Guidelines For Seeding New Pastures and Renovating Old Pastures
II: Getting Ready To Seed

This publication is the second of a three part series dealing with seeding new pastures and renovating old pastures. This series of publications outlines the procedures to be followed for successful establishment of pastures and the management practices to be used after establishment to maintain your pastures. The first publication in this series deals with the planning process, weed control and liming and fertilization necessary before you seed. These procedures need to start 6 to 24 months prior to the actual seeding. This publication deals with the steps 5 through 8 that occur just prior to seeding. The third publication in the series deals with the seeding procedures and management practices that should be followed during and after establishment. This series of publications takes you step-by-step through the entire process.

Once the proper planning steps have been completed (broadleaf weed control, soil testing and application of recommended amounts of lime and fertilizer), you can begin the seedbed preparation steps for the actual seeding. But do not take shortcuts in the planning steps such as not soil testing or not applying the necessary lime and fertilizer in order to save time and plant sooner. Shortcutting the planning steps typically leads to seeding failure or less than satisfactory stands.

Proper Field Preparation to Prevent Poor Pasture Establishment and Performance

5. Graze and/or Clip Close

This is the one exception in pasture management when overgrazing is beneficial. Intensive, close grazing and/or frequent close clipping during a period of several weeks prior to a late summer seeding or during the fall prior to late winter seeding will assist in suppressing competition from existing vegetation.

Forcing livestock to closely graze unpalatable and/or low quality pastures can reduce animal performance. This is obviously unacceptable for growing or lactating animals but is generally acceptable for dry, mature, pregnant animals. Observe animals for weight loss.

6. Select Suitable Grass and Legume Species to Fit Soil and Site Characteristics

Many factors need to be considered when selecting suitable grass and legume species. Seed of a wide range of grasses and legumes is available and each species has its own particular characteristics, making it more or less suitable for a particular site and purpose. Many forage plantings fail or perform poorly simply because the species chosen for planting is not adapted to the site or the area.

The first and foremost factor to be taken into account when selecting species is the necessity of matching grasses and legumes to the characteristics of the soil on which they are to be grown. Soil type, drainage, moisture holding capacity, fertility, pH, and winterhardiness all have an affect on plant species adaptation. But roducers, farm supply personnel, farm advisors and consultants often select or recommend species based on personal or industry preferences and biases without considering soil and site characteristics.

To illustrate a rather common occurrence, several years ago I was asked to visit a newly constructed horse farm to investigate a pasture establishment failure. It was a beautiful waterfront property fully constructed with new barns, board fences, laneways and roads – pretty much everything a horse owner would want – except green pastures. A typical ‘horse pasture’ mix of about a half dozen grasses and three or four legumes had been seeded,

but by mid-summer of the year after seeding, very few of the desirable grasses and legumes seeded remained. Pastures were mostly either bare soil or crabgrass and weeds.

It was readily evident that most of the soil on the farm was very poorly drained and unsuited for orchardgrass, bluegrass and white clover as the owner desired. Other species in the mixture such as perennial ryegrass and timothy were not adapted to the region (hot, dry summers). The species that were adapted to the soil and site characteristics – tall fescue, reed canarygrass and alsike clover – were not acceptable to the owner. A large investment was made in land and facilities that could never produce the desired outcome.

The foremost consideration before purchasing the land should have been the soil and site characteristics and suitability of the land for the grass and legume species the owner desired for pasture. That thought never crossed the mind of the owner until the land had been cleared and construction of buildings, fences and facilities completed – a costly mistake. Unfortunately, this example is not an unusual occurrence, particularly with small and part-time farmers.

Among the questions to be addressed in the process of selecting adapted grass and legume species are:

- What are the soil limitations of each field in the grazing system?
- Is drainage a limiting factor any place on the farm? Poorly drained soils place stresses on plant root systems. Species differ in their ability to persist on poorly drained soils.
- Are fertility and pH limiting factors? It is important to know not only what the fertility and pH limitations are, but also to know where they are (which fields). Old, permanent pastures typically have low pH and fertility, severe limitations especially for legume production. Soil pH and fertility are correctable limitations but keep in mind that it may take 2 to 3 years or more for surface applications of lime and fertilizer to effectively change levels in the root zone.
- Are rooting depth and topography limiting factors in any of the pasture fields? Shallow soils are droughty and they will stress plants during hot, dry weather. Steep slopes limit access and operation of equipment for liming, fertilizing, clipping, etc

Choosing the forage species or mixture to plant is extremely important because it will affect efficiency of production for the entire life of the stand. Decisions must be made in the context of your individual farm, because each farm is unique. In addition to matching the plants to the soil and site characteristics, the kind and age of livestock being fed (beef cows and calves, growing or fattening animals, dairy cows, sheep, horses or perhaps some combination), the time of year in which it is to be used, and the seasonal distribution of forage growth also have an influence in determining which forage species to plant.

