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## Interseeding for Pasture and Range Improvement

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# INTERSEEDING FOR PASTURE AND RANGE IMPROVEMENT



A 3-year-old stand of Teton alfalfa obtained by interseeding in native range in Faulk County. This is early spring growth. Regrowth after grazing is less erect.

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# FOR PASTURE AND RANGE IMPROVEMENT

FS 422

# INTERSEEDING

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South Dakota's greatest natural resource is its grassland. There are 28 million acres of pastures and rangeland in the state. However, a vast majority of the native pastures in eastern counties have been overgrazed to the extent 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 rapidly by complete renovation and seeding of more productive grasses, yet many acres of rough and highly erodible or stony land must remain under present vegetation. Methods of improving these areas include 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 INTERSEEDING IS

Interseeding is seeding a legume and/or a more productive grass into a permanent grassland with minimum tillage of the existing sod (See Figures 1 and 2). In some cases alfalfa may be interseeded to replace the native legumes that have been killed by misuse of the pasture. In other cases it may be interseeded into a tame grass sod. In each case the most important function of the legume is to take nitrogen out of the air and make it available in the soil where



Figure 1. Alfalfa seedlings developing in native range in Harding County four months after interseeding.



Figure 2. Seedlings of grass seeded into native range with sweep furrow opener.

it can be utilized for increased quality and quantity of grass forage. The U.S. Department of Agriculture estimates that a proportion of 35% alfalfa in a pasture will maintain the nitrogen content in the soil. In addition, the legume contributes to the yield of forage.

Mixtures of either sweet clover or alfalfa with grass produce more forage than either grass or legumes alone. Furthermore, protein content of grass grown in mixtures with legumes is higher than when grown in pure stands.



Figure 3. Travois alfalfa and Oahe intermediate wheatgrass seedlings one month after seeding with winged shovel furrow openers. Clods of sod from furrows soon weather away.



Interseeding of grasses may be done for several reasons. In some cases 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, it may be desirable 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 pasture improvement that could be 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 the more productive grass might bring the pasture into a better condition in much less time.

### WHERE TO INTERSEED

Interseeding can be used to 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 considerably by interseeding a legume and one or more high producing grasses. The choice of grasses would largely depend on the season of the year that the pasture is to be used. Certain other grassland areas in Eastern South Dakota have remnants of desirable grasses and under a seasonal deferment program, these species may increase, resulting in high producing pasture. The interseeding of a legume, particularly a pasture-type alfalfa, also can improve these areas by furnishing a permanent source of nitrogen and by adding to the total forage produced.

The vast area of low producing grasslands in Central South Dakota is better suited to improvement by interseeding than by reestablishment, because of stoniness, or erodibility of soil. Remnants of high producing species are less likely to be found, so that increase in production through livestock management is a slower process.

Less is known of the place for interseeding 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 non-erodible sites, complete reestablishment is possible. On less favorable sites, interseeding has a definite place. This is perhaps a small percentage of the total grassland area, but would provide an opportunity to give the upland sites a seasonal deferment. There also is evidence to suggest that interseeding has a definite place on the upland range sites. 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.

### SUCCESSFUL INTERSEEDING

Successful stand establishment of grasses and legumes depends on time of seeding, type of equipment, rate of seeding and use of adapted variety of proper crop. It is absolutely essential that seed be planted in a *firm seedbed* and that *competition be removed* until seedlings became established.

Although some farmers have obtained good alfalfa stands by applying heavy pressure on the disks of an ordinary grain drill and drilling the alfalfa into bluegrass sod, this method is seldom successful unless the seeding is done when moisture conditions are favorable, very early in the spring and on pastures that have been heavily grazed the preceding fall. Competition from the existing grass sod generally restricts seedling development, resulting in poor stand establishments. This system is less satisfactory for tame grasses than for alfalfa and entirely unsatisfactory for native grasses.

### CROP AND VARIETY

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 existing grass. If that grass is a species that does not respond well to the nitrogen, or if for other reasons existing grass is undesirable, then an improved selection of grass also should be interseeded. The alfalfa should be inoculated.

Because of differences in their characteristics, 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. Ideally, introduced species should be capable of dispersion by vegetative processes as well as by seed.



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 probability 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 in situations 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 pastures available, season of use needed, type of soil and existing vegetation. Western wheatgrass and green needlegrass are cool season natives that have been successfully used. Oahe intermediate wheatgrass, both fairway and standard type crested wheatgrass, smooth brome grass and Russian wildrye are the important tame species that may be used.

