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Cooperative Extension South Dakota State University

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# **INTERSEEDING AND Modified RENOVATION**

**Cooperative Extension Service  
South Dakota State University  
U.S. Department of Agriculture**

# INTERSEEDING AND Modified RENOVATION

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South Dakota's greatest natural resource is its grassland. There are 25 million acres of pastures and rangeland in the state. However, a vast majority of the native pastures in eastern counties have been overgrazed so much that the more productive grasses have been eliminated and only the less productive remain. Likewise, 70% of the native rangeland is in only fair or poor condition.

Many acres can be improved by complete renovation and seeding of a legume and more productive grasses. However, many other acres are rough and highly erodible. They might be damaged if existing vegetation is removed prior to seeding more productive species. You can use modified renovation on some of these areas without destroying the present cover. This includes deferred grazing, fertilization, weed control, and interseeding with more desirable grasses and/or legumes. One or more methods are applicable in almost every section of the state. (Each is discussed in a separate fact sheet.)

## What Is Interseeding?

Interseeding is the seeding of a legume and/or a more productive grass into a permanent grassland with minimum tillage of the existing sod. (See Figures 1 and 2.) It is done with a machine similar to the one shown in Figure 3.

The addition of the more productive species increases forage production, with the legume (if inoculated) providing part of the nitrogen needed by the existing grasses. At the Pasture Research Center at Norbeck, interseeding in native sod increased forage production 30 to 40%. USDA estimates that a proportion of 35% alfalfa in a pasture will maintain (not increase) the nitrogen level of the soil.

Interseeding of grasses is done for several reasons. The condition of the existing grass may be so low that it does not respond to improved soil fertility resulting from interseeding legumes. More productive grasses that will respond can be interseeded.

In other situations, you may want to establish a more productive grass in a poor pasture. Smooth brome grass, for example, might be interseeded into a bluegrass pasture located on terrain that should not be tilled extensively.

In still other cases, interseeding a grass may speed up the pasture improvement that is done with proper grazing management. For example, deferred grazing of a blue grama-buffalo grass pasture may allow western wheatgrass to become reestablished, but it might take several years. Interseeding with a more productive grass can bring the pasture into better condition in much less time.



Fig. 1. Alfalfa seedlings developing in native range in Harding County 4 months after interseeding.



Fig. 2. Travois alfalfa and Oahe intermediate wheatgrass seedlings 1 month after seeding with winged shovel furrow openers. Clods of sod from furrows soon weather away.



Fig. 3. Interseeder in operation on bluegrass pasture in Lincoln County. Note two sets of seed boxes.

### Where To Interseed

Interseeding can improve low producing pasture or range in many areas where complete renovation is impractical. The area may be too stony, too rough or too erodible for reestablishment. There may be remnants of desirable species that will come back into production if managed properly, or the operator may have no place to keep his livestock during the year of renovation.

In eastern South Dakota, there are many bluegrass pastures without remnants of high producing grasses. Production can be increased by interseeding a legume and one or more high producing grasses. The choice of grasses largely depends on the season of the year that you will use the pasture.

Certain other grassland areas in eastern South Dakota have remnants of desirable grasses. Under a seasonal deferment program, these species may increase, resulting in high-producing pasture. The interseeding of a legume, particularly a pasture-type alfalfa, can furnish a permanent source of nitrogen and add to the total forage produced.

In the eastern half of the state, the use of modified renovation may be a more satisfactory practice to improve grasslands with level or undulating to slightly rolling topography, unless it is too stony.

The vast area of low producing grasslands in central South Dakota is suited to improvement by interseeding. Remnants of high producing species are less likely to be found, slowing down any increase in production through livestock management alone.

Less is known of the interseeding results in western South Dakota. Successful field trials have been accomplished on several sites, but large-scale interseeding on individual ranches is not yet commonplace. There are many sites in this vast range area where present production could be increased greatly. On more favorable sites, complete reestablishment or modified renovation is possible. Plowing may be done for complete reestablishment on non-erodible sites. Modified renovation and interseeding do not destroy the existing vegetation and can safely be used on slopes. Interseeding destroys very little vegetation and can be used on relatively steep slopes; however, it is frequently difficult to obtain good stands on these slopes.

