ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

REVIEW ARTICLE

Value addition of Banana: key roles to minimize post harvest losses

Jayasheela,D.S[1*].Dr.G.S. Sreekala[2] and Prasanth, K[3].

1. Department of Processing Technology, College of Agriculture Vellayani, Kerala Agricultural University, Thrissur.
2. Assistant Professor, Department of Plantation Crops and Spices, College of Agriculture Vellayani, Kerala Agricultural University, Thrissur.
3. Department of vegetable crops, TNAU, Coimbatore.

Manuscript Info

Manuscript History:

Received: 15 March 2015
Final Accepted: 29 April 2015
Published Online: May 2015

Key words:

postharvest management, banana, precooling, waxing, $KMnO_4$, MAP

Corresponding Author

Jayasheela,D.S

Abstract

Banana sometimes called "apple of paradise" is one of the oldest fruits known to humankind.Is one of the widely grown and consumed fruits due to their distinct aroma and taste, in all parts of the world. It is the staple food and economic life line for many countries. It is cheap source of carbohydrate and rich source of potassium, calcium, antioxidants and other micronutrients. India is one of the major producers of bananas cultivating in an area of 83 lakh hectare with a production over 2.9 million tonnes. worth of $83,55croresas reported for the year 2011 (FAO, 2011). The major banana producing states of India are Tamil Nadu, Maharashtra and Gujarat. In many places, there is significant loss of the food value of banana due to improper postharvest management practices that causes huge economic loss. Food availability and accessibility can be increased by increasing production, improving distribution, and reducing the losses. Thus, reduction of post-harvest food losses is a critical component of ensuring future global food security. Post production losses of banana can be reduced by adopting various post-harvest management practices that are currently in practiceall over the world to prolong its shelf life. Postharvest management practices such as cleaning, sorting, and pre-storage treatments, viz. pre-cooling, chemical treatment for disinfection, modified atmospheric packaging, for banana are discussed in brief, in the following sections.Postharvest loss of banana is high, ranging from 20-30% (Santosa*et al*., 2010).

INTRODUCTION

Causes of losses in Banana

In banana physical injuries, shrivelling, contamination with pathogenic fungi and bacteria are major causes of losses. Lack of awareness, knowledge and skills of produce handlers and marketers, aided by high ambient temperature and non-availability of efficient cool chains also aggravate postharvest losses. Apart from that poor handling during transportation and the use of poor marketing structures also contribute to loss (Debela*et al*., 2011).

STEPS TO MINIMIZE POST HARVEST LOSSES

1.HARVESTING

Bananas are harvested at various stages of its maturity depending upon distance to market and the purpose for which it is cultivated, such as culinary, table purpose, etc. (Davara and Patel 2011) The fruit ripening and maturity standards vary from country to country depending on the expected green life required by the fruit before ripening takes place. Rajkumar*et al*., (2012) found that non-destructive method to distinguish the banana fruit ripening or maturity stages and fruit quality by using the hyperspectral imaging.

a. Degree of fullness of fingers/angularity -Here the angularity of fruits change to or fullness fingers appears. (Saraswathy*et al*., 2012).
b. Bunch age – Different varieties of banana mature at different stage. Grand Naine and Williams can be harvested from 22 and 24 weeks after bunch emergence respectively (Muchui*et al*., 2010). Rasthali harvested at 11 and 12 weeks after emergence of the first hand can be considered as commercial harvest period (Kheng*et al*., 2012).
c. Grade – for export purpose banana is harvested based on the grade. The diameter of middle finger on the outer bunch of the second hand is measured using a calliper and are harvested when they attain a suitable width (New GMC, 2005).

2.PRECOOLING

Field heat generated due to the harvest stress can cause overheating of the fruits. The different pre-cooling methods tested in Robusta dipping (immersion) was the fastest, followed by spraying and forced air cooling. Cold storage had the highest shelf life (24 days), followed by evaporative storage (18 days), and room storage (10 days) (Doshi and Sutar, 2010).

