Planting Guide for Forage Crops in North Carolina

NC STATE EXTENSION

This planting guide provides the best available information about planting dates, rates, and depths for forage crops commonly grown in North Carolina. The process of establishing a forage crop is very important because:

- It is expensive — $100 to $250 per acre
- Perennial crops can remain productive for several years without replanting, and thus poor stand establishment can result in long-term low forage productivity
- Soil and water conservation and animal feeding depend upon rapid establishment of persistently good forage stands

In addition to this publication, use this online tool to quickly access information about establishing forages, to use a pure live seed calculator, and to find estimates of frost dates in North Carolina.

Variety Selection

Most of the information provided here applies to all varieties of the same plant species; however, variety selection can influence the productivity and persistence of a crop. Information on variety performance can be obtained from North Carolina's Official Variety Testing Program and also from Forage Variety Trial Programs conducted in neighboring states of the transition region (e.g., Tennessee, Kentucky). Remember, however, that poor establishment can nullify the influence of even the best varieties.

Planting Region

The climate and soils of North Carolina vary considerably across the state. These variations necessitate planting at different times in each area. The state can be divided into three major regions: mountains, piedmont, and coastal plain. The planting dates in this guide are listed for these major regions and are based on normal growing conditions.

A review of the average freezing dates in the spring and fall indicates significant differences in weather within and between the three major regions. Therefore, the suggested planting dates may be adjusted by a few days on the basis of local experience and weather records. For example, the optimum planting dates for the mountains are 15 to 30 days earlier in the fall than those for the piedmont, but a review of temperature records indicates that the best planting dates in the southern mountains may be similar to those in the piedmont.

Planting Time

Establishing a successful forage crop depends partly on weather conditions shortly before and after planting. Years of field research and experience under North Carolina's varied growing conditions have made it possible for researchers to recommend planting dates that will most likely lead to success or minimize risk (**"best dates"**). Delaying planting until the last possible dates indicated may reduce the chance of a good stand by 30 to 50% (**"possible dates"**) (Table 1). We have also included general recommendations in Table 2 for planting some cool-season grass-legume mixtures. Nevertheless, cool-season grass-legume mixtures can also be achieved by frost-seeding clover seed by early-to-mid-February in cool-season grasses that are already established.

The timing of planting is important because the survival rate of developing seedlings is related to the period during which stress occurs from drought, freezing, or competition for light and nutrients. If no such stress occurs, or if it occurs after seedlings are well established, survival and production losses can be minimized. It is worth noting that date ranges may vary each year, especially in light of erratic and extreme weather patterns. This guide is designed to provide generalized best management practices.

Fall Plantings. In general, cool-season forages, and especially perennial forages, can be best established by planting in the fall. Seedbeds should be prepared during favorable autumn weather when weeds are not

as competitive. Furthermore, seedling root systems can become well established before the arrival of hot, dry weather the following season. However, late fall plantings can result in winter injury from freezing and heaving.

Here are some points to remember about fall planting:

- Cool-season grass seedlings are more tolerant of freezing temperatures and heaving than legumes.
- In prepared seedbeds, alfalfa and ladino clover should have five to seven true leaves present before frequent freezing weather occurs.
- In prepared seedbeds, grasses should have three to four leaves before freezing weather occurs.

Spring Plantings. Spring plantings carry additional risks (i.e., drought, heat, and weed encroachment) beyond fall plantings. Spring plantings in the piedmont and mountains may be justified (1) if land or sod is prepared in the fall or winter, and plantings can be made early enough (between mid-February and late-March) for the crop to become established before summer stress; and (2) if summer weeds can be controlled while the seedlings develop.

Overseeding

Overseeding (also "interseeding" or "sod seeding") is the practice of planting/introducing one type of forage into an existing stand of another already established forage. This practice is commonly used for overseeding cool-season annual forages (e.g., oats, wheat, rye, ryegrass, triticale) into existing stands of warm-season perennial grasses (e.g., bermudagrass, bahiagrass). When planting fescue or orchardgrass in existing sod, it is best to plant in the fall.

Seeding Rates

Seeding rates vary because of seed size, coating, purity, germination percentage, and seedling vigor (all of this information should be provided on the label of the seed bag). The percentage of seeds that will germinate generally declines with age, but if seeds are stored in a cool, dry place, gemination should not decline more than 10 percent in the first year. In general, seeds that have low germination levels also produce seedlings with poor vigor. Planting rates (lbs./acre) are provided on a pure live seed (PLS) basis. To determine PLS planting rates, refer to this PLS Calculator. Under adverse conditions, only 10 to 50 percent of the seeds planted will establish successfully. Consequently, many seeds are needed to obtain a satisfactory stand.

