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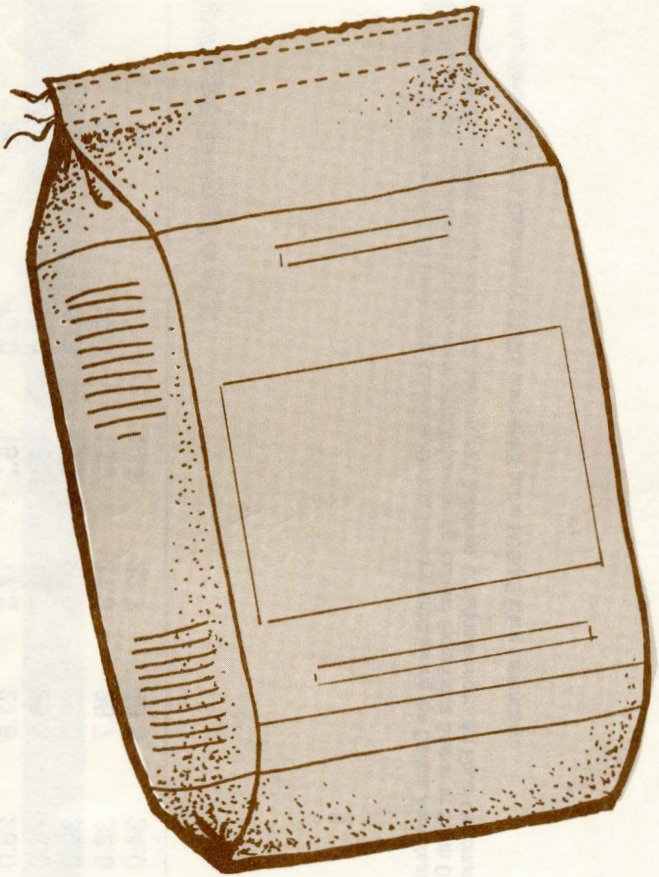

Agricultural Experiment Station
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B 706

Small Grains: Seed Size

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Larger small-grain seeds have greater yield potential at planting time than do smaller seeds of the same variety.

The yield advantage of larger seeds has been positively correlated with early season growth. Mainly, plants from larger seeds produce more tillers, and thus additional seed heads per plant.

Small-grain seed size depends on variety, year of production, environment, and management practices. Consequently, it pays to check size each planting time. Wheat, oats, and barley yields can increase from 2 to 15%, depending on crop and the original seed lot quality, after sizing.

Seed size by variety

Table 1 shows seed count/lb averages for small grain varieties popular in South Dakota. Data are from the 1988 harvest, making many of the seed counts/lb 15 to 20% higher than normal because of drought stress in the 1988 growing season.

Seed size (weight) compared to test weight per bushel

Test weight per bushel affects seed quality, but it is not an accurate measure of seed size.

Table 2 shows a comparison of test weights, seeds per pound, and pounds needed to seed an acre for Siouxland winter wheat harvested at different locations in 1987, 1988, and 1989.

Test weight per bushel is a measure of weight per volume. Seed weight is a more accurate measure of seed size. (It is usually expressed as grams/1000 seeds.)

There is only one weight per 1000 seeds. Number of seeds per pound, however, can vary at a given test weight (Table 2).

Table 1. Seed size (seed count) averages and ranges among some popular small grain varieties from seed samples tested in 1988 (SDSU Seed Laboratory data).

Crop: Variety	Number of samples	Seed count range	avg.
		thousand (1000) seeds/lb	
Spring Wheat			
Butte 86	163	13.1-28.7	17.8
Guard	40	14.0-29.4	19.4
Prospect	40	14.8-26.5	18.8
Stoa	63	13.4-30.9	20.3
All samples tested	388	13.1-30.9	18.0
Winter Wheat			
Redland	28	15.9-28.4	21.1
Rose	19	19.1-31.1	22.9
Siouxland	50	13.6-25.9	19.0
All samples tested	141	13.6-31.1	19.9
Oats			
Burnett	10	13.3-18.9	15.3
Don	172	11.5-23.1	17.1
Hytest	46	13.2-19.7	16.1
Kelly	29	15.8-21.7	18.1
Steele	32	14.1-17.6	15.8
All samples tested	365	11.5-23.1	16.9
Barley			
Bowman	10	9.9-11.9	10.8
Morex	21	12.5-18.9	15.3
Robust	91	11.7-18.8	15.4
All samples tested	127	9.9-18.9	14.9

Table 2. Comparison of test weight, seeds per pound, and pounds needed to seed an acre of Siouxland winter wheat seed lots harvested in 1987, 1988, and 1989.

Year of harvest	Test wt. in lbs.	Seeds per pound	Lbs. needed for 1,000,000 seeds/acre
1989	61.5	16,439	60.8
1989	61.0	16,174	61.8
1988	60.9	20,282	49.3
1987	60.9	16,502	60.6
1987	60.4	14,698	68.0
1987	59.5	13,699	73.0
1987	59.5	16,309	61.3
1987	58.0	17,921	55.6
1988	57.8	21,928	45.6
1989	56.0	22,028	45.4

SDSU Seed Testing Laboratory data.

