NOTE ON MODIFIED STAINING METHOD FOR ESTIMATING THE GERMINATIVE CAPACITY OF WHEAT AND BARLEY[1]

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Estimating germinative capacity of barley and wheat by actual growth tests takes several days. Staining methods based on the presence of enzymes (dehydrogenases) in living tissues can give results in 1 or 2 hr. (1,2); an ultrarapid method (3) can shorten the time to 15 min. These staining methods are considered adequate, though not absolutely reliable (3,4).

In the procedures of Bishop (1,3), the grains have to be cut longitudinally prior to the staining, to expose the seat of the enzymes and embryo and to facilitate the staining procedure. The cutting is done by

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hand with a razor or by a machine manufactured in Europe; however, cutting by hand is tedious, inconvenient, and time-consuming, and the machine is not widely available. In the whole-grain staining procedure of Crafa *et al.* (2), elevated temperatures are applied and all kernels appear stained to some extent; the operator may therefore have difficulty distinguishing the degree of staining.

To eliminate the cutting step, we have exposed the germ of wheat and barley kernels by partial debranning or dehulling in a hand-operated wire-brush barley pearler, a device which is widely available in cereal laboratories.

Breakage of kernels during pearling can be prevented by tempering the grain in water or 20% (wt.) aqueous glycerine solution. The soaking time for wheat is 15 min. in water or 10 min. in 20% glycerine solution; the soaking time for barley is 1 to 2 hr. in 20% glycerine solution.

After the kernels are strained, they are put in the pearler, and the minimum turns necessary to expose the germ ends are made on the hand crank. The number of turns may have to be established for individual machines. For this study, it was 15 for wheat and 40 for barley.

The pearled kernels are rinsed with water and 100 or 200 kernels are counted, placed in a test tube, and soaked in a 0.25% aqueous solution of 2:3:5-triphenyl tetrazolium chloride for 60 min. The staining time can be shortened by evacuating the test tube for a few min.; after readmittance of air, the staining solution enters the kernels rapidly. The kernels are strained from the staining solution, spread on filter paper, and kernels with red-stained germ ends are counted.

The percentage of the kernels stained using the proposed revised method agrees with that of other methods for estimation of germinative capacity (Table I).

TABLE I

COMPARISON OF GERMINATIVE CAPACITY ESTIMATIONS

	Germination between Blotters	Preparation for Staining Method	
		Halved Longitudinally	Debranned in Pearler
	%	%	%
Kansas hard red winter wheat, 1962	98	97	98
Idaho hard red spring wheat, 1962	96		98
Idaho hard red winter wheat, 1962	98		98
Atlas barley, 1962	97		97
Atlas barley, 1963	98[a]		98
Tennessee barley, 1963	97[a]		98

[a] Barley still in dormant stage; filter paper moistened in 0.75% H_2O_2.

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Literature Cited

1. BISHOP, L. R. Proc. European Brewery Conv., Scheveningen, 1947.
2. CRAFA, J. A., STANSBREY, J. J., and SCALLET, B. L. Proc. Am. Soc. Brewing Chemists **1949:** pp. 39–52.
3. BISHOP, L. R. J. Inst. Brewing **63:** 516–520 (1957).
4. MEREDITH, W. O. S., ANDERSON, J. A., and HUDSON, L. E. Evaluation of malting barley. *In* Barley and Malt, ed. by A. H. Cook. Academic Press: New York and London (1962).