Sudangrass may be 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

Competition from the existing sod must be removed until seedlings of newly planted species become established. This is accomplished by removing a strip of sod. The amount of sod to remove depends on the vigor of the existing sod and on the species of crop being interseeded. 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 get established. Wider furrows or channels are needed in the more competitive sods.

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 have proved to be adequate for alfalfa and several cool-season grasses when interseeded into overgrazed bluegrass or short grass sod. A wider furrow would be needed for native grasses. Likewise wider channels would be needed for tame grasses if interseeded into more vigorous sods.

### ROW SPACING

The best distance between rows (furrows) has not been established. To date, most interseeding of alfalfa in South Dakota has been in rows spaced 20 to 40 inches apart. Row spacing will vary with conditions of the existing native pasture, annual rainfall and the intended use of improved grassland. In the central and western areas of the state, rainfall will not support a dense stand of alfalfa. A sparse stand, however will improve soil fertility, so that the existing grass will produce more forage. Consequently, wider row spacings are satisfactory. In areas of higher rainfall, more dense stands of legumes are possible. Such stands add to the forage production of the pasture. In an extreme case, it might be desirable to establish a dense stand of alfalfa in bluegrass sod and cut the legume for hay. Narrower row spacing and higher seeding rate would be required for this use, however, narrow spacings could create an erosion problem in some areas.

The primary objective for interseeding grasses is to establish a species that will produce more forage. Consequently, it often may be desirable to use narrower row spacings for grasses than for legumes.

### FERTILIZER AND INTERSEEDING

If fertilizer is needed, a broadcast application will normally stimulate the existing grass sod, resulting in severe competition with the new seedlings. Therefore broadcast applications of fertilizer generally should be deferred 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, but place it 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. Broad-leaved 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 have emerged. 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.

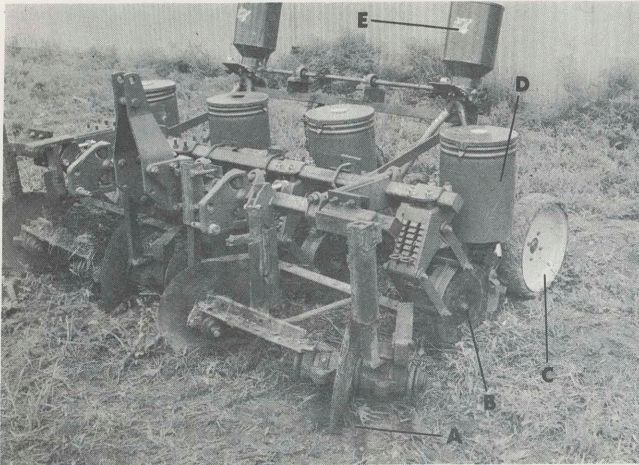


Figure 4. An experimental pasture interseeder shows essential features: (a) sod remover, (b) depth bands on discs, (c) packer and drive wheel for seed boxes, (d) seed box for small seeded legumes or free-flowing grasses, and (e) seedbox with agitator for chaffy seeded grasses.

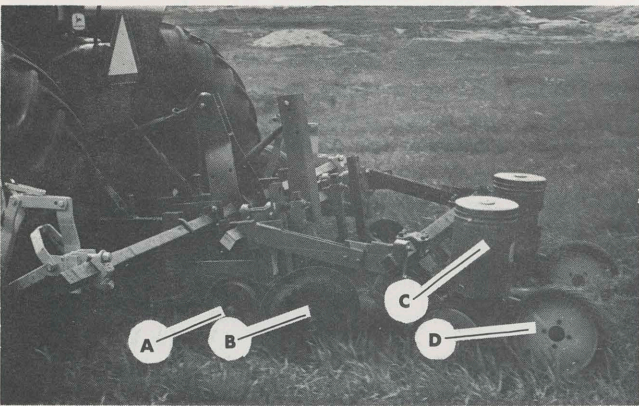


Figure 5. An experimental pasture interseeder showing: (a) depth control, (b) sod remover, (c) seed boxes for seeding small-seeded legume or free-flowing grasses, and (d) packer and drive wheel for seeder boxes.

(Photo courtesy of Henry Waelti, Ag. Eng. Dept., SDSU)

## RATE AND DATE OF SEEDING

Seeding rates vary with area, soil type and row spacing. One to one and a half pounds of alfalfa and about four pounds of grass seeds are suggested for an average pasture in Eastern or Central South Dakota. Early spring to about the end of May, if moisture is still present, is the best time for interseeding. August seeding is good if there is moisture, but if the soil is dry, it probably is best to wait until November and then interseed in the dry soil. New seedlings will emerge the next spring.

