

Forage Planting and Establishment Methods¹

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Establishment of an excellent, uniform stand of forage in a short period of time is important. Failure to obtain a good stand means the loss not only of cash expenses but also the use of the land for a year or even longer in the case of perennials. If a sparse stand initially develops, many of the perennial grasses have the ability to fill in the bare spots and achieve complete ground cover, especially if the new planting is on virgin land; but if the new planting is on old pasture land contaminated with an aggressive, weedy grass, such as common bermudagrass, the ability of the new improved grass to provide complete ground cover is lessened. The producer needs to do everything possible to ensure successful establishment.

Several requirements must be met in order to successfully establish a new stand. These requirements are briefly discussed in the following sections, along with various planting methods. Most of this discussion deals with establishment on a clean-tilled seedbed. Overseeding (sod seeding) is not discussed in this publication.

Choosing the Right Forage

Many different grasses, legumes, and combinations are used for forage. The producer must choose those forages adapted to the soil and climatic conditions at his/her location.

Land Preparation

A producer may wish to develop an improved pasture on native or undeveloped land. In this situation, trees, stumps, and brush may need to be removed. Several types of machines and methods are available to clear and prepare undeveloped land for planting of pasture; these include everything from very large and expensive tree and stump removal equipment (bulldozers, etc.) to the tractors and disk harrows used for final seedbed preparation. If the land is to be used only for grazing, some stumps and roots can be left in place; however, this makes cultural practices such as fertilizing and spraying difficult. If the producer plans to harvest hay or silage or plant the land in a row crop, then all stumps and roots must be removed. Special machines have been developed for these operations.

Liming

Have the soil tested early to determine the need for lime. If lime is needed to neutralize soil acidity, it should be applied prior to the first tillage and, if possible, several months before planting. Lime should be incorporated into the soil whenever possible since lime reacts only with the soil that it contacts. Either calcitic or dolomitic limestone may be used. If lime is recommended and the soil test shows

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magnesium to be medium or low, then dolomitic limestone should be used.

Seedbed Preparation

A producer can establish pasture on new ground, following a row crop, or by complete destruction and replanting of an old pasture to a new species. Establishment of a new forage crop requires detailed planning. Plan well in advance of the expected planting date so that a seedbed can be developed that is level, firm, and free of trash and weeds. Till early to incorporate lime, to allow time for rains to settle the loose soil, and to allow several crops of weeds to germinate and be killed by repeated disking. Reduction of the weed population can be helpful in establishing the new forage. In a situation where land has been freshly plowed just before planting and has not had time to settle, disking and cultipacking or rolling may be needed to firm the seedbed before planting small-seeded forage crops such as clovers and bahiagrass. Planting into a loose seedbed increases the risk of placing the seed too deep.

Primary tillage can be accomplished using a heavy cutting disk or moldboard plow. Use a moldboard plow to renovate old pasture; use a cutting disk on land where stumps might be present. Secondary tillage uses a finishing disk and drag. A drag pulled behind the disk will help to fill holes and level and smooth the surface. Obtaining the desired seedbed may require repeated disking. The final disking should be done just ahead of planting to destroy any germinating weeds.

Fertilization for Establishment

Fertilization practices can vary according to the crop being planted. For the annual grasses, establishment fertilizer is usually applied just prior to or at planting. For perennial grasses and especially on sandy soils, it is recommended that producers wait until the new shoots emerge and have developed some roots before applying the fertilizer. Much of the planting is done in the summer rainy season and on sandy soils where leaching of nutrients out of the root zone can occur. Therefore, it is desirable to have some roots in place and ready to take up nutrients when the fertilizer is applied. The type, amount, and timing of fertilizer application during establishment can be obtained from the EDIS publication SL-129 *UF/IFAS Standardized Fertilization Recommendations for Agronomic Crops* (<http://edis.ifas.ufl.edu/ss163>).

Planting Dates

Cool-season forages are planted at the beginning of the cool season (fall). Warm-season forages are planted at the start

of the warm season (spring and summer). See [Table 1](#) and [Table 2](#) for specific planting dates.

