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GOOD SEED FOR RANGE RESEEDING
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Basis of Seed Quality

Good quality grass seed is essential to successful artificial reseeding of range lands. Quality of seed depends primarily upon genuineness, purity, and degree of germination. Genuineness refers to freedom from adulteration with cheaper seed. Fortunately, range grass seed is seldom adulterated, although errors in labeling, due to unfamiliarity of the dealers with the species, may occur. Seed purity is the percentage by weight of uninjured pure seed of the species listed on the label. In a purity analysis seed is separated into pure seed, other crop seed, weed seed, and inert matter which includes such things as broken seed, chaff, and dirt. Germination is the percentage of the pure seed that, under normal environment, is capable of developing into normal plants.

Under ordinary conditions the buyer is not interested in either the purity or germination alone but in the amount of seed that will grow. The pure, live seed content, obtained by multiplying the germination by the purity, represents the real value of the seed. Thus seed with a germination of 95 percent and a purity of 96 percent contains 91.2 percent pure, live seed; on the other hand seed with a germination of 57 percent and a purity of 80 percent contains 45.6 percent pure, live seed or but half as much as the first lot. If there are no other differences the first lot would be worth twice as much as the second lot and would yield as many plants per square foot if seeded at half the rate.

By dividing the percentage of pure, live seed into the cost per pound the actual cost of a pound of pure, live seed can be obtained. If a price of 15 cents per pound is asked for the first lot of seed in the above example, the actual cost of a pound of pure live seed would be 15 divided by 91.2 or approximately 16½ cents. If 10 cents per pound is asked for the second lot the actual price of a pound of pure, live seed would be approximately 22 cents. When the germination and the purity are known, the buyer thus has a guide for determining the real value of the seed.

How to Tell Good Seed

Although all buyers cannot be experts in determining seed quality they can easily learn enough to make intelligent purchases. In buying seed one should consider germination, date of germination test, purity (including noxious weed seed content), seed source, and age of seed and should inspect seed for color and soundness. When purchase is by mail small representative samples of the seed in question can be secured for inspection and testing. Reputable seed dealers can be relied upon to furnish reliable information.

Bright color and clean appearance indicate good seed. Seed which is dirty, moldy, discolored, or musty either in odor or appearance should be avoided as it usually indicates that it is old or diseased, has been badly stored or was harvested under very unfavorable conditions. Poorly filled seed coats and shrunken or shriveled seed should be avoided. Seed coats should be tested with a knife, or pinched between the teeth or the fingernails to make sure that they are well-filled.

If germination is not known it can be tested by most State Seed Laboratories or the buyer can very easily test a sample himself. Count out four samples of 100 seeds each and place them without crowding between clean moist cloth or several thicknesses of paper towels in a covered dish. Since some seed requires light for germination, the cover should be a glass sheet or dish. The dish may be placed in a north window in the house where it is subject to indirect light and to ordinary room temperature. Overheating or direct sunlight should be avoided in germination tests. The cloth or blotters should be kept moist but the seed should not be allowed to stand in water. At the end of 4 to 7 days (depending upon the species) all normal germinated plants should be removed and counted. Counting should be done about twice a week until the seeds have stopped germinating. Germination may continue for three to four weeks. The total count from the four samples of 100 seeds each may be averaged for final germination. If great difference occurs among the four it would be well to run the test again.

Purity can be determined accurately only in a laboratory such as the State Seed Laboratory but the buyer can examine the sample for the presence of weed seeds, broken seed, beards, hulls, straw, chaff, dirt, and other foreign material. Such materials not only affect the cost per pound of pure, live seed, but may prevent the seed from feeding readily through a drill. Attention should be given to noxious or poisonous weed seed although these problems are not generally as serious in grass seed as in other crop seeds. Broken seeds, chaff, dirt, or inert material is merely waste but if weed seed is present it may start a noxious weed infestation. The kind of weed seed present is more important than the quantity.

Where the seed is grown is also important since plants from seed produced in different sections of the country vary widely in forage production and growth habits and in their ability to withstand drought and winter-killing. Locally grown seed usually will produce plants that are best adapted to the particular areas, although seed grown at a considerable distance but under similar climatic conditions may be entirely satisfactory.

Seed of most species useful for range reseeding may be planted the year of harvest with good results. Sometimes a higher germination is obtained if seed is stored for one or two years but this storage is of practical importance for only a few species, notably Indian ricegrass (Oryzopsis hymenoides). On the other hand, seed of most grasses decreases rapidly in germination after 3 to 5 years, and old germination tests on seed may be worthless. Whenever there is a doubt as to the age or germination of the seed a new test should be made.

The value and purity of many light, fluffy, awned, or incompletely threshed seeds can be greatly improved by running them through a hammer mill and such processed seeds are now available on the market. Where these species are to be drilled, the slight additional cost for de-awning is more than made up for in ease and uniformity of drilling and in having chaff and poor seed removed. De-awning does not impair storage qualities of seed.

Seed Characteristics and Standards

The quality of grass seed varies greatly depending on the species, maturity, and the climatic and other conditions during growth and harvest. Recognized standards of purity and germination of seed of most range grasses have not been set up. The information contained in the following discussions is based on the best available sources and should serve as a guide to seed quality. The photographs (Fig. 1) will be of value in identifying the species.

