



Successful forage crop establishment

Because of high costs, seeding forage crops is considered to be a “high stakes” farming operation. The days of spreading some seeds on the ground and hoping for nature to cooperate are past. Today, success is imperative. Forage producers must minimize risk as much as possible to ensure successful forage crop establishment. Here are some practices that can improve the success of forage crop seedings.

PLANNING AHEAD

As with most other high-risk farming operations, it is important to plan ahead. Planning ahead not only improves the chances of successful forage establishment, but also greatly reduces the amount of personal worrying after a forage has been seeded.

One Year Before Seeding

Forage species selection. Decide which forage species or mixture will be seeded. Some species are better suited to certain soil types than others. For example, alfalfa does not tolerate poorly drained or low pH soils, while red clover and reed canarygrass perform very well under these conditions. Although it often is difficult and expensive to change soil characteristics, species can be changed easily with little or no expense. Proper matching of forage species to soil characteristics not only makes establishment easier, but also improves production over the life of the stand. For more information on forage species and their adaptability to Pennsylvania conditions, consult the appropriate Penn State Agronomy Facts publication.

Producers should not attempt to seed alfalfa back into an alfalfa field within one year from when the old alfalfa was killed. Established alfalfa plants produce a chemical that is toxic to alfalfa seedlings. Rotating out of alfalfa for a minimum of one year will allow the chemical to decompose. In addition, rotating to another crop will help reduce alfalfa disease and insect pests.

Soil test. A soil test should be completed and lime should be added to the soil to correct low pH conditions at least six months prior to forage seeding. Planning a year in advance gives producers several opportunities to apply any

nutrients that a soil test recommends. For more information on soil testing and adjusting soil pH, consult *Agronomy Facts 31-A, Soil Fertility Management for Forage Crops: Pre-establishment*.

Weed control. Weed control in previous crops can significantly reduce weed infestations during forage seedling establishment. However, herbicide use during the year preceding a forage seeding should be monitored closely. Triazine herbicides that carry over in soil used for a previous corn crop will cause yellowing and can kill young legume seedlings. Therefore, producers should avoid using triazine herbicides in the last year of corn. If triazine is used in the year preceding forage seeding, application rates should be less than 1 pound per acre. For information about herbicides containing triazine, consult the *Penn State Agronomy Guide* or appropriate product labels.

Six Months Before Seeding

Variety selection. Producers should select varieties of the forage species they expect to plant and order seed early to insure that they obtain the best variety for their situation. For information about production methods and disease and insect resistance for alfalfa, red clover, and grass varieties, consult the *Penn State Forage Trials Report*.

Soil pH and fertility adjustments. The six months prior to seeding is the last chance producers have to adjust soil pH before planting. Most agricultural-grade limestone requires about six months from the time of application until it effectively changes the soil pH. Consequently, adding lime to raise the soil pH within less than six months of seeding will generally result in forages being seeded into soil with a pH lower than desired.

Apply the amount of fertilizer recommended by the soil test to achieve optimum or high soil nutrient levels. Fertilizers may not be needed if fields have received manure applications during the previous crop. However, a soil test can accurately measure soil nutrient levels and prevent poor forage establishment as a result of improper soil fertility. For more information about soil nutrient levels required for forage crop establishment, consult *Agronomy*

Weed control. If the crop rotation permits, the six months before seeding is the final opportunity for producers to control those perennial weeds that will be difficult or impossible to control once the forage is seeded. Weed control costs are an investment that will be returned over the life of the forage stand.

SUCCESSFUL TILLAGE AND SEEDING PRACTICES

Seeding Date

Late summer. Late-summer seedings of forages generally are most successful in Pennsylvania. An early maturing grain crop can be grown and harvested, the seedbed prepared, and the forage crop seeded before late August. Fall rains and cool temperatures provide an ideal environment for forage seedling growth and establishment.

Spring. Spring forage seedings are common throughout Pennsylvania and can be as successful as late-summer seedings. However, wet soil conditions that make preparing a good seedbed difficult, increased weed competition, and the possibility of summer droughts all increase the risks of spring forage seedings.

Winter. Winter seedings or frost seedings generally are not as successful as late-summer or spring seedings, but they also are not as costly. Winter seeding involves spinning forage seeds onto the frozen ground (generally to thicken an existing forage stand or to establish a forage crop into a fall-seeded small grain). This method is more successful if completed when the soil is not snow covered and is freezing at night and thawing during the day. Traditionally, clovers are the easiest and grasses are the most difficult forages to establish with this seeding method.

Basic Seeding Principles

Regardless of the seeding date or method, there are several important agronomic principles that should be kept in mind when attempting to establish forage crops.

Seeding depth and seed-to-soil contact are critical. A general rule of thumb is that seeds should not be placed deeper than five times their diameter. For most forage crops, seeding depth should not exceed 3/8 inch. Deeper seedings will drastically reduce the number of seedlings that will establish.

After planting, seeds must absorb water from the soil before they germinate. Poor seed-to-soil contact will delay water absorption, allow seeds to dry after absorbing water, and in general cause poor germination and forage establishment.

Recommended seeding rates are designed to compensate for normal forage seed and seedling losses during establishment. Seeding at lower rates than recommended can jeopardize the success of the seeding. Consult the *Penn State Agronomy Guide* for forage seeding-rate recommendations.