### Crops and Varieties

Native and tame species of grass, alfalfa, and sweet clover have been successfully established. The choice of species and varieties depends on the needs of the ranch as determined by the livestock, the composition of the range to be interseeded, the season of the year that it is to be grazed and by other areas available for grazing.

Most interseeding mixtures will include alfalfa alone or alfalfa mixed with one or more grass species. Alfalfa adds to the amount of forage produced and also furnishes nitrogen for the grass. The alfalfa should be inoculated.

Some strains of alfalfa are better suited for grazing than others. Range and pasture plants must survive drought, severe winter conditions, disease, frequent removal of top growth, and trampling by livestock. Seedlings must have sufficient vigor to establish themselves in the range environment in competition with grasses already present.

Teton, Travois and Rambler alfalfas are recommended because they will remain in the pasture. They also grow at a rate more comparable to grass, which reduces the chances of bloat. Teton and Travois were developed in South Dakota and Rambler in Saskatchewan. All are winter hardy and suitable for interseeding anywhere within the state. Teton is a broad-crowned strain, whereas Rambler and Travois spread by development of a new plant from a root at a distance from the original plant.

In some cases, sweet clover may be interseeded. It has as much seedling vigor as alfalfa and will furnish nitrogen for the grass, if inoculated. It probably will produce more forage than alfalfa during the second year, and there is less hazard of bloat. However, biennial sweet clover plants die after the second year, and stands will be maintained only where the crop can reseed itself.

Choosing the species of grass, if it is needed, depends on several things. Primary considerations include other kinds of pasture available, season of intended use, type of soil and existing vegetation. Oahe intermediate wheatgrass, both fairway and standard type crested wheatgrass, smooth brome grass and Russian wildrye are the important tame species that you can use.

In rangeland, western wheatgrass and green needlegrass are cool-season natives that have been successfully used to improve range condition.

Sudangrass has been used in certain areas where the existing grasses are in very poor condition and the need for mid-summer grazing is critical. Successful interseedings have been made in west central South Dakota, and the carrying capacity of the range was increased considerably for one year. However, sudangrass is an annual crop and therefore will be impractical for most situations.

### Width of Channel for Interseeding

Competition from existing sod must be removed until seedlings of newly planted species become established. You accomplish this by removing a strip of sod. The amount of sod to remove depends on the vigor of the existing sod, the species of crop being interseeded, and the moisture regime. A brome grass

sod, for example, will compete more strongly than a bluegrass sod. If only a narrow strip of brome grass sod is removed, it will fill in before the newly interseeded seedlings can be established. There is less competition for moisture in wider channels. Wider furrows or channels are needed in the more competitive sods and in drier areas.

Alfalfa germinates and becomes established more quickly than tame grasses, and tame grass seedlings develop faster than native grass seedlings. Therefore, alfalfa can be interseeded in narrower channels than the grasses. Alfalfa will become established before the existing sod fills the channels, but grasses may not. Removal of a strip 4 to 6 inches wide and 2 to 3 inches deep has proved to be adequate for alfalfa and several cool-season grasses when interseeded into overgrazed bluegrass or short grass sod. A wider furrow is needed for native grasses. Likewise, wider channels are needed for tame grasses if interseeded into more vigorous sods. Wider channels are needed in dry areas than in more humid regions.

### Row Spacing for Interseeding

Most interseeding of alfalfa in South Dakota has been in rows spaced 20 to 40 inches apart. In the central and western areas, rainfall will not support a dense stand of alfalfa. Consequently, wider row spacings are satisfactory. In areas of higher rainfall, more dense stands of legumes are desirable. Such stands are obtained with narrower row spacing.

The primary objective for interseeding grasses is to establish a more productive species. Since increased production is related to thickness of stand, it may often be desirable to use narrower row spacings for grasses than for legumes.

