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## Establishing Forage Legumes with Herbicides

Each year Minnesota farmers establish nearly one million acres of alfalfa and legume-grass mixtures for livestock feed. Most of this acreage is seeded with a companion crop such as oats, wheat, or flax. A companion crop is used to help crowd out weeds that otherwise would compete excessively with the forage legumes. However, this companion or "nurse" crop also competes with the forage legumes and often reduces the forage stand.

Most of the companion crop acres are harvested as grain for a cash crop, or the straw is used for bedding and the grain for livestock feed. When the companion crop is allowed to grow to maturity, competition for light, water, and nutrients becomes severe and often kills or reduces the vigor of many forage legume seedlings and reduces forage yields. In Minnesota, most small grain companion crop acres are cut and swathed before combining to allow further drying. If rain delays combining, windrows often mat down over the forage legume seedlings and smother them. Also, the companion crop tends to shatter before or during combining, and thick stands of volunteer grain provide further competition for young forage seedlings.

Seedling legumes generally are poor competitors with weeds. If the seeding is done in the spring, annual grasses such as the foxtails and annual broadleaf weeds such as pigweed and common lambsquarters usually compete aggressively with the legumes. Unless the field is comparatively weed free or unless repeated tillage is used to kill seedling weeds prior to seeding, a herbicide usually is needed.

### Direct Seeding

Seeding alfalfa or other forage legumes alone in early spring with herbicides to control annual weeds is a relatively new method of legume establishment called "direct seeding." With this method there is little or no competition to the forage legumes, and better stands and higher yields are possible in the seeding year and subsequent years.

If alfalfa or other forage legumes are direct-seeded with a herbicide, no forage grasses can be included in the mixture or they will be injured or killed. Direct seeding of alfalfa should not be attempted on steep slopes or other soils where wind or water erosion is a problem. On these sites, a companion crop will give more soil protection and can be used, but it should be harvested as forage before the grain matures.

There are four herbicides cleared for use to control annual grass and broadleaf weeds in direct-seeded forage legumes. These are: EPTC (Eptam), benefin (Balan), and profluralin (Tolban), all preplant incorporated herbicides that will control most annual grass weeds and a few annual broadleaves, and 2,4-DB (Butyrac, Butoxone), which will control many annual broadleaf weeds when applied early postemergence (see table).

Annual grass weeds such as green, yellow, or giant foxtail usually compete more severely with forage legume seedlings than do broadleaf weeds. Therefore, one of the preplant incorporated herbicides should be used to control grass weeds and increase seeding year forage legume yields.

### Selecting a Herbicide

All three of the preplant incorporated herbicides can injure the forage legume seedlings if used at excessive rates for the soil type. Use the lower labeled rate on coarse- and medium-textured soils and the higher rate on fine-textured soils. These herbicides should be thoroughly incorporated into the top two to three inches of soil (see table).

EPTC is the most water soluble of the three, more subject to loss by leaching, and more likely to cause legume seedling injury under irrigation or high rainfall conditions, especially on coarse-textured soils. However, EPTC requires less soil moisture to activate the herbicide and has performed somewhat better under low rainfall conditions. EPTC also has given fair control of a few more broadleaf weeds such as common ragweed, which benefin or profluralin does not control.

### Controlling Perennial Weeds

If perennial weeds are a problem in a field to be seeded to forage legumes, these weeds should be controlled prior to seeding. Herbicides, tillage, or a combination of both can be used. Once forage legumes are seeded, perennial weeds are difficult to control without injury to the crop.

Perennial broadleaf weeds such as Canada thistle, perennial sowthistle, or field bindweed can be treated the fall prior to seeding with 2,4-D, dicamba (Banvel), or a combination of the two. For best results, spraying should be done before a killing frost when the weeds still are growing and temperatures are higher than 50°F. Before seeding pure alfalfa stands, glyphosate (Roundup) can be used to control perennial weeds such as quackgrass or Canada thistle either fall or spring prior to seeding. Spray when there is at least four to six inches of leaf canopy, and allow one week after treatment before tillage and seeding.