Soil moisture is usually the most critical factor determining when to start planting and whether establishment will be successful. Always plant in a moist seedbed and when sufficient soil moisture can be expected to continue for several weeks (10 to 12). Planting a perennial grass in April in south Florida is not a good idea because of the expected April/May drought. Warm-season forages are generally planted at the start of the warm season (spring and summer), but a few like bermudagrass and rhizoma perennial peanut are planted in late winter (February-March).

Seed Purchase

Good quality seed or planting material should be used. It is desirable to use seed that has at least 80% germination. The seeds should also have enough food reserves for the seedling to reach the soil surface and grow rapidly. When vegetative planting material is used, it should have been well fertilized and should be mature when harvested for planting. It should be pure as to variety and free of common bermudagrass or other weedy plants.

Planting Methods for Seed-Propagated Forages

Several methods and types of machines have been developed over the years to plant the seeds of different forage crops — from an individual who walks the land with a container of seed and broadcasts the seeds by hand to very sophisticated precision planters.

Many brands of broadcast seeders are available. Most spread the seed by means of a rotating spinner or fan. There is one type that uses an oscillating arm (slinger). Some are ground-driven, while others are powered by a hand crank, small electric motor, or the tractor power takeoff (PTO).

Bahiagrass seeds are often mixed with fertilizer and broadcast onto the soil surface by a fertilizer-spreading truck. This technique reduces the number of trips over the field but may risk loss of fertilizer to leaching rains or allow fast-growing weeds to use the fertilizer before the slower-growing forage crop.

If the seedbed is very loose, it may need to be firmed by rolling (cultipacking) before broadcasting the seeds. After broadcasting the seeds, the soil is harrowed very lightly to cover the seeds with approximately 1/4 to 1/2 inch of soil. Then a cultipacker or roller is used to pack and firm

soil around the seed. Where seeds are broadcast on a loose seedbed, only cultipacking may be needed to obtain sufficient seed to soil contact. The seed of some grasses, such as Callide rhodesgrass, are very small and should be only pressed into the soil surface. Any disking (harrowing) can cover the seeds too deeply. See [Table 1](#) and [Table 2](#) for recommended seeding depths.

Several types of precision planters are available for planting forage crops. These planters allow for more precise planting rates and seeding depths. Because of the precise seed depth, lower seeding rates can be used with these seeders as compared to broadcasting. The conventional grain drill with a small seed-box attachment can be used for planting small-seeded grasses and legumes and may be the most common type of precision planter used. Excellent results have been obtained planting bahiagrass with a conventional grain drill when the soil was rolled before planting. Rolling or firming the soil before planting allows the drill to place the bahiagrass seed uniformly at the correct depth. This machine has been modified by placing rolling coulters in front of each planting unit. The device is often called a pasture drill or sod drill and is used in some areas to overseed legumes and cool-season annual grasses into established grass sods. Do not use this type of drill on a tilled seedbed since it is very heavy and may place the seed too deep. A cultipacker-style seeder, used on clean-tilled seedbeds, is popular with some producers. This planter consists of two corrugated rollers pulled in tandem, with a seed box mounted between the rollers. The first roller makes shallow furrows. The seed drops in the furrows and is covered by the second roller. This is the ideal planter for small-seeded forage crops in a clean-tilled seedbed. This planter should only be used on land that is completely free of tree roots, rocks, or other obstructions.

Planting Methods for Vegetatively Propagated Forages

Hybrid bermudagrasses that develop rhizomes are often planted from dug sprigs. Near the end of the winter (dormant period) when tops are not available, the plant crowns and rhizomes are dug with a bermudagrass sprig digger or a spring-tooth harrow and rake. The sprigs are then loaded on a truck or trailer and covered; then they are transported to the site where they will be planted. If more than a day passes between digging and planting, the producer must be concerned about the planting material overheating. The material can be soaked with water to cool it, or it can be unloaded and spread out in a thinner pile to allow the heat to escape.

