Forage News
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Guidelines for Pasture Establishment

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Introduction

Pasture establishment is vital to ensure high levels of production pastures. Before establishing new pastures or renovating existing pastures, producers must evaluate the farm's forage needs. It is important to consider how the forage will be used (grazing vs. hay), what species might be more adapted to the area, and what resources (equipment, money, and time) are available. Renovating a pasture should be based on existing percentages of the desirable species present in the pasture. The following criteria could be used in such a decision:

1. If the pasture contains 75% or more of the desirable species, then consider not renovate and concentrate on management.
2. If the pasture contains 40 to 75% of the desirable species, then consider over-seed and concentrate on management.
3. If the pasture contains less than 40% of the desirable species, then consider reestablishment.

New pasture establishment or renovating an existing pasture usually requires some management practices to get the forage growing quickly and vigorously. Some of the steps involved in establishing or renovating a pasture include (a) soil testing and correcting soil nutrient deficiencies, (b) selecting species adapted to a specific area, (c) implementing the correct seeding method and rate, (d) implementing a weed control program, and (e) using proper management to maintain a productive stand.

Soil fertility

If possible adjust soil fertility prior to seeding. With today's high fertilizer prices, a farmer cannot afford to guess how much fertilizer to apply. The first step is to obtain an accurate soil sample, and apply the recommended amounts of lime and fertilizer prior to seeding. Contact your county extension agent for assistance on how to take a proper soil sample, or refer to **MSU**

information sheet IS-0346. If a producer is planning on utilizing manure applications, it is important to note that in the soil sample sheet so the recommendations will reflect the nutrient contributions from manure.

Soil acidity is a major factor limiting forage production in Mississippi. Acidic conditions reduce nutrient availability, root growth, and nitrogen fixation of legumes. Any nutrient deficiencies will compromise the success of the stand. Lime also affects the availability of most of the other essential elements needed for forage production. Phosphorus availability, in particular, increases as the pH is increased. New seedlings in particular require sufficient levels of available phosphorus and potassium to get established. For forages to be productive, grass pastures should be maintained at a pH of 5.8 to 6.2, while legumes should have a pH value of 6.0 to 6.8. To maintain such pH, lime application might be necessary. Lime not only corrects soil acidity, but also supplies calcium and magnesium while reducing the availability of toxic nutrients such as aluminum and manganese.

Planning for a successful pasture establishment or renovation should begin months in advance, often six months to one year, ahead of the actual pasture establishment or renovation. It some cases it could take years to correct severe soil acidity. If lime is needed, it should be applied six to 12 months prior to seeding to allow for the pH to adjust in the root zone, which will maximize the use of nutrients. Wherever it is practical, try to incorporate the lime, rather than leaving it on the soil surface.

Avoid fertilizer applications to drought-stressed seedlings, as the application could cause burning injury to young seedlings already under stress. If preparing a seedbed, incorporate necessary fertilizer during seedbed preparation based on soil test recommendations. Proper Phosphorous (P) application at seeding time is the key element in establishing grasses and legumes. Phosphorus encourages root development, particularly lateral and fibrous root formation. Quick root development is especially important when establishing forages in the fall. Well-developed root growth will minimize winter injury and allow rapid growth in the spring. Potassium is essential for plants to cope with heat and water stress. It also is essential for plant growth and reproduction. Legumes require high potassium levels; low potassium levels can contribute to legume loss from the pasture. Nitrogen is best applied in small, frequent

applications when plants are actively growing. Nitrogen, along with proper defoliation management, stimulates tillering in grasses.

Seedbed Preparation

Good seed-to-soil contact is essential to maintain adequate moisture near the seeds. This moisture is necessary for germination and for the small root systems of young grass seedlings. The type of seedbed preparation that is chosen will depend on the type of equipment available and whether a new pasture is being established (conventional tillage) or an existing pasture is being renovated (no-till drill).

