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# Sod Seeding Legumes Into Grass Pasture

Minnesota has more than 3.5 million acres of unimproved grass pasture that needs to be renovated to improve livestock production per acre.

Legume additions benefit grass pastures by providing nitrogen to grass through symbiotic nitrogen-fixation, by improving feed distribution during the grazing season, by increasing animal intake, and by improving animal performance. Cooperators involved in the Northern Minnesota Beef Demonstration Project have proved that a legume or legume-grass pasture in a grazing system can increase beef produced per acre three to four times over an unimproved grass pasture.

Pasture renovation methods have been available for many years, but have required repeated fall tillage operations including plowing to kill undesired grass and to prepare seedbeds for establishment of desirable legume or legume-grass mixtures. Many unimproved grass pastures are too steep for complete destruction of sod or too rocky for plowing. These limitations have restricted the acceptance of pasture renovation.

## NEW METHODS OF SOD SEEDING

"Sod seeding," also called "interseeding" or "no-till pasture renovation," offers new opportunities for improving permanent pastures. Sod seeding can be accomplished with few field operations. Sod seeding can be accomplished with erosion hazard, and a minimum loss of grazing during the seeding year. New methods of sod seeding require a special drill that opens grass sods and allows shallow seed placement and coverage. Paraquat, a contact herbicide, sprayed on existing grass retards grass growth until new seedlings are established.

## RESEARCH RESULTS AND EQUIPMENT

University of Minnesota research indicates grass pasture productivity has more than doubled by interseeding legumes into grass pasture (tables 1 and 2). Red clover and a lime-coated alfalfa-clover mixture were easiest to establish, followed by alfalfa. Limited success occurred in establishing birdsfoot trefoil. Application of paraquat improved the percent legume established.

Drills for interseeding include Midland Manufacturing's "Zip" seeder, John Deere's "Powr-Til" seeder and Melroe's "No-Till"

Table 1. The influence of paraquat on total 1976 yields and percent legume of interseeded red clover, alfalfa, and birdsfoot trefoil in a Kentucky bluegrass-orchardgrass pasture: North Central Agricultural Experiment Station, Grand Rapids (Interseeded 1975)

| Legumes interseeded | Yield of dry matter in tons per acre |          | Percent legume |          |
|---------------------|--------------------------------------|----------|----------------|----------|
|                     | No. chem.                            | Paraquat | No. chem.      | Paraquat |
| Red clover          | 1.70                                 | 2.59     | 33             | 47       |
| Alfalfa             | 1.16                                 | 1.15     | 19             | 29       |
| Birdsfoot trefoil   | .98                                  | 1.24     | 12             | 18       |
| Check               | .98                                  | -        | -              | -        |

drill. No-till corn planters can be used by narrowing to 30-inch or narrower rows. (Splitting the no-till strips in a second trip over the field gives desirable row spacings of 15 inches or less.) Legume seeds are metered through the granular insecticide boxes and dropped in front of the press wheels.

Table 2. The influence of paraquat on 1st cutting yields and percent legume harvested in 1976<sup>1</sup> from interseeded red clover, alfalfa, birdsfoot trefoil and crownvetch in brome, orchard, or reed canarygrass pastures: Rosemount Agricultural Experiment Station (Interseeded 1975)

| Legumes interseeded                          | Yield of dry matter in tons per acre |          | Percent legume |          |
|--|--------------------------------------|----------|----------------|----------|
|  | No. chem.                            | Paraquat | No. chem.      | Paraquat |
| Red clover                                   | 1.58                                 | 1.82     | 44             | 51       |
| Alfalfa                                      | 1.21                                 | 1.15     | 17             | 27       |
| Birdsfoot trefoil                            | .80                                  | 1.01     | 7              | 11       |
| Alfalfa-clovermix <sup>2</sup> (lime-coated) | 1.48                                 | 1.71     | 37             | 43       |
| Check  | .74                                  | -        | -              | -        |

<sup>1</sup>Drought limited regrowth for additional cuttings.

