

Lime and Fertilizer Recommendations for the Various Crops of Tennessee

Chapter III Forage Pasture/Hay/Silage Crops

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Revised: Aug. 08: P and K recommendations at high soil test levels changed to zero

Revised: March, 2009: Conservation warm-season native grass and native grass pasture/hay codes and recommendations clarified, K recommendations for hybrid bermudagrass hay lowered

Reviewed and Revised April 2016: CRP code removed. Now only use native warm-season grass code (NWSG). Sulfur note added for bermudagrass and corn silage. Teff grass added to summer annual grass recs. (SAG)

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Alfalfa

Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre Per Year)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Establishment	0-15	150	60	0	0	240	190	0	0	1,2	
2. Maintenance	0	80	60	0	0	240	190	0	0	3	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 1

- Each alfalfa sample has two recommendations. The first should be used for new seedings. The second should be used for maintenance of an existing crop. For future maintenance of the new crop, use the second recommendation and omit the lime recommendation until the field is re-tested. Soil test every two years.
- Incorporate lime and fertilizers plus 2 pounds of boron per acre into the soil prior to seeding. For no-till establishment, apply lime and fertilizers broadcast to the soil surface. If the soil pH is below 5.8, seeding alfalfa no-till may not be desirable. If more than 4 tons of lime per acre are required for no-till establishment, apply only 4 tons of lime per acre and re-test after two years.
- After the first production season, broadcast maintenance phosphate and potash plus 2 pounds of boron annually in late fall or winter before new growth begins or prior to drilling a grass forage into an existing stand of alfalfa. The potassium should be applied in a split application with one-half of the recommended potash being applied before seeding or new growth begins and the second half applied after the first harvest. For alfalfa-grass mixtures, where alfalfa is less than 25 percent of the mixture, apply 30 pounds of nitrogen per acre between March 1 and 30 and again after the first cutting if an additional cutting is expected. If more than 4 tons of lime per acre are required, apply only 4 tons and re-test after two years.

Bermudagrass

Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre Per Year)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Establishment Common and Hybrids	60	80	40	0	0	80	40	0	0	1,2,5	
2. Maintenance Pasture											
a. B. Common	60-180	60	40	0	0	120	80	0	0	3,5	
b. B. Hybrids	120-180	90	60	0	0	120	80	0	0	3,5	
Hay											
c. B. Common	300	120	80	0	0	90	60	0	0	4,5	
d. B. Hybrids	400	120	80	0	0	120	60	0	0	4,5	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2.

Establishment recommendations apply to common and hybrids.

- Each bermudagrass sample has two recommendations. The first should be used for new crops or to renovate an existing crop. The second should be used for maintenance of an existing crop. For future maintenance of the new or renovated crop, use the second recommendation and omit the lime recommendation until the field is re-tested. Soil test every two years.
- Apply 30 pounds of nitrogen right before sprigging or seeding and 30 pounds one month later. Also, apply recommended lime and other fertilizer to the soil right before seeding or sprigging. A more vigorous nitrogen fertilization program may be beneficial with “improved” seeded varieties for hay production during the first year. Consult with your local county Extension office if you are not sure about whether more nitrogen may be needed. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.
- The rate of nitrogen topdressing depends on the need for forage. Apply one-half of the total recommended nitrogen on May 1 and one-half on July 1. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources. If the higher rates of N are used, use the higher rates of P and K on the hybrid pasture. Split application of the total potash is recommended. One-half of the potash should be applied prior to first spring growth and one-half on July 1. Broadcast all lime and fertilizer on the soil surface. If more than 5 tons of lime per acre are required, apply only 5 tons of lime per acre and re-test after two years.
- The rate of nitrogen topdressing depends on the need for forage. Apply up to one-fourth of the total recommended nitrogen May 1 and again after each cutting when conditions favor regrowth. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources. Four cuttings per year are often possible. For better forage quality, harvests should be done within about 30 days of growth or regrowth. Split application of the total potash is recommended. One-half of the potash should be applied prior to first spring growth and one-half after the second harvest. Broadcast all lime and fertilizer on the soil surface. If more than 5 tons of lime per acre are required, apply only 5 tons of lime per acre and re-test after two years.

