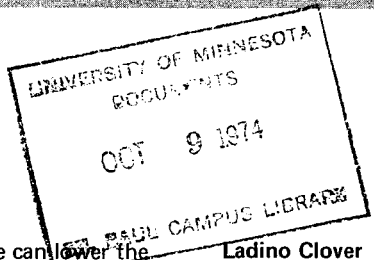


MN 2000 FSA 30



4 AGRONOMY NO. 30-1974

H. J. OTTO and A. R. SCHMID

Forage Mixtures

High per acre yield of good quality forage can lower the cost of livestock production and increase profits. Wise choice of forage plants is the first step in successful forage production programs. Grasses, legumes, or grass-legume mixtures are used for pasture, hay, or silage production. The proper choice will depend on soils, climatic conditions, and intended use.

Usually, mixtures and legumes will provide maximum production of quality forage at the lowest cost. Grasses grown alone require large amounts of nitrogen fertilizer to produce yields comparable to grass-legume mixtures (table 1). This increases cost of production. Legume-grass mixtures are higher in protein than pure grass if no nitrogen fertilizer is applied. Pure stands of alfalfa or clovers in pastures may cause bloat in ruminant animals, so pure stands of these species are usually used only for hay or silage production.

Table 1. Relative yielding ability of grasses and legumes

Grasses and legumes	Percent of yield of alfalfa or alfalfa-grass mixture
Alfalfa or alfalfa-grass mixture	100
Red clover or clover-grass mixture	85-95
Clover (red, alsike, ladino) grass mixture	60-70
Birdsfoot trefoil	65-75
Grass, no nitrogen fertilizer	30-40
Grass, 50 pounds N per acre per year	40-50
Grass, 100 pounds N per acre per year	60-70
Grass*, 200 pounds N per acre per year	90-100

*Tall growing grasses (bromegrass, reed canarygrass, timothy, or orchardgrass).

Under conditions less favorable for alfalfa, such as wet soils or low pH, clovers, clover-grass mixtures, or fertilized grass will yield more in relation to alfalfa.

SPECIES FOR USE IN MIXTURES

Many species of legumes and grasses are suitable for use in forage mixtures in Minnesota. Some of the better ones will be discussed. For more species, improved varieties are available: see Miscellaneous Report 24, "Varietal Trials of Farm Crops" for descriptions.

Alfalfa

Where it is adapted, alfalfa, alone or in mixtures with tall-growing grasses, is one of the highest yielding forage plants available. Alfalfa produces best on well-drained soil with good water-holding capacity and pH of 6.5 or above. It is long-lived and drought resistant. Choose varieties with good winter hardiness, bacterial wilt resistance, and high yielding ability. Varieties with resistance to Phytophthora root rot resistance adapt better to wetter soils.

Red Clover

Red clover is shorter lived than alfalfa. Older varieties usually provide only 1-2 years of hay or pasture production. Newer varieties may persist longer. If alfalfa can be successfully grown, it is a better choice. However, red clover grows on wetter and more acid soils than alfalfa.

Ladino Clover

Although not very winter hardy, it usually survives most winters well enough to contribute to the mixture. Do not use Ladino as the only legume in mixtures. Under conditions favorable for its growth it becomes very aggressive and may increase the bloat hazard.

Alsike Clover

This short-lived perennial tolerates wet and acid soils better than alfalfa and slightly better than red clover. On wet or acid soils, alsike may be desirable even if it does not persist long in the mixture. While it survives, it will provide nitrogen to the grass, thus lowering production costs.

Birdsfoot Trefoil

This legume does not cause bloat and is useful for pasture. It is not as productive as alfalfa, but will survive and produce on wetter soils and soils with lower pH. It starts 2-3 weeks later in the spring so should not be pastured as early as alfalfa. Newer varieties such as Carrol and Leo have more seedling vigor than Empire so are faster and easier to establish. The erect-growing European types of birdsfoot trefoil are not sufficiently winter hardy for Minnesota.

Bromegrass

Smooth bromegrass is one of the most productive, palatable grasses available. It is widely used in mixtures with legumes for pasture, hay, or silage. When used in pasture mixtures, a faster recovering grass such as orchardgrass should be included to increase the grass content.

Timothy

This is one of the most widely used grasses in the humid northern United States. It is quite productive, especially in northern Minnesota. It is easier to seed than bromegrass. A large proportion of the total production usually is in the first harvest. However, if rainfall is adequate and temperature is moderate, timothy will produce well during the summer.

Orchardgrass

Somewhat lacking in winter hardiness, orchardgrass will usually survive if snow cover is available. It has good seedling vigor and recovers faster than bromegrass after cutting or grazing. It is useful in mixtures containing bromegrass, particularly in pastures. Because of its vigor throughout the growing season, it adds grass and thus helps prevent bloat in legume-grass mixtures. It matures early and must be managed carefully.

Reed Canarygrass

Previously considered to be suitable only for low, wet areas, reed canarygrass is one of the most productive grasses on upland sites if adequately fertilized. It contains alkaloids which cause it to be less palatable than other grasses listed earlier. It should be used in pure stands. When cattle are not given a choice, they eat reed canarygrass and produce well on it. Adequate fertility increases productivity of reed canarygrass and may increase palatability.

CHOOSING A MIXTURE

For well-drained soils, alfalfa-grass mixtures are the highest yielding forages available when nitrogen fertilizer is not used. Thus these mixtures should be used wherever the soil is suitable. Clovers can tolerate moderately wet soils and soils of lower pH than alfalfa and are suitable for soils which are uniformly moderately drained. On soils with variable drainage and pH suitable for alfalfa, mixtures of clover, alfalfa, and grass may be used. Clover will predominate in poorly drained areas where alfalfa kills out.