<sup>2</sup>Prepared by Northrup King Co.

## STEPS TO FOLLOW

A number of precise management practices are necessary for successful pasture interseeding:

**Site Selection.** Interseeding can be equally effective on unproductive and productive grass pastures. Orchardgrass and quackgrass are very competitive, especially during cool, moist temperatures, and make legumes difficult to establish. An excellent stand of 6-year-old smooth bromegrass was least competitive to legume establishment compared with reed canarygrass and orchardgrass at Rosemount.

**Soil Test.** Collect representative soil samples to determine lime, phosphorus, and potassium needs. Soil samples can be sent to the Soil Testing Laboratory, 1529 Gortner Ave., University of Minnesota, St. Paul, MN 55108.

**Apply Lime and Fertilizer.** A soil pH of at least 6.5 is best for legumes. Birdsfoot trefoil, red clover, alsike clover, and ladino clover are more tolerant of acidity (minimum soil pH of 5.8) than alfalfa. Few research results are available on the effect of surface lime application on establishment of interseeded legumes. Limited research indicates that lime must be applied and incorporated 6 to 12 months before seeding legumes. Lime can be applied before interseeding, but its effectiveness may be many years away.

Phosphorus and potassium are critical to legume establishment. Required amounts can be applied with the interseeder or top-dressed ahead of interseeding.

**Control of Broad-Leaved Weeds and Brush.** Weeds can be a serious problem when interseeding legumes in grass pastures. If weeds are allowed to remain, they are stimulated by fertili-

zation and compete with the seeding. Once legumes are established, weeds are difficult to control because broad-leaved herbicides cannot be used.

For best interseeding results, control weeds by spraying during the preceding year. Apply 1 or 2 pounds per acre of 2,4-D; MCPA; 2,4,5-T; silvex; or mixtures of these (follow label instructions) to control broad-leaved weeds or brush with a single application. Weeds should be sprayed when perennials are 6 to 8 inches tall or biennials are 3 to 4 inches tall (usually late May or early June). If additional weed control is needed, apply again in September or October.

If weeds were not controlled the year before seeding and broadleaf weeds are present, spray 2,4-D at ½ to 1 pound active ingredient per acre at least 1 week before seeding. For more details of broadleaved weed or brush control, see Extension Bulletin 400, "Cultural and Chemical Weed Control in Field Crops."

**Graze Closely.** Graze closely or clip closely before seeding to reduce vegetative growth and insure even coverage of grass-suppressing herbicides. Overgrazed pasture makes seeding easier.

**Apply Herbicides to Suppress Grass Growth.** Paraquat is currently the only herbicide cleared for use to suppress grass growth for interseeding. Broadcast spray paraquat at ½ to 1 quart per acre in 18 to 75 gallons of water. Use a wetting agent as indicated on the label for thorough coverage of the foliage.

Paraquat can be used 1 or 2 days before seeding, at seeding time, or no later than 3 days after seeding. For drills which till soil during seeding ("Powr-Til"), paraquat must be applied at least 1 hour before seeding (seeding may begin after leaves have dried). Paraquat will not kill established biennial or perennial weeds. It may kill small, annual broadleaf or grass weeds. Its main purpose is to suppress aboveground vegetation to give seedlings a better chance to develop. Suppression will last 3 to 4 weeks.

**Seed in Early Spring.** Seed as soon as existing grass has come out of winter dormancy and is green and growing. Grass must be actively growing for paraquat to be effective. In 1977, alfalfa interseedings established on April 16 and May 3 were harvested twice before September 1 (compared with only one harvest on a June 1 seeding at Rosemount). Satisfactory results from interseeding can be expected until June 15, unless there are severe shortages of soil moisture.