3.CHEMICAL TREATMENT

Chlorinated compounds, particularly hypochlorites, are widely used in microbial control and have along history of application in the food processing industry. In addition to their economic benefits, hypochlorites are effective in inactivating micro-organisms suspended in water and on nonporous surfaces .Chemicals have been widely used to reduce the incidence of postharvest diseases (Amin and Hossain, 2012).

4.HOT WATER TREATMENT

Hot water treatment delayed ripening and prolonged the green-life of fruit (Alvindia, 2012). Shelf-life of bananas increased and post-harvest losses of fruits reduced significantly through hot water treatment at 53 °C for 9 minutes or 55 °C for 7 minutes(Amin and Hossain, 2012). Hot water treatment at 50°C for 20 min could be used to control anthracnose(*Colletotrichummusae*) in Berangan banana instead of using fungicide as practically used in commercial now (Mirshekari*et al*., 2012).

5.WAXING

Banana cv. Robusta dipped in 6% wax gave shelf life of 13days in room storage and 19 days in Zero energy cool chambers and 24 days in cold storage (Doshi and Sutar, 2010). The gum Arabic 10% incorporated with 1.0% chitosan act as a biofungicide for controlling anthracnose in banana (Maqbool, 2010). Dipping of fruits in 1.5% or 2.5% Tal-prolong solution delayed yellow colour development by 4-8 days (NHB, 2012). Dwarf Cavendish dipped in 6% wax increase the green life by 40 days (Saravanan, *et al*., 2013).

6.IRRADIATION

Bananas were treated with three gamma radiation doses of 0.30 kGy, 0.40 kGy and 0.50k Gy for 5 minutes and stored in a dry place under room conditions (25±2°C/ 80± 5% RH). The control bananas ripened within 6 days while the gamma irradiated bananas ripened within 26 days, indicating that the shelf life of banana was extended by 20 days thereby delaying banana ripening (Zaman*et al*., 2007).

7.MODIFIED ATMOSPHERE PACKAGING

MAP is a preservation technique that further minimizes the physiological and microbial decay of perishable produce. Modified atmosphere (MA) refers to any atmosphere different from the normal air.Poyo, Giant Cavendish and Williamfruits are packed in HDPE and LDPE bags resulted in longer shelf life, followed by packaging in dried banana leaf and teff straw. Storage under ambient condition is 27 days followed by 18 days. Unpackaged fruits remained marketable for 15 days only (Hailu*et al*., 2012). MAP with green keeper at 12 ± 1°C and 85–90% RH could be commercially used for long term storage and long distance transportation of banana with maximum shelf-life of 7 weeks (Kudachikar*et al*., 2011). The banana stored at 14 and 18°C temperatures have shelf life of 37 and 34 daysrespectively when wrapped with unperforated plastic bags. The untreated bananas have the shortest shelf life of 15 days (Hossain*et al*., 2013).Ethylene absorbents can be included inside modified atmosphere packages and the following examples illustrate some of their uses. Ripening in bananas can be delayed by using an ethylene scrubber. There are several compounds that can be used as inhibitors of ethylene, for example aminoethoxyvinylglycine (AVG), an inhibitor of ethylene synthesis; 1- Methylcyclopropene (1-MCP), an inhibitor of ethylene action and potassium permanganate ($KMnO_4$), an oxidising agent. For banana, 1-MCP and $KMnO_4$ are the most commonly used ethylene scrubbers (Sen*et al*., 2012).Application of clay powder as $KMnO_4$ Carrier is effective for prolong storage banana var. Raja Bulu. Application of clay powder at rate 30 g, equal to 30 g kg -1 fresh banana is desirable to maintain banana storage for 18 days(Santosa*et al*., 2010).1-MCP combined with perforated polyethylene packaging extended shelf life of banana for over two weeks (Zewter*et al*., 2012). Ethylene scrubber made out of filter paper delayed ripening of fruits and increased storage life (Saravanan*et al*., 2013).

