The Value of

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value of this weather damaged crop for seed purposes. In other communities some of the hard red spring wheat harvested before the rains is low in test weight and is not of desirable seed quality. Frost damage also occurred to some durum and hard red spring wheat which may have lowered germination.

Several types of damage should be looked for in choosing seed from the 1965 crop.

Weather Damage: Can be simply a loss of color and a lowering of test weight with little or no effect on seed quality.

Sprout Damage: Prolonged high moisture in the kernel may have resulted in varying degrees of sprouting. When the sprouting is severe enough, such kernels have little or no value as seed.

Low Test Weight: Severe weather damage, sprout damage or premature ripening as a result of leaf diseases or early frost may have caused test weight to be considerably below normal. Seed from such crops is of questionable value.

High Moisture Storage: For normal, safe, long time storage of small grains the desired moisture content is 13 per cent and for flaxseed 9 per cent. If the moisture content in storage has run even 1 or 2 per cent above these levels, molds even though unseen can develop. Use of such grain for seed is not recommended.

Frost Damage: Can lower germination even though the kernels are plump and test weight is quite good.

Head Blights: Small shriveled kernels resulting from blights will not make good seed and should be removed from any potential seedlots by heavy seed cleaning.

Loose Smut of Barley: About 40 per cent of the barley crop in eastern North Dakota is running over 10 per cent in loose smut, even though it may be plump and otherwise is of apparent good quality.



(A) Normal weather-damaged kernels not sprouted, (B) sprouted germ end split only and (C) easily visible sprout damage. A laboratory germination test on four such different lots of 1965 wheat are shown in table 4.

The prolonged, wet harvest season starting Aug. 23 and continuing until about Oct. 1, and early fall frost, caused varying kernel damage to crops both standing and in the windrow. Durum showed considerably more sprout damage than did hard red spring wheat. Barley, oats and flax came through the wet spell with a minimum of sprout damage.

In communities where little or no harvest took place before the rains and in areas where fall frost was severe questions are being asked concerning the

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All barley seed should be tested for loose smut before planting. Heavy cleaning to save only the largest and plumpest kernels will reduce the loose smut percentage.

Will Damaged Seed Germinate

Seed low in test weight because the kernels are shriveled by drouth or plant diseases such as rust may actually germinate surprisingly well (tables 1 and 2). While low test weight seed may germinate quite well, the size and vigor of young plants produced from such seed is considerably lower than from good, plump seed (table 3).

Table 1

AVERAGE GERMINATION OF 462 SAMPLES

OF HARD RED SPRING WHEAT, GROUPED

ACCORDING TO TEST WEIGHT PER BUSHEL.

Test weight group-lbs.	No. of samples	Average germination per cent	Range low and high germination
Above 52	42	87.8	68100
48 to 52	78	86.9	65 98
43 to 47	180	82.9	44 99
38 to 42	134	81.2	43 98
Below 38	28	81.0	58 91
Total and aver	ge 462	83,4	43100

Table 2
AVERAGE GERMINATION OF
DURUM SAMPLES TESTED

Test weight grouplbs,	No. of samples	Average germination per cent	Range low and high germination	
Above 57	12	77.2	61==86	
53 to 57	26	74.0	5685	
48 to 52	21	71.2	5488	
47 and below	7	65.5	4279	
Total and averag	je 66	71.1	4288	

Table 3

COMPARING THE AVERAGE GREEN TOP WEIGHT
OF 100 SEEDLING WHEAT PLANTS FROM
SHRIVELED AND PLUMP SEED

Test weight group (pounds)	Comparative weight 100 plants (grams) 1		
60check	10.9		
5054.9	7.1		
4549.9	4.6		
4044.9	3.8		

Weights recorded about 14 days after emergence

Sprouted grain will resprout several times if it is dried down to safe storage levels between each time it sprouts so molds do not develop. Mold-free seed will continue to resprout as long as the coleoptile (stem) is not broken off in threshing and handling, until the food reserve in the kernel is exhausted. Each time the kernel resprouts the seedling is weakened.

Photo on cover page shows hard red spring wheat kernels taken from the same lot.

Table 4

GERMINATION PERCENTAGE OF HRS WHEAT WITH DIFFERENT DEGREES OF SPROUT DAMAGE.

