
4.8	4.25	5.75	7.0
5.0	4.0	5.25	6.25
5.5	3.0	4.0	4.75
6.0	2.0	2.75	3.25
6.5	1.25	1.5	2.0

pH Desired - 6.5

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, T/A		
4.8	3.5	4.5	5.0
5.0	3.0	3.75	4.25
5.5	1.75	2.5	3.0
6.0	1.25	1.5	2.0

pH Desired - 6.2

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, T/A		
4.8	3.00	3.75	4.25
5.0	2.50	3.25	3.75
5.2	2.00	2.50	3.00
5.4	1.50	2.00	2.50
5.6	1.00	1.50	2.00
5.7	1.00	1.25	1.75
5.8	0.75	1.00	1.25
5.9	0.50	0.75	1.00
6.0	0.00	0.00	0.00

pH Desired - 5.8

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, T/A		
4.8	2.25	3.0	3.5
5.0	1.75	2.5	3.0
5.2	1.25	2.0	2.5
5.5	0.75	1.25	1.5

pH Desired - 5.2

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, T/A		
4.0	2.00	2.75	3.00
4.3	1.50	2.00	2.25
4.5	1.25	1.50	1.75
4.8	0.75	1.00	1.00
5.0	0.25	0.50	0.50

Lime Recommendations - Homeowner Crop Categories and Commercial Turf Production

pH Desired - 6.5

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, lbs/1000 sq. ft.		
4.8	135	180	200
5.0	120	145	170
5.5	80	85	110
6.0	45	60	70

pH Desired - 5.2

pH of Unlimed Soil	Soil Type		
	Sandy	Loamy	Clayey
	Lime, lbs/100 sq. ft.		
4.0	10	12	14
4.3	7	9	11
4.5	6	7	8
4.8	3	4	5
5.0	1	2	3

Lime Recommendations - Potted House Plants

pH Desired - 6.5

pH of Umlimed Soil	Lime, teaspoons/pot
4.8	2.5
5.0	2.0
5.5	1.5
6.0	0.5

Lime Recommendations - Greenhouse and Nursery Production

pH Desired - 6.5

pH of Unlimed Soil	Soil Type	
	1:1 Soil-Light weight Mix	Soil-less Mix
	Lime, lbs/100 sq. ft.†	
4.8	17	26
5.0	15	23
5.5	10	16
6.0	5	8

† lbs/100 sq. ft. x 0.54 = lbs/cu.yd.

pH Desired - 5.2

pH of Unlimed Soil	Soil Type	
	1:1 Soil-Light weight Mix	Soil-less Mix
	Lime, lbs/100 sq. ft.†	
4.0	11	17
4.3	9	14
4.5	7	11
4.8	4	6

† lbs/100 sq.ft. x 0.54 = lbs/cu.yd.

Lime Recommendations - Surface-Mined Areas

pH of Unlimed Soil	pH Desired	
	4.5-5.0	5.5-6.2
	Lime, T/A	
3.0	5.5	10.25
3.5	4.5	8.0
4.0	3.0	5.75
4.3	2.0	4.75
5.0	-	2.5
5.2	-	2.0

Lime Recommendations - Organic Soils - All Crops

pH Desired - 5.2	
pH of Unlimed Soil	Lime, T/A
4.0	6.0
4.3	4.5
4.5	3.5
4.8	2.0
5.0	1.0

LOWERING SOIL PH WITH SULFUR

On occasion, it is necessary to increase the acidity of the soil for certain "acid-loving" plants such as blueberries, azaleas, and rhododendron which grow best under acid conditions. The following are guidelines for lowering soil pH with sulfur:

1. For crops with optimum pH of 6.0 - 6.8, no sulfur is usually recommended regardless of how high the soil pH is because most crops in this category (1) will tolerate a pH of 7.0 - 8.0 and grow well, and (2), in most cases, the soil pH will gradually decrease with time.

2. For crops requiring pH of 5.5 - 6.0, sulfur is usually required to adjust the pH to 5.5 when the soil pH is above optimum.

3. For crops requiring a pH of 5.0 - 5.5, sulfur will be required to adjust the pH to 5.0 when it is above optimum.

4. No more than 15 lbs of S/1000 sq.ft. (1.5 lbs S/100 sq. ft.; 10 lbs aluminum sulfate/100 sq. ft.) should be applied at any one time. Instead, the soil should be retested in 4 to 6 months to determine if further sulfur applications are needed.

The following table contains rates of sulfur to apply to reduce soil pH. **S** is for sandy soils. **L** is for loamy soils. **C** is for clayey soils.

Reducing Soil pH With Sulfur or Aluminum Sulfate

Initial Soil pH	Desired Soil pH														
	4.0			4.5			5.0			5.5			6.0		
	S	L	C	S	L	C	S	L	C	S	L	C	S	L	C
	Sulfur Required†, lbs per 1000 sq. ft.‡														
4.0	0	0	0												
4.5	4	10	16	0	0	0									
5.0	8	20	32	4	10	16	0	0	0						
5.5	12	29	47	8	20	32	4	10	16	0	0	0			
6.0	15	38	61	12	29	47	8	20	32	4	10	16	0	0	0
6.5	19	48	77	15	38	61	12	29	47	8	20	32	4	10	16
7.0	23	57	92	19	48	77	15	38	61	12	29	47	8	20	32
7.5	27	67	107	23	57	92	19	48	77	15	38	61	12	29	47

† Aluminum sulfate = pounds of sulfur x 6. For lb/100 sq.ft. or oz/2 1/2 bu. move decimal one place to left. For lb/A multiply by 43.56.

