



Tall Fescue, Orchardgrass and Timothy

Cool-Season Perennial Grasses

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The majority of pastures and hayfields in Tennessee contain either tall fescue, orchardgrass or timothy. These are cool-season perennial grasses, meaning that they grow during the spring and fall, but are somewhat less productive or dormant during the summer. Since they are perennial, they come back each year from a crown instead of through seed germination.

The major reason these grasses form the base of most forage programs in Tennessee is their long growing season (Figure 1). Tall fescue and orchardgrass are the primary grasses used for pastures and hay, although some producers use timothy either alone or in mixtures with the other two grasses. All three of these grass species can be used successfully in Tennessee. Differences between these grasses make the choice on which grass to use dependent upon what the purpose is (grazing vs. hay) and where in the state your farm is located. Several other cool-season perennial grasses can be grown in Tennessee. Grasses like Kentucky bluegrass and matuagrass can be used, however the stand life of the grasses is generally reduced due to summer heat and drought. Because of the shorter stand life of these plants, they generally are not recommended for hay or pasture in Tennessee.

Adaptation

Tall fescue is a long-lived bunchgrass with short rhizomes (below-ground stems). Tall fescue is adapted to a wide range of conditions, tolerant of soil acidity and poor drainage, and relatively tolerant of drought. The major

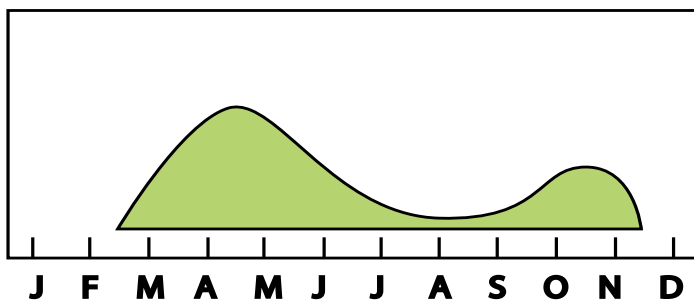


Figure 1. Yield distribution of cool-season perennial grasses.

factor influencing the persistence of tall fescue is the fungal endophyte *Neotyphodium coenophialum*. This is a fungus that lives between the cells inside the plant. The fungus is not visible from outside the plant. When infected, research has shown that tall fescue plants are more tolerant of drought, insects and disease. The result is improved persistence, particularly when the plants are grazed. If the fungus is removed, the plant's stress tolerance is reduced, causing a decrease in persistence.

The improved persistence due to the endophyte is the positive side. The negative side to the endophyte is that some of the alkaloids found in the plant reduce the performance of grazing animals. Many producers across the Southeast have used endophyte-free varieties of tall fescue and achieved better animal performance compared to Kentucky-31 endophyte-infected tall fescue. However, many of these producers lost stands because of the lower level of persistence in endophyte-free varieties. Research has shown that these varieties can be maintained if attention is paid to the soil fertility and grazing management of endophyte-free stands. Even though the only difference between infected and non-infected tall fescue is the endophyte, it is often easier to consider these plants as two different "species," since the persistence and animal performance from these plants are so different. For more information concerning the endophyte, see Extension **SP 439-A Tall fescue: endophyte-infected or endophyte-free?**

Orchardgrass is a bunchgrass that grows 2-4 feet tall. It is less tolerant of drought and poor drainage than tall fescue but is more tolerant of shading. Orchardgrass is not as persistent as endophyte-infected tall fescue but is similar in persistence to endophyte-free tall fescue. Attention needs to be paid to soil fertility and grazing management. If fertility is allowed to drop, or stands are grazed hard, particularly during the summer, stand life will generally not exceed 2-4 years.

Timothy is a bunchgrass that grows 2-4 feet tall. It grows best in cooler climates. Timothy is used primarily as a hay crop. When planted in the majority of Tennessee conditions, summer droughts cause stand reduction. Stands are not

expected to last more than 3-4 years. It is a popular hay crop for horses, although orchardgrass and tall fescue can also be used successfully.

Which One Is Best?

To have a successful forage program, it is important to select the right forage species. When planting a permanent pasture or hayfield, producers have to decide which cool-season grass to use. The best species to select depends on the goal one has for the field.

Hay. All of these forages can be used successfully for hay. Orchardgrass and tall fescue will provide the highest yields. It is important to realize that hay produced from endophyte-infected tall fescue will result in the same reduced animal performance as when grazing endophyte-infected tall fescue. Lower yields and shorter stand life results in higher production costs of timothy hay, so it is generally appropriate only for high-value hay markets (such as the horse hay market).

