



THE EFFECT OF TEMPERATURE, PROCESSING AND STORAGE PRACTICES ON STABILITY OF VIT.C IN AMALAKI (PHYLLANTHUS EMBLICA LINN.) – A REVIEW

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ABSTRACT

Amalaki is consumed as a fresh fruit or in the form of food products like preserves. It is used in various ayurvedic preparations like Chyvanprash, Triphala churna and possesses anti-aging, rejuvenating, antioxidant, hypoglycemic activity. Amla is a rich source of vitamin C. The fresh Amalaki fruit, because of its high astringent taste, is not palatable for direct consumption; hence it is consumed mainly in processed form. Due to its perishable nature, different methods used to extend shelf life e.g. cold storage, sun drying, and hot air drying or by processing to preserve, candy, bar, jam, pickle, juice, syrup, squash and dehydrated powder. The main objective of the review is to highlight effect of temperature, processing and storage practices on stability of vit. C in Amalaki.

KEYWORDS: Amalaki, Phyllanthus emblica, Vit.C.

INTRODUCTION

Amalaki is widely used in Ayurvedic treatment. There are several varieties of Amalaki grown throughout different parts of India e.g. Banarasi, Chakiya, Kanchan, Banarsi red, pink-tinged, NA7, etc. Amalaki fruit is a good source of vitamin C, carotene, nicotinic acid, polyphenols, pectin, tannins, etc. The fruit is a potent antioxidant, hypolipidaemic, antimicrobial, immunomodulatory, anti-inflammatory, antiulcer activity and HIV-1 reverse transcriptase inhibitory action.^[1] Moreover, the fresh Amalaki fruit is highly acidic and astringent; it is not popular as table fruit. However, excellent nutritive and therapeutic values of the fruit have great potentiality for processing into several quality products. It is highly perishable in nature, the fruit needs processing for increasing shelf life and value addition. The methods of extending shelf life are by cold storage, sun drying and hot air drying or by processing to preserve, pickle, juice, syrup, supari, bar, candy, dehydrated powder, etc.

Vit.C content in fresh Amalaki fruit is 590-974mg/100gm and in dry fruit 256-421mg/100gm (D. Prakash, etal 2000).^[3] The present review describes effect of temperature, processing and storage practices on stability of vit.C in Amalaki.

Effect of drying methods

Sunil Pareek, etal (2012) reported effect of drying methods on Vit.C present in Amalaki fruits. The fruit slices of 5 mm thickness were dried using different

methods viz. direct solar drying, oven drying, microwave drying and fluidized bed drying until the moisture level was below 15%. The sliced sample was evenly spread on to an aluminium tray and kept under sunlight for drying. Another sample was then spread on to the perforated tray of the oven, which was set to the required temperature of 65°C. Yet another sample was taken in the microwave oven and dried at a temperature of 65°C. The fourth sample was taken in the perforated mesh container of the fluidized bed dryer and dried at a temperature of 65°C with air velocity of 90 m/ min. Powdered dehydrated Amalaki were sealed in air tight polyethylene sealing machine and stored for 90 days.

The highest Vit.C was found in fluidized bed dried Amalaki (272.74 mg/100 g), followed by microwave dried (198.40 mg/100 g), oven dried (181.15 mg/100 g) and solar dried Amalaki (170.11 mg/100 g). On 90 days of storage, highest per cent reduction was observed in fluidized bed drying (24.64%), followed by microwave drying (18.94%), oven drying (15.50%) and least in sun drying (12.95%) over the start of experiment. However, powder making with fluidized bed drying was acceptable even after 90 days of storage and contains 205.5 mg / 100g Vit.C.^[3]

In another study by Poonam Mishra etal (2009), the fruits were used to prepare the powder by different techniques like freeze drying, sun drying, spray drying, hot air drying and vacuum drying.

For the preparation of spray dried powder, Amalaki juice was evaporated up to 50% using rotary evaporator. Maltodextrin (5%, w/v of initial juice) was added to the concentrated juice and stirred for 5 min using mechanical stirrer followed by spray drying at 200°C inlet and 150°C outlet temperature and 40% aspiration speed to dry the sample.

For freeze drying 200 ml of juice was subjected to freezing at -35°C for 3 h followed by freeze dehydration in a freeze dryer at 60°C for 16 h. Sun dried powder was prepared from grated Amalaki dried under sun followed by grinding in a mixer grinder and filtration using muslin cloth. The powder was also prepared by drying the grated Amalaki in a vacuum oven at 50°C and in a tunnel drier at 70°C followed by grinding and filtration.

