Alternative forms of banana marketing improve quality and reduce losses

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Abstract— *At the moment a crescent is verified disputes of the consumers for foods of better quality and presentation forms. That interest has been contributing to the development of new techniques to prolong the useful life of the products, besides improving the presentation and the practicality during the commercialization, transport and consumption. However, the shelf life and losses of the bananas 'Nanicão' and 'Prata anã' under different presentation forms were evaluated in laboratory conditions of grocery store of the city of Lavras, MG, Brazil.*

Keywords— longevity, Musa spp, packaging, post-harvest, quality.

I. INTRODUCTION

The banana is one of the most fruit crops worldwide. According to FAO (2016a), Brazil is in third position in the ranking of the largest producers of bananas, after India and China. In the year 2015 it was produced over 7 million tons, and the types of most cultivated banana in Brazil were the table, such as 'Prata', 'Nanica', 'Maça' and 'Ouro' (IBGE, 2016). Although Brazil be the third largest banana producer in the world, it is a small exporter, being that limited its production domestic consumption, mainly due to the lack of product quality control (COELHO, 2011).

Of the total harvested bananas, only about 40% to 50% actually reach the hands of consumers, this is due to losses caused by damage sustained in the following phases: from planting to harvest (due to lack of crop management planning) at the time of harvest, the heaping of curls, in wooden containers, in domestic and foreign transport and handling of fruits in the markets and supermarkets (TAGLIARI & FRANCO, 1994).

Currently there is a growing consumer demand for better quality food and presentations. This interest has contributed to the development of new techniques to extend the life of products, besides improving the presentation and practicality in the marketing, transportation and consumption (BRESSAN, 2007).

The type of packaging and the storage temperature can influence the conservation or life Banana shelf, especially in grocery store where the fruit is subjected to successive handlings since the withdrawal of the boxes to reach the consumer's table (LIMA et al, 2013; PEREIRA et al, 2009). According Prado et al. (2011), improper handling of food, lack of processing (packaging), there is poor quality of packaging of products and prolonged exposure time in grocery store, are among the main causes of food and product losses.

Research by Pereira et al. (2008) on the acceptance of new forms of presentation in the banana trade in Lavras/MG, indicate that on average 29.0% consumers prefer the form of bouquet, 33.0% in bunch, 21.0% packed in styrofoam trays and 17.0% in bulk. According to these authors, 35.0% of consumers said that the banana in bulk and packaged, presented longer shelf life and loss only 2.0%, whereas for banana bunch losses have been reported up to 12.0%. This study aimed to evaluate the shelf life and losses of bananas 'Prata Anâ' and 'Nanicão' in different forms of presentation in grocery store and laboratory conditions.

II. MATERIAL AND METHOD

This work was carried out in November 2010, in two horticultural establishments (grocery stores) in the city of Lavras / MG and post-harvest laboratory Epamig, located at the Experimental Farm of Lavras. Bananas used were acquired from grocery stores of Lavras/MG, where the research was conducted, being these fruits coming from Ceasaminas / BH. The bananas were obtained in stage two (2) in the maturation scale (BRASIL, 2000), stage where bananas have green color with yellow lines. To standardize the samples bananas were selected as the size and absence of defects in fruit and they were matured until stage 3, stage in which bananas have coloration more green than yellow. After standardization of bananas, they were

prepared as form of presentation for each cultivar, they are: Packed (6 – 8 fruits or fingers detached from Styrofoam tray lined with polyethylene parafilme); Bulk (fruits or fingers detached from the bunch unpackaged); Bouquet (bunch in half containing 6 – 8 fruits) and, Bunch (traditional marketing system).

The shelf life was determined in laboratory and the grocery store, have been used 6 reps for each presentation of the bananas distributed entirely at random on a counter at room temperature. The mean temperature and relative humidity in the laboratory and in the grocery stores it was monitored, averaging 24.5 ± 0.5ºC e de 64.5 ± 5%, during the period of conducting the survey. The shelf life of bananas was determined by the number of days elapsed from the date, which were in maturity stage 3 until the second day in 7 maturity stage (yellow with brown areas).

It was also determined the percentage of loss of bananas for each cultivar, calculated based on the ratio between the number of improper bananas to market, that is, with large brown areas on the shell on the second day in the maturity stage (stage 7 of scale colors) and the total number of exposed bananas on newsstands, and this data determined for each form of presentation.

The experiment was conducted in a completely randomized design (DCI), with treatments arranged in a factorial 2 x 4 x 2, being: 2 cultivars (‘Nanicão’ and ‘Prata Anã’); 4 presentations of bananas (packed, bulk, bouquet and bunch) e 2 exhibition venues (laboratory and grocery store). The data were submitted to variance analysis using the computer program Sisvar 4.0 (FERREIRA, 2000).

