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You Can Simplify Oat-Legume-Grass Seeding

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Oat-Legume-Grass Seeding

by T. W. Casselman and J. M. Scholl

ABOUT 15 percent of Iowa's cultivated acreage is planted to forages each year. A recent survey indicates that about 77 percent of the state's farm operators use endgate or centrifugal seeders and that about 23 percent use drills in establishing their forage stands.

The same survey also indicates that the most common method used to establish a forage stand is (1) broadcasting oats on disked cornstalk land, (2) disking again for seed coverage, (3) distributing grass and legume seed on the surface and (4) rolling or harrowing for seed coverage. This method, in use for some time, involves several trips over the field to do the forage-seeding job.

Single Operation . . .

As a means of reducing forage seeding costs, interest has been growing in the possibility of seeding oat-grass-legume mixtures in a single, once-over operation. There has been some hesitation in accepting this practice for two reasons. (1) It seems logical that the smaller, heavier seeds might sift down through larger or lighter seeds—resulting in a change in the ratio of small, heavy seeds such as legumes to the lighter, larger seeds such as oats as the hopper progressed from full to empty. (2) There is a belief that larger seeds should be placed at a greater depth than smaller seeds.

Agricultural engineers and agronomists have been looking into these problems for several years. Dale O. Hull and Maurice Clark reported in the August 1953 issue of Iowa Farm Science on trials with a single-hopper seeder. They concluded that, "...grass-legume seed mixtures—particularly those containing fluffy seeds like brome—will not separate in the hopper and can be seeded as a mixture." More recent tests with other mixtures have supported this conclusion.

Seeding Results . . .

In one test in 1957 we tried a grain drill and a broadcast spreader for ability to seed mixtures without seed sorting or stratification. The mixture used included 50 pounds of oats, 5 pounds of bromegrass, 3 pounds of orchardgrass and 8 pounds of legume seed. Seed was thoroughly mixed before being placed in the hopper, and each machine was given severe shaking by driving over a rough field.

Samples of the seed mixture were taken at the hopper outlet before shaking and at several stages of seed depth in the hopper while the machines were operating (see table 1).

You'll notice some changes in the seed ratios at different stages, but none of the variations are important from a practical standpoint. Any of the samples would have given you an adequate seed ratio for a good forage stand.

Uniform Distribution?

Uniform distribution on the ground of the seed mixture from the hopper, however, is a different matter. There's no problem if you use a drill. The hopper mixture is fed down the seed tubes and placed precisely where you want it. This isn't so with the endgate or centrifugal seeder. You've probably seen strips of brome left by a centrifugal seeder in an alfalfa-brome forage seeding. This is because the light and fluffy brome seeds have more air resistance and don't fly out as far as the smaller legume seeds.

We checked the distribution pattern of the centrifugal seeder used in our tests. The oats and legume seeds covered about a 20-foot swath, while the bromegrass and orchardgrass covered about a 10-foot swath. So, sown in the normal manner, the mixture will result in strips of the two grasses in the forage stand. And, to get a uniform distribution of the grass or grasses would require operating the centrifugal seeder to give

| Table 1. Mixture of grass and legume seed as placed in hopper and as drawn from hopper as seeding progressed. |
|---|---|---|---|
| **Stage** | **Percent of mixture by weight** | **Percent of mixture by weight** | **Percent of mixture by weight** |
| **Grain drill** | **Brome-grass** | **Orchard-grass** | **Legume** |
| As mixed | 75.0 | 7.6 | 4.5 | 12.1 |
| Before shaking | 71.0 | 7.4 | 6.2 | 15.4 |
| After shaking | 70.5 | 7.7 | 5.6 | 16.0 |
| **Hopper full** | 65.2 | 10.0 | 4.5 | 18.3 |
| Before shaking | 72.1 | 8.5 | 6.0 | 13.4 |
| After shaking | 71.8 | 8.1 | 4.7 | 8.4 |
| **Hopper empty** | 75.0 | 6.4 | 5.9 | 12.7 |

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an overlap of roughly 50 percent. This, in turn, would give you a double stand of oats and legumes since you would, in effect, be seeding the wider swath of the oats and legumes twice.