The intended use of the crop will influence the mixture choice. Mixtures containing alfalfa or clover to be pastured should contain 50 percent or more grass to prevent bloat. For strictly hay production, more legume and less grass may be used in the mixture. Pure alfalfa provides the best quality hay and will yield as much as an alfalfa-grass mixture if the stand is good.

ESTABLISHING STANDS

Effective establishment is necessary to obtain good stand with a desirable composition. Many factors, including firm seedbed, shallow seeding, adequate soil fertility, good weed control, use of companion crops, and cutting or grazing management affect stand establishment. For information on stand establishment, see Agronomy Fact Sheet 19, "Establishing Small Seeded Forages."

MAINTAINING THE MIXTURE

To keep mixtures in a productive condition for several years, fertilize according to soil test recommendations. Also manage grazing and cutting to maintain a good balance of the desirable legumes and grasses.

Productive mixtures need fertilizer. The kinds and amounts applied can alter the composition of a mixture. Nitrogen favors grass growth. Phosphorus and potash favor legumes. Nitrogen can be supplied in manure or commercial fertilizer. Liberal applications of phosphorus and potash stimulate legumes in pastures.

Alfalfa stands in a mixture can be severely damaged by close continuous grazing, by too frequent rotational grazing, by grazing too early in the spring, or by grazing too close in the fall. Alfalfa is favored by rotational grazing that allows it to grow 8-10 inches high before grazing in the spring. It should be allowed to regrow 4-5 weeks before subsequent grazing.

Management which allows this regrowth also favors the tall grasses such as brome, orchardgrass, reed canarygrass, or timothy.

For maximum hay and silage yields and quality and persistence of stand, cut alfalfa at the bud to early bloom stage and red clover at the half-bloom stage. Avoid cutting in September and October. If grasses predominate, cut when grass is in head but before flowering.

GUARDING AGAINST BLOAT

Fifty percent or more grass in a legume-grass mixture greatly aids in preventing bloat. Several ways can be used to get more grass in the mixture. One is to use better seeding methods. Many times a fair stand of legumes is obtained but no grass. Where bromegrass is mixed with the grain and seeded from the grain box of the drill, a better stand of brome may be obtained by cultipacking ahead of the drill to prevent seeding too deeply.

If, during the first production year, the percentage of grass in a mixture is low, it may be used for hay and pastured the next year when grasses have thickened. Adding a quick-recovering grass like orchardgrass to a mixture helps increase the grass percent. Nitrogen fertilizer also increases the grass composition.

In pasturing legumes and grasses, bloat hazard may be reduced by: (1) not turning cattle on when they are very hungry, (2) providing some dry material, such as hay, while on pasture, (3) providing plenty of salt and water, (4) use of poloxalene according to instructions.

SPECIFIC MIXTURES FOR PASTURE, SILAGE, OR HAY

Many of the following mixtures can be used for pasture, silage, or hay. They provide grass and legume combinations which will produce high-yielding forages at reasonable cost. In selecting a mixture, choose one that will fit your soil and livestock needs.

Mixture and pounds per acre¹

For moderately drained, well-drained, nondroughty soils

Alfalfa-Grass Mixture

1. Alfalfa 6-8 lbs.
2. Grass 4-9 lbs.
 - a. brome 6² lbs.
 - b. brome 6² lbs., timothy 2 lbs.
 - c. brome 6² lbs., orchardgrass 3 lbs.
 - d. timothy 4 lbs.

Clover-Timothy Mixture

1. Clover 6-8 lbs.
 - a. red clover 8 lbs.
 - b. red clover 5 lbs., alsike 2 lbs.
2. Timothy 4 lbs.

Alfalfa-Clover-Grass Mixture

1. Alfalfa 5 lbs.
2. Clover 3 lbs. (red clover 2 lbs., alsike ½ lb., and Ladino ½ lb.)
3. Grass 8 lbs.
 - a. brome 8 lbs.
 - b. brome 6² lbs., timothy 2 lbs.
 - c. brome 5 lbs., orchardgrass 3 lbs.

Birdsfoot trefoil 6-8 lbs., alone or with

- a. timothy 2-3 lbs.
- b. brome 6 lbs.

Poorly Drained Soils

Clover-Grass Mixture

1. Clover 6-7 lbs.
 - a. red clover 6 lbs.
 - b. red clover 4 lbs., alsike 2 lbs., Ladino ½ lb.
2. Grass 6-8 lbs.
 - a. brome 6²-8 lbs.
 - b. brome 6² lbs., timothy 2 lbs.
 - c. brome 5² lbs., orchardgrass 3 lbs.

Wet Land

Reed Canarygrass 8-10 lbs.

(2-4 lbs. of timothy may be added)

Droughty Soils

Alfalfa-Grass Mixture

1. Alfalfa 8 lbs.
2. Brome 6-8 lbs. plus orchardgrass 2 lbs.

Comments

If used for hay, use less grass. For pasture, brome plus orchardgrass best to help prevent bloat.

Use for silage or hay in short rotation. May be used on soils too acid for alfalfa. Not as productive as alfalfa-grass mixture.

Good mixture if field is variable in drainage and/or pH.

For pasture, silage, or hay.

For pasture or early cut for silage or hay. Germination is sometimes a problem so be sure to check the seed tag.

For pasture, silage, and hay.

¹All seeding rates are based on good seedbed preparation. On poorly prepared seedbed, increase seeding rates. Where precision planting is combined with excellent seedbed preparation, seeding rates may be decreased.

²If bromegrass can be seeded at higher rates (up to 15 pounds per acre) a better stand will result, especially in the first production year.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Roland H. Abraham, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. We offer our programs and facilities to all people without regard to race, creed, color, sex, or national origin.