It is possible to develop pasture systems for much of the Mid-Atlantic Region which will provide year-round grazing and a reasonably uniform forage supply. Such systems use more than one forage species or mixture and should be organized to fit the needs of your particular farm situation. The most productive and highest quality pastures are generally those that contain an improved, highly productive grass species with one or more legumes. To reduce fertilizer costs, legumes can be grown with the grass to supply nitrogen. If you wish to do this, legumes should make up at least 25% of the forage and 40 to 50% is even more beneficial. Legumes, in addition to their contribution of high protein feed, fix atmospheric nitrogen and thus reduce the need for nitrogen fertilizer. When the legume component drops below 25%, a decision must be made to either add nitrogen fertilizer or reintroduce legumes.

High quality seed is essential for good forage stands. Certified seed should be used to insure varietal purity and high seed quality.

7. Inoculate Legume Seeds

Inoculation of legume seeds with appropriate strains of nitrogen-fixing bacteria is essential for successful legume establishment. A little extra time and effort invested in a thorough job of inoculating the seed usually pays off.

Inoculants should be stored in a refrigerator from time of purchase to time of use. The seed dealer should also have stored the inoculant in a refrigerator or cooler. The rhizobia bacteria are living organisms that can be killed

at high temperature. Also check the expiration date on the inoculant package. Do not purchase out-of-date inoculant.

Sugar water can be used as an adhesive to hold the inoculant on the seed. Sugar water is much more effective than milk, colas, water, etc. Soft drinks, being acidic, can be detrimental to the rhizobia. The equivalent of 2 cups of sugar per 1 quart of water makes a very effective adhesive. Thoroughly moisten the seed and then add the inoculant. If the seed is too moist to flow through the seed hopper, mix in cornstarch until the seed flows freely. Sugar water and cornstarch have the added benefit of providing a substrate for the bacteria during legume seedling establishment. Various commercial inoculation products are also available and can be used effectively.

If you purchase pre-inoculated seed, likewise be sure that the inoculation is not out-of-date.

8. Prepare a Proper Seedbed

Common terminology used to describe forage seeding methods include conventional, no-till, broadcast, drilled, cultipacker, frost and walk-in or tread-in. Two or more of these terms might describe a seeding. For example, conventional seedings might be broadcast-seeded or drill-seeded. The same with no-till seedings. Seeding methods will be categorized here by the type of seedbed – tilled vs. no-tillage. The erosion potential of a field needs to be considered before choosing a tillage method. Primary tillage implements like the moldboard plow, chisel plow and heavy disks bury much or all of the surface residue, leaving bare soil subject to runoff and erosion, especially on sloping fields.

A. No-till Seedings

If productive species are not present in the existing sod and both the grass and legume species must be seeded, then late summer seeding with broadcast applications of paraquat (Gramoxone Inteon) or glyphosate (Roundup Weather Max, Touchdown Total or other labeled glyphosate formulation) are recommended. If an adequate stand of productive grasses such as orchardgrass or tall fescue is present and the renovation is primarily for introducing legumes, then late winter/early spring seeding without the use of a herbicide is possible.

L*ate summer seedings with herbicide to suppress competition*

If 2,4-D and/or dicamba or other broadleaf herbicide was applied the previous fall, the existing vegetation is annual grasses and broadleaf weeds, and if close grazing or mowing has been done, apply 1.0 to 2 pints (0.25 to 0.50 lb. active ingredient) of paraquat (Gramoxone Inteon) in 20 to 60 gallons of water per acre in mid-July. A second application of paraquat will be made 4 to 6 weeks later, at the time of seeding. Always use a nonionic surfactant with paraquat.

