

Germination Tests of Seed Corn

By R. D. LEWIS

Department of Agronomy, The Ohio State University



FARMER should take for granted that his seed corn will give a satisfactory stand. Even when seed corn is selected early in the fall, carefully dried at once to 15 per cent or less of moisture, a germination test will reassure one of his wisdom in selecting and storing the seed. In spite of the ease with which seed corn may be selected and dried in the early fall, there are very few who thus insure next year's corn crop.

Hence, whenever the maturity of corn is checked by an early frost, and whenever the humidity of the air remains high until severe freezes arrive, poor stands of corn the following spring reflect the damage done to seed corn. In occasional years, as in 1918, 1925, and 1936, prolonged sub-zero temperatures leave very little corn undamaged. Unless corn has less than 15 per cent of moisture, it is liable to damage by exposure to prolonged zero temperatures.

At the Ohio Experiment Station, an average increase of 4 bushels per acre was obtained over a 5-year period for tested as compared with untested seed corn. In two critical seed corn years, average gains of 15 bushels were recorded for testing at the Iowa Experiment Station.

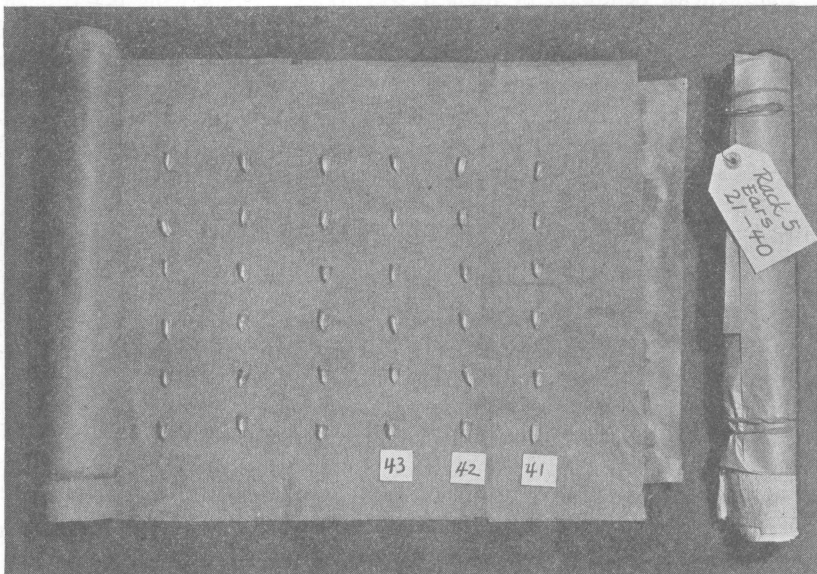


Fig. 1.—Left, a filled and partly rolled paper doll. Right, labeled paper doll ready for soaking and placing in the tester box.

THREE STEPS IN TESTING SEED CORN

To obtain reliable information on the ability of corn to grow, two and often three steps are necessary:

1. Select or "cull" the ears to be tested.
2. Make a composite test.
3. Test individual ears.

SELECTING EARS FOR THE TEST

Unnecessary testing may be greatly reduced by a careful examination with eyes, hands, and a knife of the ears from which seed may be taken. Before starting germination tests, *discard all ears* that:

1. Are obviously of high moisture content.
2. Are roughly indented or of a dull color.
3. Are light in weight for their size.
4. Show any evidences of moldy kernels, cracked kernels, or of shredded and discolored cobs.
5. Show kernels with badly blistered backs or brown, discolored germs.
However, when corn that has less than 25 per cent of moisture is frozen, the germs may not appear discolored.

The best seed ears are low in moisture, bright in color, of good weight, and free from evidences of disease. Yet, however carefully the culling is done, there are usually ears bearing kernels that may not grow. Hence, the efficiency of the culling must be checked by germination tests.

THE COMPOSITE TEST

The general condition of the ears saved for seed may be determined by taking a kernel from two places on each of 100 or more ears, *chosen at random and representative of the whole lot*. If a germination test of these kernels results in 90 per cent or more of strong, healthy sprouts, then the seed which the kernels represent should be satisfactory. If this composite test shows less than 90 per cent of strong sprouts, individual ear testing is advisable, and will return a handsome profit over the costs of the labor and materials involved. After the materials have been obtained and the ears selected, approximately a total of one hour of work is required for testing each 100 ears by the rag or paper doll method.

GERMINATORS

The composite test of two kernels from each of 100 or more ears may be made in a simple plate or pan germinator. Over the bottom of a pie plate or any similar dish, place three or four layers of thoroughly moistened muslin or paper toweling. Count out the seeds to be germinated, place them on the wet material, and cover them with another moistened layer of paper or cloth. Cover the germinator tightly with a second dish or a pane of glass. Keep the cloth or toweling wet and see that the edges of the containers fit closely so that the chamber will not dry out. Keep in a warm place and determine the proportion of sprouted seeds in six or seven days.

Individual ear tests are best made with a sand or sawdust box germinator, or with the "rag doll" or "paper doll" germinator. The paper doll germinator will be most widely used. It is inexpensive, effective, and suited for general use. If directions are followed, tests made in rag or paper dolls are as reliable as those made in sand, sawdust, or soil.

NUMBER THE EARS

The ears to be tested must be numbered in some way so that the undesirable ones may be eliminated after the test is completed. They may be so arranged on shelves or racks in groups of 10, 20, or 50, as to avoid numbering each ear. As the usual paper doll tester holds the kernels from 20 ears, racked groups of 20 ears will correspond exactly with the tester. The first and last ear in a group should be marked to correspond with the exact positions in the germinators.