Broadcast vs. Drill

Drilling concentrates the seeds within a furrow; therefore, seeds occupy a smaller area of the ground, and are better able to break through the soil crust. Planting rates for drilling or using a cultipacker seeder are 20 to 50 percent less than for broadcasting. Seed placement, soil-seed contact, and uniformity of stands usually fare better with drilling than with broadcasting, especially when planting conditions are not optimum.

Planting Depth

Generally, small-seeded crops can be planted slightly deeper in sandy soils than in clay soils. Grasses can usually be planted deeper than legumes in similar soils. It is important, however, to prepare a firm seedbed before planting to conserve moisture and avoid variation in planting depth. Precision planting equipment is usually required to get proper depth control for small forage seeds, especially in minimum or no-till plantings.

What is a Good Stand?

Because plant characteristics change depending upon their density, age, grazing or cutting height, and other factors, it is difficult to say exactly how many plants it takes to make a good stand. In general, a good stand is one that provides 90 to 100 percent ground cover and will produce high yields when managed properly. The clover portion of mixtures should make up at least 30 percent of the stand (on a weight basis) in order for the clover to significantly contribute to the mixture. One should walk the fields several times each growing season in order to make a fair evaluation of stands.

When Using This Guide, Remember:

This guide serves as a tool to use in planning your forage system, but not all forages included will be successful in North Carolina's climate. In fact, several crops have not performed satisfactorily in this state. Information about the varieties is included to increase the chance of success if the decision to plant them has already been made. Additional information on various forage varieties can be obtained by contacting your local county N.C. Cooperative Extension center.

Table 1. Planting guidelines for several forage crops in North Carolina

Crop	Type A: annual P: perennial CS: cool-season WS: warm-season	Seeding Rate (lb./acre; PLS: pure live seed basis) B: broadcast D: drill (4–9" row) R: row (30+ inches)	Planting Depth (inches)	Mountains (above 2500 ft. elevation)[1] See footnote for below 2500 ft.		Piedmont and Tidewater[2]		Coastal Plain[2]	
				Best Dates	Possible Dates	Best Dates	Possible Dates	Best Dates	Possible Dates
Alfalfa (Medicago sativa)	P, CS	B:20–25; D:15–20	¼	Jul 25–Aug 10 Mar 1–Apr 7	Jul 15–Aug 20 Mar 1–Apr 15	Sep 15–Oct 15	Sep 15–Oct 31 Mar 1–31	Sep 1–30	Sep 1–Oct 31
Bahiagrass (Paspalum notatum)	P, WS	B:15–25; D:10–20	¼–½	Not adapted		May 1–15	Apr 20–Jun 30	Feb 15–Mar 15	Mar 15–Jun 30
Barley (Hordeum vulgare)	A, CS	B:140; D:100	1–2	Aug 1–20	Aug 1–Oct 10	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20
Bermudagrass (Cynodon dactylon)	P, WS	**Sprigged types:** 30–40 bushels per acre (1 bushel = 1.25 cu ft)	1–3	Not well adapted		Mar 1–31	Feb 15–Apr 15 or through July if irrigated	Mar 1–31	Feb 15–Apr 15 or through July if irrigated
		Seeded types: Common: B:6–8; D:5–7 Improved: D:10–15	¼–½	Not well adapted		Apr 15–May 15	Apr 1–Jun 15	Common: Apr 1–May 15 Improved: Apr 15–June 1	Mar 15–Jun 7
Big Bluestem (Andropogon gerardii)	P, WS	B:10–12; D:8–10	½–¾	May 25–Jun 15	May 1–Jun 30	May 10–Jun 1	May 1–Jun 30	Apr 20–May 15	Apr 10–Jun 30
Bluegrass, Kentucky (Poa pratensis)	P, CS	B:10–15; D:8–12	¼	Jul 25–Aug 10	Jul 15–Aug 25	Not well adapted		Not well adapted	
Caucasian Bluestem (Bothriochloa caucasica)	P, WS	B:4 PLS; D:2	¼–½	May 25–Jun 15	May 7–Jun 30	May 7–20	May 1–Jun 30	May 1–15	Apr 15–Jun 30
Crabgrass (Digitaria ciliaris)	A, WS	B:8–10; D: 5–7	¼–½	May 15–31	May 1–Jun 30	May 1–31	Apr 25–Jun 30	May 1–15	Apr 20–Jun 30
Crimson Clover (Trifolium incarnatum)	A, CS	B:20–25; D:15–20	¼–½	Jul 25–Aug 10	Jul 15–Aug 20	Aug 25–Sep 15	Aug 25–Oct 25	Sep 1–30	Sep 1–Oct 30
Dallisgrass (Paspallum dilatatum)	P, WS	B:20–30; D:15–20	¼–½	Not well adapted		Mar 1–31	Mar 1–Apr 15	Mar 1–30	Feb 15–Apr 15
Eastern Gamagrass (Tripsacum dactyloides)	P, WS	D:10–15	¾–1.5	May 15–Jun 15 Nov–Feb	May 1–Jun 30	May 10–Jun 1 Nov–Jan	May 1–Jun 30	Apr 20–May 15 Nov–Jan	Apr 10–Jun 30

