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Evaluation of Bioactive Compounds of Five Mango (*Mangifera Indica* L.) Varieties in Bangladesh

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ABSTRACT

The sources of nutrients for the betterment of human are fruits and vegetables. Among the various fruits available in Bangladesh, mango occupies a vital place in the human nutrition for its delicious taste and higher nutritional value. Five different mango varieties (*Fazli, Amrupali, Langra, Gopalbogh* and *Misribogh*) available in Northern Bangladesh were used in this experiment to investigate the quality ofbioactive compounds.. Bioactive compounds, including ascorbic acid and β-carotene contents were evaluated. Bioactive compounds *viz*. vitamin C (28.63~40.92 mg/100g) and β-carotene (0.01593 to 0.02028 mg/g) were found to be significantly varied among the mango varieties ($p \leq 0$). It can be concluded from the results of this study that all the mango varieties are high in beneficial compounds for the human health. The study findings would be helpful for the consumers, dietitian and industry policymakers.

Keywords: Bioactive compounds, Vitamin C, β-carotene, Mango varieties

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INTRODUCTION

Mango (*Mangifera indica* L.) grows well mostly in Indian subcontinent. The total production of mango is 47.13 million tons with securing third position among the tropical fruits in the world (Islam et al., 2013; Rashid et al., 2019), FAO (2017). Mango acquires 1st and 3rd place in terms of cultivation area and production, respectively among all fruits in Bangladesh (BBS, 2017). Among all of the indigenous fruits, mango is now recognized as one of the best fruits due to its excellent flavor, attractive fragrance, and beautiful shades of color, delicious taste and high nutritive value. A few specific varieties are commercialized based on preferences of different regions of the countries About 250 varieties of mangoes are grown in Bangladesh as mentioned by Shafique (2006). It is a decent supplier of bioactive compound shaving delicious taste, exotic flavor, and many-shaded colors. Mango supplies a considerable quantity of antioxidant such as β-carotene and ascorbic acid (Pal, 1998). It contains vitamin C that contributes a great deal to the food value of the fruit among all of the others nutrient. The loss of excess fruits may reduced by using the post-harvest value addition technology resulting high return of money for our national economy.. Mango is consumed worldwide as either whole fruit, fresh-cut produce, processed juice, pickle, dried fruit, chutney, pulp, paste, puree, jam, slices in brine or flour (IIRR, 2006;Evans, 2008; Ntombela, 2012). The fruit composition, ripening stage and certain post-harvest processing treatments are important factors for the stability of fresh-cut or dried mango during processing and storage. The higher susceptiblity to flesh browning during cutting operation of mango due tothe presence of higher phenolic content and higher polyphenol oxidase (PPO) activity (Vasquez et al., 2002). It is interesting to compare the quality parameters and bioactive compounds of mangoes of different varieties with other types knowing the potential of other alternative mango cultivars. This can open a new perspective to the farmers and local industries and will also benefit the consumer by offering a great source of antioxidant compounds. Therefore, it is necessary to study the bioactive compounds of different mango variety available in Bangladesh. This will help the consumers to choose the right variety with more medicinal value as well as the processed food manufacturers to predict the suitable variety for different mango products. Therefore, this study was undertaken to analyze the bioactive compound's present in selected five mango varieties in Bangladesh.

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MATERIALS AND METHODS

Experimental site

The experiment was carried out atthe Food and Process Engineering Lab-1 and Laboratory of Agricultural Chemistry, Hajee Mohammad Danesh Science and Technology University, Dinajpur.

Sample collection

Selected mangoes varieties *viz*. *Fazli*, *Langra*, *Amrupali*, *Gopalbogh* and *Misribogh*, were collected from Rajshahi district during harvesting season (June-July 2017). These mangoes were brought into the laboratory and stored in a refrigerator at 3-5^{o}C for further use.

Determination of vitamin C

Ascorbic acid was determined following the method of Ranganna (1979). Ten (10) gram of fruit sample blended with about 50 ml metaphosphoric solution then it was filtered with a white thin cloth then it was transferred in a 100ml volumetric flask and volume up to the mark with the metaphosphoric acid solution. Fruit sample of 10 ml was taken in a conical flask and titrated with dye solution from the burette.

$$\textbf{Vitamin C (mg/100g)} = \frac{\textbf{Titrate value x dye factor x volume of sample made up x 100}}{\textbf{Volume of sample used x weight of sample x 1000}}$$

Determination of β-carotene

β-carotenecontent was determined with a slightly modified method described by Nagata and Yamashita (1992). Accurately weighed 1.0 g of sliced fruit part was homogenized with 10.0 ml of acetone-hexane (4:6) solution. Homogenized solution was centrifuged at 3600 rpm for 10 minutes and filtrated the solution. A little amount of supernatant sample was taken in a cuvette and placed in a spectrophotometer (T80 UV/VIS Spectrometer, PG Instruments LTD.).The absorbance of the prepared supernatant solution was measured at 663 nm, 505 nm and 453 nm.