Sizing seed

Hard red spring and winter wheat seed is sized best with slotted screens. Listed below are the seeds per pound obtained from using three screen sizes and three spring wheat varieties.

Slotted screen size (inch x inch)	**Avg. no. of seeds/lb**
5/64 x 3/4	17,383
5 1/2 /64 x3/4	16,429
6/64 x 3/4	14,744

Sizing seed with a screen with smaller than 5/64 x 3/4 slots is not recommended. The 6/64 screen will provide the largest seed and largest cleanout percentage.

Wheat seed with 13,000 to 15,000 seeds/lb is considered good quality for popular varieties grown in South Dakota.

Sizing oats requires a combination of air volume and screen size. Air volume varies with individual machines and must be determined by trial and error. Slotted screen sizes of 4 1/2 /64 x 3/8 to 5/64 x 3/4 inch are recommended for removal of thin oats.

Oat seed with 11,000 to 15,000 seeds/lb is considered good quality.

Six-row and two-row barley seed lots can be sized with 5 1/2 /64 to 6/64 x 3/4 inch slotted screens. Air settings need to be determined by the operator for individual air-screen cleaners.

Six-row barley with 11,000 to 14,000 and two-row barley with 9,000-12,000 seeds/lb are considered good quality.

Recommended seeding rates

To determine the population to plant, match the seed count per pound to your seedbed condition (Table 3).

All spring small-grain crops except triticale have a recommended seeding rate of 28 pure live seeds per square foot or 1.2 million seeds per acre under firm seedbed conditions. This will generally result in a final plant density of 25 plants per square foot and a final field population of slightly more than one million plants per acre.

When the seedbed is poor or soft and/or when you must seed late, you will have to adjust seeding density.

Under soft seedbed conditions a higher seeding density is justified to compensate for a lower field emergence percentage from poor seed-soil contact.

Table 3. Recommended small grain seeding rates according to seed size, seed density and field conditions.

	Field conditions-seeds/square foot (SF)		
	Seedbed conditions		
Seed size	Firm 28/SF	Soft 32-35/SF	Late planting 35/SF
Seeds/lb	*lbs/acre*		
10,000	*128	147-160	160
12,000	107	122-134	134
14,000	92	105-115	115
16,000	80	92-100	100
18,000	71	82-89	89
20,000	64	73-80	80
22,000	58	67-73	73
24,000	53	61-67	67
26,000	49	56-62	62
28,000	46	52-57	57
30,000	43	49-53	53
32,000	40	46-50	50

**Seeding rates are based on 95% pure live seed (PLS)*

An increase in seeding rate often is also needed when seeding late. It will compensate for a reduction in the ability of seedlings to stool or tiller. High temperatures associated with late seedings often reduce the numbers of tillers.

For a given field condition (firm or soft seedbed and late planting, as in Table 3), as seed size or number of seeds per pound increases, the number of pounds needed to seed an acre decreases.

It is better to seed larger seed which requires more pounds per acre than smaller seed which requires fewer pounds per acre. Relatively large seeds which are more vigorous at the proper seeding density will give you better small-grain stands than small seeds which are less vigorous.

In other words, base your planting rates on the number of relatively large seeds planted per square foot or linear foot, not on the number of pounds per acre.

Drill calibration

To plant the optimum number of seeds per acre, you must know the number of seeds your drill delivers per foot of row. The calibration settings on drills are usually based on pounds per acre and not seeds per foot of row.

Calibrate the drill by running it over a road or other hard surface and counting the number of seeds delivered per linear foot of row. Then determine the setting delivering the desired seeds per square foot (Table 4).

Where to get seed-size counts

The SDSU Seed Testing Laboratory conducts seed counts per pound for no charge on all small-grain seed samples which are tested for purity and/or germination. Samples submitted for only seed count will be charged $4.00 per sample. Small grain purity and germination tests cost $5.00 each.

Samples may be sent to:

SDSU Seed Testing Laboratory
P.O. Box 2207A,
South Dakota State University
Brookings, SD 57007.

Table 4. Seeding density needed to deliver a final population of 1,000,000 seeds per acre at 6 drill row spacings.

Desired seed population	Seeds per sq. foot	Drill spacing (inches) 6	7	8	10	12	14
		Seeds per linear foot					
871,200	20	10.0	11.7	13.3	16.7	20.0	23.3
958,320	22	11.0	12.8	14.7	18.3	22.0	25.7
1,045,440	24	12.0	14.0	16.0	20.0	24.0	28.0
1,132,560	26	13.0	15.2	17.3	21.6	26.0	30.3
*1,219,680	28	14.0	16.3	18.7	23.3	28.0	32.7
1,306,800	30	15.0	17.5	20.0	25.0	30.0	35.0
1,393,920	32	16.0	18.7	21.3	26.7	32.0	37.3
1,481,040	34	17.0	19.8	22.7	28.3	34.0	39.7

**recommended rate for spring seeded small grains.*

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