The new species are sown in channels at a depth of  $\frac{1}{4}$  to  $\frac{1}{2}$  inch. Complete coverage of the seed in the furrows is not necessary, although desirable, since wind and rain will soon complete the covering process.



Figure 6a. Sweeps mounted ahead of seeding spout to remove wide strip of sod before seeding slow developing native grasses. May be mounted on drill shown above left.

Figure 6. A commercially built range interseeder on which sod removers of various widths may be mounted (See below).

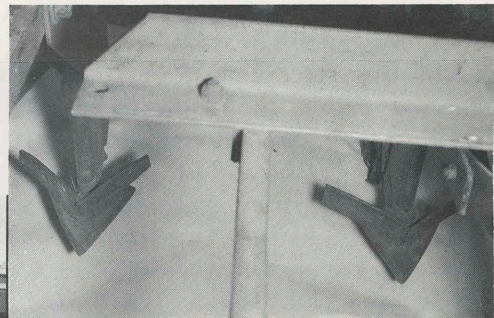


Figure 6b. Corn cultivator shovels with wings welded on either side make suitable furrows for most interseeding in native or bluegrass sods. Weld a supply beforehand. If wings break off, merely change shovels and continue. May be mounted on drill shown above right.



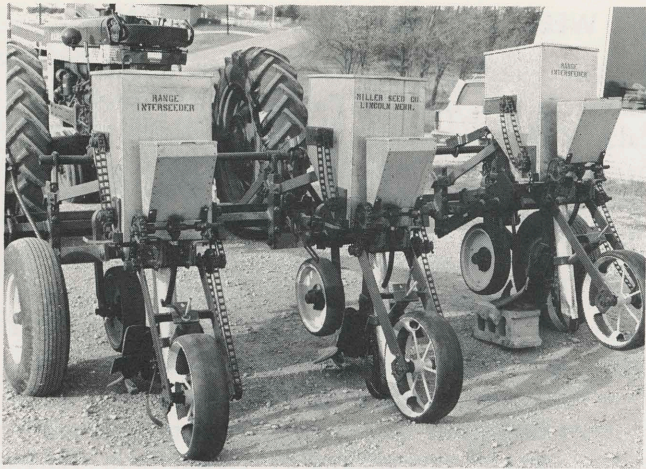


Figure 7. A commercially built range interseeder using several seeding units on a tool bar (Photo courtesy of Miller Seed Co., Lincoln, Neb.).

## GRAZING AND INTERSEEDING

Deferment of the pasture is not necessary if only the pasture-type alfalfas are being seeded.

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 graze new seedlings. Such management reduces competition from old sod and allows seedlings to make normal growth.

When grass also is included in the interseeding, a partial deferment may be necessary. Livestock should be removed during July and August or at any time when they begin to graze the new seedlings. If the pastures are to be grazed during the year of establishment, a light stocking rate is suggested.

## SEEDING EQUIPMENT

Interseeding requires special equipment. The seed must be sown shallowly into a firm seed bed and competition from other plants must be removed from seedlings. Several types of machines give good results. Some interseeders are home-made (see Figures 4 and 5), and others are commercially built (see Figures 6 and 7).

Each seeder must have several special features (see Figures 4 and 8). One feature is a sod 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 a wide sweep (see Figure 6a), winged shovels (see Figure 6b), large

disks (see Figure 9), 6-inch shovel on deep-furrow drill, roto-tiller 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, 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 (see Figure 9) and the mountings also should have break-away features (see Figure 11).

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 (see "b" in Figure 4), or gage wheel that regulates the depth of the seeding. Agitators on the grass seed box (see Figure 10) are needed to move chaffy seeds out of the box and prevent bridging over the spout.