However, it is seldom possible to have row spacings of less than 20 inches. Many interseeders, especially those with disk-type furrow cutters, throw sod from one row over on the adjacent row if rows are too close. Sod on top of the seed tends to smother new seedlings.

### Fertilizer and Interseeding

If fertilizer is needed, a broadcast application normally will stimulate the existing grass sod, resulting in severe competition with the new seedlings. Therefore, defer any broadcast applications of fertilizer as a general practice until after the interseeded species have become established.

The value of using a starter fertilizer has not been adequately demonstrated for interseeding. A soil test may reveal that native grasslands are low in either nitrogen or phosphorus, or both. If phosphorus is deficient and a legume is being interseeded, it is important that the phosphorus be applied in a band

immediately below or to one side of the seed. If equipment is not available for band application, it usually is best to defer fertilization until after the seedlings are well established.

### Weed Control and Interseeding

Any weeds present should be controlled before interseeding is done, or the weeds may impair the value of the interseeding. Broadleaved weeds should be sprayed with an herbicide before legume seedlings emerge. Any chemical applied after the alfalfa comes up will cause more damage to the crop than to the weed. With early emerging weeds, such as goldenrod, it may be possible to interseed in early May and spray the weeds a week or so later, before the alfalfa and/or grass seedlings emerge. This is not likely to work with weeds such as gumweed that do not emerge until late May or early June—past the optimum time for interseeding. However, these may be sprayed in late June before interseeding is done in the fall.

### Grazing and Interseeding

Deferment of the pasture may not be necessary. Careful grazing can be beneficial. Existing sod may be grazed in the spring before new seedlings emerge, and grazing may be continued until the livestock start to eat or trample new seedlings. Such management reduces competition from old sod and allows seedlings to make normal growth.

### What Is Modified Renovation?

Modified renovation is the solid seeding of a legume and/or more productive grass into a permanent grassland that has been tilled to inhibit plant growth long enough to allow new seedlings to get established.

Modified renovation has been used successfully in demonstrations and by numerous livestock producers. Two different procedures have been followed.

One procedure is to chisel (Figure 4) the sod twice (once lengthwise and once diagonally) early in the spring and seed the alfalfa and grass with a grassland drill (Figure 5).

In a demonstration near Wagner this procedure was used to seed Teton alfalfa and Oahe intermediate wheatgrass into a brome grass sod. The chiseling was done on April 12 and the seeding on April 20. By early June, the brome grass was producing considerable growth, so cattle were allowed to graze it for about a month. In the next year, the untreated pasture produced 1,500 pounds of forage per acre; interseeded pasture (alfalfa in 20-inch rows) produced 2,700

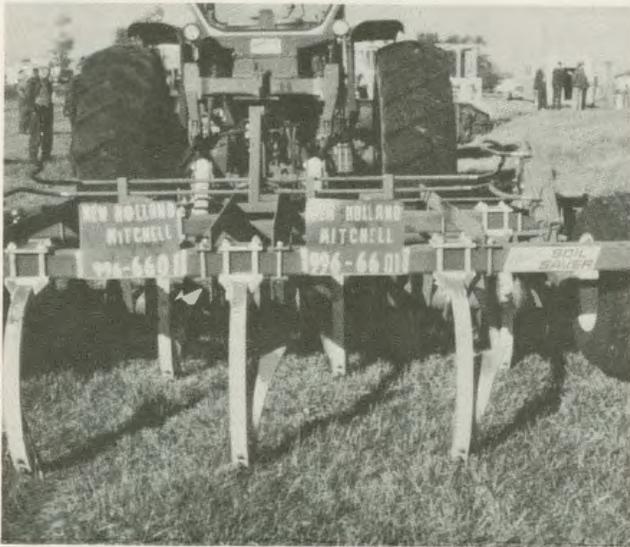


Fig. 4. Chisel plow is useful for preparing seedbed for modified renovation of tame-grass pastures and some native pastures on loamy soils.