USING THE "PAPER DOLL" GERMINATOR

The following directions outline the procedures for ear testing corn for seed:

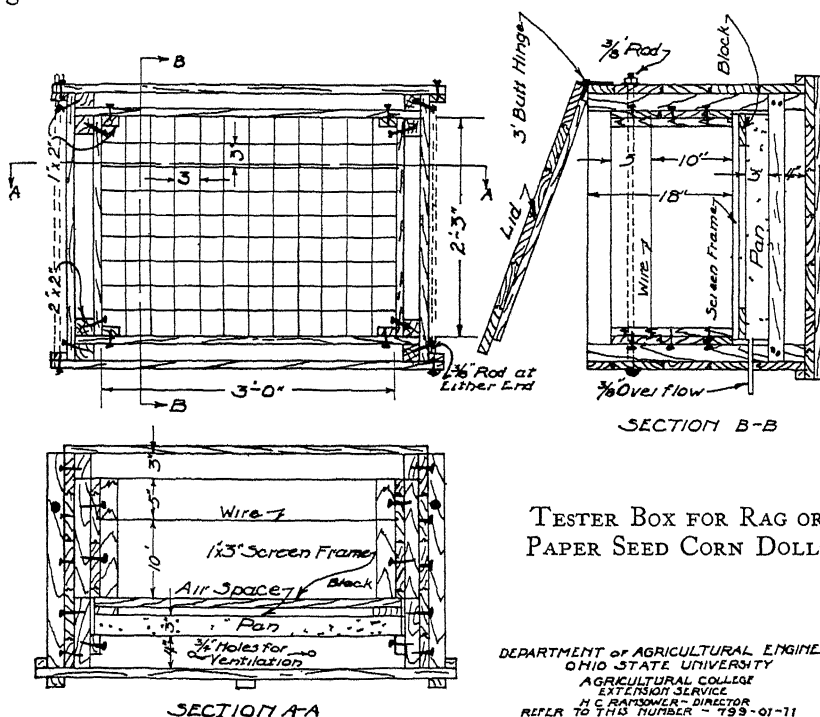
1. Obtain heavy water finish paper such as is used in butcher shops for wrapping meats. This may be obtained in 12-inch widths from paper companies.
2. At the same time obtain paper toweling, either in rolls or as separate towels.
3. The dolls are made from the butchers' paper and the toweling paper as follows:
 - a. Cut off 54-inch lengths of the 12-inch wide butchers' paper.
 - b. Place on top of this about 45 inches of well moistened paper toweling.
 - c. Each doll should accommodate 20 ears.
4. Remove six or eight kernels from each ear (spirally around the ear from the butt to the tip). As the kernels are removed, place the ears in a rack or on a shelf in the same order as the rows of kernels are placed on the doll.
5. Place the six or eight kernels from the first ear in a vertical line across the toweling, as shown in Fig. 1, with the tips of all kernels pointing in the same direction.
6. Two inches from this first line of kernels, place an equal number of kernels from the second ear, and so on.
7. Number the first and last rows of kernels to correspond with the proper rack and ear numbers.
8. After placing kernels from the twentieth ear, roll up the heavy paper, the toweling, and the rows of kernels, starting at the end containing the kernels from the last ear.
9. Keep from unrolling by placing a rubber band around each end of the roll or "doll."
10. With a lead pencil label the doll, identifying the rack containing the ears and giving the date of starting the test.
11. Soak the prepared doll in lukewarm (not hot) water for an hour.
12. Set the dolls upright, with tips of kernels down, in a pail or box containing 1 to 2 inches of sand, sawdust, pieces of boards, or some other support to keep them out of water. Home made tester boxes or pails should be lined with burlap sacks which are to be kept moist throughout the test. Also, the pail or box should be covered to keep the air in the chambers as moist as possible. The details of construction of a special tester box, that will accommodate 108 dolls at one time, are given in Figure 2.
13. While germination proceeds most rapidly at temperatures of 80° to 85° F., satisfactory results will be obtained if the tester box is located in the warmest part of a well heated room, even though the temperature may vary during the day and night.

14. The dolls should be sprinkled daily with lukewarm water, so that they will not become dry, but they should not stand in water.
15. When sprouts appear (usually in 6 to 7 days) remove the doll, unroll it near the racked ears and discard each ear that does not show a healthy sprout from each kernel.
16. Prepare for planting those ears which do show satisfactory germination.

The papers should be destroyed, as they may have become contaminated with molds.

THE RAG DOLL

The rag doll is similar to the paper doll except that a 45-inch strip of 12-inch wide muslin is used in place of the paper toweling. The muslin may be used repeatedly, but it should be carefully sterilized in boiling water before it is again used.



TESTER BOX FOR RAG OR PAPER SEED CORN DOLLS

DEPARTMENT OF AGRICULTURAL ENGINEERING
OHIO STATE UNIVERSITY
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Fig. 2.—Detailed plans for constructing a tester box for 108 dolls.

HOW MANY EARS TO TEST?

Twelve to fifteen perfectly germinating ears will provide enough seed for one acre. How many need to be tested to obtain these will depend upon the average condition of the ears and the efficiency of the culling prior to testing. If only 10 to 25 per cent of the tested ears give a perfect record on the germinators, experience has shown that such seed should be planted at a little higher rate than seed obtained from lots in which a high proportion of the ears gives satisfactory germination.