If broadleaf herbicide was not applied the previous fall but close grazing or mowing has been done, apply 2,4-D and/or dicamba or other broadleaf herbicide in mid-July as outlined in step 2 of *Guidelines for Seeding New Pastures and Renovating Old Pastures: I. Plan Before You Seed.* Apply 1.0 to 2 pints (0.25 to 0.50 lb. active ingredient) of paraquat (Gramoxone Inteon) in 20 to 60 gallons of water per acre 3 to 6 weeks following application of 2,4-D and/or dicamba or other broadleaf herbicide. Remember to always use a nonionic surfactant with paraquat. Seeding should be done immediately.

If broadleaf herbicide was not applied the previous fall nor was close grazing or mowing performed, then apply 1.0 to 2 pints of paraquat 7 to 10 days following application of 2,4-D and/or dicamba or other broadleaf herbicide. Allow the grass and germinating weeds to recover and grow 2 to 6 inches. Then make a second application of 1.0 to 2 pints of paraquat at the time of seeding (2 to 4 weeks after first application). Always use a nonionic surfactant with paraquat.

If perennial weeds such as quackgrass are present, glyphosate (Roundup Weather Max, Touchdown Total or other labeled glyphosate formulation) should be used in place of the 2,4-D/dicamba and paraquat applications. Glyphosate is a nonselective translocated herbicide and will control many annual and perennial grasses and broadleaf weeds plus many tree and woody brush species. Application must be made when the target weeds are at the correct stage of growth for most effective control, thus seeding should be timed accordingly. Apply 0.50 to 3.1 quarts (0.50 to 5.0 lb. active ingredient) of Roundup Weather Max, 0.35 to 3.5 quarts (0.50 to 5.0 lb active ingredient of Touchdown Total, or labeled rates of other glyphosate formulations, in 10 to 60 gallons of

water per acre. Rate varies depending upon weeds to be controlled. Seeding should be delayed at least 7 days after application to allow proper translocation into underground plant parts.

Note: Since new herbicides are constantly being developed and formulations of existing herbicides frequently change, consult with local Cooperative Extension, Natural Resources Conservation Service/Soil Conservation District, or farm supply/commercial applicator personnel for more specific current recommendations. Current herbicide recommendations can also be found on the Web at http://www.agnr.umd.edu/MCE/Publications/EB237online/index2.cfm.

Late winter seedings without herbicide to suppress competition

Seedings of red clover can be made without the use of paraquat provided that seeding is done before the grasses initiate spring growth. Red clover seed germinates quickly and seedlings are much more vigorous than most other forage legume seedlings. Thus, if red clover is planted before the grass starts to grow, the seedlings can become established and compete successfully with the existing grass. This will work best where grass stands are thin or where the grass sward was heavily grazed during fall and early winter. On well-drained soils where puddling is not a problem, the trampling effect of the grazing animal may actually improve seed/soil contact, but animals should be removed when germination of the seeded legume begins.

B. Tilled Seedbed Seedings

Tilled seedbed seedings are sometimes referred to as conventional seedings since conventional tillage practices (plowing, disking, harrowing, etc.) are used to prepare the seedbed. The purposes of tillage are to loosen the soil (alleviate compaction and aerate the soil), eliminate existing vegetation, turn under surface weed seeds, incorporate lime and fertilizer into the soil, and provide a smooth surface for harvesting operations. Any tillage sequence that controls weeds and provides a firm seedbed with just enough loose surface soil for shallow seed placement with good seed-soil contact is satisfactory.

Tillage that leaves some residue on the surface will provide better conditions for developing seedlings than an overworked seedbed with no residue or mulch. However too much surface residue or trash can result in too shallow seed placement due to seeding units riding on top of the residue. Cloddy or trashy seedbeds are usually too rough or uneven for uniform depth control and seed placement and are too coarse for good seed-soil contact. Overworking the soil (too much tillage) results in fluffy, powdery seedbeds that dry out quickly and may be too fine, increasing the potential for surface crusting following rainfall and poor seedling emergence. Crusting is particularly a problem with small-seeded legumes. Small clods or soil aggregates can be beneficial to prevent soil crusting. The primary problems with conventionally tilled seedbed seedings are soil moisture loss during tillage and the soil erosion potential until the seeding becomes established. It typically take 4 to 6 months or more for tilled soil to settle and the surface become firm enough for grazing.