Custom operators can be hired to plant bermudagrass sprigs. They usually supply the sprigs and have all of the equipment needed plus plenty of valuable experience. The planting material is usually sold and planted on a volume basis. A minimum of 20 bu/acre (1.25 cubic feet per bushel) and preferably 30 to 40 bu/acre are recommended. Perennial peanut is also established from underground rhizomes that are dug and planted in a manner similar to bermudagrass. Eighty or more bushels of loosely packed rhizomes are recommended per acre.

The bermudagrass sprigs can be broadcast on the soil surface by hand or with a spinner-type spreader; then the sprigs are disked in and rolled. The preferred method is to use a specially constructed bermudagrass sprig planter.

Late-winter and spring planting of dug sprigs is mainly done in north Florida, where the chances of a severe spring drought are less than in south Florida. Most of the planting of vegetative material in south Florida is done during the summer rainy season.

Other grasses planted vegetatively in Florida do not develop rhizomes and are planted from either tops or tops and stolons during the summer. These grasses are limpgrass (*Hemarthria*), stargrass, and digitgrass (Pangola). Hybrid bermudagrass can also be planted from tops or dug sprigs during the summer.

Producers are encouraged to first establish a nursery of a new grass or legume that is vegetatively propagated, and use that establishment to expand their plantings. This practice provides the producer with less expensive planting material, and since it is on-site, there is less time spent between harvesting the planting material and actual planting. The land where the nursery is established should be prepared in such a way that it is free of all weedy grasses before planting the new grass. If a weedy grass is present in the nursery, it spreads along with the new improved grass, thus infesting all of the new pastures or hay fields.

When planting material (tops) is harvested, it should be pure as to variety, free of weedy grasses, well fertilized, and relatively mature (8 plus weeks old). Depending on the type of planting equipment available, the planting material can be harvested and handled loose; formed into small, 50-pound rectangular bales by a conventional hay baler; or formed into large, round bales (1,000 to 1,500 lb). The baled material must be planted as quickly as possible (same day) so that it does not overheat.

These grasses should be planted at the rate of 1,000 to 1,500 pounds of planting material (tops) per acre. Use the lower rate on new ground and the higher rate on land that has been in cultivation for a number of years and may have a buildup of weeds. Even higher rates can be used if the planting material is nearby, abundant, and inexpensive.

The planting material can be broadcast on the soil surface by hand or with the help of machines. A “grass planter” has been used for many years in Florida. This machine is ground-driven and uses a spinner or fan mechanism to throw and scatter the planting material. It is pulled behind a flatbed truck or trailer loaded with the planting material, usually in 50-pound rectangular bales. Four or five persons are needed, besides the tractor driver. One moves bales to the back of the trailer; two lift bales onto the planter and cut the strings (bindings); two, one on either side of the planter, drop pieces of the bales onto the spinner. This work can be done with fewer people, but they probably won't be able to work all day.

These machines are built by local machine shops. The rear end from a wrecked automobile is used in construction of the planter. A larger version of this machine that can handle large, round bales has been built by Deseret Ranches of Florida. With this machine, all of the loading, lifting, and unrolling of the bales are done mechanically with the use of hydraulic motors. A more recent development is the use of a hay bale processor to distribute the planting material over the seedbed. A large, round bale (roll) is placed in the machine, which chops and blows the planting material in a 50 to 60 foot swath. This machine greatly reduces the labor requirement.

Once the planting material is on the ground, it should be covered or pressed into the soil immediately (within 15 minutes). A disk harrow, with the blades set fairly straight, can be used for this purpose, or a “fairway roller” or “crimper” that has 8- to 10-inch-deep flanges with blunt edges can be used to push the planting material into the soil. This tool works well on moist sand. The crimper may not work well on chopped planting material. The soil should then be firmed around the planting material by pulling a cultipacker or heavy land roller over the land at least twice to create an extra firm seedbed. The land rollers are usually filled with water to give them added weight.

