

Establishing Forage Crops

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Successful livestock production depends on a forage program that supplies large quantities of quality, homegrown feed. Such forage programs do not develop by chance but are the result of careful planning and detailed attention to establishment, production, and utilization of forage crops.

Establishment of a good stand is a first and important step in a successful forage program. The costs of stand establishment are equal to approximately 1 to 2 tons of production. It is important that everything possible is done to ensure success, because a stand failure can nearly double these costs and result in a loss of forage production. In addition, a stand failure exposes soils to more erosion and the loss of valuable topsoil and nutrients. Several steps that are of vital importance in the establishment and maintenance of good forage stands include:

1. Match plants to soils.

There is wide variation in soil capabilities on almost every farm. Soils differ in their capacity to supply water and nutrients, and they vary in slope, internal drainage, and other factors that affect establishment, production, and persistence of a given forage crop. In addition, grasses, legumes, and grass-legume combinations vary widely in their ability to become established, produce, and persist on different soils. It is important to match the plant species or mixture of species to the soils so that the greatest returns can be realized and the soil is protected.

The best use of level to gently sloping, deep, and well-drained land is to plant the highest-producing crops, such as corn silage, alfalfa, or a mixture of alfalfa-orchardgrass or alfalfa-timothy. Steeper land should be maintained in sod-forming grasses, such as tall fescue or bluegrass, to minimize soil erosion. Alfalfa should be used with a cool-season grass where soil is at least 2 feet deep and well drained. On soils that are less than 2 feet deep or are poorly drained, clover-grass mixtures or pure grass stands may be used. Legumes may be established in grass-dominant sods through renovation. For more information on pasture renovation, see Cooperative Extension publication AGR-26, *Renovating Grass Fields*.

2. Match plants to the intended use.

Plan for maximum quality and versatility in the forage program. Select plants that produce high-quality feed, and use each field for hay, silage, and/or pasture as weather and feed needs dictate. Legumes generally produce higher-quality feed than grasses, resulting in higher animal performance. Thus, legumes

should be used to the maximum extent possible. Taller-growing legumes, such as alfalfa and red clover, are more versatile than a legume such as white clover, which is used primarily for grazing. Grasses such as orchardgrass, timothy, and tall fescue are better adapted than bluegrass for hay and silage. Some farmers want pure alfalfa for horses or dairy cattle. Timothy-alfalfa mixtures work well for this use, since most of the timothy growth is removed each year at the first cutting. The grass helps control weeds and aids in getting the first hay harvest cured, but subsequent harvests during the season are almost pure alfalfa. Warm-season grasses can help balance cool-season forages by providing better production during summer months. Annual crops can be used to complement perennial grasses and legumes. County Extension offices have publications about each of these forages.

3. Select high-quality seed of an adapted variety.

Selecting high-quality seed is an essential step in the establishment and longevity of a forage stand. Such seed should have high percentages of germination and purity, low percentages of weed seed, and freedom from noxious weed seed.

Another important step is the selection of improved crop varieties that are adapted to your geographic location. If you are uncertain about a variety's adaptation and performance, check with your county Extension agent for agriculture or the Department of Agronomy at the University of Kentucky before seed purchase. It is never a good practice to plant large acreages to varieties of unknown performance or adaptation. The best assurance of the genetic purity is to plant certified seed, if available. Poor quality seed and/or unadapted varieties are never a bargain at any price. See the most recent *Forage Variety Annuals Report* available at each county Extension office or on the Web at: <<http://www.ca.uky.edu/agc/pubs/respubs.htm>>.

4. Supply proper fertility.

Just as humans and animals must have food to survive, so plants must have proper nutrition if they are to survive and produce well. The soil is a vast reservoir of nutrients needed by plants; however, soils vary widely in their nutrient status, and a deficiency of one element can limit forage-plant growth and encourage weed encroachment. The most sensible approach to providing balanced fertility is to have soil samples tested prior to forage establishment to determine nutrient levels and fertilizer needs. Keep good records of soil test results and the amounts

of fertilizer and lime applied to each field. Forage fields should have soil samples taken every third year. A soil test is the most important agronomic and economic investment in your overall forage fertility program.

In Kentucky, the fertility factors most limiting to growth are usually lime, nitrogen (N), phosphorus (P), and potassium (K). Boron (B) is always recommended where alfalfa is to be grown or where red clover is to be harvested for seed.

