6-1-1961

# Producing Grass Seed in South Dakota

J. G. Ross

BULLETIN 502

# *Producing Grass Seed In South Dakota*

AGRONOMY DEPARTMENT
AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE, BROOKINGS

# *Producing Grass Seed*

by J. G. Ross[1]

## Introduction

Grass seed production can be a profitable enterprise for many South Dakota farmers.

Weather conditions in South Dakota are extremely suitable. Ample moisture and cool temperatures are the rule in early spring so that large numbers of flowering heads are formed. Later, the dry, warm, breezy days of late June favor abundant pollination and high seed-set.

### Large Market

A large market for grass seed will continue to develop in the Midwest and Great Plains because (1) the practice of pasture renovation is increasing, (2) the advantages of including grasses in rotations are being recognized as a means of maintaining soil structure, (3) more intensive use of western range and pasture lands demands large scale renovation practices, and (4) continuing retirement of cultivated land to grass as a means of restricting surpluses can be expected. Certified seed of outstanding varieties will command premium prices and cost little more to produce than uncertified seed.

As with every enterprise, there are problems. To be successful, the producer must be alert to these and manage so as to minimize the hazards. The important considerations necessary to successfully produce grass seed are discussed in this article.

## Species and Varieties

Select a grass variety for seed production that is adapted to South Dakota conditions. In eastern and central South Dakota, smooth brome grass, intermediate wheatgrass, crested wheatgrass and Russian wild rye may be grown for seed production. In the west smooth brome grass is not as suitable as the other grasses for seed production, except under condi-

[1]Professor of Agronomy

tions of favorable moisture. Reed canary grass is suited to low areas flooded in the spring. Tall wheatgrass will do well on salty soils.

### Field Data Obtained

At the Brookings Experiment Station, seed yields of varieties and strains of smooth brome grass for 1958-60 (table 1) were obtained. The highest yielding strain was Canadian Commercial, which, however, has been shown to be lowest for forage production. This is also true for Manchar. Homesteader, however, has been equal to or higher in forage yield than other named varieties in trials at Brookings and has higher seed yield than other good forage yielders. In these tests, Achenbach has been definitely inferior in seed yield.

Intermediate and pubescent wheatgrass varieties were tested at Brookings for seed production in 1958 and 1959 as shown in table 2. Mandan 759, Amur, Nebraska 50, and Ree wheatgrass in this order, have higher seed yields than other varieties. Mandan 759, an unreleased strain, yielded significantly more than all other varieties except Amur. Amur has a larger seed than other varieties tested.

### New Variety Released

Oahe, a new variety of intermediate wheatgrass, not included in this test, is being released from South Dakota Stte College, and will be described in an Experiment Station bulletin. Oahe yields significantly more seed than any of these shown here and is equal or better in forage production.

### Nordan Yields Highest

In table 3, seed production of varieties of crested wheatgrass are shown for 1958-59 at Brookings. Nordan has the highest yield of any named variety tested. Fairway

**Table 1. Seed Production of Bromegrass Varieties in Pounds Per Acre at Brookings, Sown in the Fall of 1956 in Rows 3½ feet Apart with Five Replications**

| Variety | Harvest Year | | | Average |
|---|---|---|---|---|
| | 1958 | 1959 | 1960 | |
| Canadian Commercial | 557 | 418 | 622 | 532 |
| Mandan 404 | 397 | 451 | 622 | 490 |
| Manchar | 401 | 340 | 539 | 427 |
| Homesteader | 384 | 269 | 524 | 392 |
| Minnesota Syn. B | 339 | 297 | 537 | 391 |
| Wisconsin 63 | 328 | 302 | 517 | 382 |
| Southland | 335 | 145 | 557 | 346 |
| Lyons | 350 | 133 | 539 | 341 |
| Lincoln | 333 | 174 | 483 | 330 |
| Lancaster | 285 | 185 | 472 | 314 |
| Fischer | 272 | 181 | 453 | 302 |
| Wisconsin 55 | 325 | 102 | 386 | 271 |
| Achenbach | 193 | 128 | 437 | 253 |
| Least Significant Difference at 5% point | 108 | 91 | 133 | 108 |