Establishment Weed Control

After the above steps, a pre-emergence herbicide could be applied if one is available and safe to use on the new grass. See the publication *Weed Management in Pastures*

and *Rangeland*, SS-AGR-08 available at <http://edis.ifas.ufl.edu/wg006>. Also, certain postemergence herbicides such as 2,4-D, Banvel[®], or a combination of the two (Weedmaster[®]), can be used on some grasses. One must know whether or not these herbicides injure the new grass before using them. For example, 2,4-D and Weedmaster[®] cannot be used on seedling bahiagrass nor on limpograss. Banvel[®] can be used on limpograss. In south Florida, producers can use Weedmaster[®] when establishing stargrass, bermudagrasses, and digitgrass. Sedges (water grass) can be a severe problem especially during the rainy season. These weeds can be effectively controlled by applying Weedmaster[®] 7 to 10 days after planting, when the sedges are just germinating. Older sedge plants are not controlled; therefore, timing of application is important. If herbicides are not available, mechanical control by mowing at appropriate times provides some control of annual weeds or at least prevents them from shading out the newly planted grass.

Summary

Two sources of weed contamination must be recognized. The first comes as an impurity with the seed or planting material. The second relates to the history of the land and poor seedbed preparation. Selection of pure, good quality seed or planting material and good seedbed preparation provide the first line of prevention against weed invasion that is commonly associated with establishment failures.

One should be successful in establishing a new planting if all of the requirements for establishment are met in a timely manner.

- Plan ahead; have the land prepared well ahead of the expected planting date.
- Plant during the time of year when rainfall is plentiful and temperatures are appropriate for the forage crop being planted.
- Use excellent quality seed or planting material.
- Prepare a smooth, level, weed-free, and firm seedbed.
- Always plant into a seedbed with good soil moisture.
- Place seed or planting material at the appropriate depth.
- Firm soil around the seed or planting material.
- Use appropriate establishment fertilizer and weed control methods.

For additional information on this and other forage topics, please visit the Forages of Florida website at <http://agronomy.ifas.ufl.edu/ForagesofFlorida/index.php>.

Table 1. Planting dates, seeding rates, and planting depths for common forage crops planted from seed in Florida.

Season	Forage crops planted from seed ^a	Planting dates	Seeding rates (lbs/A broadcast)	Planting depths (inches)
Fall ^b	Alfalfa	Oct 1 - Nov 15	15-20	1/4-1/2
	Clover			
	Arrowleaf	Oct 1 - Nov 15	8-12	1/4-1/2
	Berseem	Oct 1 - Nov 15	15-20	1/4-1/2
	Crimson	Oct 1 - Nov 15	20-25	1/4-1/2
	Red	Oct 1 - Nov 15	10-15	1/4-1/2
	Rose	Oct 1 - Nov 15	15-20	1/4-1/2
	Subterranean	Oct 1 - Nov 15	12-22	1/4-1/2
	Sweetclover	Oct 1 - Nov 15	12-15	1/4-1/2
	White	Oct 1 - Nov 15	3-4	0-1/4
	Oats-forage	Sep 1 - Nov 15	100-120 (3-4 bu)	1-2
	Pea			
	Austrian winter	Oct 1 - Nov 15	40-60	1/2-1
	Rough/singleton/caley	Oct 1 - Nov 15	30-40	1/2-1
	Rye-forage	Oct 1 - Nov 15	90-120 (1.5-2.0 bu)	1-2
	Ryegrass, Italian (annual)	Oct 1 - Nov 15	20-30	0-1/2
	Triticale-forage	Oct 1 - Nov 15	84-112 (1.5-2.0 bu)	1-2
	Turnips	Oct 1 - Nov 15	5-6	1/4-1/2
	Vetch, hairy	Oct 1 - Nov 15	30-35	1-2
	Wheat-forage	Oct 1 - Nov 15	100-120 (1.5-2.0 bu)	1-2
Spring & Summer	Alyceclover	Apr 15 - June 30	15	1/4-1/2
	Aeschynomene	Mar 30 - June 30	6-8 (dehulled)	1/4-1/2
	Bahiagrass ^c	Feb 15 - Aug 15	25-30	1/4-1/2
	Bermudagrass	Feb 15 - Aug 15	10-15	1/4-1/2
	Corn			
	Temperate	Feb 15 - Aug 15	See note ^d	
	Tropical	Apr 15 - June 15	100-120 (60-90) ^e	
	Cowpea	Apr 1 - July 31	35-60	1-3
	Desmodium, carpon	Feb 15 - June 30	6-10	1/4-1/2
	Indigo, hairy	Apr 1 - June 30	6-10	1/4-1/2
	Phasey bean	Mar 30 - June 30	10-15	1/4-1/2
	Vigna parkerii	Feb 15 - June 30	2-5	1/4-1/2
	Millet			
	Brown top	Feb 15 - Aug 15	15-20	1/2-1
	Japanese	Feb 15 - Aug 15	24-30	1/2-1
	Pearl	Mar 15 - June 30	12-15	1/2-1
	Sorghum			
	Sorghum, forage	Apr 1 - June 30	30-40 (25) ^e	1-2
Sorghum x sudan	Mar 15 - June 30	10-12	1-2	
Brachiaria, Mulato	Mar 15 - Aug 15	5-10	1/4-1/2	

