WEIGHT LOSS, SPECIFIC GRAVITY AND MEALINESS DURING STORAGE OF RUSSET BURBANK POTATOES

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The characteristics of potatoes associated with length of time in storage and conditions during storage are of importance as they pertain to anticipated marketing and use. Since late-crop potatoes are marketed up to six months after harvest, the percentage loss of weight during this time is especially significant, as it affects profits to be expected during orderly marketing. The eating quality of stored tubers is also of importance as this, too, relates to their marketability.

Two questions frequently asked the authors of this paper are whether tubers change in specific gravity when stored, and if so, whether degree of mealiness changes when specific gravity changes. Although numerous studies have been conducted on change in specific gravity and weight of potatoes during storage, these data have not been correlated with organoleptic testing.

Potatoes lose weight during storage. This is due to loss of water and carbon dioxide when decay losses are excluded. It might be expected that specific gravity would increase because of water loss; however some workers have found little change in total solids. Harvest weight and shape of the tubers and harvest specific gravity may be associated with per cent of weight loss. Since mealiness is closely associated with specific gravity it might be expected that taste-panel scores for mealiness would vary if other tuber characteristics varied.

Talley, Fitzpatrick and Porter (10) studied Katahdin potatoes during six months of storage and found little change in total solids although a progressive loss of weight occurred. Murphy and Goven (7) reported that Russet Burbank potatoes declined in specific gravity until dormancy ended, and then increased slightly. At a storage temperature of 50 F and relative humidity of 85%, specific gravities averaged 1.079 and 1.078 in October and December, respectively. In February, specific gravity averaged 1.079 and in April, 1.080.

Heinze (4) reported that when Russet Burbank potatoes were stored at 40 F and 83% rh, the average specific gravity changed from 1.090 at harvest to 1.093 after 2 to 4 months of storage, and to 1.097 after 5 to 6½ months of storage. The following year, using 88% rh, increase in specific gravity was slight, from 1.090 at harvest to 1.092 at the end of six months. Weight loss for this group was 3% at midseason and 4% at the end of storage, based on harvest weight.

Terman, Goven and Cunningham (11) correlated tuber size with change in specific gravity and loss in weight in storage. Working with Green Mountain and Katahdin varieties at 36, 40, and 50 F temperatures, they reported, “specific gravity increased appreciably with time in storage, and slightly with size of tuber, but not with temperature.” Shrinkage increased with temperature, time in storage and size of tuber.
Heine et al (3) reported significant loss of mealiness after three and six months of storage at 40 F when scores for seven potato varieties were averaged together. In a later paper (5) their data showed that the Russet Burbank variety increased slightly in mealiness during storage.

The present study was conducted with Russet Burbank potatoes to determine: (i) the effect on mealiness of (a) length of time in storage, (b) changes in specific gravity during storage, (c) change of weight during storage; (ii) the effect on shrinkage during storage of (a) harvest weight, (b) size, (c) and specific gravity.

**Materials and Methods**

All work was conducted on individual tubers of the Russet Burbank variety. The samples used in the study were drawn immediately after harvest from commercially-produced late-crop potatoes harvested in the fall of 1958. Sixteen farms, four in each of the four main growing areas of Oregon were selected for sampling. Selection of farms was by random choice from lists of potato growers made available by the Oregon Potato Commission. Six 100-pound samples were obtained from each grower and shipped directly from the fields to the laboratory.

After washing, tubers were divided into specific gravity classes, using the method of brine flotation, in which solutions differed by intervals of 0.005.

These specific-gravity-separated tubers were divided into two lots. One lot was used for studying change in weight and specific gravity of individual tubers in each of six specific gravity classes: 1.085, 1.090, 1.095, 1.100, 1.105 and 1.110. Five tubers from each of the 16 farms, a total of 80 in each specific gravity class, were weighed and the diameters measured. They were packed in net sacks and stored at 40 F and 85% rh for this study. The samples were taken from the cold room at the end of each month, allowed to return to room temperature, and records made of weight and specific gravity. At the end of six months, these potatoes were cooked and scored for mealiness.

Matching tubers from the same farms, and having specific gravities of 1.095, 1.105 and 1.110,* were rated for mealiness before storage and after 1, 2, 4 and 6 months of storage.

Mealiness was evaluated by the following method: At the end of each storage period two tubers from each of the 16 farms were baked and scored. They were taken from storage on the day previous to testing and allowed to come to room temperature. Tubers were placed on wire racks in an oven preheated to 400 F, and baked to an internal temperature of 212 F. Baked tubers were split lengthwise into four quarters, and served while hot to a trained four-member panel. The order of presentation was randomized among farms and specific gravities. A reference sample, prepared from dehydrated potato flakes, was served with each tray. Mealiness was evaluated on a scale ranging from “1”, lacking mealiness, to “9”, extremely mealy.

Data were analyzed by means of the analysis of variance for the

*The selection of tubers of high specific gravity for this part of the study was based on a survey of the 1957 crop, which indicated that over half of Oregon-grown Russet Burbank potatoes had specific gravities exceeding 1.090. (6)