[1] Fall dates may be extended by 20 days where elevation is below 2500 feet, and seed 15 days earlier in spring.

[2] For the black, heavy-textured soils in the tidewater region, use dates for the piedmont.

Table 1. Planting guidelines for several forage crops in North Carolina (continued)

Crop	Type A: annual P: perennial CS: cool-season WS: warm-season	Seeding Rate (lb./acre; PLS: pure live seed basis) B: broadcast D: drill (4–9" row) R: row (30+ inches)	Planting Depth (inches)	Mountains (above 2500 ft. elevation)[1] See footnote for below 2500 ft.		Piedmont and Tidewater[2]		Coastal Plain[2]	
				Best Dates	Possible Dates	Best Dates	Possible Dates	Best Dates	Possible Dates
Flaccidgrass (Pennisetun flaccidum)	P, WS	D:2–4	¼–½	Jun 1–15	May 15–Jul 1	May 15– Jul 7	Apr 15–Jul 1	May 7–Jun 1	Apr 15–Jun 15
		Sprig: 3/ft in 18" rows	2–3	Mar 1–Apr 7	Feb 15–Apr 15	Feb 20–Mar 20	Feb 1–Mar 30	Feb 15–Mar 15	Feb 1–Mar 30
		Tillers: 2–4/ft	Root cover	May 15–Jun 15	May 1–Jul 15	Apr 25–Jun 1	Apr 15–Jul 15	Apr 25–May 20	Apr 15–Jul 10
Indiangrass (Sorghastrum nutans)	P, WS	B:10–12 PLS; D:8–10	½–¾	May 15–Jun 15	May 1–Jun 30	May 10–Jun 1	May 1–Jun 30	Apr 20–May 15	Apr 10–Jun 30
Lespedeza, Kobe (Kummerowia striata)	A, WS	B:30–40; D:20–25	¼–½	Mar 15–31	Mar 1–Apr 15	Feb 10–28	Feb 1–Mar 30	Feb 1–20	Feb 1–Mar 20
Lespedeza, Korean (Kummerowia stipulacea)	A, WS	B:20–30; D: 15–20	¼–½	Mar 15–31	Mar 1–Apr 15	Feb 10–28	Feb 1–Mar 30	Feb 1–20	Feb 1–Mar 20
Millets: **Foxtail** (Setaria italica), **Japanese** (Echinochloa sculenta), **Browntop** (Urochloa ramosa)]	A, WS	D:10–15; R:5–7	½	Mar 15–31	May 1–Jun 30	May 1–31	May 1–Jun 30	May 1–15	Apr 20–Jun 30
Millet, Pearl (Pennisetum glaucum)	A, WS	B:20–25; D:15–20; R:6–10	½	Mar 15–31	May 1–Jun 30	May 1–31	Apr 25–Jun 30	May 1–15	Apr 20–Jun 30
Oats (Avena sativa)	A, CS	B:130; D:100	1–2	Aug 1–20	Aug 1–Sep 30	Sep 15–Oct 15	Sep 1–Nov 15	Sep 15–Oct 15	Sep 1–Nov 15
							Feb 20–Mar 20		Feb 20–Mar 20
Orchardgrass (Dactylis glomerata)	P, CS	B:12–15; D:8–12	¼–½	Jul 25–Aug 10	Jul 15–Aug 20	Sep 15–Oct 15	Sep 1–Nov 15	Not well adapted	
				Mar 20–Apr 20	Mar 1–May 15		Feb 20–Mar 20		
Rape and Turnips (Brassica spp.)	A, CS	B: 6 to 8; D: 3–4	¼	Mar 1–Apr 30	Feb 15–May 10	Feb 15–Mar 15	Feb 1–Apr 15	Feb 15–Mar 1	Feb 1–Apr 1
				Jul 15–Sep 1	Jul 1–Sep 15	Sep 15–Oct 15	Aug 1–Oct 1	Sep 1–Oct 1	Aug 15–Oct 30
Red Clover (Trifolium pratense)	P, CS	B:10–15; D:8–10	¼–½	Jul 25–Aug 10	Jul 15–Aug 20	Sep 15–Oct 15	Feb 20–Mar 20	Sep 1–30	Sep 1 –Oct 15
				Mar 20–Apr 20	Mar 1–May 15				Feb 15–Mar 20
Reed Canarygrass (Phalaris arundinacea)	P, CS	B:5–10; D:4–8	¼–½	Jul 25–Aug 10	Jul 15–Aug 20	Aug 25–Sep 15	Aug 25–Oct 25	Not well adapted	
				Mar 20–Apr 20	Mar 1–May 15		Mar 1–31		
Rescuegrass (Bromus catharticus)	A, CS	B:20–25; D:25–30	½–¾	Aug 20–Sep 7	Aug 15–Oct 1	Sep 1–15	Aug 25–Oct 15	Sep 1–30	Aug 25–Oct 15
				Mar 15–30	Mar 1–Apr 30	Mar 1–30	Feb 15–Apr 30		

