Influence of ventilation and humidity during storage on weight and quality changes of *Russet Burbank* potatoes

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Summary

The data reported herein show that maintaining at least 95% relative humidity in the ventilating air caused significantly less weight loss than ventilating with air of 85% relative humidity. In addition, significantly less flattening, shrivelling, and sprouting were found in tubers ventilated with air of 95% relative humidity. There was no difference between the two air humidities in the amount of rot found.

Intermittent ventilation allowed significantly less weight loss than continuous ventilation. Also, intermittent ventilation caused significantly less flattening, less shrivelling, and less sprouting than continuous ventilation.

The processing data indicate that tubers ventilated with air of 95% or more relative humidity resulted in less peel loss, less trim loss, lower sugars content, and in general, produced higher-quality processed products than when the tubers had been ventilated with air of 85% relative humidity.

Introduction

Significant advances have been made in recent years with respect to the technological aspects of potato storage. As a result, quality change and weight loss during storage have been reduced. Fall crop potatoes can now be stored for 11 months or longer without serious quality deterioration and with much less weight loss than was formerly possible. Previous studies have revealed that certain relationships exist between the storage environment, storage management, length of the storage season, and level of weight and quality changes that occur during storage. However, certain environmental factors such as ventilation and humidity were not completely evaluated in terms of their effects on either weight loss or quality change. The data presented herein point out the interrelationships between the storage environment and weight and quality changes occurring to *Russet Burbank* potatoes throughout a 330-day storage period.

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Materials and methods

*Russet Burbank* potatoes grown at the University of Idaho, Aberdeen Branch Agricultural Experiment Station, were harvested, placed in storage research bins in the storage research building, and treated with a sprout inhibitor. Each of the bins held about 1800 kg (4000 pounds) of potatoes. The temperature, humidity and flow of air through each bin was controlled. The weight losses of the potatoes were obtained by weighing the bins periodically throughout the entire storage period. In each of two years, there were 14 pairs of bins and in the other two years, there were 16 pairs of bins.

To obtain the recovery rate and processing data, sample bins were removed from the storage at intervals, potatoes examined for defects, and then processed into various products. The specific gravity of each lot of potatoes was determined by the weights in air and water method. The raw product was analysed for sugar content. The quality of the finished product from each lot of potatoes was determined by standard procedures.

Two variations of ventilation management were used to control the temperature within the bins – intermittent and continuous. When ventilated intermittently, the tubers were supplied with air only as often and as long as was necessary to maintain a uniform temperature within the mass of potatoes, whereas with continuous ventilation, air was supplied 24 hours a day, throughout the storage season.

Two variations in the relative humidity of the air in the bins were used – 85% and 95%. The proper relative humidity was maintained by operation of louvres, refrigeration coils, and humidifiers.

Results

**Potato weight loss**

The weight that potato tubers lose during storage is influenced by a number of factors, such as amount of injury, presence of diseases, field frost and water rot. Also, the variety of potatoes grown, the cultural and climatic conditions under which they were grown can have some effect. However, for the purpose of this paper, only the effects of the relative humidity of the ventilating air and continuous versus intermittent ventilation are considered.

*Ventilation.* Ventilating the potato tubers intermittently at the rate of about 0.3 m³ per minute per 1000 kg (0.5 ft³/min per 100 pounds) showed significantly less weight loss than when the air was provided continuously (Table 1). At the end of a 30-day period, the bins ventilated continuously showed 0.34% more weight loss than comparable bins receiving air of the same temperature and humidity intermittently. The bins under continuous ventilation continued to lose weight more rapidly than those receiving air intermittently, and at the end of the 330-day storage period had lost 1.42% more weight than had the latter.

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