	Lot 1	Lot 2	Lot 3	Lot 4	Ave.
Α	96%	91%	98%	92%	94%
В	54%	67%	80%	73%	68%
С	11%	16%	18%	52%	24%

The value of sprouted grain for seed should be based on both a germination test and general appearance. The practical approach is to use for seed only grain that has a minimum amount of visible sprout damage. When the sprout itself is easily visible, it is too easily broken off in handling during cleaning and seeding operations and the break provides a good chance for molds to develop.

Wheat, oats and barley that went into permanent storage with more than 13 per cent moisture or flax over 9 per cent should not be used for seed. Damp, stored grain is likely to develop molds and is likely to heat and spoil when the first warm weather occurs in the spring. Under no circumstance should moldy, heated or spoiled grain be used for seed. Even if the mold damage is not visible except as a dull grayish color or as a slightly musty odor the viability of the seed may be profoundly affected.

Grain mechanically dried at temperatures over 110 degrees will not germinate and is not suitable for seed.

Grain left unharvested in the field over winter has little or no value as seed if it entered the winter with high moisture.

Grain with visible although slight frost damage will be lower in germination and have reduced seed-ling emergence.

Germination Tests Are Important :

All seed should be tested for germination. A good representative sample is needed for an accurate test. Only good, healthy, normal sprouts should be counted as live seed.

When a test shows low germination the seed is dead or dormant. To break dormancy requires drying at low temperatures (110 degrees or less) or prechilling before running a laboratory germination test. Sometimes sowing in soil or sand is required to break dormancy. When drying, prechilling or a test in soil do not bring grain up to satisfactory germination levels, it should not be used for seed.

Dead seed can result from frost damage, sprouting or other weather damage, high moisture during storage or diseases. Molds or fungi even though they cannot be seen may damage germination of stored grain unless it is stored well below safe moisture storage levels.



A germination test on a good representative sample is the only way to be sure of seed value. standard germinations for good seed are: Hard red Spring wheat 90 per cent, durum wheat 85 per cent, oats and barley 90 per cent and flaxseed 85 per cent. In addition to good germination, seed should have good appearance, be plump, have good test weight, be free of damage and disease to produce strong healthy seedlings.

Weak Seed Produces Weak Seedlings

Large, plump seed produces strong healthy seed-ling plants.

Tests have shown that:

- 1. Individual plants from large kernels are larger, stool better and yield distinctly more then the smaller plants resulting from small kernels.
- 2. When small kernels of good germination and quality are sown at a normal rate (pounds or measure), more plants per acre usually are obtained then from large seed. This greater number of plants per acre may offset to a considerable extent the yield advantage of larger plants in a normal or above normal growing season.
- 3. Seedlings resulting from large plump, vigorous seed make faster early growth and are better able to fight weeds and ward off seedling diseases.
- 4. Large, plump seed of good test weight and quality never results in lower yields and may increase yields in many seasons.

Weak Seedlings Can't Take It

Weak or small seed and plump vigorous seed sown in the field may emerge at about the same time although the emergence from plump seed will be more even and vigorous.

Unfavorable spring growing conditions following emergence are likely to affect seedlings from weak seed more than from strong seed. Results from using weak seed will depend on temperature and soil moisture conditions following emergence. Drouth sufficient to cause wilting will result in many weak seedlings dying while strong seedlings survive.

Weak seedlings produce a thin stand, plants grow slower, stool less, are more easily attacked by diseases and less able to fight weeds.

Frost heavy enough to freeze back top growth will result in weak seedlings not recovering as well as strong seedlings. Freezing temperatures after early sown crop (wheat or barley) have emerged are quite common. Environmental conditions before or immediately after a low temperature greatly influence the total form in urw. The temperature doop

is gradual, small grain plants are in better condition to resist injury and can stand surprisingly low temperatures. Similarly, slowly rising temperatures after a frost and satisfactory soil moisture conditions are desirable to aid recovery. Drouth, wind and high evaporation are likely to aggravate the frost injury and lessen the chances of recovery. Plants from weak seed are less able to recover from serious seedling injury probably because they do not have as much reserve food material in the kernel to draw on.

Good quality plump kernels produce strong seedlings that can withstand adverse spring growing conditions better than the weaker seedlings resulting from small weakened or light weight seed.

Seed Treatment Helps

Some seed may carry black point, scab and other blights. All seed should be cleaned well to remove small and diseased kernels salvaging only the plump, heavy kernels for sowing.