Grazing. For most Tennessee producers, plant persistence is the most important characteristic for a forage plant. If this is the case for your farm, endophyte-infected tall fescue is the best plant to use. The effect of the endophyte on animal performance can be minimized if legumes are maintained in the pasture. If the highest possible animal performance is required, either orchardgrass or endophyte-free tall fescue will be the best choice. Endophyte-free tall fescue is often the better of these two, due to its greater fall growth, allowing for more fall and winter grazing than orchardgrass. Both endophyte-free tall fescue and orchardgrass will require a higher level of management than endophyte-infected tall fescue. The lower yield and stand life of timothy reduces its potential for satisfactory use as a grazing plant.

Often producers plant endophyte-infected tall fescue in a mixture with either orchardgrass and/or timothy. The goal is to have a high-quality pasture with the orchardgrass and timothy, but to have endophyte-infected tall fescue in the mix so that as the other plants begin to die, something will be left in the pasture for grazing. Research in Tennessee has shown that planting endophyte-infected tall fescue with other grasses does not reduce the toxicosis problems due to the endophyte. The real consequence of this procedure is a pasture that will have a medium to poor stand after a few years. Legumes such as red and white clover do an effective job reducing the effects of fescue toxicosis. For best results, either use only endophyte-infected tall fescue as the grass in a pasture or use the other grasses, such as orchardgrass or endophyte-free tall fescue – don't plant a mixture of endophyte-infected tall fescue with another cool-season grass.

Establishment

Difficulties in managing a pasture or hayfield are often due to the poor stand that was originally obtained. Getting a good, thick stand initially can make the management of a field a lot easier. Paying attention to a few simple details can improve the chances of successfully establishing a stand.

- 1. Fertilize and lime according to soil test results.** The proper pH and nutrient levels in the soil are important in getting a healthy stand. A low pH, potash or phosphate level can result in slow seedling growth, leading to increased weed pressure. This can put the grass seedlings at a competitive disadvantage. Apply 30 lb N per acre, and potash and phosphate according to soil test results. Fertilizer can be applied at planting, but lime needs to be applied at least six months prior to seeding. This will allow time for the lime to raise the pH in the soil. Proper fertility is the first step in planting a grass pasture or hayfield. Contact your local Extension office for more information regarding soil testing.

Table 1. Seeding guide for tall fescue, orchardgrass and timothy.

forage species	seeding rate (lb/acre)	seeding date
tall fescue	15-20	Aug 15 - Oct 1 Feb 20 - April 1
orchardgrass	10-15	Aug 15 - Oct 1
timothy	8	Aug 15 - Oct 1 Feb 20 - April 1

- 2. Plant the proper amount of seed at the proper depth.** To get the proper number of plants per acre, the proper number of seed must be planted. Table 1 shows the recommended seeding rates and dates for tall fescue, orchardgrass and timothy. Unless you own your own drill and can be reasonably sure of the flow rate of seed, it is a good idea to spend a little time calibrating the drill. This will allow you to adjust the flow rate of the seed, insuring the proper amount of seed is planted.

Seeding depth is also important. Planting seeds too deep could result in poor seedling emergence, causing a poor stand. These cool-season grasses should be planted approximately ½ inch deep.

3. Plant at the proper time. Plantings of cool-season perennial grasses can be made in either the spring or fall (Table 1). Seedings should be made to allow as much time as possible for the seeds to germinate and establish before harsh conditions arrive. In most years, fall seedings are more successful than spring seedings. For spring seedings to succeed, it is important to plant in early spring, giving the seedlings time to develop a root system before the summer heat and dry conditions develop. For fall seedings to succeed, wait to plant until after fall rains begin. Planting into a hot, dry seedbed poses a great risk, even when planted within the recommended seeding dates.

4. Plant into a weed-free environment. The goal during planting is to create an environment where grass seedlings have an advantage during the establishment phase. Limiting competition from other plants is an important part of this. Plantings can be made by either no-till or conventional methods. In no-till plantings, weeds are killed chemically by using some type of burndown herbicide prior to planting. In conventional plantings, weeds are killed mechanically by working the ground. In either case, removing all competition is important. The total cost of establishing cool-season grasses is about the same for both establishment methods. No-till establishment entails greater chemical costs, while tillage systems require more machinery time and labor.

5. Minimize weed competition during establishment. After planting, weed seed in the soil can germinate and become a competition problem. To limit this, two things should be done. First, clean up any persistent weed problems in the field ahead of time. It is easier to kill weeds when there is no concern about young grass seedlings. Herbicide sprays during the year prior to planting can prevent many problems, especially with perennial weeds like curly dock, johnsongrass and horsenettle. Second, continuously evaluate the field during the first several months of seedling establishment. If weed problems develop, herbicides can still be used to kill many broadleaf weed species, although the options are more limited after the grass is planted. Contact your local Extension office for herbicide recommendations that are specific to your situation.