5. On soils having a coarse textured subsoil, 10 pounds of sulfur per acre as part of the fertilizer blend may benefit yield, especially where deficiency symptoms have been observed in the past or where plant tissue tests have suggested sulfur deficiency. Forage sulfur levels should be checked prior to fertilization with sulfur because tissue levels above 0.3 percent sulfur can be antagonistic to grazing cattle, and levels above 0.4 percent sulfur are harmful.

Corn Silage

Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre Per Year)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Silage											
a. 15-18 T/A	120	120	60	0	0	180	120	0	0	1,2,3,4,7	
b. 19-25 T/A	150	160	80	0	0	240	160	0	0	1,2,3,4,7	
c. above 25 T/A	180	200	100	0	0	300	200	0	0	1,2,3,4,7	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2. Use note 5 and 6 only as indicated.

1. Banding a portion or all of the phosphate and potash 2 inches to the side and below the seed level may result in increased yields on soils testing low in either or both phosphorus and potassium. For soils testing medium or higher, either banding or broadcasting are effective methods of application. If fertilizer is placed directly with the seed, do not apply more than 30 pounds per acre of nitrogen or nitrogen plus potash to prevent seedling injury and loss of stand.
2. Split applications of nitrogen may be beneficial when nitrogen rates are greater than 120 pounds per acre.
3. If nitrogen sources containing urea are not incorporated, some loss of nitrogen may occur, *without* the use of a urease inhibitor, if applied to moist soils followed by three or more days of rapidly drying conditions without rainfall.
4. Reduce N rate by 60 to 80 pounds per acre following a winter cover crop of crimson clover or hairy vetch that has reached early bloom stage.

Use Notes 5 and 6 only as indicated in the last sentence of the note.

5. Apply 5 pounds of zinc (approximately 15 pounds zinc sulfate) per acre just prior to planting. (*Note 5 is used only when the zinc test indicates a need for zinc*).
6. If zinc was not tested, apply 5 pounds of zinc (approximately 15 pounds zinc sulfate) per acre when soil pH is 6.1 or above and phosphorus is high or anytime lime is applied or anywhere zinc deficiencies were observed the previous year. (*Note 6 is used for the following counties when the zinc test is not requested: Bedford, Cannon, Coffee, Cumberland, Davidson, DeKalb, Fentress, Franklin, Giles, Grundy, Jackson, Lincoln, Macon, Marshall, Maury, Moore, Morgan, Overton, Pickett, Putnam, Robertson, Smith, Sumner, Trousdale, Warren, Williamson and Wilson*).
7. On soils having a coarse textured subsoil, 10 pounds of sulfur per acre as part of the fertilizer blend may benefit yield, especially where deficiency symptoms have been observed in the past or where plant tissue tests have suggested sulfur deficiency.

Grain Sorghum Silage (GSS) or Sorghum silage Hybrids (SSH)
Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre Per Year)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Establishment	90	120	60	0	0	180	120	0	0		

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2

Warm-Season Pasture/Hay
Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre Per Year)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Native perennial Grass Pasture/Hay	0	90	60	0	0	90	60	0	0	1	
a. Establishment	0-120	90	60	0	0	90	60	0	0	2	
b. Maintenance											
2. Sum. Ann. Grass	60-120	60	30	0	0	90	60	0	0	3	
3. Soybean & Millet Hay	30	60	30	0	0	90	60	0	0	4	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2 except Native Grass, where no lime is recommended.

- Warm-season perennial grasses include Switchgrass, Big bluestem, Little bluestem, Indiangrass, Eastern Gama grass and Side oats gramma. At or just prior to seeding, apply lime, phosphorus and potassium according to soil test recommendations. Do not apply nitrogen fertilizer at seeding. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources. Warm season perennial grasses are slow starters and nitrogen will stimulate weed competition. If more than 4 tons of lime per acre is required, apply only 4 tons of lime per acre and re-test after two years.
- Beginning the spring following establishment, apply 60 pounds of nitrogen per acre when grass begins growing in May and then again in July if additional growth is desired. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources. No nitrogen is needed for minimal growth or wildlife cover only. Apply recommended amounts of phosphorus and potassium in one application any time during the year.