**August Seedings.** University of Minnesota demonstrations conducted in summer 1976 at five locations in northern Minnesota were unsuccessful. However, drought conditions existed and not enough soil moisture was available to sustain enough summer growth for overwintering. Seed between July 25 and August 10 in northern Minnesota and August 1 and August 15 in southern Minnesota.

**Seeding Rates and Mixtures.** Seed only legumes where grass stands are fair to good. Once legumes are established, grass will thicken and vigor improves. Inoculate all legumes with inoculum before seeding, unless preinoculum is still effective. Check the seed tag for expiration date of preinoculum.

Sometimes legume mixtures may be advantageous, but usually a single species is easier to establish and manage. A small amount of red clover included with alfalfa and birdsfoot trefoil will enhance seeding-year and first-year yields while the slower growing trefoil and alfalfa establish (table 3). Although alfalfa is not as slow to establish as birdsfoot trefoil, interseeding research and demonstrations indicate first-year yields are higher when red clover is added, especially if soil pH is

**Table 3. Interseeding rate suggestions**

| Species or mixture   | lbs/A | Species or mixture       | lbs/A |
|----------------------|-------|--------------------------|-------|
| 1. Alfalfa           | 4-8   | 7. Red clover            | 3     |
| 2. Red clover        | 3-7   | Alfalfa or ladino clover | 1-1 ½ |
| 3. Birdsfoot trefoil | 6-8   | Orchardgrass             | 3     |
| 4. Alfalfa           | 4     | 8. Alfalfa               | 4     |
| Red clover           | 2     | Orchardgrass             | 3     |
| 5. Birdsfoot trefoil | 6     | 9. Alfalfa               | 4     |
| Red clover           | 2     | Orchardgrass             | 2     |
| 6. Alfalfa           | 4     | Bromegrass               | 8     |
| Red clover           | 2     | 10. Birdsfoot trefoil    | 6     |
| Orchardgrass         | 3     | Timothy                  | 2     |

marginal (pH 6.0-6.5) or drainage is limited. On sites suited to alfalfa, seeding only alfalfa is best.

If the grass pasture stand is poor, grasses should be added to alfalfa or red clover to provide enough grass in the pasture after seeding to prevent bloat. Alfalfa and clovers provide a potential bloat problem, while birdsfoot trefoil is nonbloating.

Seeding rates and mixtures in table 4 are minimum rates for interseeding. Research and demonstrations have indicated that interseeding drills which provide loose soil to cover seeds, and which pack this soil over seeds, will aid in establishing excellent legume stands at the lower rates. However, drills which leave some seeds on top of the sod require the use of higher seeding rates. For additional information on seeding mixtures, see "Forage Mixtures," Agronomy Fact Sheet No. 30.

**Managing New Seedlings.** The producer must be patient and use good management to help the forage seedlings become established.

Paraquat turns the original grass brown, restricting growth for 3 to 4 weeks. Label requirements restrict grazing until forage seedlings are 3 inches tall. Thus, grazing is not permitted for 5 to 7 weeks after seeding.

When the grass begins shading the legume seedlings, use a heavy stocking rate for a short grazing time. Avoid overgrazing or grazing for longer than 1 week at a time. If 6-10 cattle per acre cannot be added at once, use frequent clipping by clipping back tall growth to a 4- to 6-inch stubble to control grass growth during the seeding year. Some mowing may be necessary to control weeds.

**Management After Establishment.** After the seeding year, manage grazing to maintain a productive legume-grass mixture. Avoid grazing too early and too closely. Where alfalfa has been seeded, use rotational grazing. For maximum stand life, alfalfa-grass pastures should be grazed with heavy grazing pressures for short durations of grazing. Twenty-five to 30 days of rest are preferred. Rest pastures from September 1 to October 15 to allow legumes to accumulate reserves in their root systems to prevent winter injury.

Fertilize annually according to soil test recommendations. Maintaining adequate levels of phosphorus and potassium is essential to maintaining legume stands.

Use periodic clipping to spread manure and control troublesome weeds.

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