

Improving the Small Grains

Tests that lead to Larger Yields and Better Quality of Wheat, Oats and Barley

By C. W. Warburton

In The Country Gentleman

"For seed you should choose the heaviest corn, the fullest ears, and set them apart in the barn, and by no means admit those ears that are not full thruout, but have only grains here and there by intervals."

These are not the words of one of our modern plant breeders or agronomists, but of Varro, a Roman of two thousand years ago. When we remember that the "corn" of which Varro wrote was wheat, oats and barley, and that the "ears" were heads, we have the essence of the present-day doctrine of seed selection for the improvement of the small grains. We know better in these days the reasons for making such selection, and we have done much recently to perfect methods of testing the strains after selections are made; but Varro and his early Roman friends had pretty thoroughly separated the kernels from the chaff.

Improvement of the small grains is not a particularly difficult problem. In addition to a discerning eye to select "the heaviest corn, the fullest ears," numbers from which to select, time to test the selections, and painstaking care in making these tests are the requirements. The simplest method of improving the yield and quality of our grain crops is mechanical selection of the largest and plumpest kernels by means of an air-blast, the use of screens of the proper sizes, or any other manner of cleaning and grading grain. A combination of the air-blast and screen methods of separating the kernels, as in the ordinary fanning mill, is most effective, particularly for oats. Wheat, barley and rye can be graded acceptably only by means of screens, as the largest grains are usually the plumpest, but quite the reverse may be true with oats. In dry or otherwise unfavorable seasons, "double" grains are often produced; that is, the outer and larger grain in the spikelet does not contain a kernel, but its empty hull completely incloses the inner and smaller grain. These large, double-hulled grains, which would be retained with the best grade if screens alone were used in making the separation, are light in weight and hence readily removed by the air-blast.

Big Seeds—Big Yields

The growth and yield of the crop depend largely on the vigor of germination and the quantity of plant food which is available to the young plants early in development. A large, plump seed will germinate better and produce a stronger plant than a small or shriveled one, for the germ is larger and the seed contains more food for the use of the young plant till it produces sufficient roots and leaves to obtain its own sustenance from the soil and the air. Small or shriveled seeds often produce weak, spindling plants

which die before maturity or, if they live, fail to bear seed.

It is an advantage, then, to sow uniformly large, plump seed, for the growth of the crop is more uniform and the yield is usually better. This doctrine is far from a new one. Lisle, an English gentleman farmer, in his quaint Husbandry, writes: "About the middle of April, 1705, I took sixty grains of corn barley, of three different sizes—that is, twenty grains of the biggest, twenty of the middle size and twenty of the smallest corns. I put the twenty of each sort into three several pots, with rich mold of the same sort in each pot. In eight or nine days I found thirteen of the fuller-bodied corns were come up, nine of the middle-sized, and but five of the smallest; but the fullest-bodied corn, both in color and breadth of blade, exceeded either and both the other sorts."

Though all the large and medium-sized grains and seventeen of the smaller germinated later, Lisle states that "these blades of the worst sort car-

At the Ohio station, average yields of 46.3, 44.8 and 42.6 bushels of oats to the acre were obtained from heavy, ordinary and light seed in a seven-year test. Similarly, in Kansas, average yields of 30.9, 29.9, and 27.5 bushels of oats were had in an eight-year test. Other stations have sometimes secured less favorable results and some have even shown it was detrimental to grade oats and wheat for seed; but I would be willing to back my crop from graded seed against that of my neighbor from ungraded seed every time, other things being equal. I believe grading and cleaning pay, if for no other reason than that the weed seeds and dirt are removed, thus allowing more uniform distribution of the seed and aiding in the production of a cleaner crop.

Running seed grain through a grader or fanning mill will take out the largest and plumpest kernels and will separate mixtures of different grains, as oats and barley in wheat, fairly well, but it will not separate different varieties of the same grain. The cereals

Just a word of caution about buying new and widely advertised varieties of grain. Go slow. Some of them are all right and well worth having, but perhaps the variety which is painted in such high colors is one you tried and discarded some years ago. Unscrupulous seedsmen are not above renaming varieties in order to sell seed at high prices, or buying ordinary stock and unloading it on their customers as some valuable new variety. However, it is to the credit of the American seed trade that this practice is a very rare one nowadays, much more so than a few years ago.

Even though the new variety is all it is represented to be it probably has not been widely tried and it may not be nearly so good for your locality as something else. Do not risk your whole crop to any new variety—and this caution applies to all farm and garden crops as well as to the small grains. If you want to try something new get enough to sow half an acre or an acre, for that will show you what

it will do and the loss will not be great if it proves worthless under your conditions. Sow this grain at the same time and under the same conditions as the rest of your crop, preferably on part of the same field. Measure the field of the new variety accurately, and also that sown to the seed of your own growing. Carefully keep the two lots separate at harvest and threshing time and compute the acre yield of each lot. This is the only accurate basis of comparison and the only way you can tell whether the new variety is an improvement over what you already have. Even then it really cannot be definitely determined without repeating the test for several years; but if the variety is one which has already been tested by your experiment station or in your section and has proved a good one, it will be quite safe to sow it on a larger scale the following year.

The Best Method for Farmers

Grading the seed and testing new varieties are two methods of improving our small grain crops which any one can follow. Painstaking care is required in the actual selection and breeding necessary for the permanent improvement of these crops and the development of new varieties. Of the two methods used by breeders in this work, the bulk or seed-plot method is the more easily followed by farmers. The other, the head-row or plant-row method, though somewhat slower and requiring greater attention to detail, is more certain to bring satisfactory results.

The bulk method of selection consists in going thru the field at harvest-time and selecting a considerable quantity of good heads, taking care that they are as uniform as possible in type. Our fields of grain are nearly always

Continued on Page 23



Each plot is cut, harvested and threshed separately, careful record being kept of the yield, sample, etc., all of which will have an influence upon its value for seed purposes after the final selection has been done.

ried a manifest disadvantage in color and breadth, and doubtless many of them would not have come up at all in poor ground, though the better sort might all have grown, so I question not but I shall find the same disproportion in tillows, ears and body of the grain." And to any reader of Lisle's words at this day I can guarantee the same result.

The most conclusive evidence we have in favor of grading seed grain is furnished by the Ontario Agricultural College Experimental Farm. The average annual yields in a seven-year test were 62 bushels of oats to the acre from heavy seed, 54.1 bushels from ordinary seed, and 46.6 bushels from light seed. In another experiment the heavy seed was taken from the crop grown from the heavy seed of the year before and the light seed from the crop grown from light seed, till at the end of twelve years the difference in yield in favor of heavy seed was 22.4 bushels to the acre.

which are ordinarily grown on our farms are not of any distinct variety, but just oats or wheat or barley. They are like scrub cattle which are not Hereford or Jersey or Holstein, though some individuals may resemble some one of those breeds closely enough so we can say they belong to that particular type. In the same way our fields of wheat are often not pure Marquis or Red Fife or Blue Stem, tho they may resemble those varieties more or less closely. Usually these scrub or nondescript grains are just as inferior to the pure, selected varieties as scrub cattle are to purebred ones.

The good varieties may be obtained in one of two ways—we can purchase them from some one else or we can make them ourselves. As we get a new generation every year, and the rate of interest is very rapid, it does not take long to multiply a good strain of wheat, oats or other grain till we have enough to sow all we want on our own farm and sell some to the neighbors.