6. Seed clovers into grass pastures and hayfields in late winter/early spring. The ultimate goal for many pastures and hayfields is to have a grass/legume mixture. Often the grass and clover are planted together in the fall. There is a risk when seeding these together, however. Clovers are more aggressive as seedlings than are perennial grasses. The result is a stand that is

dominated by the clover, eventually producing a pasture or hayfield that has a poor stand of grass. The best way to get a good grass/clover field is to seed the grass as a pure stand in the fall, let it become established with no competition from the clover during the fall and winter, then seed the clover in mid- to late February. Two pounds of white clover and 4 pounds of red clover per acre broadcast the last two weeks of February should provide an adequate clover stand in the field. Following this procedure allows for the grass seedlings to develop a strong root system and not be outcompeted by the clover seedlings.

Management

The purpose of a cool-season perennial pasture or hayfield is to produce an acceptable yield of a good-quality forage for several years. This sounds somewhat vague, but each producer has different expectations of yield, quality and stand life. To be the most profitable with cool-season grasses, attention must be paid to several basic factors after the stand is established.

Harvest Management. The yield and quality of the forage from these grasses is directly related to harvest management, whether it is harvested by grazing or haying. An important concept in forage production is that as a forage plant grows older and matures, the quality of the forage decreases. As a plant begins to change from vegetative growth (growing leaves) to reproductive growth (producing flowers and seedheads), the protein and energy level in the forage drops, while the fiber level increases. The result is a forage that has reduced forage quality.

The drawback with early cutting of hay is that yield is reduced. If a plant is allowed to grow into its reproductive phase, yield will be increased. Yield and quality must be balanced. The best management is to harvest the forage for optimal yield and acceptable quality. Grasses should be cut just as they begin to show seedheads from the sheath of the plant. This is called the “boot” stage. This is the stage where the best trade-off is found between yield and quality. After the first cuttings of cool-season grasses made at the boot stage, second cuttings should be made approximately four weeks later.

When these grasses are used for grazing, the same principle applies. If forage is allowed to grow old and mature, forage quality is reduced. Grazing management should be such that the plants are not allowed to mature into their reproductive growth.

However, one difficulty with pastures is the potential for overgrazing. Plants depend on leaves to capture sunlight, which is then used to produce energy through photosynthesis. If the plants are overgrazed, then they have limited leaf area for capturing sunlight and must depend on stored energy in the roots for regrowth. Continuous

overgrazing stresses the energy reserves of the plant and can lead to eventual stand loss. Timothy, orchardgrass and endophyte-free tall fescue are especially sensitive to overgrazing, especially during the hot and dry summer.

The best management for these grasses is to graze them down to about 3 inches, then allow the plants to regrow to 8 inches before regrazing. It will be important to allow these plants to have a rest period to regrow leaves and store some energy in the crown for later use. If a rest period is not allowed, stand life will probably be reduced.

Fertility. To maintain a productive stand of a high-quality forage, the proper nutrients for plant growth must be provided. If the nutrient status of the soil is allowed to drop, then grass growth will be reduced, and weeds will begin to encroach. Lime, phosphate and potash should be applied according to soil test results. A soil test should be taken every three years. It is a good idea to soil test a third of your fields each year. Following this procedure, soil tests will be taken each year in different fields, building a habit of soil testing. The question will not be "Is this the year I need to soil test?" but will be "Which fields do I need to test this year?"

Renovation with Clovers. The forage quality of cool-season perennial pastures and hayfields can be improved by the addition of red and white clover. These legumes also can produce the N needed by the grass in the spring. Two pounds of ladino white clover and four pounds of red clover can be broadcast per acre during the last two weeks of February. Clovers should be added every three years, so the same recommendation as for soil testing applies here. Seed clovers on a third of your fields each

year. The same fields that are soil tested can be seeded with clover in the late winter. On droughty hillsides, annual lespedeza can be included in the clover mix at the rate of 8 pounds per acre.

Weed Control. Weeds can be pests in many fields. Fertility and harvest management can reduce the weed competition in fields. However, there are times that herbicides must be used to control weeds. Contact your local Extension office for herbicide recommendations specific for your farm. Since most herbicides that will kill broadleaf weeds will also kill clovers, a herbicide program should be tailored to fit into the rotation of soil testing and clover seeding. Be sure to follow all label instructions for any herbicide that is used on your farm.

Conclusion

Cool-season perennial grasses make an excellent forage for pastures and hayfields in Tennessee. Their high quality, production and long growing season make them ideal to use in livestock operations. To successfully establish and maintain these grasses, environmental conditions in the field need to be manipulated so the grasses have an advantage over undesirable plants, such as broadleaf weeds and broomsedge. Soil testing, fertilizing and controlling weeds are important both before and after establishment. Remember that all management practices carried out in a field of tall fescue, orchardgrass or timothy should be aimed toward producing and maintaining a good stand of high-quality forage plants that can be productive over the majority of the year.

Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store, or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

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