



## Virginia's Horse Pastures: Forage Establishment

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Well-managed pastures can provide a relatively inexpensive and high-quality feed source for horses in Virginia. In contrast, poorly managed pastures are less adequate nutritionally and can reduce environmental quality. Proper pasture management starts with forage establishment. The establishment phase of forage production is critical since all other management practices depend on a healthy sod. Forage establishment begins long before the actual seeding. Successful forage establishment requires a great deal of planning and attention to detail.

**Control weeds.** Perennial weeds must be controlled prior to seeding. This is especially important if a mixture of grasses and legumes will be established. There are no herbicides available for controlling grassy or broadleaf weeds in grass-legume mixtures. In most cases, pasture herbicides are designed to kill either broadleaf weeds (legumes included) in grasses or grassy weeds in legumes. The use of herbicides and cropping sequences that include winter-annual (small grains) and/or summer-annual (pearl millet, foxtail millet) smother crops prior to seeding can prevent the accumulation of weed seed. Broadleaf weeds can be controlled in pure grass stands using selective herbicides (herbicides that affect only broadleaf plants). Reseeding restrictions need to be taken into account when applying these herbicides. In situations where both undesirable perennial grass and broadleaf weeds are present, or when a total burn-down is desired a nonselective (affects both grasses and broadleaf plants), translocatable herbicide such as glyphosate should be applied prior to seeding. For more information on herbicides for pastures see *Pest Management Guide: Field Crops*, Virginia Cooperative Extension publication 456-016.

**Adjust soil fertility prior to seeding.** Test the soil in pastures and apply the recommended amounts of lime and fertilizer prior to seeding. Soil acidity is a major factor limiting forage production in Virginia. Cool-season grass pastures should be maintained at a pH of 6.0 to 6.2, while grass-legume mixtures should have a pH value of 6.2 to 6.4. Acidic conditions reduce nutrient availability, root growth, and nitrogen fixation of legumes. Lime not only corrects soil acidity, but also supplies calcium and magnesium while

reducing the availability of toxic nutrients such as aluminum and manganese. *Lime should be applied six to 12 months prior to seeding to allow adequate time for it to react with the soil.* In conventional seedings where more than two tons of lime per acre are required, one-half should be applied and disked in before plowing and the remainder should be applied after plowing and disked in. In no-tillage seedings where more than two tons of lime per acre are required, one-half of the lime should be applied before seeding and one-half the following season. For more information on soil testing contact your local Virginia Cooperative Extension office to speak with an agricultural agent.

**Choose an adapted forage species.** Forage species must be adapted to the soil conditions present in the pasture and the region where it will be grown. *If the forage is not regionally adapted, the chances of successfully establishing and maintaining a healthy sod are low.* It is also important to select a forage species that will tolerate close and frequent grazing. Use certified seed or a proprietary variety which is adapted to your climatic region. This will ensure you are getting high quality, weed-free seed. For more information on forage species see *Virginia's Horse Pastures: Forage Species for Horse Pastures*, Virginia Cooperative Extension publication 418-102. For information on varieties of adapted species contact your local Extension office.

**Inoculate legume seed.** 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 25 percent of the stand on a dry matter basis. A visual rating of clover percentage is a good estimate of clover on a dry matter basis for taller growing species such as ladino or red clover, but often overestimates common (dutch) white clover. Therefore, pastures where the predominant clover is common (dutch) white clover may require nitrogen fertilization even when a visual rating indicates more than 25 percent clover. *Legume seed should always be inoculated with the proper strain of nitrogen fixing bacteria before seeding.* In many cases legume seed comes preinoculated. If the seed is not preinoculated, mix prepackaged inoculum with the seed just prior to seeding.

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**Prepare the seedbed.** For conventional seedings, prepare a fine and firm seedbed by plowing or heavy disking followed by other tillage tools to shape and smooth the soil. Avoid overworking the soil. A firm seedbed serves two purposes. First, it allows capillary action to draw water to the soil surface. This will provide needed moisture for seeds to germinate and help to sustain small seedlings during dry periods. Second, a firm seedbed allows for accurate seed placement. In many cases a soft seedbed allows seed to be placed too deeply, resulting in poor emergence and weak stands. A general rule is that the seedbed is too soft and should be refirmed if you walk across it and sink past the sole of your shoe.

No-till seedbeds must also be prepared by suppressing the existing sod and reducing surface residue prior to seeding. You can accomplish this with hard grazing in late fall and early spring. Vegetation can also be suppressed by using a low rate of nonselective herbicide. For more information regarding herbicides for sod suppression see the *Pest Management Guide: Field Crops*, Virginia Cooperative Extension Publication 456-016.

