

Forage Establishment Fundamentals

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Sound forage establishment and management practices are critical to realizing a profit in hay and/or forage-based livestock production. In many instances, the existing forage base may be adequate for a given enterprise, and fine-tuning management is all that is required. In some cases, however, a different forage species may be desired to augment existing forage resources.

Both new landowners and people with extensive forage and ranching experience may encounter situations regarding unfamiliar forages. It is critical for managers to understand there are **fundamental differences** in managing introduced and rangeland forages. In the eastern part of the state where precipitation levels are higher, introduced species dominate forage-based livestock production systems. West of the IH35 corridor from Denton to San Antonio and then west of IH37 from San Antonio to Corpus Christi, however, you will notice fewer introduced species are used. The main reason is primarily due to the lack of moisture, although temperature has a contributing effect. Native plant communities, known as rangelands, dominate these more arid regions. While the management of introduced forages demands appropriate grazing management, fertilizer inputs, and more frequent use of herbicides; good grazing management and prescribed fire alone generally represent the management strategies for rangelands. The information contained in this publication is designed to improve the potential for success of forage production and management in Texas for both introduced species and rangelands. Where management strategies are different, they will be noted in the text.

Adaptation

Not all forage species grow well on every type of soil or in all parts of the state. The person in charge of establishment should determine whether or not the forage species under consideration is adapted to the site. Of primary importance is the location in the state. Some forage species may have higher moisture requirements or may have less cold tolerance than others. In Texas, there is a moisture gradient in the state; that is, there is less precipitation received as you travel from east to west. In fact, areas of southeast Texas may receive 60” or more of precipitation on an annual basis, central Texas may receive 30 to 35”, and the panhandle and trans-Pecos regions only 10-18”. To understand how moisture availability can affect your choice of forage species, let’s use white clover as an example. White clover has less drought tolerance than bermudagrass or Old World bluestem. If the ranch location was in west central or west Texas, white clover could be a poor species choice doomed to failure without intensive inputs, such as irrigation. Even if used in the appropriate part of the state, however, site selection plays a critical role in forage species success. In east Texas, where there is adequate rainfall, white clover may not persist if planted on a droughty, upland sandy site simply because there may not be enough available moisture. Thus, while planted in the right part of the state, a poor choice of soil type or location on the ranch could result in failure of certain forages.

Unfortunately, much of the information regarding the suitability of forages for one soil type or another comes from anecdotal evidence and not research trials. Many times anecdotal accounts are informative, but producers should enlist the aid of agricultural professionals to ensure a good match

between forage species and site. Local county agricultural Extension agents and the Natural Resources Conservation Service (NRCS) can provide informed insights into which forages are best adapted to local conditions.

A few helpful tips should be mentioned at this juncture. **First, producers can learn a great deal about the productive capability of their property by obtaining and studying the Standard Soil Survey for their county, if one is available.** A site specific soils map of your property can be found by accessing the Web Soil Survey (<http://websoilsurvey.sc.egov.usda.gov>). These surveys are available free of charge from local NRCS offices or from their web site. Using aerial photos in the survey, a producer can locate their property and determine what soil types are found on their ranch. Detailed information regarding each of the soil types is contained in the surveys and will give a good indication of the soil texture, water holding capacity, depth of soil, inherent fertility, best use of the site, etc. The Standard Soil Survey can provide important first information regarding the types of species that may or may not be successfully grown on the site.

Identify those areas that may prove to be potential problem sites. Certain areas that are prone to flooding, for example, may not be good areas for a hay meadow or for a winter pasture. Wet areas could prevent hay harvest at the appropriate time and weed pressure may be greater due to a continued influx of weed seed from areas upstream. Likewise, waterlogged areas are not good areas for cattle to spend the winter.

If planting in a low site that is prone to periodic flooding, or has poor drainage, choose a species that is tolerant of saturated soils. Species such as white, berseem, or Persian clover are legumes species that do well under more poorly drained conditions, as may 'Jiggs' bermudagrass. In northeast Texas, tall fescue tolerates periodic flooding better than many species. Be alert to the site on which you intend to establish forages and plant accordingly.

Species

A plan to use a mixture of both warm-season and cool-season forages is usually required to best match nutrient availability with livestock nutrient demand and to minimize winter feeding costs. Most livestock producers in Texas heavily depend on hay for winter-feeding programs. Hay is generally the most expensive method to winter livestock because of the costs involved in harvesting, baling, storing, and hauling hay (somewhere between \$60-\$70 per 1000-lb round bale of bermudagrass). Livestock are much more efficient at harvesting forage compared to hay harvesting equipment. Therefore, the goal of the livestock producer should be to have animals **grazing** forage of acceptable nutritive value as many months of the year as possible. Hay should only be used in tactical situations such as drought, snow or ice cover days, etc. As soon as the situation creating the need for hay is over, hay feeding should end and animals should return to grazing.

In Texas, producers have the luxury of using warm-season grass species such as bermudagrass, bahiagrass, dallisgrass, Old World bluestem, weeping lovegrass, and rangeland species. These same producers can also utilize small grains or annual ryegrass to provide livestock good nutrition for much of the winter. Increased attention is also being placed on cool-season perennial grasses in various parts of the state.