### Comparing Advantages and Disadvantages

Direct seeding has several advantages over establishing forage legumes with a companion crop. They include: less competition for legumes, thus better forage stands (especially true for birdsfoot trefoil); more high protein can be harvested per acre in the seeding year; less risk of weeds taking over the stand; and no establishment costs for companion crop.

Disadvantages include: less erosion control with legumes than with grass and legume mixture; no straw for bedding and no grain for potential cash crop; can only seed pure stands of legumes, not legume and grass mixtures; and seeding costs may be higher (herbicide cost).

## Keys to Successful Direct Seeding

Seed in the spring as soon as a good seedbed can be prepared. Alfalfa and red clover can be seeded earlier than birdsfoot trefoil. Birdsfoot trefoil is slower to germinate and has less seedling vigor. For alfalfa or red clover, usual seeding dates are April 15 to May 1 in southern Minnesota and May 1 to May 15 in northern Minnesota. Seeding of birdsfoot trefoil is often delayed two to three weeks after alfalfa or red clover.

Select an adapted, disease resistant species or cultivar. Seed 15 pounds of alfalfa, 14 pounds of red clover, or 10 pounds of birdsfoot trefoil per acre. Red clover and birdsfoot trefoil will tolerate poorly drained soil conditions better than alfalfa. If alfalfa is to be planted on poorly drained soils it is important to select a phytophthora resistant variety.

Apply corrective phosphate and potash, according to soil test needs, before secondary tillage. Apply lime to correct acid soil to a pH 6.8 for alfalfa and 6.0 for red clover and birdsfoot trefoil. Red clover and birdsfoot trefoil require less phosphate and potash than alfalfa. Yearly maintenance applications of phosphate and potash are needed on most soils to keep the stand productive.

Select one of the three preplant, incorporated herbicides — EPTC (Eptam), benefin (Balan), or profluralin (Tolban) — for annual grass weed control. Use the rate recommended for the soil type and apply and incorporate according to the herbicide label. It is best to apply and incorporate the herbicide three to five days before seeding.

Seed at the proper depth, ¼ to ½ inches, into a firm, level seedbed to help ensure seed germination and good seedling emergence.

Scattered annual broadleaf weeds will not compete seriously with forage legumes and likely will be killed by the first cutting. However, if annual broadleaf weeds become a serious problem, apply 2,4-DB (Butyrac, Butoxone) according to label directions when the forage legumes have two to four trifoliolate leaves and when weeds are small.

Harvest the first cutting of alfalfa in the bud to first bloom stage (usually 60 to 70 days after seeding). Birdsfoot trefoil can be cut 80 to 90 days after seeding. Two or three cuts of alfalfa are possible during the seeding year when seeded early and if rainfall is normal.

If the forage legume is seeded in mid to late summer, annual weeds are much less of a problem and seeding without a herbicide is usually possible. If the field is known to be weedy, however, one of the preplant, incorporated herbicides should be used to help reduce weed competition. The seeding should be done by early to mid-August to ensure good root establishment before a killing frost occurs.

Control perennial weeds with herbicides, tillage, or a combination of these prior to establishment.

Insect and disease problems need to be identified and controlled using recommended practices.

### Herbicides for direct seeding of forage legumes.

Crop(s)	Herbicide	Rate lbs/A	Time of Application	Remarks	EPA Limitations on use
Alfalfa; red or alsike clover; sweetclover; birdsfoot trefoil	EPTC	2 to 4	Preplanting incorporation	Incorporate immediately after application.	None
Alfalfa; red, alsike, or ladino clover; birdsfoot trefoil	benefin (Balan)	1 1/8 to 1 1/2	Preplanting incorporation	Incorporate as soon as possible within 8 hours after application.	None
Alfalfa only	profluralin (Tolban)	1/2 to 1	Preplanting incorporation	Incorporate as soon as possible within 4 hours.	None
Alfalfa; red, alsike, or ladino clover; birdsfoot trefoil (amine)	2,4-DB (Butyrac, Butoxone)	1/2 to 1 1/2 (amine)	When legumes have 2 to 4 trifoliolates and weeds are small	Use lower rates for weeds less than 1 inch tall; higher rates for weeds 2 to 3 inches tall.	Do not graze or feed treated crop within 60 days after application.
Alfalfa; birdsfoot trefoil (ester)		1/2 to 1 (ester)			

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