

COMMUNICATION TO THE EDITOR

Effect of 2,4-D on Germination of Hannchen Barley

DEAR SIR:

Many reports have been published on growth-regulating substances and their effects on germination and growth of barley (1-5). As Prentice *et al.* (5) have indicated, some of these compounds have potential value in the malting process, and at least one (gibberellic acid) is now being used in preparation of malt on a commercial scale. Since a way of increasing germination rate during malting could be of economic value (assuming that properties of the malt were satisfactory), the report of Hsueh and Lou (3) was of particular interest to us. They indicated that 2,4-dichlorophenoxyacetic acid (2,4-D) stimulated germination in the concentration range of 0.0035 to 0.007%, whereas at higher concentrations germination was inhibited.

Preliminary testing of this compound in our laboratory with Hannchen barley, however, failed to show stimulation of germination at any level tried, and a series of carefully set-up germination tests confirmed this result (Figs. 1 and 2).

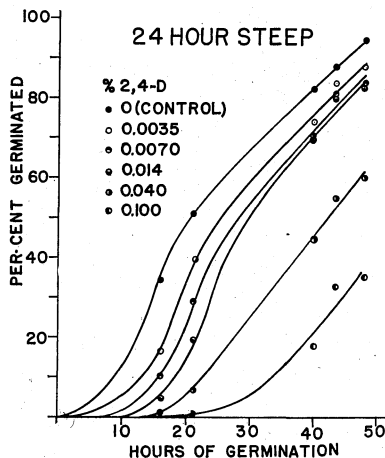


Fig. 1. Effect of various concentrations of 2,4-D in the steep on subsequent germination of Hannchen barley; steeping time, 24 hr.

Unfortunately, Hsueh and Lou did not mention the variety of barley used in their tests, but the chances are it was a six-rowed variety. Wiebe and Hayes (6) have shown that the resistance of certain barley varieties to foliar applications of dichlorodiphenyltrichloroethane (DDT) is genetically controlled. They found, furthermore, that resist-

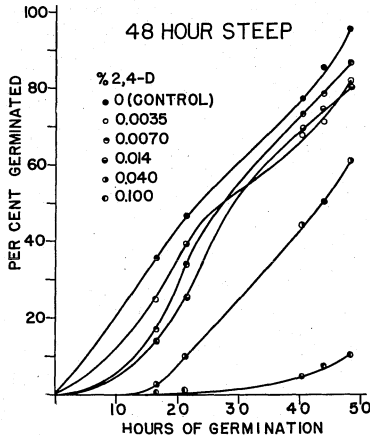


Fig. 2. Effect of various concentrations of 2,4-D in the steep on subsequent germination of Hannchen barley; steeping time, 48 hr.

ance is much greater in two-rowed varieties than in six-rowed varieties. Since the barley used in our experiments is of the two-rowed type, different genetic makeup may explain the observed difference between our results and those of Hsueh and Lou. If this is true, it may be desirable to re-examine the effects of other growth-regulating substances in barleys of varying genetic composition.

The experimental results were obtained with lots of 100 grains of barley. These were steeped in water and in fresh solutions of 2,4-D (Eastman) varying in concentration from 0.0035 to 0.1%. Four lots were steeped at each concentration for 24 hr. and four for 48 hr., all at 4°C. The seeds were rinsed with distilled water, blotted with a dry towel, and placed on moist blotters in Petri dishes; the dishes were then arranged in germinators in random fashion to eliminate the effects of position. The randomization scheme was set up by drawing numbered slips of paper from a beaker, and was similar to the randomization schemes used in plant growth experiments.

Germinators consisted of cylindrical cardboard cartons (12 in. in diameter, 14 in. high), coated with paraffin inside and out and containing a dish of water to maintain humidity. Temperature was maintained at 24° ± 0.5°C.

The numbers of grains germinated were determined 16, 21, 40, 43.5, and 48 hr. after the beginning of the test. The criterion of Taylor (7) was adopted; seeds were regarded as germinated when any organ had attained a length of 1.5 mm. or more.

Results are given in Figs. 1 and 2, which represent 24-hr. and 48-hr. steeping respectively.

It is apparent that barley steeped with 2,4-D at any concentration germinated at a lower rate than did barley steeped in water alone. Statistical analysis showed that even the lowest concentration of 2,4-D used, 0.0035%, decreased the germination rate significantly.

The suggestions of J. J. Stansbrey in statistical design of the experiments are gratefully acknowledged.

While the above results are essentially negative and leave several questions unanswered, we hope that they may be of some value to others in planning experiments with growth regulators.

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BARRETT L. SCALLET

JOHN J. KURUSZ

Anheuser-Busch, Inc.
St. Louis 18, Mo.

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