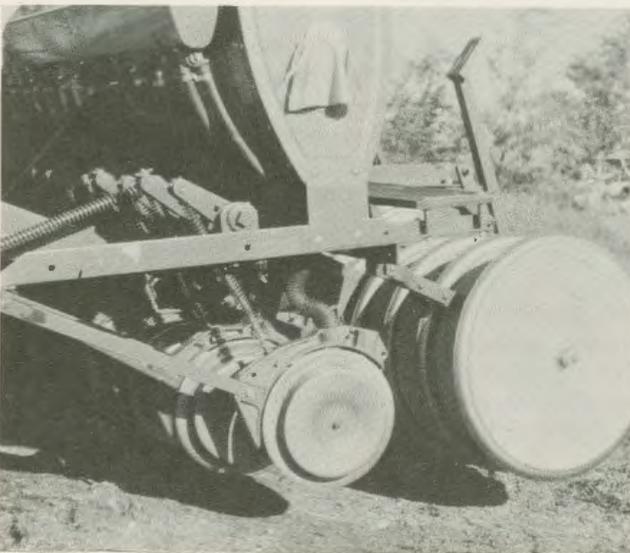


Fig. 5. Grassland drill showing (a) seedbox for small seeded species, (b) seedbox for larger seeded species, (c) depth bands, and (d) packer wheels.

pounds, and the modified renovation treatment produced 4,000 pounds. Four years later, these production differences still existed. Modified renovation left no furrows and was as smooth as the untreated area in the fall after seeding. The interseeded area was furrowed and remained rough for several years.

Another satisfactory procedure that has been used in south central South Dakota is to disk the sod once with a heavy (offset) disk in mid-July and leave it. Disk it again in mid-August and seed with a grassland drill.

In good years, the pasture is ready to graze the next growing season. Some operators have planted hay-type alfalfa and mowed it for hay. Others have planted alfalfa and Oahe intermediate wheatgrass.

The most successful seedings more than doubled the forage production of native range. The tillage killed the unproductive short grasses and stimulated the growth of western wheatgrass, resulting in a mixture of western wheatgrass, intermediate wheatgrass, and alfalfa. It is possible that western wheatgrass will eventually take over. If this occurs, the intermediate wheatgrass and alfalfa provide good forage while the western wheatgrass is increasing in density.

### Rate and Date of Seeding

Seeding rates vary with area, soil type and row spacing. Two pounds of alfalfa and about four pounds of grass seeds are suggested for interseeding in most pastures in eastern or central South Dakota. These rates should be doubled for modified renovation.

Early spring to about the end of May, if moisture is still present, is the best time. August seeding is good if there is moisture, but if the soil is dry, it probably is best to wait until November and then seed in the dry soil. New seedlings will emerge the next spring.

### Seeding Equipment

Regardless of how forage crop seed is planted, it must be sown shallowly in a firm seedbed, and excessive competition from other plants must be removed from new seedlings.

Modified renovation can be done with equipment that is readily available. The tillage must be sufficiently severe to deter growth and competition from existing grass. This can be done with a chisel (Figure 4) or offset disk, one of which is relatively easy to obtain in most areas. The chisel is useful on sites that have been cropped previously or on lighter textured soils, but a disk may be better suited for use on native or on clay-like soils.

A grassland drill (Figure 5) is the best piece of equipment for seeding on rough seedbeds left by the tillage operation. A grassland drill differs from regular double-disk grain drills in that it has depth bands on the disks that make it possible to sow the seed at a depth of  $\frac{1}{4}$  to  $\frac{1}{2}$  inch. It has packer wheels that firm the seedbed over the seed, and it has agitators in the main hopper to ensure even flow of chaffy grasses such as smooth bromegrass. Lastly, it has a seeding attachment for sowing alfalfa and other small-seeded crops. Many SCS districts and some seedsmen have grassland drills available for a nominal rental fee. They are worth the extra cost.

