

NC Forages and Pasture Technical Note No. 2

Considerations for Pasture Fertilization

This table provides specific guidelines on when to apply maintenance nutrients to various forages when grazed or harvested as hay/silage. Lime, phosphate and potash rates will come from soil test reports, and a range in the amount of nitrogen is also suggested in the soil test report. This table does not consider nitrogen suggestions for establishment year. Refer to the NC 590 Nutrient Management practice standard for requirements related to total planned nitrogen rates. An additional reference for nitrogen application general suggestions can be found in the NCDA&CS Forage Note #12.

Crop	N rate, potential lbs/acre/yr	Seasonal Suggestions for N applications Based on Typical NC Growth Needs				P2O5, K2O	Considerations
		Spring	Summer	Autumn	Fall		
		March-May	Jun-Aug 25	Aug 25-Sept	Oct-Nov		
Alfalfa and Red Clover, Assumes more than 30-50% legume	0-30	N is rarely justified on these legumes, except when planting into N deficient soils and/or the seedling plants are not sufficiently nodulated with the proper rhizobia. Under such conditions up to 30 lbs/ac at planting or after seedling emergence when plants show signs of poor nodulation.				Phosphate and Potash may be applied in late winter to mid spring or autumn.	The exception to timing of P and K is on sandy textured soils where 50% of potash may be applied in mid-growing season.
Bermudagrass	<100	40-60 at green up in April	Apply the remainder in mid-June to early July	Apply zero N after Aug 25. Expect the least response in this season & low priority for N when < 100 lbs N/ac/yr is used.	zero	Phosphate and Potash may be applied in late winter to mid spring. The exception is on sandy textured soils where 50% of potash may be applied in mid growing season.	Bermuda sites that do not have winter annuals growing on them are suitable for winter feeding sites because the bermuda can recover from hoof traffic. However, there is some potential for loss of N and K due to leaching during late winter because there is no living plants to take up the nutrients.
	100-220	Do not apply more than 50% of total for the year and do not exceed 75 lbs/acre at green up.	Highest yield response is during this season so apply remainder of annual N in one or two equal splits at 4-6 week interval but not less than 40 lbs/a/application.		zero		
Bermudagrass, over seeded with winter annual grasses (ryegrass or small grains)	<100	60 lbs N in early March will favor winter annual production. To favor the bermuda apply N in May.	When <100 lbs/a/yr apply zero during this season because winter annual production is desired.		Over stimulating bermuda with N as it prepares to enter its dormant season can increase winter injury.		
	100-220	Do not apply more than 50% of total for the year during this season and do not exceed 75 lbs/acre at green up of the bermuda.	Highest yield response is during this season so apply remainder of annual N in one or two equal splits at 4-6 week interval but not less than 40 lbs/a/application.				