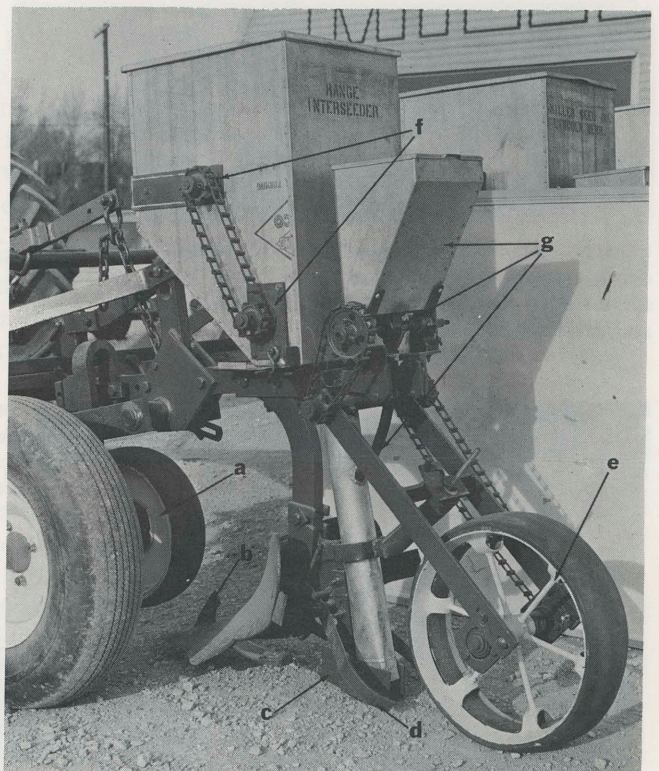


Figure 8. Important parts of a range interseeder: (a) gage wheel to control furrow depth, (b) sweep-type furrow opener, (c) runner to control seeding depth, (d) spring-controlled seed covers, (e) packer and drive wheel for seed boxes, (f) large seed box for the agitator and large seeding spouts for chaffy grasses, and (g) small seed box with fluted feed and small seed tube for small-seeded legumes and free-flowing grasses. (Photo courtesy of Miller Seed Co., Lincoln, Neb.)



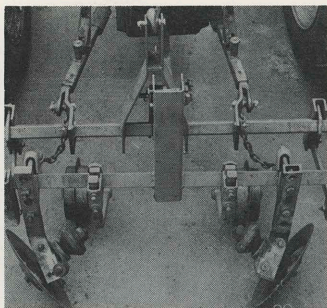


Figure 9. Large disks make suitable channels for most interseeding and may also ride over rocks without tripping like sweeps or shovels do.

(Photo courtesy of Henry Waelti, Ag. Eng. Dept. SDSU)

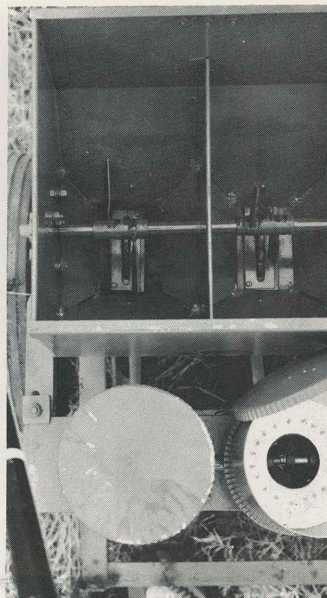


Figure 10. Agitator in grass seed box to move chaffy seed out of box into seeder spots.

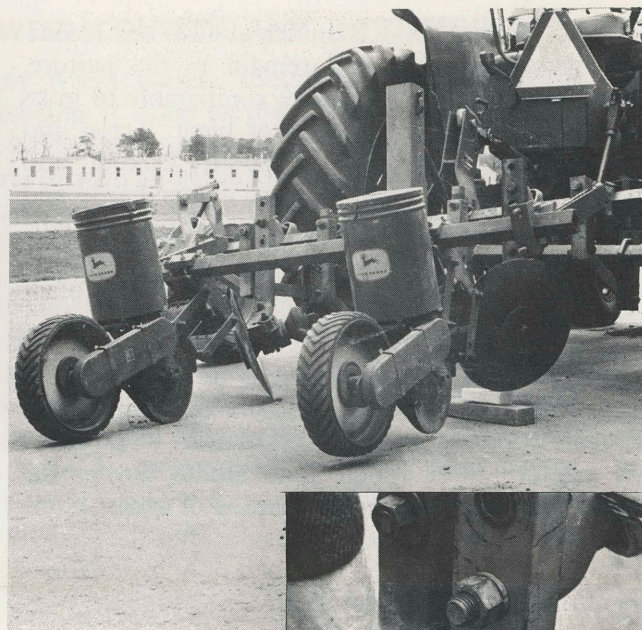


Figure 11. Mountings for disks should be flexible enough to allow disks to ride over rocks and similar obstacles. Disks can be mounted so that they "break-away" when they contact a solid obstacle (see insert at right).

**Read these fact sheets for additional information.**

- Tame Grasses for Pasture and Hay
- Native Grasses for Pasture and Hay
- Planting Tame Pasture and Hayland
- Grazing Management Based on How Grasses Grow
- A Pasture System for You
- Fertilizing Pasture, Range and Hayland
- Weed Control in Pasture, Range and Hayland
- "Proper" Range Use
- Reseed Native Range Grass? Or Plant a Tame Pasture?
- Range Seedings
- Graze Longer and Feed Less Roughage
- My Rangelands — What Kinds? How Good?