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Factsheet

# Successful Forage Establishment

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Forage establishment has left the days of shotgun seeding and a wishful hope for nature's cooperation, but many fields are still lost each year. Dry seasons, winterkill and poor seed are reasons given, but these seldom truly describe the situation. The real reasons why such a high number of seedlings die must be understood and management corrected accordingly.

## SEEDBED PREPARATION

A quality seedbed is the most important feature in obtaining maximum germination of forage seeds. The ideal seedbed features:

(1) surface level enough that machinery can place seed at a satisfactory depth;
(2) enough fine soil aggregates to put the germinating seed in close contact with soil and allow moisture to migrate to the seed;
(3) soil surface coarse enough to prevent crusting on the surface.

Fall plowing is most beneficial on medium- to fine-textured soils. Subsequent freezing and thawing will improve soil tilth and structure. Spring plowing may leave the soil too loose and allow excessive moisture loss early in the season. Incorporation of moderate amounts of residue insures water infiltration and reduces soil erosion. Excessive residue will leave the soil too loose and increase losses from drought. It should be removed or plowed under with a moldboard plow. Chisel type plows and cultivators leave more residue near the surface than moldboard plows and disks.

Excessive secondary tillage will result in the destruction of desirable soil aggregates which reduce the porosity and decrease the water infiltration.

Cultivators will bring quack grass rhizomes to the surface where drying will help to control them. Disks will cut the rhizomes and cover them, giving rise to many new plants.

## METHODS OF SEEDING AND FERTILIZATION

The aim of any seeding method is to achieve a thick vigorous stand. One of the most precise seeders is the double corrugated roller with the seed box mounted between the two rollers, sometimes called the 'cultipacker seeder'. The first roller makes a groove into which the seed is dropped, and the second roller covers the seed by packing soil around it. A second method is a grain drill with a grass seeding attachment which broadcasts the seed before or after the disks of the grain drill.

A third method is 'band seeding', a modification of the grain drill. This is a technique in which the fertilizer is placed 5 cm directly below the forage seed. The grass seed is sown directly above the band of fertilizer on the soil surface. Drag chains or press wheels may be used to cover the seed and firm the seedbed. Band seeding is especially advantageous in very dry years or in soils of low fertility.

A general recommendation for rapid seedling growth and better stands of all forage species is a band placement of 20 to 40 kilograms of phosphorus per hectare. Higher rates of phosphate should be applied where the soil test indicates a higher requirement. If band placement of fertilizer cannot be made, the alternate procedure is to broadcast the required phosphorus and work it into the soil before planting.

In the fall of the establishment year additional phosphorus and potassium is usually required to achieve the desired yield in the first full year of production. A soil test is necessary to establish the appropriate rate for such applications.

Further information on forage fertilization may be obtained from Ontario Ministry of Agriculture and Food Factsheets, Fertilizer Use in Forage Establishment, Agdex 120/530 and Fertilizer Practices for Alfalfa Production, Agdex 121/542.

## COMPANION CROP OR DIRECT SEEDING

Companion crops have traditionally been used as competition for weeds and to provide a better 'catch' during the year of establishment. Recognition of the feeding value of forages, particularly legumes, has questioned the value of a grain crop. One or two cuts of forage can be obtained in the seeding year under direct seeding.

Companion crops compete heavily with forage crops for light and moisture. Forages in competition with a companion crop may be limited by a shortage of nutrients especially if soil moisture levels are low. The most severe competition will come from a lodged crop. Regardless of the stage of growth, a badly lodged companion crop should be removed soon after lodging. Cutting the grain crop for hay or silage at the early dough stage will remove the largest amount of protein and TDN per acre.

When grazing, the grain should be allowed to grow to about 30 cm in height and then grazed back to 8 to 12 cm. Continuing growth may provide repeat grazing but it may be necessary to spray or clip the weeds.

High rates of nitrogen will produce large amounts of vegetative growth in the grain. The most severe situation occurs when the heavy grain crop lodges where moisture conditions favor grass and legume growth under the lodged grain. Reduced rates of nitrogen will lower the competition from the companion crop by allowing greater light penetration. Lower seeding rates of the companion crop or sowing the companion crop in 35 cm rows, will also tend to increase

light penetration. This is not a direct relationship since increased tillering of the cereal will tend to offset the results of reduced seeding rate.