Calculation:

The β-carotene content was estimated in mg/100ml by using the following equation (Barros et al., 2007; Igbokwe et al., 2013):

$$\textbf{β-carotene (mg/100 g)} = 0.216\ A_{663} - 0.304\ A_{505} + 0.452\ A_{453}$$

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RESULTS AND DISCUSSION

Vitamin C

Vitamin C or ascorbic acid is an important antioxidant in food and it is the major vitamin present in citrus fruits. Ascorbic acid plays a major role as an antioxidant in the detoxification of hydrogen peroxide, superoxide radicals (O^{2-}) and hydroxyl radicals ($OH^{\bullet}$) that are generated from the different reactive oxygen species in the plant tissue (Moldau, 1998).This study found that vitamin C of different mango variety was varied significantly ($P < 0.05$) from 28.63 mg/100g to 40.92 mg/100g (Figure 1). Figure 1. shows that the highest vitamin C value was found in *Langra* (40.92 mg/100g) variety followed by *Fazli* (38.19 mg/100g), *Amrupali* (33.53 mg/100g), *Gopalbogh* (31.75 mg/100g) and *Misribogh* (28.63 mg/100g) variety. According to the previous reports (Robles-Sánchez et al., 2009;Valente et al., 2011), the ascorbic acid content varied between the mango cultivars, and also depend on various factors such as temperature, storage conditions, exposure to light, air etc.

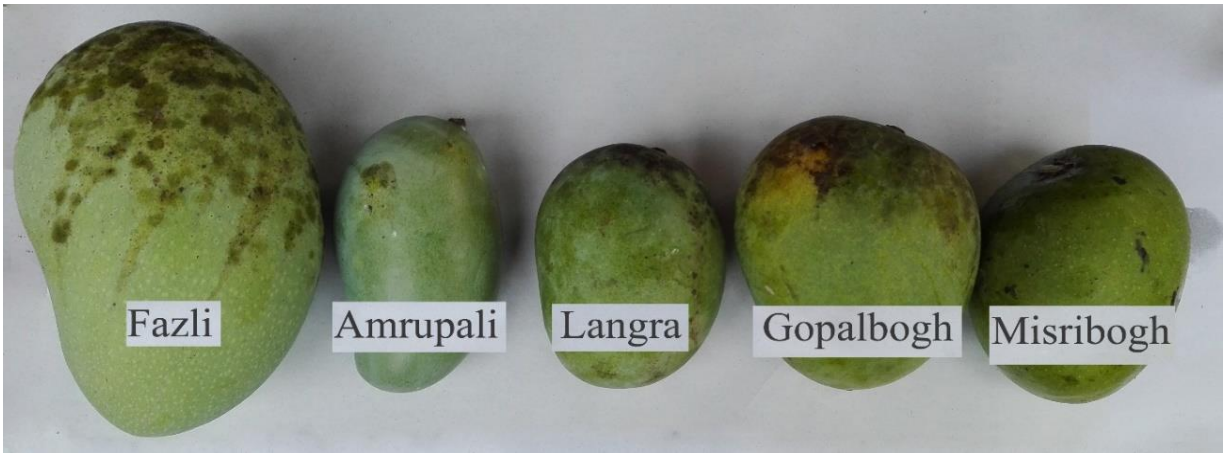

Figure 1. Freshly collected mangoes

β-carotene

β-carotene is ubiquitously present in green leafy and yellow-orange fruits and vegetables.β-carotene content of different variety was found in the range of 0.01593 mg/100g to 0.02028 mg/100g (Figure 2). The maximum value of β-carotene was found in *Fazli* variety while the minimum value was found in *Misribogh*, although there was no significant difference among the mango variety. The β-carotene content of fruits may be influenced by the growing

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conditions, maturity index, post-harvest handling conditions, as well as variety or cultivar (Mangels et al., 1993).