Table 1. Planting dates, seeding rates, and planting depths for common forage crops planted from seed in Florida.

^a Always check seed quality (% germination, dormancy, weed seed, other crop seed, and trash). Seed germination should be 80% or higher for best results.

^b Planting-Date Range: In general, cool-season forage crops in north Florida can be planted in the early part of the planting-date range and, in south Florida, during the later part of the range. Also, planting in a clean-tilled seedbed can generally be done earlier than sod seeding (overseeding).

^c Bahiagrass may be planted over a wide range of dates, but February or June are preferred dates under most conditions. Seeding Rates: 25 to 30 lb per acre. Higher seeding rates (up to 40 lb per acre) can be used for faster grass coverage. The seed of certain new varieties of bahiagrass may be very high priced and thus require a low seeding rate. If less than 10 lb of seed is planted, be sure that % germination is greater than 80% and that % dormancy of the seed is low. Plant only in a well-prepared, smooth seedbed using a precision planter. Mow regularly to control weeds.

^d Consult seed company recommendations for hybrid or variety used.

^e Seeding Rate: lb per acre when planted in rows 30 to 36" wide, instead of broadcast.

Table 2. Planting dates and rates for common forage crops in Florida planted from vegetative material.

Forage Crops Planted from Vegetative Material	Planting Dates and Planting Rates
Bermudagrasses (dug sprigs)	<ul style="list-style-type: none"> - Plant between January 15 and March 15 or between June 1 and August 15.^a - Use underground stems (rhizomes and sod crowns). - To obtain planting material use a commercial sprig digger; or use a plow or disk and pitchforks. - Plant 30-40 bushels per acre. - To plant, use a commercial sprig planter; or broadcast sprigs onto the soil surface, cover with a disk, and firm soil with a cultipacker or heavy land roller. - Planting depth: 2-3 inches.
Bermudagrasses (tops) Digitgrasses Limpograss (<i>Hemarthria</i>) Stargrass	<ul style="list-style-type: none"> - Plant between June 1 and August 15.^a - All these grasses can be planted from upright stems (green tops). Use mature grass (8+ weeks). - To cut tops, use a mower similar to the mower used for harvesting hay. Tops may be handled loose or made into bales using conventional hay balers. - Plant 1,000-1,500 lb green tops per acre. - Special machines for broadcasting tops are available. Uniformly scatter planting material over soil surface; cover immediately, using a finishing disk set at a slight angle. Firm the soil with a cultipacker or heavy land roller. Fertilize appropriately and control weeds. - Planting depth: 2-3 inches.
Perennial Peanut	<ul style="list-style-type: none"> - Plant between December and March 15 or between June 15 and August 15. - Use a commercial sprig digger to harvest rhizomes (underground stems). - Plant 80+ bushels per acre. - Plant rhizomes in a well-prepared seedbed, using a row-type commercial sprig planter. Pack soil after planting. Irrigate to insure successful establishment. - Planting depth: 1.0-1.5 inches

^a For southern Florida, planting can be made later in the year, provided soil moisture conditions are favorable; rainy season is June 15 to August 15.