Conclusion : Reduction of post-harvest food losses is a critical component of ensuring future global food security. Post production losses of banana can be reduced by adopting various post-harvest management practices that are currently in practiceall over the world to prolong its shelf life. Increase the availabilty of food to the consumers and increase the economy status of the farmers and nation.

Reference.

Alvindia, D.G. 2012.Revisiting hot water treatments in controlling crown rot of banana cv. Bungulan. Crop Prot. 33: 59-64.

Amin, N.andHossain, M.2012**.** reduction of postharvest loss and prolong the shelf-life of banana through hot water treatment**.** Journal of Chemical Engineering.vol.27(1),42-47.

Davara, P.R. and Patel, N.C. 2011.Assessment of postharvest losses and value addition to banana grown in Gujarat.Agricultural Engineering Today.35(4) : 3-9.

Debela, A., GerbaDaba, G., Bane, D. and Tolessa, K. 2011. Identification of major causes of postharvest losses among selected fruits in jimma zone for proffering veritable solutions.Int. J. of Current Research. 3(11): 40-43.

Doshi, J.S. and Sutar, R. F. 2010.Studies on pre-cooling and storage of banana for extension of shelf life. J. AgrlEngg. 47(2): 14-19.

Hailu, M., Workneh, T. S. and Belew, D. 2012.Effect of packaging materials on the quality of banana cultivars. Afr. J. Agric. Res. 7(7):1226-1237.

Hossain, M.Z., Hassan, M.K.., Hasan, G.N. and Islam, M.R. 2013.Effects of modified atmosphere packaging and low temperature on the physico-chemical changes and shelf life of banana. Academic J. of Plant Sci. 6 (1): 19-31.

Kheng, T.Y., Ding, P. and Rahman, N.A.A. 2012.Determination of optimum harvest maturity and physico-chemical quality of rastali banana (Musa AAB Rastali) during fruit ripening. J. Sci. Food Agric. 92: 171-176.

Maqbool, M., Ali, A., Ramachandran, S., Smith, D.R., and Alderson, P.G. 2010.Control of postharvest anthracnose of banana using a new edible composite coating. Crop Prot. 29: 1136-1141.

Mirshekari, A., Ding, P., Kadir, J. and Ghazali, H. M. 2012. Effect of hot water dip treatment on postharvest anthracnose of banana var. Berangan. Afr. J. Agric. Res. 7(1): 6-10.

Muchui, M.N., Njoroge, C. K., Kahangi, E. M. and Onyango, C. A. 2010. Determination of maturity indices of tissue cultured bananas (Musa spp.) Williams and Grande Naine.ActaHorticulturae 879: 425-430.

NHB [National Horticulture Board]. 2012. Indian Horticulture Database 2011 [online]. Available: http://nhb.gov.in/area-pro/database-2011.pdf. [05 Oct 2012].

Rajkumar, P., Wang, N. Elmasry, G.Raghavan, G.S.V. and Gariepy, Y. 2012.Studies on banana fruit quality and maturity stages using hyperspectral imaging.Journal of Food Engineering 108, 194–200.

Santosa , E., Winarso D. Widodo W.D. andKholidi. 2010. The use of clay as potassium permanganate carrier to delay the ripening of raja bulu banana. *J. Hort. Indonesia* 1(2):89-96.

Saravanan, S., Suchitra, V. and Kumar, R. 2013. Influence of wax coating and indigenous potassium permanganate based ethylene absorbents on shelf life of banana cv. Dwarf Cavendish. Progressive Hort, 45(1):83-88.

Sen C., Mishra H. N. and Srivastav P. P.2012.Modified atmosphere packaging and active packaging of banana (Musa spp.): A review on control of ripening and extension of shelf life.Journal of Stored Products and Postharvest Research Vol. 3(9), pp. 122 – 132, 8 May, 2012

Zaman, W., Paul, D., Alam, K., Ibrahim, M. and Hassan, P. 2007. Shelf life extension of banana (Musa sapientum) by gamma radiation. J. Biosci. 15: 47-53.