**Ensure good soil to seed contact.** Seeding methods include drilling, broadcasting and dragging or cultipacking, band-seeding, and cultipack-seeding. The type of seeding method you choose will depend on the equipment you have and whether you are preparing a conventional seedbed or doing no-till seeding. Regardless of the seeding method, the goal is to achieve good soil-seed contact. Good soil-seed contact ensures that the seed will germinate and emerge in a timely manner.

**Seed on the correct date.** Cool-season grasses are normally established in either early spring or late summer. Spring seedings generally have plenty of moisture, but increased weed problems. A general rule is that early-spring

plantings should be made four weeks before the last average killing frost in the spring. Late-summer seedings are at more risk of failure due to a lack of moisture, but generally have fewer weed problems. It is critical to allow seedlings time to reach adequate size before winter, therefore late-summer plantings should be made at least four to six weeks before the first average killing frost in the fall. Plantings of warm-season grasses should be made in late spring or early summer after the soil has reached a temperature of 65°F. This usually occurs when night time temperatures remain in the 60s.

**Seed at the proper rate.** It is not uncommon for less than one-third of the sown seed to produce viable seedlings and only half of those to survive the first season. Therefore, seed must be applied at higher rates to obtain the desired stand densities. *It is important to remember that raising seeding rates above reasonable levels will not compensate for a rough seedbed or poor seeding methods.* Having approximately 20 plants per square foot at the end of the seeding year will result in a stand density of six plants per square foot the year after establishment. Seeding rates for commonly used forages are shown in Table 1.

**Seed at the proper depth.** Small-seeded forages have very little energy stored in the seed. Therefore, seed that is placed too deep will germinate, but not have enough energy to make it to the soil surface. On the other hand, seed that is placed too shallow may not have adequate moisture to germinate. In general, best results are obtained with a seeding depth of one-quarter to one-half inch. As a general rule, never place small-seeded forages deeper than one-half inch. *It is important to remember that proper seed placement cannot be obtained on poorly prepared seedbeds.* Seedbeds that are too soft will result in the seed being placed too deep.

**Table 1. Seeding rates and dates for horse pastures in Virginia.**

Forage Species	Seeding Rate lb/A	Time of Year to Plant
Orchardgrass	10-15	early spring and late summer
Tall Fescue	15-25	early spring and late summer
Timothy	6-8	early spring and late summer
Orchardgrass + Red Clover	8-10 + 6-8	early spring and late summer
Tall Fescue + Red Clover	10-15 + 6-8	early spring and late summer
Timothy + Red Clover	4-6 + 6-8	early spring and late summer
Orchardgrass + Ladino Clover	8-10 + 1-2	early spring and late summer
Tall Fescue + Ladino Clover	8-10 + 1-2	early spring and late summer
Annual Ryegrass	20-35	early spring and late summer
Small Grains	90-120	early spring and late summer
Pearl Millet	20-30	late spring-early summer
Bermudagrass with clay coating	8-12	late spring-early summer
Bermudagrass without clay coating	4-6	late spring-early summer
Crabgrass	3-6	late spring-early summer

**Control weeds during establishment.** Newly emerged forage seedlings are extremely susceptible to weed competition. Weeds compete for water, nutrients, and light. In pure grass stands, broadleaf weeds can be controlled with herbicides once grass seedlings have at least four leaves. No herbicides are available for mixtures of grasses and legumes. You can use frequent clipping to control weeds during establishment. Clip weeds down to a height of just above the desired forage seedlings. For clipping to be successful, it must be implemented in a timely manner and on a regular schedule until seedlings become established.

**Do not graze new stands too early or frequently.** Newly established forage stands do not develop into a fully mature sod until the second growing season after establishment. New stands should be grazed only after plants are well anchored. *Light and infrequent grazing can encourage the development of a healthy sod, but avoid overgrazing.* Feeding hay in a sacrifice/exercise area and limiting animal access to new stands is a good way to avoid overgrazing during the establishment period.

**Fertilize newly established stands.** Plants require nutrients to grow and persist. Apply lime, phosphorus, and potassium as needed according to the soil test. Pure grass stands will also require nitrogen fertilization. Nitrogen, along with proper defoliation management, stimulates tillering and helps new stands to form dense sod. Nitrogen is best applied in small, frequent applications when plants are actively growing.

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## Forage Establishment at a Glance

- Control weeds prior to establishment.
- Soil test and adjust fertility six to 12 months prior to establishment.
- Choose a forage species that is adapted to the region, soil conditions in the pasture, and grazing.
- Always inoculate legume seed before planting.
- Prepare a fine and firm seedbed for conventional seeding.
- Suppress the sod and reduce surface residue prior to no-till seeding.
- Seed at the appropriate time of year.
- Never place seed deeper than one-half inch.
- Control weeds during establishment.
- Do not graze stands too early, closely, or frequently during the establishment period.
- Sods require 18 to 24 months to become fully established.
- Fertilize new stands to encourage the development of a healthy sod.