**Table 2. Seed Production of Intermediate and Pubescent Wheatgrass in Pounds Per Acre at Brookings, Sown in the Fall of 1956 in Rows 3½ feet Apart With Five Replications**

| Variety | Species | Harvest Year 1958 | Harvest Year 1959 | Average |
|---|---|---|---|---|
| Amur | Intermediate | 174 | 162 | 168 |
| Nebraska 50 | " | 227 | 101 | 164 |
| Ree | " | 210 | 100 | 155 |
| Idaho No. 4 | " | 164 | 96 | 130 |
| Greenar | " | 139 | 67 | 103 |
| A-12496 | " | 118 | 47 | 82 |
| Mandan 759 | Pubescent | 261 | 125 | 193 |
| Utah 109 | " | 77 | 83 | 80 |
| A-1488 | " | 64 | 91 | 78 |
| Topar | " | 54 | 83 | 68 |
| Least Significant Difference at 5% Point | " | 54 | 83 | 68 |

yielded the least seed of any variety under these conditions.

Vinall Russian wild rye has performed well for seed production. In 1960, 450 pounds of clean seed were harvested from the foundation seed increase field of this variety at Brookings. Under the same conditions, Nordan crested wheatgrass yielded 600 pounds. Field yields of 550 pounds of smooth brome grass were also harvested in the Brookings area in 1960. Yields of this nature were also obtained in other parts of the state where moisture conditions were favorable.

## Grass Varieties Available For Certification in 1961[1]

Smooth Brome grass
Homesteader
Lancaster
Lincoln
Crested Wheatgrass
Fairway

**Table 3. Seed Production of Crested Wheatgrass Varieties in Pounds Per Acre at Brookings, Sown in the Fall of 1956 in Rows 3½ feet Apart with Five Replications**

| Variety | Harvest Year 1958 | Harvest Year 1959 | Average |
|---|---|---|---|
| Mandan 2194B | 234 | 290 | 262 |
| Nordan | 237 | 229 | 233 |
| P-27 | 207 | 240 | 224 |
| Mandan 2359 | 203 | 207 | 205 |
| 42-1 | 269 | 122 | 196 |
| Summit | 222 | 151 | 186 |
| Nebraska 10 | 190 | 171 | 180 |
| Fairway | 208 | 128 | 168 |
| Least Significant Difference at 5% Point | N.S. | 46 | 62 |

Nordan
**Intermediate, Pubescent and Tall Wheatgrass**
Approved certified varieties
**Switchgrass**
Nebraska 28
**Russian Wild rye**
Vinall
**Green Needlegrass**
Green Stipgrass
**Side Oats Grama**
Butte
**Needle-Ricegrass Hybrid**
Mandan Ricegrass

## Planting for Seed Production

For seed production of certified grass varieties, special precautions concerning seeding operations should be followed.

One of the best ways to obtain stands is to summer-fallow and seed in late August on well prepared and well packed land. This is feasible with seed of new varieties which will command a premium price. Seeding in late August on newly plowed and packed land, from which a small grain crop has been removed, is practical when moisture conditions are favorable. Because of the undependability of the moisture supply, this practice cannot be recommended for a new grass variety where the immediate increase of seed is imperative, but it may be satisfactory for seeding many certified varieties when the seed supply is well established.

Spring grain may be overseeded to help catch the winter snow and prevent erosion. Weed competition, the chief hazard after spring seeding, is eliminated when seed is sown in the early fall.