Prior to establishing a new stand, lime, phosphorus, and potassium should be applied according to soil test recommendations. If the cropping history of a field indicates nitrogen is needed at seeding, it is usually recommended at the rate of 30 pounds per acre on grass-legume mixtures and 50 pounds per acre for straight grasses. Annual applications of fertilizer should be made as soil tests and crop removal indicate.

5. Prepare an adequate seedbed.

The soil should be tilled to incorporate lime and fertilizers, destroy weeds and other vegetation, and prepare a level, firm seedbed. Ridges and depressions should be reduced to a minimum to make it easier for harvest machinery to operate. Don't forget, this stand may be in the field for several years, so it is worth the extra effort to get the soil surface smooth. No-till or minimum tillage techniques can be used to establish most forage crops.

6. Inoculate legume seed.

When properly nodulated, legumes such as alfalfa and clovers have a unique ability to convert large quantities of nitrogen from the air into a chemical form that plants can use to make protein and other nitrogen compounds necessary for growth. To ensure proper nodulation, inoculate all legume seed (unless pre-inoculated) with the proper bacteria just prior to seeding. This should be done even if the legume to be seeded has been previously grown in the field. To ensure that inoculum sticks to each seed, use an appropriate commercial adhesive or sugar solution. See Cooperative Extension publication AGR-90, *Inoculation of Forage Legumes*.

7. Use proven seeding methods.

Seeding can be done using aircraft, cyclone-type seeders, band seeders, cultipacker seeders, and drills with forage box attachments. Each method can be successful when seed is properly distributed and placed uniformly just below the soil surface ($\frac{1}{4}$ to $\frac{1}{2}$ inch) and when the soil is firmed to give good seed-soil contact. Remember, though, if the seed is placed too deeply, it may not emerge. If the seed is placed at unequal depths, the stand will be uneven because of different emergence times. Also, remember that both the seed and the inoculum on legume seed must survive the seeding method. Seed germination and inoculum effectiveness may be lowered when mixed with fertilizer. Some cover over the seed aids inoculum survival and provides better seed-soil contact. Any technique can be successful if it results in uniform distribution of seed at the recommended depth and rate.

8. Seed at the right time with the correct amount of seed.

Many cool-season grasses and legumes can be successfully seeded in either spring or late summer. Alfalfa, red clover, and white clovers are usually most successfully seeded in late winter or spring; however, late summer seedings can be successful if soil moisture is adequate. Late summer and early fall seedings of such crops as alfalfa, fescue, bluegrass, timothy, orchardgrass, ryegrass, and small grains for forages are preferred by many farmers since they enable them to prepare seedbeds during favorable weather conditions and spread the year's work more evenly. In addition, late summer and early fall seedings have fewer weed problems than spring seedings. Warm-season species are best seeded or sprigged in spring after the threat of frost has passed.

Lack of adequate moisture for germination and emergence is perhaps the major problem with late summer seedings. Cultipacking to get good seed-soil contact is highly desirable. Legume seed might germinate after a small shower of rain and then perish during an extended dry period. One technique to avoid some of the problems associated with dry conditions is to have everything ready to seed but to wait for at least an inch of rain before seeding. Seed as soon after the rain as soil conditions permit. This usually provides enough soil moisture not only to germinate the seed but also to give time for the young, developing roots to grow into moist soil. If rain doesn't come early enough to get plants established, the seed may be planted the following spring. On rolling land, a light seeding of small grain will protect the soil during the winter and could serve as a mulch for no-till seeding the next spring. For information on seeding rates and dates, see Cooperative Extension publication AGR-18, *Grain and Forage Crop Guide for Kentucky*.

9. Control pests.

Pests such as insects, diseases, and weeds can lead to poor stands. Herbicides and insecticides may be used to control some of the pests. Selecting varieties with resistance to diseases and insects is the best assurance for control. For information concerning pest control chemicals, consult your county Extension office. Information on the types of materials recommended as well as rates and times of application is available. When using any pesticide, always read and follow all label directions and precautions.

It is difficult to predict the probability of success in establishing forages when so much depends on weather. The steps outlined above do not guarantee success, but if followed, they can increase the probability of obtaining thick, vigorous forage stands. Once these stands are obtained, the forage must be marketed directly as forage products or through livestock, and perennial plants must be managed to keep stands for several years to realize top profits. Such management can avoid or at least minimize the re-establishment costs that can occur if forage crops are not properly managed.