Conventional Tillage

A properly prepared seedbed is a key step in pasture establishment. Conventional tillage should be used when a uniform seedbed is needed. Large soil clods and excess sod will impact seed germination. For conventional seeding, prepare a fine and firm seedbed by disking followed by rolling the field with a cultipacker after the final disking. Preparing a firm seedbed will allow capillary action to draw water to the soil surface where moisture is needed for seed germination, and will also help sustain small seedlings during periods of dry weather. A firm seedbed may help ensure that seed is not planted to deep, which usually results in poor seedling emergence and weak pasture establishment. A general rule is that if you walk across the seedbed and you sink past the sole of your shoe more than ¼-inch, the seedbed is too soft and should be cultipacked.

Forages established in conventional seedbed usually establish quicker and more uniform than no-till established pastures. Conventional tillage seedbeds also warm quicker, allowing for better seed germination at cooler temperatures. Some disadvantages with conventional tillage include soil erosion potential, changes in soil structure due to tillage, and higher oxidation of organic matter (less moisture retention).

No-till seedbed

No-tillage involves using herbicides to kill existing vegetation and then seeding directly into the residue. No-till seedbeds must also be prepared by reducing surface residue prior to seeding by hard grazing or hay removal [most are late summer for fall plantings]. The advantages of no-tillage are the reduction of passes over the field, potential reduced soil erosion, and improved moisture conservation. The disadvantages of no-till are slower and less uniform seedling emergence. For more information regarding herbicides for sod suppression, see the Guidelines for Weed Control (**MSU Publication 1532**).

Seeding Methods

The type of seeding method you choose will depend on the type of equipment available and whether planting on a no-till or a conventional seedbed. To ensure good soil to seed contact and that seed will germinate and emerge in a timely manner, different seeding methods are available. Some of these methods include drilling, cultipacking, and broadcasting. Drilling cuts a thin furrow in the soil, deposits the seed, then covers it and firms the soil with press wheels. A good rule is to plant the seed three to four times as deep as the diameter of the seed. With a cultipack planter, the seed is dropped from a hopper onto the soil where toothed rollers press the seed below the surface. When using a cultipacker [the Brillion limits seed depth by the depth of the teeth; seeding depth can be adjusted by the firmness of the soil], be careful not to bury the seed too deep, decreasing germination. Broadcast seeding with a fertilizer spreader can result in an uneven seed distribution if the overlap is too wide. Less seed is distributed on the outer third so adjust your spacing to provide double coverage. Make sure the spreader is calibrated for the necessary seeding rate. When broadcasting, recommended seeding rates should be increased by 20%, and the stand should be rolled with a cultipacker to establish a good soil/seed contact.

Seeding Time

Seeding on the correct date is also very important. Cool-season grasses are established in late summer or early fall (August to November, see: **MSU Information sheet 1168**). Warm-season grasses should be planted in late spring to early summer after the soil has reached a temperature of 65°F or above. Usually spring seeding has plenty of moisture for seed germination, but there is an increase in weed pressure. Spring seeding should be made at least four weeks after the last frost killing. Late summer seeding is recommended for wet areas, since the soil is usually dry enough during the summer with less weed pressure. Fall seeding should be made at least four to six weeks before the first killing frost in the fall; this will allow seed time to have adequate growth before winter. No till-drill planting in late summer might provide adequate moisture for seed germination since organic matter provides cooler soil temperatures and higher moisture levels.

Seeding Rates

Determining proper seeding rates depends on species and seeding method being used (**MSU Publication 1532**). It is important to make sure that the seed used is good quality (germination rate and purity) and has not been stored for a long period of time. If the seed is poor quality, the seed must be applied at higher rates to obtain a desirable stand. The use of certified seed with good quality is recommended. Buying lower cost seed does not always translate into savings, since the seed quality may affect the amount of pure live seed necessary to achieve the desired seeding rate. If legumes are seeded, make sure the seed is inoculated with the proper bacterial strain. In many cases, legume seed have been pre-inoculated. If the seed is not pre-inoculated, mix prepackaged inoculum with the seed just prior to seeding (**Visit MSUCares Forage website for inoculation methods**). Make sure that the inoculants have been store properly. Legumes form a symbiotic relationship with Rhizobium bacteria, in which nitrogen from the air is fixed into a plant-available form. There is no need for nitrogen fertilizer when legumes make up more than 30 percent of the pasture. It is vital to have proper seeding depth and seed coverage. When drilling legumes, make sure to plant no deeper than ¼ to 2-inch depending on the seed type and size. Planting depths greater than 2- inch will decrease

seedling emergence as much as 50% in some forage species. Seed of good quality (high purity and high germination rate) should also be used to obtain a good establishment. Seed cost could be a major portion of the total establishment cost (especially with the new tall fescue varieties). The use of cheap seed with low quality is neither agronomically nor economically sound (**Table 1**).