The three most common methods of seeding on tilled seedbeds are cultipacker seeding, drill seeding, and broadcast frost seeding. Cultipacker seeders consist of two sets of corrugated rollers with seed-metering boxes or hoppers that drop the seed between the two sets of rollers. The first set of rollers firms the soil into shallow corrugations, seed is dropped, and the second set of rollers splits the ridges of the corrugations, covering the seed and firming the soil over and around it. Cultipacker seeders provide optimum seed placement and good seed-soil contact if seedbeds are properly prepared.

On medium and heavier textured soils, some of the seed remains on the top and sides of the ridges as well as being at the bottom of the corrugations. Since these corrugations are split by the second set of rollers, the seed is distributed across a range of depths from ¼ to 1 inch. On sandy soils, most of the seed falls to the bottom of the corrugations and deeper coverage is obtained as is desired. Cultipacker seeders should not be used on heavy soils having a moist surface because crusting is likely. Adequate soil coverage may not be obtained on seedbeds having heavy crop residues, clods, or stones or with light, fluffy grass seeds such as smooth bromegrass.

Variations of cultipacker seeding include aerial, fluid (or suspension) and broadcast seeding. The ground is cultipacked, seed distributed, and cultipacked again. Distributing seed through sprayers, referred to as fluid or suspension seeding, is a very effective way of broadcasting seed uniformly over large areas in a short time, usually by custom applicators.

Grain drills with grass and legume seed attachments and seed tubes extending to the ground can accurately meter the seed, but controlling the depth of seeding can be difficult. Seed may be covered too deep, especially if the disks (shovels or hoes on older drills) are set too deep and the seed is dropped near the opener. Seed that falls beneath soil thrown up by the openers frequently is covered with too much soil for the seedlings to emerge, especially if additional soil is washed into the furrow by rain. Drills with press wheels generally provide excellent results if a uniform shallow depth can be maintained. They also work better than cultipacker seeders on fields with crop residue.

Some producers still broadcast seed in late winter on the soil surface of fall-sown small grains. Before the advent of no-till drills this was the common method for seeding alfalfa and other hay crops. Freezing and thawing action (honeycombing of the soil surface with ice crystals) plus rain will cover seed to about the right depth. Frost seeding is successful only during relatively short periods when soil and climate conditions are right.

Some Soil Conservation Districts have drills available for rent. Most of these drills require at least 45 horsepower tractors and some of the larger drills require 75 to 80 horsepower tractors. Check with your local district office for availability. If your district has drills available for rent, get your reservation in early as the waiting lists can sometimes be quite long. Contact information is provided at the end of this publication. Some equipment dealers also rent drills, seeders, and other pasture maintenance equipment. Check with dealers in your area for availability.

Summary

After you have completed each of the steps outlined in *Plan Before You Seed* and in *Getting Ready to Seed*, you will be ready to do the actual planting of the seed. See *Planting the Seed and Management After Seeding* for guidelines on seeding equipment, when to seed, and management during and after establishment.

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Reviewed by members of the Maryland Horse Outreach Workgroup. The Horse Outreach Workgroup was established to provide information to horse owners on pasture and manure management issues. Technical assistance is available from local county Soil Conservation Districts/Natural Resource Conservation Service and the Maryland Cooperative Extension office. The workgroup consists of representatives from local Soil Conservation Districts, Maryland Department of Agriculture, Natural Resource Conservation Service, Cooperative Extension, University of Maryland, the Equiery, and the Maryland Horse Council. The Maryland Department of Agriculture's Office of Resource Conservation provides coordination for the workgroup.

For more information on horse manure management and other soil conservation and water quality practices, contact you local Soil Conservation District. For more information contact your local Soil Conservation District/ Natural Resources Conservation Service/ (SCD/ NRCS) office or county Maryland Cooperative Extension (MCE) office. Addresses and phone numbers can be found at http://www.mda.state.md.us/resource_conservation/technical_assistance/index.php , http://www.md.nrcs.usda.gov/contact/directory or http://extension.umd.edu or check the listing County Government for SCD/MCE or US Government, Department of Agriculture for NRCS of the phone book blue pages. January 2007