### Row-Seeding Recommended

Seeding in rows in the spring without a nurse crop is also an excellent way to get a stand if the weeds are controlled. A larger yield of seed may be expected the following year from spring seeding than from early fall seeding. Rows should be marked by seeding a small amount of small grain with grass seed so that cultivation may be started early. Placing a small amount of fertilizer such as 16-20-0 just below or to the side of the seed will give the seedlings a good start, but placing it with the seed may harm germination. Modern equipment for side-placing starter fertilizer on corn can be used for this purpose at time of seeding. Seeding of cool season grasses very early in the spring will help the seedlings get well established before the warm season weeds get started. The broad-leaved weeds may be controlled by application of 2,4-D.

When seeded in rows under ideal conditions, 2 to 5 pounds per acre of seed is satisfactory. The more care in seeding, the less seed is necessary. The seed should be sown ½ to 1 inch in depth on well packed soil and soil packed again over the seed.

[1]Grass seed certification standards are described in a bulletin which may be obtained from the Seed Certification Service; South Dakota Crop Improvement Association, College Station, Brookings, South Dakota.

## Stand Density and Available Nitrogen

To take full advantage of the favorable climate for grass seed production, two important elements must be insured—moisture and available nitrogen. Neither is sufficient without the other. The grass plant supplied with more moisture uses more nitrogen; therefore, with the greater rainfall in eastern South Dakota, economical rates of nitrogen application will be higher than in drier western areas.

### Population Affects Yields

Reducing the number of plants per acre will increase seed yield in areas of limiting moisture. For example, in areas with rainfall similar to western South Dakota, spacings of 4 or more feet between rows have been found to be best, while in areas of higher rainfall similar to eastern South Dakota, spacings of 3 feet have given high seed yields.

Under irrigation near Redfield, as would be expected when moisture is not limiting, seed yields of adapted grasses the first year after seeding were highest with the highest plant populations, in this case, at the 9- and 18-inch row spacing (see table 4).

### Wide Rows Increase Yields

Besides conserving moisture, wide-row spacings with clean cultivation make more nitrogen available to each plant and therefore increase the total seed yield. During the first year after establishment, if the row spacings are wide enough, only a small increase would be expected from applying nitrogen fertilizer; but when the stand is older, even though it is kept in rows, increased seed production will result when nitrogen is applied.

**Table 4. Seed Yields in Pounds Per Acre of Grasses Under Irrigation at Redfield**

| Grass | Row Spacing in Inches | | |
|---|---|---|---|
| | 9 | 18 | 36 |
| Smooth brome grass (Homesteader) | 302 | 362 | 237 |
| Crested wheatgrass (Standard) | 519 | 488 | 317 |
| Intermediate wheatgrass (Ree) | 321 | 294 | 201 |
| Tall wheatgrass (Common) | 257 | 266 | 190 |
| Average | 350 | 353 | 236 |

**Table 5. Effect on Seed Yield of Different Rates of Nitrogen Applied to Various Grasses Under Irrigation at Redfield**

| Species | Lbs. of Seed per Acre | | | |
|---|---|---|---|---|
| | No N | 40 #N | 80 #N | Average |
| Smooth brome grass | 252 | 358 | 704 | 446 |
| Intermediate wheatgrass | 122 | 251 | 294 | 222 |
| Reed canary grass | 14 | 23 | 50 | 29 |
| Orchard grass | 40 | 91 | 88 | 73 |
| Tall oatgrass | 92 | 363 | 488 | 314 |

Increased applications of nitrogen fertilizer to grass stands when the moisture is plentiful gives increased seed yields in direct proportion to the amount of nitrogen added (see table 5). This is particularly true of smooth brome grass, intermediate wheatgrass, and tall oatgrass. The hazards in harvesting reed canary grass are illustrated since the low yield shown in this table is a result of loss of seed as it became ripe, so all the seed was not harvested. Orchard grass is not winter hardy and not adapted for seed production in South Dakota, though it did live over the winter in this experiment.