The freeze dried powder had the highest Vit.C content 543mg/100gm followed by spray dried powder 405mg/100gm, Tunnel dried 340 mg/100gm and Vacuum dried 333mg/100gm. The lowest concentration of Vit.C was found in sun dried powder 300 mg/100gm.^[4]

Syrup and Pickle

Vaishali Agte, et al. (2014) studied properties of Syrup and Pickle prepared by using Amalaki fruit. Syrup was prepared by mixing the juice and sugar syrup in 1:2 ratio and stored in a refrigerator in air tight glass bottle without adding any preservative. Pickle was prepared by mixing 200g finely grated unpeeled Amalaki with 30g salt, 70g ready pickle masala, 50g jaggery and layered with 30g Soya oil and stored in refrigerator in air tight glass bottle. After 33 days vitamin C values for the syrup decreased from 64.6 to 32.5mg (49.70% loss) and in case of pickle decreased from 60.6 to 14.4 mg/100g (76.29% loss).^[5]

Toffe, Bar and Candy

Puranik V, et al. (2012) showed retention of bioactive components in processed Amalaki. Amalaki Toffee: Amalaki pulp cooked in ghee to 1/3 of its volume. Sugar was added and cooked up to 70°B. Then glucose, Skimmed milk powder were added and cooked till 82°B. Spread on greased tray (0.5cm. thick layer). After cooling cut into pieces and wrapped in butter paper.

Amalaki Bar: Amalaki pulp cooked in ghee to 1/3 of its volume. 3/4th part of syrup and pectin were added. Then glucose powder added and cooked for 2 min and Skimmed milk powder in paste form (With 1/4th of syrup) added and cooked till it leaves the corners of the pan. Spread on greased tray. After cooling it at room temperature for 30 min. wrapped in butter paper.

Amalaki Candy: Syrup was prepared with sugar upto 48° Brix. Amalaki steeped in sugar syrup for 24 hours and washed. The process with syrup of 58°B for next 24 hours and with syrup of 72°B for next 24 hours has been

repeated. After drying in hot air oven at 55°C for 2 hours, cooled and filled in PET Jars.

Vitamin C content found in Amalaki candy 324 mg/100gm, in Amalaki bar 229 mg/100gm and in Amalaki toffee 170 mg/100gm. The maximum retention of vitamin c in candy is may be due to candy preparation does not have heating step of Amalaki flakes, it requires steeping of flakes while toffee and bar requires frying of pulp.^[6]

Preserve (Morawala)

Priya MD et al (2013) prepared *Morawala* by three methods i.e. “traditional method”, “brine method” and “no-cooking method”. A decreasing trend of Vit.C content in all the treatments and storage period was observed during storage of 90 days. The preserves made using “traditional method” cannot be stored for more than a month at initial concentration of sugar syrup below 60°B.

The maximum retention of Vit.C 184.250mg/100g was noticed in samples of “no-cooking method” at sugar syrup of 70°B and minimum 44.450mg/100g was observed in “brine method” at sugar syrup of 60°B. Sample prepared by traditional method contains 32.450 mg/100g of Vit.C at the end of 30 days.^[7]

Juice

Bhattacharjee AK, et al (2013) studied quality evaluation in storage of Amalaki juice extracted from fruits preserved by steeping in water. Mature and healthy Amalaki fruits were washed thoroughly under running tap water and preserved in water for 30 days in steel container (50 L capacity) at room temperature (15-20°C). The water was changed twice a week to avoid the appearance of microbial growth. The fruit samples were withdrawn in triplicate at 0, 5, 10, 15, 20 and 30 days of preservation for quality evaluation. Juice was extracted after each withdrawal of fruits with a hydraulic press at 10.3 MPa (1500 lb/inch²) pressure after crushing the fruits in a fruit mill. It was pasteurized at 90°C for 2 min and preserved with 500 ppm SO₂ as potassium metabisulphite in presterilized glass bottles up to 9 months under ambient conditions (15-35°C, 50-80% R.H.). The Vit.C content decreased continuously in all the juice samples throughout the storage period. It decreased from 309 to 111 mg/100 ml, 197 to 73 mg/100 ml and 43 to 8 mg/100 ml in juice prepared from fresh, 10 or 30 days steep preserved fruits, respectively, after 9 months of storage under ambient conditions. Around 50 per cent of Vit.C could be retained in juice extracted from fresh, 5 or 10 days steeped fruits up to 4 months of storage. The loss of Vit.C was comparatively less (around 60%) in juice prepared from fruits steep preserved up to 15 days than in juice extracted from fruits steep preserved for more than 15 days, where the losses were more than 75 per cent.^[8]

CONCLUSION

The Amalaki fruit is highly nutritive with great medicinal value. It is rich source of Vit.C. Because of its high acidity and astringent taste, it is not palatable for direct consumption; hence it is consumed mainly in processed form. Since Vit.C is a heat sensitive water soluble vitamin, reduction in Vit.C content was observed during processing on Amalaki fruits. Also massive loss during later period of storage might be due to its oxidation to dehydroascorbic acid. Therefore the information obtained by various researches will be helpful for choosing proper drying and processing methods, so that Amalaki can be utilized for the development of various value added products which retain Vit.C even after processing.

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