ing strains are placed in 1/40 acre plots replicated three times at three to six places in the state. Yield tests are conducted for a period of three years before a new variety can be recommended for distribution to the farmers.

Milling and baking tests are made on the most promising wheat varieties in cooperation with the Division of Agricultural Biochemistry. In the future promising new varieties of barley will be tested for malting quality in cooperation with the malting barley laboratory located at Madison, Wisconsin. The oil percentage and iodine number of varieties and hybrids of flax is determined by a commercial linseed oil company in Minneapolis.

In the breeding of corn hybrids the most promising inbred lines are top crossed to an adapted commercial variety and the general combining ability of the inbreds determined from such top cross tests. Such tests are made in replicated yield trials using three or four replications in each of several places in the state, usually having ten or twelve replications in all. The inbred lines which have the best combining ability are selected from this test and crossed in all combinations to provide F_1 crosses. These are in turn tested in the same type of experiments as the top crosses with about the same number of replications. From the yield data on the F_1 crosses it is possible to predict with fair accuracy which F_1 crosses should be combined to produce double crosses.

Double crosses are made in such a way that the predicted yield is the greatest. These double crosses are then tested in about ten or twelve replications, as a total of several places in the state, for a three year period. The poorest crosses are discarded after the first or second year of test. Notes on diseases and agronomic characters are taken in all of the above corn yield trials. Data on smut reaction is taken under smut epidemic conditions.

In the rod row tests with small grains and in the corn tests of top crosses, F_1 crosses and the initial double crosses tests the number of strains to be tested is relatively large. For such yield trials the two dimensional quasi-factorial design is to be employed for future experiments. In the 1/40 acre plot trials with small grains and the advanced double cross tests where the number of strains to be tested does not, usually, exceed twenty the ordinary randomized block methods are used.

RELATIONSHIP OF SEED BALL SIZE TO GERMINATION AS FOUND TO BE COMMON TO BEET SEED GROWN OVER THE ST. GEORGE AREAS

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In discussing relative germination as between standard seed and small seed fractions, we will deal with relative germination values established between the standard seed and small seed resulting from process during periods the various types of seed were cleaned. We shall consider the standard seed and the small seed associated with a particular standard in two series—Series "A" to be representative of the higher germinating lots of standard seed from each type considered, and the "B" Series representative of the lower

germinating lots of standard seed for each type considered; all seed being a part of the large-scale increases grown and harvested either over or tributary to the St. George areas. The term "standard seed" as used in this paper refers to seed remaining on 3 mm x 3/4" slotted screen after screening processes have been completed.

Samples of standard seed used for test were collected through an automatic sampler fitted into receiving hopper immediately below the clean seed weighing scales at St. George, and the small seed composite sample was made up from periodic catch samples as the small seed was transferred from beneath the screens. Each sample amounting to about 700 grams was thoroughly mixed and passed through a Boener sampler. Fractions amounting to about 20 grams were accepted for examination. Three lots of 100 seed each were counted out for germination, transferred to a 2-ounce beaker and soaked for 2 hours in tap water at 20° temperature. The water was then drawn away, and the adhering extract washed from the seed. The surface water was removed from the washed seed by gently rolling the seed between folds of Scott tissue. After drying processes the seed was immediately placed between folds of blotters which were kept moist enough so that water would show when the blotters were squeezed between thumb and finger. When properly indexed the pads are placed on trays in an electric seed germinator, two sets of which are used--the first automatically controlled to maintain a constant temperature of 30°C. and the second automatically regulated to hold a temperature of 20° C. At regular intervals over each 24 hours during the entire germinating period, the seed are subject to temperature change. Through transfer of the pads between the two germinators held at desired temperatures, a sharp temperature difference is realized within a relatively short period.

Germination counts were commenced on the fourth day, and all germinated seed balls with sprouts were discarded. At the end of the eighth day a second count was made, and the non-germinating balls in each sample were then transferred to a fresh pad which is used for the balance of the germination period. At conclusion of the germination period, the final counts were made, and counts from each of the three pads were accepted provided differences in the count between pads did not exceed the tolerant limits for the test. The seed type studied, both standard and small seed fractions, embraces Series "A" and "B" of the following types, all of the curly-top resistant strain:

U. S. #12
U. S. #34
U. S. #33
A-600

GERMINATION PERCENT OF STANDARD
SEED REMAINING ON 3 MM SCREEN CONSIDERED STANDARD

SEED THROUGH / SEED REMAINING		3MM	3.00 MM 2.75 MM	2.75 MM 2.50 MM	2.50 MM 2.00 MM	2. MM
Seed Type, U. S. #12 Series	(a)	100.00	47.9	41.4	37.1	7.6
" " " " "	(b)	100.00	44.9	17.0	10.8	3.1
Seed Type, U. S. #33 Series	(a)	100.00	38.2	26.5	6.4	1.7
" " " " "	(b)	100.00	60.2	51.1	18.5	2.6
Seed Type, U. S. #34 Series	(a)	100.00	59.5	49.2	12.9	5.9
" " " " "	(b)	100.00	42.9	23.3	8.6	3.7
Seed Type, A-600 Series	(a)	100.00	50.9	39.8	24.1	8.4
" " " "	(b)	100.00	33.3	19.6	13.7	1.9

A-600

GERMINATION PERCENT OF STANDARD

	Series "A"	Series "B"
Standard	100.00	100.00
Thru 3 MM Remaining on 2.75 MM	50.9	33.3
Thru 2.75 MM Remaining on 2.50 MM	39.8	19.6
Thru 2.50 MM Remaining on 2.00 MM	24.1	13.7
Thru 2 MM	8.4	1.9

GERMINATION TESTS WITH SUGAR BEETSEED*

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Germination tests conducted on 172 samples of beetseed in quadruplicate were made at Rocky Ford, Colorado, during 1935, 1936 and 1937. The purpose of this study was to develop if possible a standard method of procedure for use by the sugar beet industry. Three different types of germination beds were used, namely, paper toweling, blotting paper, and fine grained sterilized river sand. The results of this work indicate that either paper toweling or blotting paper is preferable to sand as a germination bed. Further, germination and sprout counts were made 30 or more percent faster when either paper toweling or blotting paper was used as a germination bed.

Tests were made with four temperature methods, these being, first, a continuous temperature of 20° C. for the entire period of test; second, a continuous temperature of 30° C. for entire period of test; third, an alternating temperature of 20° C. for 16 hrs., and 30° C. for 8 hours daily for period of test; and fourth a temperature of 30° C. for the first 24 hours and then alternating the temperature 16 hrs. at 20° and 8 hours at 30° C. for period of test. Method 1 and method 4 proved best in this set of results...Further work is necessary to establish best temperature method.

Tests conducted with various size seedballs indicate a positive correlation with seed size and germination. Seedballs were graded into 4.00 mm., 3.5 mm., and 2.5 mm. sizes. The larger the seedball the higher the germination, and greater number of sprouts obtained with the kind of seed used in these tests. The results were as follows:

*This paper will appear in detail in the April issue of the Journal of Agronomy.