Legumes have the ability to convert atmospheric nitrogen into plant nitrogen through a symbiotic relationship with rhizobia bacteria. In many soils, sufficient numbers of rhizobia bacteria are already present to adequately infect legume roots, particularly if the same legume species has been grown in the field within the past few years. Inoculation (adding rhizobia bacteria to the seed prior to planting) is recommended when the legume being planted has not been grown in the field for the past three years. Inoculation is inexpensive insurance that sufficient bacteria will be in the soil for proper nitrogen nutrition of the legume plant. For more details on inoculation, consult *Agronomy Facts 11, Inoculation of Forage and Grain Legumes*.

Use of a nurse crop with spring forage seedings is a common practice. Nurse crops can reduce the potential for soil erosion and weed infestations, but they also can compete with the forage seedlings for light, moisture, and soil nutrients. In addition, there are very few herbicides available for weed control in a small grain/forage seedling mixture. For additional information on herbicides, consult the *Penn State Agronomy Guide* or the appropriate product labels. Producers who decide to use a nurse crop should remember to (1) seed the nurse crop at a reduced rate (e.g., one bushel of oats per acre); (2) avoid nitrogen application, because it will increase nurse crop growth and competition with forage seedlings; and (3) mow the nurse crop off when it is in the vegetative stage or harvest it early (during the milk or early dough stage) to minimize competition with forage seedlings.

Tillage Options

Tillage is not practical on many Pennsylvania fields because of rocks or the high potential for soil erosion. In these fields, no-till seeding is recommended. However, in fields that will be tilled prior to forage seeding, a few guidelines should be followed.

Conventional tillage. Tilling soil that is too wet will make establishing a forage crop difficult, because the resulting soil compaction reduces water movement through the soil and hinders root development. In addition, it is difficult to achieve a fine seedbed or good seed-to-soil contact in soil that is wet at the time of tillage.

A firm and fine seedbed helps regulate seeding depth and improves seed-to-soil contact. However, excessive tilling will destroy desirable soil structure, reduce soil porosity, decrease water infiltration, and increase the probability of soil crusting.

A level seedbed will greatly reduce equipment and operator stress during harvesting. Taking a few minutes to properly adjust the tillage implement to achieve a level seedbed or taking one extra tillage pass to level the seedbed pays dividends over the life of the forage stand.

If weeds have not been controlled previously or are expected to be a problem during forage legume establishment, then the use of a preplant incorporated herbicide may be beneficial. For more information on weed control in

forages, consult the *Penn State Agronomy Guide*.

Response of forage seedings to starter fertilizers (small amounts of fertilizer placed near seeds at the time of seeding) has been inconsistent. Starter fertilizers are generally thought to be beneficial only when there are adverse conditions for seedling development, such as wet and cold soils, soils with low fertility, or soils with poor physical properties. For more information about starter fertilizers, consult *Agronomy Facts 31-B, Soil Fertility Management for Forage Crops: Establishment*.

No-till. No-till forage seeding is ideal for Pennsylvania's topography and soil types. This seeding method can be very successful if a few precautions are taken.

Weed suppression is essential for successful no-till forage establishment. Any green plants present in the field at seeding should be controlled with Gramoxone Extra or Roundup/Ranger herbicides.

A no-till drill is necessary for successful no-till establishment of forages. No-till drills are designed and equipped to seed in soil that has not been tilled. Conventional grain drills should not be used for no-till seedings.

Seeding must be done at the proper soil moisture level. The no-till drill opens a slit in the soil with a disc or narrow shovel. The seed is then dropped into the slit. If the ground is too wet, the slit will not close, resulting in poor seed-to-soil contact. On the other hand, when the soil is too dry it is difficult to get the no-till drill to penetrate the soil and place the seed at the proper depth. For more detailed information on successful no-till forage establishment, consult the *Penn State Agronomy Guide*.

Successful forage seedings have been made with many type of seeders. The method of seeding is not as important as achieving proper seeding depth and good seed-to-soil contact.

PROPER MANAGEMENT OF YOUNG FORAGE SEEDLINGS

From the time the seedlings emerge until they are established, producers often expend large amounts of money and energy to correct problems that should have been corrected months before the forage crop was seeded. When it comes to successful forage establishment, "an ounce of prevention" is truly "worth a pound of cure."

Fertilization. If soil nutrient levels are optimum to high at the time of seeding, then fertilization generally should not be a concern during forage establishment. An exception would be the application of 30 to 50 pounds of nitrogen fertilizer per acre to spring-seeded, pure-grass forage crops in late summer of the seeding year, if production warrants this.

Weed control. Weed control prior to forage seeding will greatly reduce the need for control during forage establishment. However, if weeds are a problem during establishment, then cultural practices (such as harvesting) or herbicides are available to help control them. For more

detailed information about herbicides labeled for use during forage establishment, consult the *Penn State Agronomy Guide*. The best weed control in forages is achieved by maintaining a dense, healthy forage stand through proper fertilization, cutting management, and insect control.

Harvest. The goal of harvest management during forage establishment should be to facilitate the production of a healthy, vigorous crop and to suppress annual weeds that may be in the new seeding. Delaying the initial harvest until the forage plant has flowered will allow adequate root reserves to develop for rapid regrowth and optimum establishment. Harvesting earlier to control weeds will reduce the amount of root reserves and will result in weaker plants. Growers should weigh the consequences of producing slightly weaker plants against the harmful effect of weed competition on forage establishment.

Pest control. Insect damage to grass forages during establishment generally is not a concern. However, legume forages, especially alfalfa, can be devastated by insect feeding. The primary insect of concern is the potato leafhopper, which can reduce the vigor and later performance of alfalfa seedings. Proper monitoring and control, when the economic threshold has been reached, is extremely important during alfalfa establishment. For more information on the potato leafhopper or insecticides for its control, consult *Pest Management Program for Alfalfa in Pennsylvania* or the *Penn State Agronomy Guide*.

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