3. Summer annual grasses included are Teff grass, sudangrass, pearl millet and forage sorghum hybrids. Apply 60 pounds of nitrogen per acre at time of seeding. For Teff grass apply an additional 30 pounds of nitrogen per acre if conditions favor an additional cutting for hay or additional pasture growth. If pearl millet and forage sorghum hybrids are seeded before June 20, apply an additional 60 pounds of nitrogen per acre as topdressing after harvest in July. If urea is the nitrogen source for topdressing, some loss of nitrogen may occur, *without* the use of a urease inhibitor, if applied to moist soils followed by three or more days of rapidly drying conditions without rainfall.
4. Apply only 30 pounds of nitrogen per acre at seeding for soybeans and millet hay. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.

Computer Codes: 1. a-b. PE, PM 2. a-b. HE, HM 3. a-b. PGE, PGM
 4. a-b. HGE, HGM 5. a-b. TIME, TIMM 6. SGR 7. SGRL

Cool-Season Pasture/Hay
Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre Per Year)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Grass-Clover Pasture											
a. Estab. or Renov.	30	90	60	0	0	90	60	0	0	1,2	
b. Maintenance	0-90	60	30	0	0	60	30	0	0	3,4	
2. Grass-Clover Hay											
a. Estab. or Renov.	30	90	60	0	0	90	60	0	0	1,2	
b. Maintenance	30-120	60	30	0	0	60	30	0	0	4,5	
3. Tall Fescue Pasture											
a. Estab. or Renov.	30	90	60	0	0	90	60	0	0	1,2	
b. Maintenance	60-120	60	30	0	0	60	30	0	0	6,7	
4. Tall Fescue Hay											
a. Estab. or Renov.	30	90	60	0	0	90	60	0	0	1,2	
b. Maintenance	60-165	60	30	0	0	60	30	0	0	7,8	
5. Timothy or Orchardgrass											
a. Estab. or Renov.	30	90	60	0	0	90	60	0	0	9,10	
b. Maintenance	60-120	60	30	0	0	60	30	0	0	11	
6. Small Grain and/or Ryegrass											
	60-180	80	40	0	0	80	40	0	0	12	
7. Small Grain and/or Ryegrass With Legumes											
	45-120	80	40	0	0	80	40	0	0	13	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2. When the grass-clover mixture contains alfalfa use Chart 1.

1. Each pasture/hay sample has two recommendations. The first should be used for new crops or to renovate an existing crop. The second should be used for maintenance of an existing crop. For future maintenance of the new or renovated crop, use the second recommendation and omit the lime recommendation until the field is re-tested. Soil test every two years.
2. If renovation involves the addition of legumes to grass pastures/hay, the nitrogen should be omitted.
3. The nitrogen should be omitted on pastures containing more than 30 percent clover in the spring; otherwise, if clover is less than 30 percent of the pasture, apply 30 pounds of nitrogen per acre between March 1-30. For fall stockpiling of fescue apply 60 pounds of N per acre August 15 to September 15 to all fescue-clover mixtures. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.
4. Apply recommended amounts of phosphate and potash in one application anytime during the year. If more than 4 tons of lime per acre are required, apply only 4 tons of lime per acre and re-test after two years.
5. Apply 30 pounds of N per acre March 1-30 and again after the first cutting if an additional cutting is expected. For fall stockpiling of fescue, apply 60 pounds of N per acre from August 15 to September 15 to all fescue clover mixtures. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.
6. Apply recommended amounts of phosphate and potash in one application anytime during the year. Apply 60 pounds of nitrogen per acre from August 15 to September 15 and from March 1 to March 30. If additional growth is only needed during one season, apply nitrogen for that season only. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.
7. If more than 4 tons of lime per acre are required, apply only 4 tons of lime per acre and re-test after two years.
8. Apply recommended amounts of phosphate and potash in one application anytime during the year. Apply 60 pounds of nitrogen per acre March 1-30. Where a second cutting is expected, apply an additional 45 pounds of N per acre immediately after the first cutting. If fescue is stockpiled in the fall, apply 60 pounds of N per acre from August 15 to September 15. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.
9. Each timothy or orchardgrass sample has two recommendations. The first should be used for new crops or to renovate an existing crop. The second should be used for maintenance of an existing crop. For future maintenance of the new or renovated crop, use the second recommendation and omit the lime recommendation until the field is re-tested. Soil test every two years.
10. If renovation involves the addition of legumes, the nitrogen should be omitted. Where one cutting per year is made, apply 60 pounds nitrogen per acre from March 15 to April 1. When more than one cutting is made, apply 60 pounds of nitrogen per acre from March 15 to April 1 and 60 pounds immediately after first cutting. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.
11. Apply recommended amounts of phosphate and potash in one application anytime during the year. If more than 4 tons of lime per acre are required, apply only 4 tons of lime per acre and re-test after two years.

