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Improving Pasture by Frost Seeding

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.

All commonly grown legumes can be established by frost seeding. Because of their greater seedling vigor, red clover, alsike clover, and ladino clover have quicker establishment than birdsfoot trefoil. 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, they usually are much improved by the second and third years. Trefoil spreads by natural reseeding. Early indications with Kura clover sow very poor seedling vigor making it a poor choice for frost seeding.

Grasses also can be established by frost seeding, but experience is limited. The grasses best suited for frost seeding, in order of their chance of success, are: orchardgrass, timothy, tall fescue, and bromegrass.

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 that frost seeding had potential as an easy, inexpensive means for pasture renovation. Some Iowa farmers have successfully frost seeded pastures for many years. Backslopes of terraces and roadside banks frost seeded with grasses and legumes have had good establishment.

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

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Frost seeding was first practiced in midwestern states with an extended freeze-thaw cycle from late winter through early spring (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 equally important as the freeze-thaw cycle for coverage of surface-sown seed.

The best legume stands are obtained in Iowa pastures when seeded into either a bunchgrass sod such as orchardgrass, very thin sods of Kentucky bluegrass, or smooth bromegrass. 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 bromegrass 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 seeded legumes and grasses often have poor establishment in years with abnormally dry springs and early summer weather. Very little viable seed will carry over for germination later in the autumn.

Recent 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 Legume to Use

Each producer needs to select the legume or legumes best suited to soil conditions and intended use. Alfalfa should be established on soils that are well drained, near neutral in pH, and adequately fertilized with phosphorus and potassium. In optimum conditions, yields and quality are high,

and stands may last four years or more of rotation grazing.

Red clover is widely used in frost seeding and has been proven to be good in establishment. Ladino and alsike clover seem to be similar to red clover, but they are not as widely used. Clovers are better suited than alfalfa for soils that are not well supplied with lime and poorly drained. Red and alsike clover stands last two years. Ladino and white clover stands may last three years or more.

Though birdsfoot trefoil is slow to establish, it is bloat free, longlived, 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.

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, but they contribute to production by mid-to late-summer.

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. Extra seed helps compensate for the reduced chance of good seed coverage and the expense is 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 the recommended amount for seeding in a tilled seedbed. Research shows that the higher rate will result in better legume stands.

When Seeded Alone

- Alfalfa—6 to 10
- Red Clover—6 to 10
- Alsike Clover— 2 to 5
- Ladino Clover—2 to 5
- Birdsfoot Trefoil—5 to 8
- Lespedeza—8 to 15

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Mixtures

- Alfalfa—5 to 8
Red Clover—3 to 5
- Red Clover—3 to 8
Ladino—2 or Alsike—3
- Trefoil—4 to 6
Red Clover—3 to 5 or Ladino—2

Steps to Follow

1. **Select a suitable site.** Chances of success are greater on thin grass stands than on thick, 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 ahead and spray weeds with 2,4-D. Weeds reduce stand establishment and can be controlled only by clipping once legumes are established.
3. **Test soil and apply needed lime and fertilizer.** Adequate plant nutrients aid establishment and increase yields. 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. Although it is not considered necessary, disturbing the soil lightly with a disk in the fall before seeding may help legume establishment.
5. **Broadcast seed in late February or March.** Seeding should be done when the ground is still frozen. Avoid seeding on heavy snow since a fast melt may wash off seeds. The probability of success 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 grass starts growing, but avoid close 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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File: Agronomy 3-3

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.