EFFECT OF STORAGE TEMPERATURE AND SIZE ON FRENCH FRY QUALITY, SHRINKAGE AND SPECIFIC GRAVITY OF MAINE POTATOES

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Because of the usual low storage temperatures of approximately 34° to 45° at which the late potato crop is held, together with other factors, the use of Maine potatoes for processed foods, such as frozen French fries and potato chips, has been rather limited. Storage temperatures appreciably below 50°F. have been found by many investigators to result in conversion of a portion of the starch in the tubers to sugars. These sugars result in a dark brown color and "burnt" taste in the fried product, which increase with higher contents of sugars.

The present investigation was undertaken to obtain more information on the effect of storage temperatures and size on French fry quality of some of the more common potato varieties grown in Maine. A representa-
tive of one processing company has estimated that as much as 12,000 carloads of Maine potatoes might be used for potato chips, French fries, and similar food products if proper quality and flow of potatoes to processors can be maintained. This emphasizes the importance of such quality studies.

**Procedure**

Potato tubers of five varieties grown under similar conditions were sized and 50 to 60-pound samples of each size class placed in experimental storage bins in early November, 1949. Controlled temperatures of 36°, 40°, and 50°F. were used for each size class of 1¾-2, 2-2½, 2½-2¼, and 2¼-3¼ inches for most varieties. Specific gravity was determined on 10 to 30 tuber samples, depending on size, by the air-water method. The weight of the bulk samples and of sub-samples for specific gravity were made on November 7, December 8, January 7, February 2, March 6, and April 3.

In January samples of the Katahdin variety stored at 36° and 40° were changed to 50°, 60°, and 70°, and those stored at 50° to 60° and 70°. In February and March 10 tubers from each lot were removed and tested for French frying quality. Similar samples from the continuous 36°, 40°, and 50° storage were also tested in April, as well as tubers from vines sprayed with 2,4,5-T (2,4,5-trichlorophenoxyacetate) in August. No actual determinations of sugars were made. Weights of the storage samples were adjusted for the samples removed for testing, so that shrinkage loss could be calculated for the entire storage period.

All varieties stored—Green Mountain, Mohawk, Kennebec, Katahdin, and Teton, in order of decreasing specific gravity—were found by Wright and Whiteman (4) to remain free from sprouts at 50°F. when stored for 14 weeks or longer.

**Effect on Quality**

The effects of 36°, 40°, and 50° continuous temperature storage on French fry quality are shown in table 1. In general, all the lots stored at 36° or 40° produced French fries which were too high in sugar and dark in color for satisfactory quality. (In this discussion, if more than 50 per cent of the tubers fell in color grade 4, medium color and sugar, or in lighter color grades, they were considered to be of satisfactory quality for French fries in regard to color.)

At the 50° storage temperature, only at the February 3 date was a large proportion of the Green Mountain tubers of satisfactory quality. This may indicate that this variety is satisfactory during the early part of the normal storage period if stored at 50° or above. The Mohawk was also of