### Nitrogen on Dryland

When nitrogen is applied under dryland conditions, yields may be expected to vary with the moisture available, as previously mentioned. The yields of adapted grasses are shown in various counties of the state in table 6. In all parts of the state, established stands soon become stunted or "root-bound" when nitrogen is not supplied. Marked increases in seed yield were noted at all locations with the exception of Meade County, where sufficient nitrogen was already present for the moisture available

Other experiments indicate that the yield of crested wheatgrass increases more when fertilizer is applied in the fall instead of in the spring. It is important to place the fertilizer near or on the surface since many grass roots feed in the top 2 or 3 inches of the soil. Therefore, application of anhydrous ammonia to grass stands may not increase seed yields as much as nitrogen applied on the surface unless the grasses have deep roots. Wheatgrasses tend to have deeper root systems than brome grass.

### Cultivation Increases Nitrogen

Available nitrogen in old stands can be increased by cultivation or the field may be plowed and seeded to flax and then returned to grass the following year. However, for seed production it would appear to

**Table 6. Effect Under Dryland Conditions of Various Levels of Nitrogen in the Form of Ammonium Nitrate on Seed Yield of Adapted Grasses in South Dakota**

| Lbs. Nitrogen Applied | Crested Wheatgrass | | | Ree Wheatgrass | | Smooth Brome grass Brookings Co. | |
|---|---|---|---|---|---|---|---|
| | Beadle Co., 1951 | Campbell Co., 1954 | Haakon Co., 1953 | Meade Co., 1955 | Deuel Co., 1949 | Upland, 1950 | Bottomland, 1950 |
| 0 | 25 | 70 | 53 | 296 | 55 | 243 | 166 |
| 20 | — | 162 | 143 | 308 | — | — | — |
| 30 | — | — | — | — | — | — | 378 |
| 40 | 187 | 245 | 171 | 292 | — | — | — |
| 50 | — | — | — | — | 178 | 700 | — |
| 60 | 285 | — | — | — | — | — | 553 |
| 80 | — | 323 | 165 | 298 | 173 | 812 | — |
| 90 | — | — | — | — | — | — | 577 |
| 120 | 575 | — | — | — | 142 | 877 | 751 |

be more economical to apply nitrogen and phosphorus than to rely completely on cultivation or renovation.

## Phosphorus

Phosphorus is also important for grass seed production. However, application of fertilizer containing phosphorus has been found to give responses only on bottomland where the high calcium content of the soil has made this element unavailable. In such circumstances, seed production of brome grass fertilized with phosphorus and nitrogen together has been much higher than with nitrogen alone. In general, though yields may not be greatly increased, a heavier and plumper seed is obtained when phosphorus is included with nitrogen. About 20 pounds per acre has been found to be adequate.

## Harvesting Methods

Seed may be harvested most easily by straight combining. This method works extremely well with smooth brome grass—its seed heads become ripe without shattering. Intermediate wheatgrass, crested wheatgrass, and Russian wild rye should be harvested slightly before maturity since much seed will be lost if left to ripen too long. If much green material is present in the seed after straight combining, care should be taken to dry it immediately. This can be done by spreading the seed in a thin layer on a wooden floor such as in a loft of a barn. Artifical drying is recommended where facilities are available.

### Removal of Old Stubble

The previous year's growth should be completely removed to prevent accumulation of disease organisms and allow the new shoots to develop normally in the spring. When an accumulation of dead stems and leaves is left, the number of seed-bearing culms is decreased. A rotary type mower has been found very effective for cleaning off the tops of the crowns after harvest.

## Weed Seed Hazard

Quackgrass in grass seed cannot be removed by cleaning and will make the seed unmarketable. Fields contaminated with this weed should not be harvested for seed.

**Acknowledgement:** Data concerning the effect of fertilizer on yields of grass seed were collected by B. L. Brage, P. L. Carson and L. O. Fine.

5M—6-61—9137