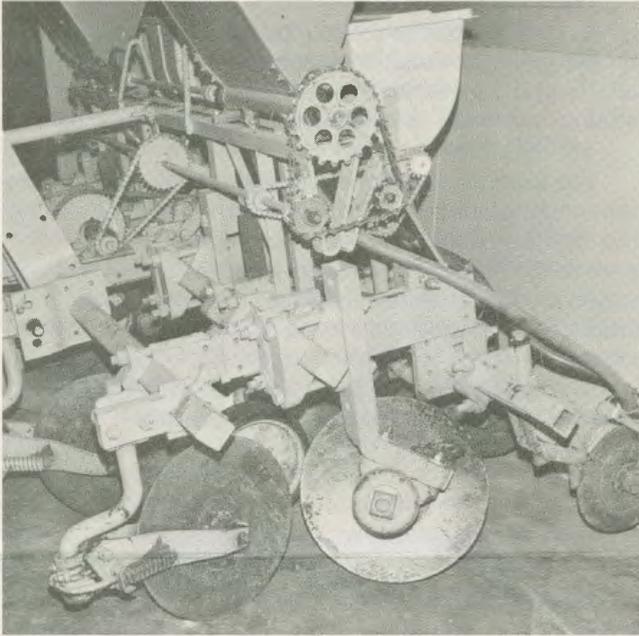


Fig. 6. Closeup of interseeder shown in Fig. 5, with (a) sod cutting coultter, (b) gage wheel for depth control, (c) disk furrow opener or channel cutter, (d) double-disk furrow openers for planting seed, and (e) alfalfa seed box.

Interseeding requires special equipment. Several types of machines give good results. A few are built commercially but most are homemade. The machine in Figure 3 was built by agricultural engineers at SDSU. Plans for building the machine are in Circular 206, "A Machine for Pasture Interseeding." It and others like it have successfully interseeded hundreds of acres of pasture.

Each seeder must have several special features (Figure 6). One desirable feature is a sod cutter or coultter mounted ahead of the channel cutter. The first

essential feature is a channel cutter or furrow opener mounted ahead of each seeding spout to remove a strip of sod. The second essential is a depth control to ensure seeding at a uniform depth. A large seed box is desirable for chaffy grasses and a smaller one is needed for small seeded legumes and free flowing grasses. Other essentials are agitators in the large grass seed box to move lightweight seed out of the box and wide mouthed feeder spouts that will allow feathery seed to flow freely.

The furrow opener may be wide sweep, winged shovels, large disks, 6-inch shovel on deep furrow drill, rototiller, or herbicide applicator. Wide sweeps to cut wide channels may be needed when slow developing native grasses are seeded or when other grasses or legumes are seeded into a vigorous sod. The winged shovels or disks, however, will produce a satisfactory furrow for most interseeding. Sweeps and shovels should both be mounted on break-away beams for use in areas where rocks may be encountered. Disks are better adapted for use in rocky areas; however, the mounting should be flexible enough to allow disks to ride over rocks and the mountings also should have break-away features.

Depth controls should make it possible to plant the seed at a depth of  $\frac{1}{4}$  to  $\frac{1}{2}$  inch below the bottom of the furrow. One type of control may be a device that adjusts the depth of the sweep or shovel that cuts the furrow and has a seeding spout attached to it. Another depth control may be depth bands on the disk or shoe attached to the seeding spouts. It is seldom necessary to have depth bands on disks because they seldom plant too deep in the bottom of a furrow; more frequently, they leave some seed uncovered. Wind and rain generally cover these seeds in a few days or weeks. Another depth control may be a gage wheel that regulates the depth of seeding. Agitators on the grass box are needed to move chaffy seeds out of the box and prevent bridging over the spout.

**Read these fact sheets for more information:**

FS 302, *Grazing Management Based on How Grasses Grow*  
 FS 425, *Fertilizing Pasture, Range and Hayland*  
 FS 426, *Weed Control in Pasture, Range and Hayland*  
 FS 503, *Planting Tame Pasture and Hayland*

FS 546, *Cool Season Grasses for Spring and Fall*  
 FS 547, *Cool Season Grasses for May and June*  
 FS 548, *Warm Season Grasses for July and August*  
 FS 549, *Grasses for Special Purposes*  
 FS 631, *Alternative Pasture and Forage Systems*

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