

ABSTRACT

Minimally Processed Pumpkin and Squash

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Minimally processed commodities are fresh, raw products processed in order to reduce or to eliminate bulk and to provide a ready-to-use or ready-to-eat product. During processing, these products remain biologically and physiologically active so that their tissues are living and respiring. The purpose of minimal processing is to deliver to the consumer a 'like-fresh' product with an extended shelf life, and at the same time ensure food safety and maintain sound nutritional and sensory quality. Fresh-cut products offer retail consumers and food service operators convenience, portion control and labour savings.

Pumpkins are relatively large, 'bulky' vegetables in which the waste or inedible parts are eliminated through minimal processing. This provides convenience to the consumer. The product is peeled, sliced and diced (3cm x 3cm x 2cm) and immersed in water to remove vegetative juices produced from the cutting operation. Samples were blanched and then packaged in polyethylene over wrapped trays with and without pinholes. A similar method was performed for the unblanched portions. Products were stored at three experimentally determined temperatures of 0°C, 5°C and 8°C. The procedure was repeated for squash. It was found that the

storage of the minimally processed pumpkin and squash at 0°C had a storage life of 40 days with acceptable cooking quality and colour. However, those stored at 5°C and 8°C resulted in the pumpkins and squash both having a shelf life of 15 days and 10 days respectively.

Chemical pre-treatments using citric acid (1500 ppm), chlorine (100 ppm) and sodium metabisulfite (200 ppm) were used at 5°C and 8°C for both the minimally processed pumpkin and squash. However it was observed that at 8°C both varieties were markedly affected by surface white discoloration, which was reflective of the onset of microbial proliferation on the cut surfaces. Blanching aided in reducing the amount of discoloration and decay for the varieties. The temperature of 5°C was more effective in maintaining both colour and the fresh-like appearance throughout the 20 days in storage. Citric acid pre-treatments coupled with blanching ensured an extension of shelf life for both the minimally processed pumpkins and squashes.

Individual quick-freezing of the pumpkin pieces was achieved by immersing the samples in direct contact with the dry ice nuggets. Solid carbon dioxide commonly known as 'dry ice' exhibits preserving qualities, and, because of its low freezing point, it is effective as a 'rapid freezing' refrigerant. Diced pumpkins both blanched and unblanched were quick-frozen and then packaged in 100 gauge thickness polyethylene

bags with and without perforations and then heat sealed using a hand held sealer. Controls (i.e. frozen at 0°C in a normal freezer) that were previously blanched or unblanched were then similarly packaged. All the samples were then stored at 0°C for a duration of 40 days. Results indicated that quick freezing of the minimally processed pumpkin not only maintained its cooking quality, but its appearance appeared more 'fresh-like' when compared to the control. In addition to this, the texture of the pieces was greatly enhanced by rapid freezing (individual quick-freezing of the pieces took 5 minutes), while retarding any changes associated with pH and sugars. It was found that dry ice quick-freezing was effective in retarding any physiological changes that would initiate deteriorative changes that would have rendered the commodity unappealing and unattractive.

Quick-freezing using dry-ice (solid carbon dioxide), is an effective

Storage of minimally processed pumpkin at a temperature of 0°C resulted in a retardation of respiration rates. Samples that were quick-frozen (diced and quick-frozen with dry-ice prior to storage at 0°C), and stored at this temperature had lower respiration rates when compared to those samples that were frozen slowly (diced samples stored at 0°C). Higher storage temperatures of 5°C and 8°C resulted in higher respiration rates in addition to a decrease in the shelf life of the pre-processed pumpkins. It was also found that reducing the size of the diced pumpkins affected the rate of respiration. Shredded pumpkins had an approximate two-fold

increase in respiration rate. This resulted in a decrease in shelf life with samples appearing slimy and soft after 5 days.

Minimally processed pumpkins that were blanched, quick-frozen and packaged in perforated bags had lower respiration rates.

A triangle taste test on stored, cooked pumpkin was conducted using a panel consisting of 20 subjects. The most favourable treatment used in this trial was the quick-frozen samples and this together with a control (freshly diced pumpkins) were used in the test. It was found that there were some differences amongst the two cooked samples at the 5% level ($p < 0.05$).

Results indicated that the quick-frozen samples exhibited a 'distinct pumpkin flavour' and tasted good even after 40 days in storage.

Quick-freezing using dry-ice (solid carbon dioxide), is an effective preservation technique that can be applied to preserve minimally processed pumpkin and at the same time aid in the retention of its 'pumpkin' flavour and fresh-like characteristics.

Keywords: Cavelle Brigitte Motilal; minimal processing, pumpkin, squash