## MIXTURES vs PURE STANDS

An ideally suited species will nearly always be reduced by introducing competition from another species. Where alfalfa is ideally suited, production will be lowered by introducing other species. When each species is limited by one or more features of soil or climate, a mixture will often do better than a single species. Under variable conditions or poor drainage, another species may add insurance in maintaining high quality and production.

Well-fertilized, high producing grasses often outyield other species, but the limitation for farm use may be quality. The addition of a legume will greatly enhance protein quality as well as limit the cost of nitrogen fertilizer. Every forage mixture should include one grass and one legume. The grass will add insurance and the legume will insure quality. The grass component should be limited to one species since the grasses are widely adapted and very competitive with each other.

## INOCULATION

All legume seeds should be inoculated especially if the intended forage has not been grown on the field for several years or not previously inoculated. Inoculation with rhizobia bacteria will permit the formation of legume nodules on the root converting atmospheric nitrogen to forms which plants can use. Recommended inoculants specific for the intended legume groups must be used to insure efficiency of the bacteria. For example, bird's-foot trefoil and alfalfa require their own inoculants. Inoculants should be applied shortly before seeding, using a sticker such as milk or syrup and a small amount of water. If seed is made too wet, the flow rate in seeding equipment will be affected.

Preinoculated seed adds convenience at seeding time. When stored over 18°C or beyond the expiry date, preinoculated seed must be inoculated again to insure viability of the rhizobia.

## SEEDING DATE

Legumes with a companion crop must be seeded as early as possible in the spring. This allows time for the seedlings to develop into sturdy plants after the grain has been removed. Well-developed forages stand the best chance of winter survival. As a bonus, the grain crop will be most productive with early seeding.

Seeding date of legumes without a companion crop is less critical though best results come with early spring seeding. Moisture supplies are greatest in the spring and plants will develop before summer droughts. Seeding must be done early if you expect a good forage crop during the seeding year. In Southern Ontario seeding after the end of July generally results in reduced legume stands the following year. Legumes seeded after mid-August seldom survive the winter. In Northern Ontario legumes should be direct seeded before the end of June.

Spring seeding of pure grass stands is preferred to insure better moisture levels. Grass may also be fall seeded any time up to mid- or late September in Southern Ontario and mid-August in Northern Ontario. Midsummer seedings often lack sufficient moisture for good germination.

## SEEDING RATES

Recommended seeding rates are designed to compensate for losses incurred under normal stresses with good management. Seeding rates must not be reduced except where the seedbed is very well prepared and moisture supply is adequate. In this case seeding rates may be reduced by 25%. Seed losses are highest in cloddy fine-textured soils during a stress period such as drought. New seed must always be used in place of seed with lower germination.

Seeding ratios in mixtures must be closely followed since these recommendations are designed to make species complement each other. Specific recommendations are available in Ontario Ministry of Agriculture and Food Publication 296, *Field Crop Recommendations.*

## WEED CONTROL

Uncontrolled weeds are a hindrance to the establishment of a strong viable stand of forage. It requires as much or more water to grow a pound of dry matter in the form of a weed as is required to grow good forage. The sprawling nature of a lot of weeds will crowd out or smother the young forage seedlings. Many weed seeds remain viable in the soil for 20 to 30 years; therefore, it is impossible to have a perfectly clean seedbed. Precautions must be taken to prevent as many weeds as possible from competing with the forage crop. In the year of seeding, yields of pure trefoil and alfalfa can be five times or two times higher respectively where weed control is used.

Pure stands of alfalfa and trefoil should be preceded by a preplant incorporated application of Eptam especially where nutsedge and annual grasses are a problem. Thorough incorporation immediately after applying Eptam is important for effective control. One method of immediate incorporation is to mount the sprayer boom in front of a disk which immediately incorporates the chemical in one operation. Eptam must be applied to a dry soil surface to be effective. Quack grass is very difficult to control in the forage stand. The best method of control is to clean up the quack grass in another crop, such as corn, where effective chemicals are available.

Many broadleaf weeds may be controlled in pure or underseeded stands of alfalfa or bird's-foot trefoil with 2,4-DB. It is important not to have more than 3 true leaves on the legume, or damage may result. Under stress conditions of drought or high temperature, lower rates should be used to avoid severe injury to the legume seedlings.

Pure grass stands can be sprayed with 2,4-D to control broadleaf weeds. Grass seedlings, especially under moisture or temperature stress, may be injured by high rates of 2,4-D. Further information on weed control in forages is available in Ontario Ministry of Agriculture and Food Publication 75, *Guide to Chemical Weed Control.*