‡ Example: Assuming the soil pH is 6.5 in a loamy soil and the pH should be reduced to 5.5, reading across from pH 6.5 to the "loamy" column under pH 5.5, 20 pounds of sulfur per 1000 square feet is required to reduce the soil pH to 5.5.

COMPUTER COMMENTS FOR PH, LIME, SULFUR, TRACE ELEMENTS, CALCIUM, AND MAGNESIUM

*601. The above lime recommendation is for adjusting the soil pH to 6.5. Omit lime application for acid-loving plants.

*602. Optimum soil pH for crops grown on organic soils (soils greater than 15% organic matter) is 5.2. While this pH level is dangerously low for mineral soils, crops grow well at this level on organic soils.

*603. The above lime recommendation is for a sandy loam soil. For a greens mixture without a soils component (ex. sand, peat), reduce the lime recommendation by 50%.

*604. The above lime recommendation is for a 1:1 soil-lightweight mix. For an all-sand mix, reduce the lime recommendation by 50%. For a soil-less (eg., peat) mix, increase the lime recommendation by 50%.

*605. Lime recommended for the 1st crop will satisfy lime needs for 3 to 4 years.

*606. Soil pH is too low for good growth of forage crops. A pH of 5.5 to 6.0 is required.

*607. LIME RECOMMENDATIONS: Apply _____ tons of agricultural lime per acre.

*608. LIME RECOMMENDATIONS: Apply _____ pounds of agricultural limestone (ground or pulverized) per 100 square feet.

*609. LIME RECOMMENDATIONS: Apply _____ pounds of agricultural limestone (ground or pulverized) per 1000 square feet.

*610. LIME RECOMMENDATIONS: Apply _____ teaspoons of agricultural limestone (ground or pulverized) per 5" pot.

*611. TYPE OF LIME TO APPLY: Apply dolomitic limestone which will supply needed magnesium in addition to correcting acidity.

*612. TYPE OF LIME TO APPLY: Apply calcitic limestone which will supply needed calcium in addition to correcting acidity.

*613. If tobacco is to be grown in the rotation in the next three years and the pH is 5.5 or higher, do not apply lime. If the pH is less than 5.5 apply only one half the lime recommended.

*614. If this field is used, disease problems may be more serious because of the high pH. Choose another field, if possible.

*615. If soil is organic (greater than 15% organic matter), and pH is 5.2 or higher, do not apply lime. If pH is less than 5.2 apply only one-fourth of the recommended limestone.

*630. Sulfur is needed to reduce soil pH. Apply _____ lbs of aluminum sulfate per 100 square feet. Retest soil in 6 months to determine if further applications are needed.

*640. Zinc, manganese, boron, and molybdenum are needed. For rates of application, see Note 4 (enclosed).

*641. Manganese, boron and molybdenum are needed. For rates of application see Note 4 (enclosed).

*642. Zinc, boron, and molybdenum are needed. For rates of application, see Note 4 (enclosed).

*643. Zinc, manganese, and molybdenum are needed. For rates of application, see Note 4 (enclosed).

*644. Zinc, manganese, and boron are needed. For rates of application, see Note 4 (enclosed).

*645. Boron and molybdenum are needed. For rates of application, see Note 4 (enclosed).

*646. Manganese and molybdenum are needed. For rates of application, see Note 4 (enclosed).

*647. Manganese and boron are needed. For rates of application, see Note 4.

*648. Zinc and molybdenum are needed. For rates of application, see Note 4.

*649. Zinc and boron are needed. For rates of application, see Note 4

*650. Zinc and manganese are needed. For rates of application, see Note 4

*651. Molybdenum is needed. For rate of application, see Note 4 (enclosed).

*652. Boron is needed. For rate of application, see Note 4 (enclosed).

*653. Manganese is needed. For rate of application, see Note 4 (enclosed).

*654. Zinc is needed. For rate of application, see Note 4 (enclosed).

*655. Zinc is needed for the small grain crop. See Note 4 (enclosed).

*656. The zinc test is not calibrated for this crop. For further information, see Note 1 (enclosed).

*657. Manganese is needed for the soybean crop. See Note 4 (enclosed).

*658. The manganese test is not calibrated for this crop. For further information, see Note 1 (enclosed).

*659. Manganese may be needed. Apply if deficiency symptoms occur. See Note 4 (enclosed) for method of application.

*660. Molybdenum is needed for the soybean crop. See Note 4 (enclosed).

*661. Apply 30 lbs of magnesium (Mg) per acre in a soluble form such as magnesium sulfate, sulfate of potash magnesia, or promesium.

*662. Apply gypsum at one of the following rates: broadcast - 900 lbs per acre, or banded over the row - 600 lbs per acre.