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Improving Pasture by Frost Seeding

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Frost seeding, sometimes referred to as overseeding, is an easy and relatively inexpensive way to establish legumes in existing grass pastures. Frost seeding is simply broadcasting legume or grass seed on existing grass pastures in late winter or very early spring when the ground is still frozen. Freezing and thawing, plus early spring rains, provide the only seed coverage.

Experience and Research Results

Frost seeding is not new. Natural reseeding of birdsfoot trefoil -- along with the “volunteer” appearance of red clover and white clover -- suggests that frost seeding had potential as an easy, inexpensive means for pasture renovation. Some Iowa farmers have successfully frost seeded pastures for many years.

Many states throughout the Midwest report successful legume establishment with frost seeding. And, the technique has been shown to work well in Iowa in numerous research studies and demonstrations.

Frost seeding was first practiced in midwestern states with an extended freeze-thaw cycle in late winter (February through early March). Southern Iowa is more likely to have this kind of weather pattern. In central and northern Iowa, early spring rains are probably as important as the freeze-thaw cycle for coverage of surface-sown seed.

The best frost seeded stands are obtained in Iowa pastures when seed is broadcast on either a bunchgrass sod such as orchardgrass, or in very thin sods of Kentucky bluegrass, or smooth brome grass. Frost seedings are also often successful in bare and disturbed pasture areas. It seems that bunch-type grasses and thin sods offer less competition to legume seedlings than vigorous stands of sod-forming brome grass and bluegrass. Thin sods and bare surface areas are desirable for both freeze-thaw and rain splash coverage.

Frost seeding is not always successful. Frost seeding efforts are often unsuccessful in years with abnormally dry springs and early summer weather. When spring frost seedings fail, usually only a limited amount of viable, hard seed will carry over for germination later in the season.

Research at Iowa State University demonstrates that alfalfa, red clover, birdsfoot trefoil, and sweetclover can be successfully frost seeded into established switchgrass and other tall, warm-season perennial grass stands. Birdsfoot trefoil, however, may be the legume of choice in mixtures with warm-season perennial grasses because of its relatively slow spring growth and low level of competition as compared with alfalfa and red clover.

What Species to Use

Most commonly grown legumes can be established by frost seeding. Because of their greater seedling vigor, red clover, alsike clover, and the white clovers have relatively quick establishment in competition with an existing grass sod. Red clover is widely used in frost seeding and has been proven to be good in establishment. Ladino clover, the smaller leaved white clovers, and alsike clover seem to be similar to red clover in establishment, but they are not as widely used in frost seeding. Clovers are better suited for soils that are not well supplied with lime and are less well drained.

By comparison, birdsfoot trefoil has relatively poor seedling vigor and establishes more slowly than do the clovers. Though birdsfoot trefoil is slow to establish, it is bloat free, longer-lived, and it does well under a wide range of soil conditions. A mixture of trefoil with red clover may be desirable. Red clover establishes quickly and produces well for one or two years, while trefoil stands improve with time and become the dominant legume as red clover dies out.

Red and alsike clover stands often persist well for two growing seasons. Ladino and white clover stands may last three years or more. Birdsfoot trefoil and red and white clovers generally persist in pastures and spread as volunteer plants in later years by natural reseeding.

There is interest in Kura clover for its long persistence in pastures. However, early pasture improvement work with Kura clover indicate that it has very poor seedling vigor, making it a less suitable choice for frost seeding.

Alfalfa seedlings are less vigorous in competition with pasture grasses than in more traditional new hay or pasture seedings. Though frost seeded alfalfa and trefoil stands often appear thin in the seeding year, stand density often improves by the second and

third years. If alfalfa is to be frost seeded, it should be established on soils that are well drained, near neutral in pH, and adequately fertilized with phosphorus and potassium. In optimum soil and growing conditions, yields and quality are high, and stands may last four years or more of rotation grazing.

Annual or Korean lespedeza can be considered for frost seeding in southern Iowa. Lespedeza is tolerant of poor fertility and irregular drainage sites. The seedlings are slow to establish, and generally only contribute to production by mid-to late-summer.

Grasses may also be established by frost seeding, but experience with grasses is limited. The grasses best suited for frost seeding, in order of their chance of success as perennial species, are: timothy, orchardgrass, and tall fescue. While annual and perennial ryegrass have rapid establishment potential, their summer dormancy and erratic winter hardiness make them less desirable candidates for perennial pasture stands. With genetic improvements, the ryegrasses may be more suitable alternatives in future years.

Seeding Rates

Most producers approach frost seeding with the attitude that they are attempting to establish the legume or grass species as a new component in a mixed stand. Thus, their seeding rates are usually just a fraction of that used for a pure stand of that species in a tilled seedbed. However, the most successful seeding rates for frost seeding into a competing sod are about equal to that used on prepared seedbeds. The use and cost of more seed to overcome reduced seed coverage and less efficient seedling success can be somewhat offset by lower costs for labor, tillage operations, and seeding equipment.

The following seeding rates in pounds per acre are suggested. The lower rate is what producers normally use and should be considered a minimum. The higher rate is nearer that recommended amount for seeding in a tilled seedbed. Iowa research has shown that the higher rate will result in better legume stand densities.

When Frost Seeded Alone

- Alfalfa..... 6 to 10
- Red Clover 4 to 10
- Alsike Clover 1 to 4
- Ladino Clover..... 1 to 3
- Birdsfoot Trefoil..... 5 to 8
- Annual and Korean lespedeza... 8 to 15

When Frost Seeded in Mixtures

- Alfalfa..... 5 to 8
- Red Clover..... 3 to 5
- Red Clover 3 to 6
- Ladino 2 or Alsike2
- Trefoil..... 3 to 6
- Red Clover..... 3 to 5 or Ladino.....2

Management Practices that Lead to Better Success with Frost Seeding

- 1. Select a suitable site.** Frost seedings are more successful in thin grass stands than in dense, vigorous stands because there is less competition for legume seedlings. Clovers and trefoil are better suited than alfalfa for soils that need lime and soil with inferior drainage.
- 2. Control weeds.** If possible, plan a year or more ahead and have broadleaf weeds under control before introducing legumes. Weeds reduce stand establishment and can often be managed only by clipping once legumes are established.
- 3. Test soil and apply needed lime and fertilizer.** Adequate plant nutrients aid establishment and increase yields. Again, plan ahead. If possible, apply needed lime one year ahead of seeding. Nitrogen should not be used the season before or the year of frost seeding because it stimulates grasses and weeds, making them too competitive. Phosphorus and potassium, however, are needed by legumes.
- 4. Graze closely the fall before seeding.** Close grazing reduces grass competition and aids establishment.
- 5. Broadcast seed in late February or early March.** Seeding should be done when the ground is still frozen. Avoid seeding on heavy snow since a fast melt may wash seeds away. The probability of success of surface-broadcast seed decreases with the onset of spring due to higher surface soil temperatures and lower moisture.
- 6. Manage grazing after seeding.** Control of grass and weed competition during the first two or three months of the growing season is critical for the establishment of adequate legume stands. Use moderate, periodic grazing after the pasture sod begins spring growth, but avoid close or continuous grazing. Some mowing may be necessary to help control grass and weeds. After the seeding year, maintain fertility and manage grazing to encourage a productive and long-lived forage stand.

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