12. For fall grazing, apply 60 pounds of nitrogen per acre at time of seeding. For fall and spring grazing, apply an additional 45 pounds of nitrogen per acre about March 1 and 45 pounds on April 15. For fall grazing and spring hay or silage, apply 60 pounds of nitrogen per acre at seeding and 60 pounds nitrogen March 1-15. For spring hay or silage only, apply 45 pounds nitrogen per acre at seeding and 60 pounds on March 15. Where ryegrass is in the mixture and an additional cutting is expected in the spring, apply an additional 60 pounds of nitrogen per acre immediately after the first cutting. For spring grazing only, apply 30 pounds nitrogen per acre at seeding, 45 pounds on March 1, and 45 pounds on April 15. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.

13. For fall grazing, apply 30 pounds of nitrogen per acre at time of seeding. For fall and spring grazing, apply an additional 30 to 45 pounds of nitrogen per acre about March 1 and again on April 15. Use the 45-pound rate when the mixture contains less than 30 percent clover in the spring. For fall grazing and spring hay or silage, apply 30 pounds of nitrogen per acre at seeding and 30 to 45 pounds of nitrogen per acre March 1-15. For spring hay or silage only, apply 15 pounds of nitrogen at seeding and 30 to 45 pounds of nitrogen per acre March 1-15. Where ryegrass is in the mixture and an additional cutting is expected in the spring, apply an additional 30 to 45 pounds of nitrogen per acre immediately after the first cutting. In each case, the 45-pound nitrogen rate is used instead of the 30 pound rate when the mixture contains less than 30 percent clover in the spring. A urease inhibitor is suggested for use with nonincorporated urea-containing nitrogen sources.

Annual Lespedeza

Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Establishment	0	40	20	0	0	40	20	0	0		

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2

Computer Codes

- 1.. SER
- 2. SERM

Sericea Lespedeza

Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Establishment	0	60	20	0	0	60	20	0	0	1	
2. Maintenance	0	40	20	0	0	40	20	0	0	2	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2

1. Each sericea sample has two recommendations. The first should be used for new crops or to renovate an existing crop. The second should be used for maintenance of an existing crop. For future maintenance of the new or renovated crop, use the second recommendation and omit the lime recommendation until the field is re-tested.
2. Apply recommended amounts of phosphate and potash in one application anytime during the year. If more than 4 tons of lime per acre are required, apply only 4 tons of lime per acre and re-test after two years.

Red/White Clover
Soil Test Recommendations for N, P₂O₅ and K₂O (Pounds Per Acre)

Practice	Nitrogen	Phosphate (P ₂ O ₅)				Potash (K ₂ O)				Notes	
	Soil Test Levels*										
	(NT)	L	M	H	V	L	M	H	V		
1. Establishment	0-15	90	60	0	0	90	60	0	0	1	
2. Maintenance	0	60	30	0	0	60	30	0	0	2	

*NT = Not Tested L = Low M = Medium H = High V = Very High

Notes: Lime recommendations from Lime Chart 2

- Each red/white clover sample has two recommendations. The first should be used for new crops or to renovate an existing crop. The second should be used for maintenance of an existing crop. For future maintenance of the new or renovated crop, use the second recommendation and omit the lime recommendation until the field is re-tested.
- Apply recommended amounts of phosphate and potash in one application anytime during the year. If more than 4 tons of lime per acre are required, apply only 4 tons of lime per acre and re-test after two years.



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