[1] Fall dates may be extended by 20 days where elevation is below 2500 feet, and seed 15 days earlier in spring.

[2] For the black, heavy-textured soils in the tidewater region, use dates for the piedmont.

Table 1. Planting guidelines for several forage crops in North Carolina (continued)

Crop	Type A: annual P: perennial CS: cool-season WS: warm-season	Seeding Rate (lb./acre; PLS: pure live seed basis) B: broadcast D: drill (4–9" row) R: row (30+ inches)	Planting Depth (inches)	Mountains (above 2500 ft. elevation)[1] See footnote for below 2500 ft.		Piedmont and Tidewater[2]		Coastal Plain[2]	
				Best Dates	Possible Dates	Best Dates	Possible Dates	Best Dates	Possible Dates
Rye cereal (Secale cereale)	A, CS	B:120; D:100	1–2	Aug 1–20	Aug 1–Oct 10	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20
Ryegrass (Lolium multiflorum)	A, CS	B:30–40; D:20–30	¼–½	Jul 25–Aug 10	Jul 15–Aug 31	Sep 15–Oct 15	Sept 1–Nov 15 Feb 20–Mar 20	Sep 15–Oct 15	Sep 1–Oct 31 Feb 20–Mar 20
Sericea Lespedeza (Lespedeza cuneata)	P, WS	B:20–40; D:15–30	¼	Mar 15–Apr 15	Mar 1–Apr 30	Mar 1–20	Feb 15–Apr 30	Mar 1–20	Feb 15–Apr 30
Smooth Bromegrass (Bromus inermis)	P, CS	B:10–20; D:8–15	¼–½	Jul 25–Aug 10 Mar 20–Apr 20	Jul 15–Aug 20 Mar 1–May 15	Not well adapted		Not adapted	
Sorghum (Sorghum bicolor)	A, WS	R:4–6	1–1½	May 15–31	May 1–Jun 30	May 1–31	Apr 25–Jun 30	May 1–15	Apr 20–Jun 30
Sorghum–Sudan/ sudangrass (Sorghum bicolor)	A, WS	B:35–40; D:20–30; R:15–20	½–1	May 15–31	May 1–Jun 30	May 1–31	Apr 25–Jun 30	May 1–15	Apr 20–Jun 30
Switchgrass (Panicum virgatum)	P, WS	B:8–12 PLS; D:6–10	½–¾	May 15–Jun 15	May 1–Jun 30	May 15–Jun 15	Apr 15–June 15	Apr 15–May 15	Apr 15–Jun 15
Tall Fescue (Lolium arundinacea)	P, CS	B:15–20; D:10–15	¼–½	Jul 25–Aug 10 Mar 20–Apr 20	Jul 15–Aug 20 Mar 1–May 15	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20	Not well adapted	
Teff (Eragrostis tef)	A, WS	B:10–12; D:8–10	⅛–¼	May 15–31	May–June 30	May 1–31	Apr 25–Jun 30	May 1–15	Apr 20–Jun 30
Timothy (Phleum pratense)	P, CS	B:10–12; D:8–10	¼–½	Jul 25–Aug 10 Mar 20–Apr 20	Jul 15–Aug 20 Mar 1–May 15	Not well adapted		Not adapted	
Triticale (Triticum x Secale)	A, CS	B: 120; D: 100	1–2	Aug 1–20	Aug 1–Oct 10	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20
White clover (Trifolium repens)	P, CS	B: 3–5; D: 3–5	¼–½	Sep	Aug	Sep 15–Oct 15	Feb 20–Mar 20	Sep 15–Oct 15	Feb 20–Mar 20
		Frost–seeded		Feb 1–15	Feb 15–28	Feb 1–15	Feb 15–28	Feb 1–15	Feb 15–28
Wheat (Triticum aestivum)	A, CS	B: 120; D: 100	1–2	Aug 1–20	Aug 1–Oct 10	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20	Sep 15–Oct 15	Sep 1–Nov 15 Feb 20–Mar 20
Vetch, Common, Hairy (Vicia spp.)	Biennial, CS	B: 25–40; D: 20–30	½–1½	Jul 25–Aug 10	Jul 15–Aug 30	Aug 25–Sep 30	Aug 25–Oct 25	Sep 1–Sep 30	Sep 1–Oct 25