Damaged seed suitable for sowing is likely to show a greater response to seed treatment than plump, heavy, high quality seed (tables 5 and 6). Be sure, however, that the moisture content of small grains is down to 13 per cent or less and flaxseed 9 per cent or less. A good uniform application of seed treatment at the correct rate per bushel is very important. Treat damaged seed at least 48 hours but not over three weeks before sowing.

Table 5

EFFECTS OF SEED TREATMENTS ON EMERGENCE OF PLANTS FROM HARD RED SPRING WHEAT OF DIFFERENT TEST WEIGHTS (GREENHOUSE TESTS)

Test weight (pounds)	Percentage emergence non-treated	Increase obtained by treating with- Ceresan
5661	89.3	+ 8.7
5155	85.5	+ 6.7
4650	84.2	₩ 7.0
4345	73.7	+14.0
4042	71.6	+13.0

Table 6

EFFECTS OF SEED TREATMENTS ON GREEN WEIGHTS OF 100 SEEDLING PLANTS FROM HARD RED SPRING WHEAT OF DIFFERENT TEST WEIGHTS (GREENHOUSE TESTS).

Test weight (pounds)	Weight of Plants (grams) non-treated	Percentage increase in weight obtained by treating with ••• Ceresan
Control 60	12.0	+ 2.7
Shriveled 5054 4346 4042	6.5 4.3 3.6	+ 9.5 +10.1 +13.7

If You Must Sow Weak Seed

A good, firm seedbed is essential so the seed will always be in close contact with the soil. A firm seedbed protects against drouth and helps to prevent sowing too deep. Damaged seed with a tendency for weak sprouts should always be sown a little more shallow then good plump seed. See table 7 for results based on frost damaged seed.

Table 7

GERMINATION AND EMERGENCE OF FROST

DAMAGED WHEAT. FOUR TEST WEIGHTS

AT FOUR SEEDING DEPTHS.

		Emergence at four sowing depths			
Test weight	Germination	1 inch	2 inch	3 inch	4 inch
60.0	95.0	95.5	90.5	76.0	28.5
57.5	88.0	91.0	84.0	66.5	21.0
53.0	74.0	75.0	67.5	35.0	4.5
42.5	48.0	48.0	28.0	10.0	0.5

Damaged seed with a tendency for weak sprouts should be sown in good season to give the young seedlings the advantage of favorable soil moisture and temperature that normally occur early in the season. Extremely early sowing of such seed should be avoided because the soil temperatures may remain cold too long thus giving seedling diseases an advantage.

Seeding rates may need adjustment based on germination and quality of seed being sown. Damaged seed will be lower in test weight but, if the damage is the result of weathering or sprouting, the kernels may still be quite plump. When shriveled seeds are involved, the number of seeds per bushel increases about 5 per cent for each 1 per cent decrease in test weight.

The number of seeds per bushel of weather or sprout damaged seed may change very little when seeding by weight but might decrease considerably if sowing by measured bushel. If the seed being used has a reasonably good germination, then sprout or weathered damaged seed should be sown at about the usual rate on a weight basis.

Suggestions on What to Do

There is no overall shortage of good seed for 1966. In many areas, some good seed was harvested

before the rain and is available for sowing. Also, there is carryover crop on which to draw for good seed.

For communities where there is a shortage, there should be plenty of good seed of desirable varieties in nearby communities. Farmers who will be looking for seed for 1966 sowing should start early to get supplies lined up.

When weak seed must be used, the following points may be helpful:

- 1. Use only properly dried seed. If the grain has run through a drier at high temperatures, it will not be suitable for seed.
- 2. Clean damaged seed heavily. Use only the plumpest and heaviest seed. Remove the lightest and smallest kernels leaving only the best for seed.
- 3. Be sure to have a germination test made of a good representative sample. General appearance should also be considered especially in judging the seed value of sprout damaged grain.
- 4. Sow weather or sprout damaged seed at normal rate by weight if the germination is within 10 points of normal.
- 5. Treat the seed. Be sure the seed is dry and to get a good uniform even coverage of seed treatment.
 - 6. Prepare a good, firm seedbed.
 - 7. Sow at a moderate depth.
 - 8. Sow in good season but not extremely early.
- 9. Use fertilizer to help the crop get off to a good start.

REFERENCES:

- Special Circular, "Shriveled Light Weight Wheat", NDSU.
- Circular No. 552, "The Value of Damp Grain for Seed", University of Saskatchewan.
- Bulletin No. 128 "The Effect of Frost on Germination and Vitality of Seedlings on a Frosted Wheat" University of Saskatchewan, Canada.