Table 1. Determining the effect of lower quality seed in planting rates and seed cost[1].

Price $/lb	Quality (purity x germination)	Pure live seed (%)	Planting rate (to give equivalent planting rate of live seeds) (lb/ac)	Cost of live seed ($/lb)
3.00	(80 x 40)/100	32	4	12.00
2.50	(70 x 20)/100	14	10	25.00
1.50	(60 x 10)/100	6	23	34.50

[1]Assume that the same forage species is used with different seed quality.

Species Selection

Selecting the right species or species mixture is extremely important. When establishing or renovating a pasture, it is important to match forage species to the site, soil type, and type of operation (grazing or hay, animal species and class). Know your soil types, soil composition, drainage, and forage capability. This information can be used to predict the success or failure of a potential forage species. Soil survey maps will provide this information.

Seasonal yield distribution is another factor to consider when making species selections. It is important to try and match the forage yield distribution with the animal's daily requirements. Cool-season perennial species (tall fescue) grow best between 60º and 80 ºF, and they generally have their highest production in the spring, followed by a summer slump and another growth period in the fall. Cool-season annuals (annual ryegrass and annual clovers) have some growth in the fall, followed by a period of dormancy or minimal growth in the winter and highest production in the spring. Warm-season annual (sundangrass, millet, and sorghum) and perennial (bahaiagrass, dallisgrass, and bermudagrass) species grow best between 80 and 95 ºF. Most warm-season grasses start their growth in April and will continue to grow until a hard

freeze occurs in the fall. Peak production of warm-season grasses generally occurs during mid-summer. Legumes are also an important part of the establishment process because they can provide nitrogen to the grasses, as well as increase production during the spring (cool-season legumes for the most part in Mississippi are not very productive during the summer months, Alfalfa would be the exception) months and increase pasture quality. Make sure that the growth habit of the selected legume species is compatible with the grass species to help minimize species competition.

Do not graze new stands too early or frequently. Allow plants to become well established before heavy grazing or set stocking. Mow or lightly graze pastures when plants have reached 8 to 12 inches and the most forage crops should not be grazed below 3-4 inches. Maintaining proper grazing height will help trigger new plants to tiller or producer runners. Allow plants to re-grow to 8 to 12 inches before grazing or mowing again. A rotational grazing approach could be beneficial in ensuring successful establishment.

Weed Management

A weed management plan will help ensure success in forage establishment. It is important to control weeds during establishment since newly emerged forage seedlings are extremely susceptible to weed competition. Weeds compete for water, nutrients, and sunlight. Broadleaf weed control can be accomplished but may take more than one application and may need to be applied at different times of the year. This approach will better control weeds that germinate during different seasons. Since new herbicides are constantly being developed and formulations of existing herbicides frequently change, consult with your County Extension Office or the **MSU Weed Control Guidelines, Pub. 1532** for further information.

Summary

Many factors influence the success of a forage/livestock operation. No one program or system fits all situations. Proper establishing forages is a key step in having a thick, lush,

profitable pasture. Take soil tests to determine fertilizer requirements and control weed problems. A producer can decrease the risk of planting too deep and reducing his stand by properly preparing the soil and calibrating the drill to proper rate and depth. Soil type, drainage, moisture holding capacity, fertility, and pH all have an effect on plant species selection. It is important to consider improved forage varieties that are adapted to the geographical area and planted at the appropriate time. Use controlled grazing management such as rotational grazing to encourage and protect new seeding. A well thought out plan will help insure success for this potentially costly endeavor. With many variables involved, failure or success often depends on adequate pre-planning. Evaluate each factor as it impacts your forage system and select those management practices that best fit your area, soil, climate, and forage crop to maximize quality and production. When planning a new forage program or trying out new technology, it is best to begin on a small scale that is easily manageable and expand as you learn or see benefits from the system.