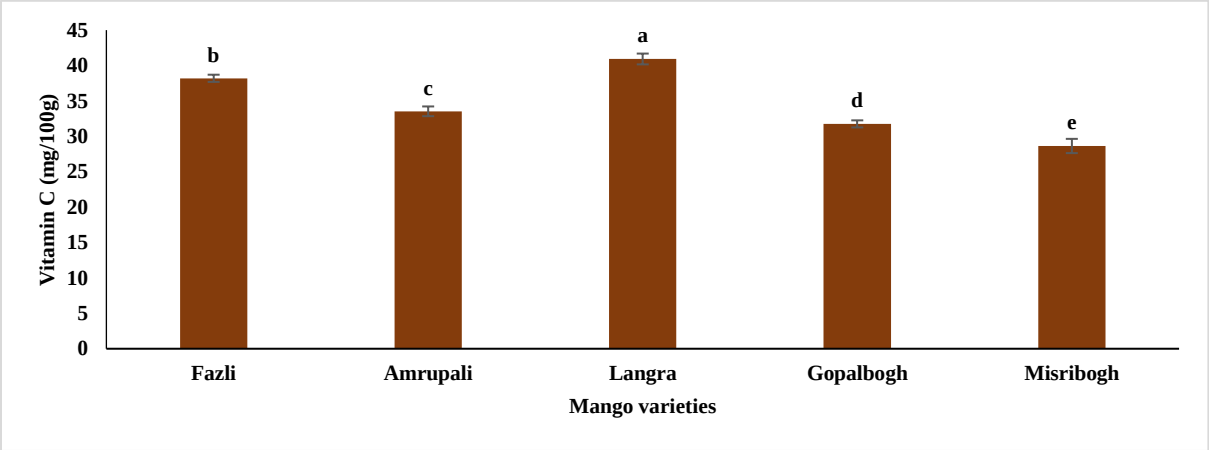

Figure 2. Vitamin C content in different mango varieties

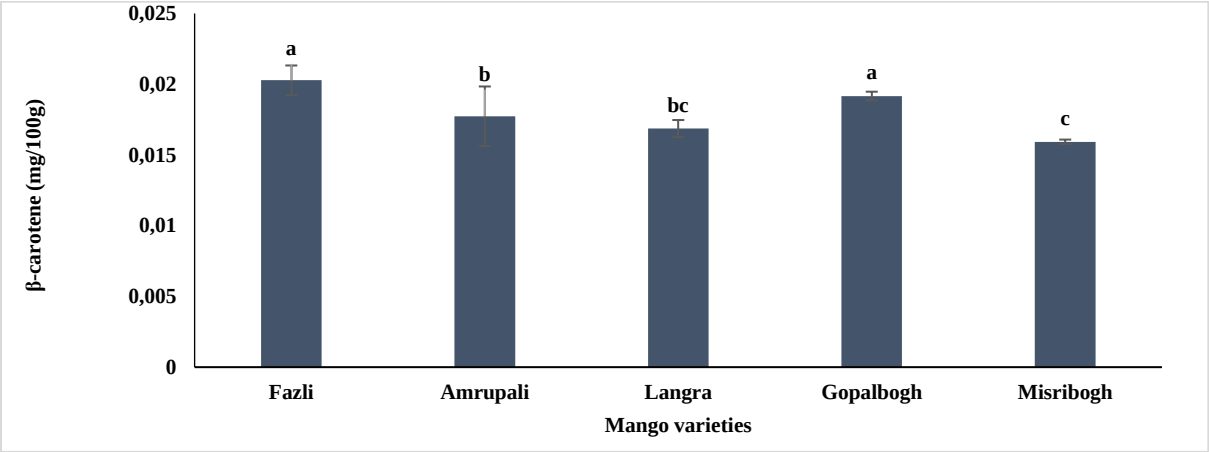

Figure 2. Contents of β-carotene in different mango varieties

CONCLUSION

Present study indicates that all varieties of mango are rich sources of vitamin C, and *β*-carotene. Results of this study revealed that, the highest amount of vitamin C was found in *Langra* variety whereas *Misribogh* contains thelowest amount of vitamin C. On the other hand, the highest amount of *β*-carotene was found in *Fazli* variety whereas *Misribogh* contains the lowest amount of *β*-carotene. Therefore, these varieties may be suitable for dietary recommendation and may be suitable for different product development. Finally, nutritional status of popular five mango

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varieties of Bangladesh was systematically addressed and recommended heir nutritional parameters, which will help the consumers, dietitian and industry policy makers.

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