[1] Fall dates may be extended by 20 days where elevation is below 2500 feet, and seed 15 days earlier in spring.

[2] For the black, heavy-textured soils in the tidewater region, use dates for the piedmont.

Table 2. Planting guidelines for grass-legume mixtures in North Carolina

Crop	Seeding Rate (lb./acre; PLS: pure live seed basis) B: broadcast D: drill (4–9″ row) R: row (30+ inches)	Planting Depth (inches)	Mountains (above 2500 ft. elevation)[1] See footnote for below 2500 ft.	Piedmont and Tidewater[2]	Coastal Plain[2]
			Dates (refer to Table 1)	Dates (refer to Table 1)	Dates (refer to Table 1)
Crimson Clover; Mixed with Ryegrass or Small Grain	B: 20 D: 15 reduce small grain by 30%	¼–½	Same as crimson clover	Same as crimson clover	Same as crimson clover
Orchardgrass + Alfalfa	B: 5 + 20 D: 3 + 15	¼	Same as alfalfa	Same as alfalfa	Not well adapted
Orchardgrass + Ladino Clover	B: 12 + 4 D: 9 + 3	¼	Same as orchardgrass	Same as orchardgrass	Not well adapted
Orchardgrass + Red Clover	B: 12 + 4 D: 8 + 3	¼	Same as orchardgrass	Same as orchardgrass	Not well adapted
Small Grain Mixed with Annual Ryegrass	Reduce small grain by 25% and ryegrass by 50%	½–1	See dates for small grains and ryegrass	See dates for small grains and ryegrass	See dates for small grains and ryegrass
Small Grain Mix (2 grains)	Reduce each selection by 50%	½–1	See dates for small grains	See dates for small grains	See dates for small grains
Tall Fescue + White Clover	B: 10 + 4 D: 8 + 3	¼	Same as tall fescue	Same as tall fescue	Same as tall fescue
Tall Fescue + Red Clover	B: 10 + 8 D: 8 + 6	¼	Same as tall fescue	Same as tall fescue	Same as tall fescue

[1] Fall dates may be extended by 20 days where elevation is below 2500 feet, and seed 15 days earlier in spring.

[2] For the black, heavy-textured soils in the tidewater region, use dates for the Piedmont.

Resources

NC State Extension Local County Centers:
ces.ncsu.edu/local-county-center

NC State Extension Official Variety Testing:
officialvarietytesting.ces.ncsu.edu

NC State Extension Planting Guide for Forage Crops in North Carolina Online Tool:
apps.ces.ncsu.edu/forages-planting-guide/index.php

University of Kentucky Forage Variety Trials:
forages.ca.uky.edu/variety_trials

University of Tennessee Institute of Agriculture Forage Variety Trials in Tennessee:
utbeef.com/Research-Forage%20Variety%20Trials.html

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