You can counteract this, however, when using a centrifugal seeder for sowing mixtures by cutting the proportion of oat and legume seeds in the mixture by half. Instead of using a mixture of 50 pounds of oats, 5 pounds of brome, 3 pounds of orchardgrass and 8 pounds of legume, use the same amounts of brome and orchardgrass but only 25 pounds of oats and 4 pounds of legume. If your mixture is different from the one we used, simply use half of the oats and legume seed you normally use in your mixture. Then, the 50-percent overlap pattern will automatically give you the proper oats and legume stand.

Seed Depth . . .

We looked into the depth-of-seed placement problems in 1958 and 1959. Using plots on the Agricultural Engineering Farm at Ames, we planted seeds separately and as a mixture (the same as used previously) at various depths to find out what happened under different conditions. Following germination, we counted plants in a given area to determine stand. We also harvested the oats at maturity to determine yield. Table 2 summarizes the results. Planting methods are briefly described at the left and the forage stand and oat yields resulting are shown at the right.

The number of oat plants and grain yield were affected by planting depth in both years. Stands were generally satisfactory when the seeds were planted at least ½ inch deep. Rolling surface-planted seeds with a corrugated roller improved oat stands over the unrolled plots, but results weren't as good as when seeds were planted at a depth of ¼ inch or more.

In 1958 the oat stand and grain yield were reduced substantially when the seed was planted less than 1 inch deep. But this was most likely due to the dry spring of 1958. The grass stands in 1958 were better when the seed was placed ¾-1 inch deep than when sown on the surface and covered by rolling. Rolling aided in improving grass seedling stands, but seeding with a drill was superior to surface seeding. Many seeds on or near the surface sprouted in 1958 but then died because of insufficient moisture.

Moisture conditions in 1959 were more favorable for forage seedling establishment. The best stands in 1959 were obtained when seed was placed at shallow depths and covered by the drill or rolling. Placement depths of legume seeds weren't critical within the range used in these tests. Legume seedings emerged well at all depths used except for unrolled surface plantings. From an overall standpoint, it appears that at least shallow coverage of ½ inch or more is important and that leaving seed on the surface is inferior to covering with a roller.

In Summary . . .

Separation of oat-legume-grass seed in the hopper isn't a problem. Uniform distribution of the seed when sowing isn't a problem when drilling and can be achieved with an endgate or centrifugal seeder by using the overlap procedure suggested. This leaves the problem of planting depth.

We can say generally that oats will emerge and develop satisfactorily when covered to a depth of ¾-1½ inches. Legumes will emerge from a depth of 1 inch. Orchardgrass and bromegrass both do best when covered to a depth of ¼-½ inch. Since all of these depths overlap at about ½ inch, it does seem feasible to plant forage seed mixtures from a single-hopper machine in one operation.

To successfully seed an oat-grass-legume mixture in one trip over the field with a single-hopper machine, remember these points:

- Mix seed thoroughly before putting it in the hopper; scooping 6-8 times from one pile to another will do this.
- Don't plant too deeply; plant at about ¼-½ inch for the small grass seeds and don't worry about the oats and legumes being too shallow.
- If you use a grain drill, "float" the openers to produce a furrow only ½-¾ inch deep; covering chains should be suitable for leaving the seeds in a satisfactory location for germination.
- If you use an endgate or centrifugal seeder, overlap the pattern enough for uniform seed distribution; don't forget to adjust your seed mixture as suggested for this practice. Avoid disk ing for coverage of the legume and grass seed; it will place some of the smaller seeds at too great a depth. A narrow pulled behind the seeder should give adequate coverage to protect it against birds and drying.
- On dry or light soils, firm the soil over the seeds with a roller.

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**TABLE 2. Effect of method of seeding on number of plants and oat yield.**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Year</th>
<th>No. of plants emerging (plants per sq. ft.)</th>
<th>Oat yield (Bu./A.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. (Check)</td>
<td>1958</td>
<td>Brome-grass</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orchard-grass</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legume</td>
<td>11.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oats</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oat yield</td>
<td>61.2</td>
</tr>
</tbody>
</table>

Notes: In 1958 a Gandy distributor was used for treatments F and G and to broadcast seed in treatment A. In 1959 all seeding was done with a grain drill. Red clover was seeded in 1958; alfalfa in 1959. Seedings were made April 8, 1958, and April 9, 1959. Seeding rate in pounds per acre: oats, 50; legume, 8; bromegrass, 5; orchardgrass, 3. Soll: Clarion-Webster; cornstalks disked twice before planting. Fertilizer in pounds per acre: nitrogen, 15; phosphoric acid, 67%. 

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