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Quality of white rice retail packaged in No. 10 cans for long-term storage

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ABSTRACT

Various dry rice cans are available for retail sale in No. 10 cans, packaged for long-term storage in case of natural disasters or other emergencies. Little information is available regarding the quality of such products packaged for prolonged storage using hermetically sealed containers with enclosed oxygen absorbers. The objective of this research was to evaluate and compare the quality of several different brands of retail white rice products packaged for long-term storage, available at the retail level.

Ten brands of rice products (7 long-grain white rice, 2 parboiled white rice, and 1 instant white rice) packaged in No. 10 cans were obtained from eight different retail distributors in four states. Observations included: Headspace Oxygen (%), Aroma (Hedonic score), Headspace Hydrocarbons (%), Headspace Oxygen Absorbers, Oxygen Absorber and rice moisture activity. A 50-member consumer panel evaluated aroma, flavor, texture, and overall acceptability using a 9-point hedonic scale. Thiamin content was compared to label claims.

Headspace oxygen was <2% in all except one can that was resealed at the manufacturer-confident statement level and had oxygen absorbers that appeared to be expended. Significant variation in can seal quality was observed, with one-fourth of the cans failing to meet specifications for a hermetic seal. Water activity ranged from 0.27 to 0.31. Brand B was labeled as being enriched with thiamin which was significantly different (p<0.05) from most of the other brands.

RESULTS AND DISCUSSION

Introduction

During storage, sealed, resealed or unsealed continuous physical and chemical changes. Many enzymes are active (Charastil 1990). Proteins undergo catalyzed changes both in tissue and in the cytoplasm (Juliano 1980). Moisture, temperature, and oxygen (Pillaiyar 1979). Most of the research on the storage of milled rice has been limited to conditions for short-term storage, usually under two years. The objective of this research was to evaluate and compare the quality of several different brands of white rice products commercially packaged for long-term storage, available at the retail level.

Methodology

Several samples were purchased at retail for 3, 6, and 12 months and were packaged in No. 10 cans. Cans were obtained from various white rice distributors in the Midwest, Southeast, and Southwest (13 years old) and Brands A and D (4 years old). Duplicate samples of each brand were analyzed.

Headspace Oxygen, Cotton Seal, and Water Activity

Headspace Oxygen (%), Aroma (Hedonic score), Headspace Hydrocarbons (%), Headspace Oxygen Absorbers, Oxygen Absorber and rice moisture activity. A 50-member consumer panel evaluated aroma, flavor, texture, and overall acceptability using a 9-point hedonic scale. Thiamin content was compared to label claims.

Hexanal, which originates from autoxidative decomposition of linoleic acid, is considered the major stale constituent of cooked rice (Juliano 1985), which corresponds to a water activity of approximately 0.42 (Liepkins and Chirife 1982). Sensory Evaluation

Data was analyzed for significance using Statistical Analysis System software (SAS Institute, Cary, NC). An ANOVA procedure was used to determine significant differences. The means were separated using Duncan’s Multiple Range test for the sensory data. Significant differences were defined at P<0.05.

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