Texas producers also enjoy the opportunity to use forage legumes such as alfalfa, clover, medics, sweet clover, annual lespedeza, various field peas, and hairy vetch. Legumes grow in a symbiotic relationship with host-specific bacteria that have the unique ability to capture atmospheric nitrogen and convert it into a plant available form. Thus, legumes do not require nitrogen fertilizer and can share some of the fixed nitrogen with other non-nitrogen-fixing species such as grasses. This nitrogen input can reduce the level of nitrogen fertilizer required in the pasture. Forage legumes are usually of good to excellent nutritive value and can improve the seasonal distribution and nutritive value of grass forage systems. If you are not presently using forage legumes in your pasture program, you may wish to consider the addition of these plants into certain fields. For more information, please see SCS-2001-

Timing

Prepared Seed Bed

Although warm-season forages are generally planted in the late winter to early spring and cool-season forages in late summer to early fall, the window of opportunity for planting can actually be extremely short. Therefore, the need for good planning and preparation beforehand is critical. Seedbed preparation usually requires the most time and generally depends on a certain level of moisture to adequately work the soil. Sometimes, the seedbed is ready to be worked, but a breakdown of the tractor or tillage equipment could delay the process. Some producers have gotten to the point of planting seed, but found out, much to their dismay, that the seed they wanted was not available or cost more than they were willing to spend.

Therefore, producers anticipating forage establishment should plan well in advance. The secret is to be aware of potential problems that might prevent planting at the right time and deal with those issues beforehand. The following checklist will help to ensure that all is ready when the opportunity to plant presents itself.

- ❑ Obtain soil sample from site.
- ❑ Decide on forage species based on system requirements and selecting adapted forages.
- ❑ Inquire as to availability of seed and seed cost. If a legume is to be established, make sure inoculant is available or request pre-inoculated seed.
- ❑ Locate equipment that will be required for establishment well in advance.
- ❑ Select the appropriate site for forage establishment based on forage species needs and adaptability.
- ❑ Begin seedbed preparation in anticipation of planting. Remember it may take several trips across the field to prepare the final seedbed. Allow adequate time to account for possible delays due to weather, equipment failure, etc.
- ❑ Incorporate P, K, and lime as required (based on soil test recommendations) into seedbed while working the ground.
- ❑ Plant good quality seed at the proper rate to the proper depth. If planting a legume, make sure seed is properly inoculated with the appropriate *Rhizobium* bacteria. Plant into a moist seedbed if possible.
- ❑ Topdress with nitrogen following germination of grass seedlings.
- ❑ Be alert for pests such as insects or weeds that may require pesticide application.

Overseeding cool season forages into warm season perennial sod

The general recommendation is to overseed cool-season annual forages from 4 to 6 weeks before the average first killing frost. Correct timing for cool-season annual forage establishment cannot be over-emphasized. If planted too early, warm temperatures and the competitive nature of the warm-season perennial grass sod can result in stand failure; if seeded late, cool temperatures retard autumn yield. Overseeding cool-season forages on a warm-season perennial grass sod has been an attractive option for cow-calf producers in Texas. Overseeding, cool-season forages on warm-season grass sods (Bermudagrass, Bahiagrass, dallisgrass, etc.) provide firm footing for livestock during wet conditions and helps optimize the use of warm-season perennial grass pastures. Grazing of winter forages overseeded on grass sods starts usually two to three months later than that planted in a well-prepared seedbed.

- ❑ The warm-season grasses should be grazed short or removed as hay before overseeding.
- ❑ Another practice to reduce the warm-season grass competition and provide earlier grazing is a light disking about 1 to 2 inches deep on sandy soils.
- ❑ Planting cool-season forages with a drill is usually better than broadcasting. More of the seed is placed at the proper depth.
- ❑ When broadcasted, the seeding rates should be increased 25 to 30% to compensate for fewer seed becoming established plants.
- ❑ Small grains should be planted from 1 to 1.5 inches deep.
- ❑ Ryegrass and clovers should be planted approximately 1/8 to 1/4 inch deep.
- ❑ When using a drill, small grains and ryegrass should be placed in different seed boxes, if possible, to allow placing the seed at appropriate depths.
- ❑ If small grains are broadcasted on a disked sod, the area should be lightly disked again to cover the seed with approximately 1 to 1.5 inches of soil.
- ❑ Ryegrass and most of the small-seeded clovers can be broadcasted on the soil surface followed by some type of drag to increase the contact between seed and soil.
- ❑ Rolling a disked seedbed after planting is a recommended practice because it increases the seed-soil contact and moisture retention in the soil, resulting in better seedling establishment.