III. RESULTS AND DISCUSSION

According to the data of the Table 1, it is observed that the shelf life of the grow crops ‘Prata Anã’ (6 – 11 days) it was superior to ‘Nanicão’ (4 – 7.5 days), regardless of its format. Medina et al. (1998), also observed longer shelf life to cultivate bananas ‘Prata Anã’ compared to other varieties. It is observed even though the shelf life of the packaged banana and bulk, did not differ significantly from each other and were superior to other forms of presentation (bunch and bouquet), both to cultivate. Prill et al. (2012) showed that the use of plastic films increased the protection of fruit against the appearance of lesions in the bark, allowing the expansion of the marketing period.

TABLE 1

SHELF LIFE (DAYS) OF BANANAS 'PRATA ANÃ' AND 'NANICÃO' IN CONDITIONS OF LABORATORY AND GROCERY STORE UNDER DIFFERENT FORMS OF PRESENTATION.

Form of presentation	Grow crops		Exhibition venue	
	‘Nanicão’	‘Prata Anã’	Laboratory	Grocery store
Bunch	4.00 Aa	6.00 Ab	6.00 Aa	4.00 Aa
Bouquet	4.50 Aa	7.12 Ab	6.75 Aa	4.88 Aa
Bulk	6.50 Ba	9.50 Bb	8.50 Ba	7.50 Ba
Packed	7.50 Ba	11.12 Bb	9.88 Ba	8.75 Ba

Means followed by the same uppercase vertically and lowercase horizontally, do not differ by the Scott-Knott test at 5% probability.

In Table 1 shows that there was no significant difference in the shelf life of bananas in the laboratory and in grocery store. As for the form of presentation it is observed that the bananas packaged and bulk had longer shelf life than bananas in bunch and bouquet.

The longer shelf life of bananas packed is due to modified atmosphere on trays lined with low density polyethylene film. Similar results were obtained by Jerônimo et al. (2007) with banana and mango.

Bulk bananas also have longer shelf life than those in bouquet and in bunches, especially in grocery store, that is basically due to excessive handling of fruits in out of the box, placement on the shelves and in the process of choice by consumers, taunting threshing, crushing and fruits from injuries, accelerating thus the decomposition process, with consequent reduction of its longevity (NASCIMENTO, 2009)

It should be considered also that the bananas packaged and bulk suffer a more careful selection for fruits with better appearance and uniformity of size. In these aspects, bananas and packaged in bulk, allow the choice of the banana ripening stage or ideal point of consumption, as well as reducing handling and thereby reducing losses and increasing the shelf life of fruits (BUSSEL & KENIGSBERGER, 1975; PEREIRA et al., 2008; BARROS et al., 1994).

In the Table 2, the loss of data is displayed (in %) for both cultivars and two storage sites studied, respectively. It can be observed that the banana bunch and presents a lower shelf life, also showed the greatest losses than other forms of presentation in both cultivars (13% to 'Nanicão' and 8.5% to 'Prata anã') and two storage locations (8% no laboratory and 13.5% grocery store). The packed bananas and bulk were those with the lowest percentage of losses for the two cultivars and two storage locations, there were no statistically significant differences between them. Losses in the grocery store 12.0% for banana bunch and 2.0% for bulk or packed, they were also found for Pereira et al., (2008). These results corroborate those of Yoneya (2010) where the right packaging, as well as enhancing the product appearance also helps producers and retailers reduce losses in post-harvest.

TABLE 2

LOSSES (%) OF BANANAS 'PRATA ANÃ' AND 'NANICÃO' IN CONDITIONS OF LABORATORY AND GROCERY STORE UNDER DIFFERENT FORMS OF PRESENTATION.

Form of presentation	Grow crops		Exhibition venue	
	'Nanicão'	'Prata Anã'	Laboratory	Grocery store
Bunch	13.00 Bb	8.50 Ba	8.00 Ab	13.50 Aa
Bouquet	10.00 Bb	7.00 Ba	6.50 Bb	10.50 Ba
Bulk	6.50 Ab	2.50 Aa	4.00 Cb	5.00 Ca
Packed	6.00 Ab	2.50 Aa	3.50 Cb	5.00 Ca

Means followed by the same uppercase vertically and lowercase horizontally, do not differ by the Scott-Knott test at 5% probability.

The variety 'Prata anã', besides presenting a longer shelf life, it was the cultivar that showed the lowest losses, both grocery store (6.0%) as in the laboratory (4.25%), and the losses of the cultivar 'Nanicão' they were 11.0% in the laboratory and 6.75% grocery store. Campos et al. (2003) found losses of about 33% for bananas 'Nanicão' in bunch, much higher than found in this work, which can be explained by the maturation stage in which they were evaluated losses, as this author evaluated the maturation (stage 8). The greatest loss in grocery store is due to excessive handling by consumers looking for the best appearance of bananas, bunch size and ideal ripening stage, which consequently causes threshing and fruit crushing. According to FAO (2016b), the losses caused by physiological damage intensify when conditions occur that accelerate the natural process of deterioration, such as high temperatures, low humidity and physical injuries.

IV. CONCLUSION

Bananas, bulk and packaged in trays coated polyethylene film had longer shelf life and lower losses than bananas in bunch and bouquet during marketing.

The lowest shelf life and greater grocery store losses of the banana is due to handling by consumers.

The 'Prata Anã' banana has a longer shelf life than the 'Nanicão'.

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