Bluegrass, big (Poa ampla). Seed of this species is harvested from native or recently planted stands in the northwestern United States. Seed is small with 900,000 seeds per pound but should be bright and well-filled. A germination of 80 percent and purity of 85 percent can reasonably be expected. Seed will retain a good viability for approximately 5 years.

Bluegrass, bulbous (Poa bulbosa). This grass produces bulbils or miniature plants in place of seed. Bulbils are produced on the seed heads and harvested and planted as "seed." They vary considerably in size, but average about 480,000 per pound. A purity and germination of 90 percent can reasonably be expected. In home germination tests bulbils may be germinated in the same manner as seed but they require low temperatures, not over 68° F., especially when freshly harvested. Bulbous bluegrass "seed" is produced mainly in the northwestern United States. The bulbils retain a good viability for 5 or more years.

Brome, mountain (Bromus carinatus) is a large-seeded species with only 40,000 seeds per pound. It is collected from native stands throughout the intermountain region and is grown commercially in the northwestern United States. In this case, the native seed is much superior as the imported northwest seed produces considerably less forage and the plants are less hardy. Germination and purity should both be 90 percent or above and good germination should be retained for about 4 years under reasonable conditions. Seed will drill better if first de-awned.

Brome, smooth (Bromus inermis). Most seed of this species comes from middle west and central states although considerable seed is now being produced in the northwestern United States. Seed maintains a good viability for 5 years and although the seed appears dark and rather fluffy it should have a clean, bright color and should be well-filled. Purity should be at least 90 percent and germinations should be 85 percent and in high quality seed should be above 95 percent. There are approximately 135,000 seeds per pound.

Oatgrass, tall (Arrhenatherum elatius) seed is difficult to harvest and to sow. Seed of this species will not feed through most drills unless it is first treated in a hammer mill. Germination percentage is usually above 80 percent and sometimes above 90 percent for about 3 years, after which it begins to drop off. Purity should exceed 80 percent. There are approximately 150,000 untreated seeds per pound. Commercial seed is grown throughout the northern United States.

Orchardgrass (Dactylis glomerata). Seed of this species should have a germination and purity of 90 percent or better. It rapidly loses its viability, and seed older than 3 years should be tested just before purchase. There are approximately 520,000 seeds per pound. Most commercial seed is produced in the central states although small amounts are grown in the northwest.

Timothy (Phleum pratense). There are more than $1\frac{1}{4}$ million seeds of this species per pound. A purity of 95 percent or above and a germination of 90 percent or above can be expected. Seed retains its viability for 6 years or more. Seed is produced mostly in the central or northeastern states.

Wheatgrass, bluebunch (Agropyron spicatum). This species and the closely related beardless bluebunch wheatgrass (A. inerme) are relatively new for reseeding and most of the seed is collected from mixed native stands or from small increase plots in the northwestern United States. Purity and germination should be above 85 percent and may exceed 90 percent. There are approximately 150,000 seeds per pound. Seed should maintain a good viability for 5 years. Seed of bluebunch wheatgrass should be de-awned before drilling.

Wheatgrass, bluestem (Agropyron smithii). Seed of this species, which is also known as western wheatgrass, has a germination and purity that

is highly variable. In high quality seed both may average 80 percent or more, although in some years seed has to be used which germinates as low as 50 percent. There are approximately 105,000 seeds per pound. Correctly stored, seed will retain a good viability for 4 years. Most seed is produced in the northern Great Plains but if it could be obtained, native grown seed would be preferable.

Wheatgrass, crested (Agropyron cristatum). Much good quality, locally grown seed of this species is on the market. Seed should be clean and bright. A few seeds with a greenish cast do not impair its quality. Seed should be well threshed so that all spikelets are shattered. Purity and germination should both be above 90 percent. Under proper storage seed may be expected to retain a good viability for 5 or more years. The standard strain of this species has about 210,000 seeds per pound and the Fairway strain near 400,000 seeds per pound.

Wheatgrass, slender (Agropyron trachycaulum). Seed of this species is produced mostly in the Great Plains but plants from such seed suffer from winter-killing. Best reseeding results have come from planting seed which was collected from native stands or grown locally. Both germination and purity should exceed 90 percent. Average seed retains its viability for but 3 years although some may last much longer. There are approximately 160,000 seeds per pound.

Wildrye, blue (Elymus glaucus). Seed of this species is being produced in the northwestern United States and is just becoming available on the market. Difficulty is experienced in drilling unless the seed has been de-awned. Germination and purity should be 85 percent or above but seed rapidly loses its viability and seed more than 3 years of age should be tested shortly before it is to be planted.

Bulbous bluegrass

Big bluegrass

Mountain brome

Smooth brome

Tall oatgrass

Tall oatgrass (de-awned)

Orchardgrass

Timothy

Bearded bluebunch wheatgrass

Bluestem wheatgrass

Crested wheatgrass

Slender wheatgrass

Blue wildrye

Blue wildrye (de-awned)

Fig. 1. Seeds of 12 grasses commonly used in range reseeding.