Bermudagrass, over seeded with winter annual legumes (crimson clover, vetch, pea)	<100	0-60 at bermuda green up, depending on legume stand and grazing or harvest management	40-180 depending on legume density and how much growth accumulates during spring. Split N into equal parts at 4-6 week intervals.	zero	zero		High N fixation is possible when legumes reach flower stage of growth or later (producing 50 to 100 lbs/ac/yr), yet this stage of growth will result in a significant delay or loss of production of bermuda in early summer. To minimize the adverse impact on bermuda, the growth of legumes will have to be maintained below 8-12 inches during the critical green up period for bermuda (March-April); expect only 40 -60 lbs N residual from the legumes when managed this way.
	100-180						
Perennial grasses, cool season without legumes (fescue, orchardgrass, prairiegrass, timothy)	<80	To get max yield/acre/yr apply all in Mar 1-April 15	Response will be low, unless moisture is good and temperate is below normal. Not advisable to apply any N during this season.	To stretch seasonal growth apply minimum of 40 lbs in early Sept but up to 80 lbs/a on some acreage	When applying <80/a/yr it is best to apply in more favorable seasons	Phosphate and Potash may be applied in late winter to mid spring or autumn. The exception is on sandy textured soils where 50% of potash may be applied in spring and fall.	Cool season grasses will produce the highest production per lb of N applied in the spring season, but they also provide reasonable response in autumn when forage is often in limited supply
	80-150	Apply max of 100 lbs in spring in 2 applications of 50 early Mar; 50 early May		40 to 75/acre early Sept	Yield response to N from mid- Oct and Nov will likely be 30 to 60% of early Sept applications.		
Perennial grasses, cool season with Legumes (fescue, orchardgrass, prairiegrass, timothy) with > 25% legume.	0-50	Occasionally 30-50 lbs. N/A are applied to stimulate growth in early spring (Feb-March) or in autumn, but only if legume component is low. Do not apply N in summer months. As a general rule, mixtures with 25% or more legumes are more economical than purchasing any amount of N.			zero	On steep slopes phosphate, potash and lime are often applied every 3 - 5 years because of expense, but this practice will probably limit production even though it may be the most economical plan.	If N is applied to mixtures with legumes, it is essential that grazing must be such that the grass does not shade out the legume. Stockpiled pastures with legumes should be grazed before heavy frost causes their leaves to drop off; this management will also favor legume survival.
Kentucky bluegrass and clover mixtures.	0-50				Expect almost no yield response because of low temperatures.		
Millet, sudan sorghum-sudan hybrids	<100	50% at planting not to exceed 75 lbs/acre	50% during this season probably after first harvest	low priority application when <100 lbs/a/yr is used	zero	Phosphate and Potash would be applied at planting or within a couple of weeks post planting	Often summer annuals are double cropped with winter annuals, and because of overlapping planting dates and end of season use, the annual production of the respective crops is reduced. Therefore the total N/acre/yr is not additive for the respective crops. Since there is usually some carryover from crop to crop consider total N for the year to be about 75%-85% of the combined N rates.
	100+	Do not apply more than 50% of total for the year and do not exceed 75 lbs/acre at planting	Largest yield response is during this season but not less than 40 lbs/a/application.	Max of 60 lbs/acre in early Aug & zero after Aug 30;	zero		

Millet, sudan sorghum-sudan hybrids with summer legumes (cowpea, soybean, sun hemp)	<40 at planting	Zero, assuming good stands of legumes; if legumes do not make up 50% of the mixture consider 40- 60 lbs/acre in applications similar to grasses growing alone.	Zero if satisfactory legume component, otherwise a max of 60 in early Aug and zero after Aug 30.	zero		Depending on the residual N in the soil from previous crop, some N may be needed to get the annual grasses established.	
Native Warm Season Grasses (switchgrass, indiagrass, big bluestem, gamagrass)	<60	100% at green-up	zero	zero	zero	Phosphate and Potash may be applied in late winter to mid spring. It's rare that natives grasses will provide economical response to more than 60 -100 lbs of N/a, with the possible exception of gamagrass.	
	60-120	50% or max of 60 lbs N/acre at green-up	remainder of N after first harvest or by mid-July	zero	zero		
Winter annual grasses (ryegrass, small grains) pure stands	<100	Highest response from small grains will occur from applications in Mar and from ryegrass in April; if more than 80 lbs are available for spring, consider split into two.	zero, usually there is no growth from small grains and insignificant growth of ryegrass in this period and no justification for N	40-50 minimum and maximum of 75 at or within a couple of weeks following planting	Cool temperatures will limit the yield response during this season, especially for plantings made after mid-October.	Phosphate and Potash would be applied at planting or within a couple of weeks post planting	Often summer annuals are double cropped with winter annuals, and because of overlapping planting dates and end of season use, the annual production of the respective crops is reduced. Therefore the total N/acre/yr is not additive for the respective crops. Since there is usually some carryover from crop to crop consider total N for the year to be about 75%-85% of the combined N rates. When small grain overseeding is included in Certified Animal Waste Management Plans, the rate in the plan must be followed to ensure compliance.
	100 -150	If more than 100 lbs available for spring consider two applications for small grains (Feb and mid-Mar) and for ryegrass 2 or 3 splits (late Feb, late Mar, & late April					
Winter annual grasses (ryegrass, small grains) with winter annual Legumes (crimson & other clovers, vetch, pea)	<0-30	zero, assuming 30-50% legume in mix	zero	0-30 at or within couple of weeks following planting	zero	Consideration must be given to the residual N following previous crop management, especially if there were legumes in the previous system.	