Fertility

Several specific nutrients are required for adequate growth of forage plants. The availability of these nutrients, or the soil fertility status, varies from site to site because of differences in precipitation, parent materials of the various soils, and past cropping history. A *soil test* is the only reliable way to know what fertilizer is required for your field. Think of the soil test as the dipstick for your soil. You would not normally add oil to a crankcase without checking the dipstick to determine a) if you need oil and b) how much to add. The soil test minimizes applying fertilizer not needed, and helps you apply the nutrients you **do** need in the appropriate amounts. Balanced fertilizers such as 12-12-12 do not address the fertility requirements of any Texas soil or crop. If a soil test is not used to determine fertility requirements, either too much or too little fertilizer will be applied to the pasture. Either way, the producer is not optimizing forage production or inputs.

Nitrogen fertilizer provides forage growth and additional crude protein and is the most limiting factor to forage growth, with the exception of moisture. Nitrogen should be applied based on the yield goal of forage grasses. In other words, only apply the level of nitrogen that will produce the quantity of grass that you need for your production system. A simple analogy would be putting only enough gasoline in the tank to get to a certain destination and back. You don't need much more than that, and for sure don't want to have less than what is required. For more information on nitrogen fertilizer see SCS-2002-09, *Nitrogen Fertilizer: What Should I Use?*

Phosphorus and potassium are additional nutrients required by plants in relatively large quantities. Legumes are especially sensitive to deficiencies in these nutrients, particularly phosphorus. If phosphorus and/or potassium are deficient, the expected response of grasses to nitrogen fertilizer will not be realized and legume growth will be reduced. Back to the automobile analogy, you can fill the fuel tank, but if there are only three wheels on the vehicle, you won't go very far. Therefore, it is important to maintain P and K at sufficient levels. Again, a soil test is the only way to know what the soil nutrient status for these important elements is.

Finally, many of our east Texas soils require lime to bring the soil pH to approximately 6.0. This soil pH is required for the best growth of forage grasses, and 6.5 to 7.0 is optimum for legume production. Lime should be evaluated based on its Effective Calcium Carbonate Equivalent, or ECCE, value. The higher the number, the better the lime and the more quickly the lime will have a neutralizing effect on the soil acidity. Many times a less expensive lime material is attractive when

compared to a better, but more expensive lime source. Consider the following calculations for a 1-ton ECCE lime application recommendation:

Lime #1 ECCE value of 65 @ \$40/ton applied

1 ton required/.65 (ECCE value) = 1.54 tons x \$25/ton = **\$61.60/acre**

Lime #2 ECCE value of 98 @ \$55/ton applied

1 ton required/.98 (ECCE value) = 1.02 tons x \$55/ton = **\$56.10/acre**

Not only is the lime material with the higher ECCE number a better value but also will react with the soil quicker. Be sure and shop for the best lime value. For additional information on soil acidity see SCS-2001-06, *Soil Acidity and Liming* and SCS-2001-05, *Managing Soil Acidity*.

Seedbed Preparation

There is no substitute for good seed-soil contact and this usually means preparing a proper seedbed. Specialized equipment may be required to prepare fine seedbeds for forage species such as alfalfa, while annual ryegrass can be established with little or no seedbed preparation. Most species fall in between these two extremes and, in many cases; common equipment found on many farms will usually suffice.

Seed

Seed cost is a small portion of the overall establishment cost of a pasture. Therefore, do not attempt to save money by purchasing “cheap” seed of unknown quality. Purchase the highest quality seed with as little weed contamination as possible. Also bear in mind that legume seed may need to be inoculated if not already pre-inoculated. Check with your seed dealer regarding the appropriate inoculant for the legume you plan to establish. Additionally pay close attention to the seed tag on the bag. Important information regarding the amount of pure (seed you are interested in), live (percentage of seed that will germinate) seed (PLS). If the seed is not 100% PLS, adjustments will be necessary to ensure the correct amount of seed is planted. For example, if the PLS is only 80% and the recommended seeding is 10 lbs./acre, you would divide 10 lbs. seed/acre by 0.8 to arrive at the new seeding rate for your bag of seed, which is 12.5 lbs. seed/acre in this example.

Equipment

A drill is an excellent method of establishing grass pastures or legumes; however, seed can also be broadcast using a fertilizer spreader. Don't feel that you have to purchase equipment. There is usually equipment that can be rented or borrowed that will allow you to get your forage established. Pay attention to recommended planting depth. Planting depth can have a negative impact on germination if seed is not planted at appropriate depth. Plan ahead, however, to make sure that the equipment will be available and in good working condition when you need it.

Pest Management

After establishment, weed or insect damage can be so severe as to eliminate the stand. Be alert and apply pesticides as needed according to label directions. Local county extension agents or IPM agents can help provide information on treatment thresholds and options. Careful scouting of newly planted pastures should be employed. For more information see SCS-2013-04, *Weed Control for Newly Sprigged Bermudagrass* and ESC-024, *Weed Control in Pastures and Forages*.

Early Grazing Management

Allow forage to attain 6" to 8" in height before grazing. A simple test to determine if the forage is well established is to attempt to pull up several plants by hand. If you are unable to uproot the plant, livestock will probably be unable to uproot the plant. Realize that with small seeded grasses and legumes; you may not have any fall grazing the first year of establishment.

Produced by the Department of Soil and Crop Sciences

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