



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(5): 2095-2098
© 2023 TPI

www.thepharmajournal.com

Received: 05-02-2023

Accepted: 15-03-2023

Rahi Jenekar

Department of Food Science and
Technology, Lovely Professional
University, Punjab, India

Value addition of exotic fruits

Rahi Jenekar

Abstract

Dragon fruit, mangosteen, durian, avocado and star fruit are some exotic fruits of India which has recently got attention due to its nutritional properties and its therapeutic properties. Exotic fruits are highly perishable and needs to be processed to increase its shelf life. Functional drink, fruit yoghurt, fruit jam, jelly, biscuits like different products were developed using different parts of fruits. Nutritional composition of value-added products were analyzed and its sensory analysis was performed. Different therapeutic properties of fruits were also analyzed. This review mentions about the different value-added products along with its nutritional, proximate and functional properties. This products will increase its shelf life and can be present all year around.

Keywords: Dragon fruit, mangosteen, value addition, star fruit, avocado, durian

1. Introduction

Different value added products are prepared from exotic fruits which increase their shelf life and also provides nutritional and therapeutic properties.

1.1 Dragon fruit

Dragon fruit leather was prepared from fruit puree along with hydrocolloids. It was made by conducting conductive hydro drying of puree mixed with hydrocolloids at three different temperature of water, 70 °C, 80 °C, and 90 °C. Without the use of hydrocolloids (L1), three hydrocolloids, including guar gum (L4), xanthan gum (L3), and gellan gum (L2), were utilized to make the fruit leather. The formed leathers used less energy than 2.097 kWh/g. The antioxidant activity and total phenolic content of the four varieties of leather produced at a temperature of 90 °C were found to be between 73.685- 82.467 percent and 4.087- 5.028 mg GAE/g d.w, respectively. The leather created with gellan gum, guar gum, and without hydrocolloid was found to be not that good leather following sensory analysis, while the leather prepared using xanthan gum as the hydrocolloid was found to be the best (Raj, & Dash, *et al.*, 2022) ^[13].

Red dragon fruit spaghetti was prepared by Saptariana and R Budiono to know about its consumer acceptability and vitamin C and fiber content in fruit spaghetti. The dependent variable was the level of preference, vitamin C, and fibre content, and the independent variables were 250 g: 0 g, 200 g: 50 g, 175 g: 75 g, and 150 g: 100 g of red dragon fruit and water. Sugar, alginate, gelatine, red dragon fruit, and water were used to make spaghetti. Later, sensory analysis was done by using hedonic scale by untrained panellists and vitamin C and fiber content was checked using laboratory tests. The results showed that the preference for aspects of colour, taste, texture, and flavour in different samples the highest percentage varied with a score of 5 or very like. For vitamin C and fibre content higher the dragon fruit used, the higher the content of vitamin C and crude fibre (Budiono, *et al.*, 2022) ^[2].

Nisa, T. C *et al.* (2018) ^[10] reported the effect of proportion of peel and flesh of red dragon fruit in jam by organoleptic test, to obtain the results of analysis of chemical properties and physical properties of jam. The result showed that proportion of peel and flesh of red dragon fruit had significant effect on hedonic quality test of color, texture, taste, aftertaste and hedonic test of flavor and taste. Based on the hedonic test, the selected formula were F3 (peel (70 g) and flesh (30g), with water content (30,95%), ash content (0,27%), protein content (0,65%), fat content (0,20%), carbohydrate content (67,93%), antioxidant capacity (164,79 mg AEAC) and total flavonoid (0,430 mg/g).

Corresponding Author:

Rahi Jenekar

Department of Food Science and
Technology, Lovely Professional
University, Punjab, India

1.2. Mangosteen

A functional beverage was prepared from mangosteen juice incorporated with high anti-inflammatory activities herbal plants. Mangosteen juice was chosen because of its high nutritional content and was supplemented with 0.20 percent w/v Sappan wood extract. The composition, which included 55 percent w/v mangosteen juice by weight and 0.20 percent w/v Sappan wood extract, also contained 6.92+ 0.27 mg/ml of tannin and 5.34+ 0.34 mg of gallic acid per ml of sample, 4.59+ 0.53 mg/l of anthocyanin, and had a potential antioxidant activity of 91.15 + 0.47 DPPH%. A product was utilised to evaluate the breast cancer cell MDA-viability; MB-231's the results revealed a decrease in the number of these cells (Mongkontanawat, *et al.*, 2022) [9].

Mangosteen rind extract was added to the yoghurt beverage to improve the product's quality. Yoghurt that had been treated with 0, 1, 2, and 3 percent (v/v) of mangosteen rind extract had its antioxidant properties studied. In yoghurt beverage, 3 percent additional mangosteen rind extract had the highest total phenolic concentration and lowest thiobarbituric acid values. According to 1, 2, and 3 percent treatments, the antioxidant activity (IC50) was 5.14, 5.1, 5.12, and 5.13, respectively. According to the findings, the total phenol content increased as mangosteen levels did. Compared to the control, the yoghurt drink with mangosteen exhibited a much higher scavenging activity (Wibawanti, *et al.*, 2019) [15].



Fig 1: Exotic fruits

1.3. Durian

In a study Durian (*Durio zibethinus Murr.*) was vacuum-dried in a microwave at 1,200 W to create durian flour, which was then used to make biscuits, which are typically prepared with wheat flour. It was used to replace wheat flour to develop composite flours containing 0, 25, 50, 75, and 100 percent durian flour. Significant amounts of starch gelatinization were caused by the microwave treatment. In contrast to wheat flour, durian flour showed increased water absorption capacity but had lower viscosity, pasting temperature, gelatinization temperatures, and enthalpy of gelatinization. The durian dough qualities, such as development time, dough stability, time to breakdown, and phase angle tangent, were inferior to those of the wheat dough. The microwave vacuum-dried durian flour had 5.56, 9.95, 7.92, 11.37, 3.31, and 66.73 g of moisture, fat, protein, crude fibre, ash, and carbohydrate per 100 g of dry matter, respectively. The starch concentration was 11.8 percent, comprised of 99.3 percent amylopectin and 0.7 percent amylose. The percentage of durian flour in the

composite flour shouldn't be higher than 50 percent in order to get acceptable dough characteristics for items made from dough (Bai-Ngew, *et al.*, 2021) [1].

A non-dairy functional beverage was prepared from durian pulp where they study effects of sequential inoculation of the bacteria *Bifidobacterium animalis* subsp. *lactis* or *Lactobacillus casei* with the yeast *Williopsis saturnus* on the fermentation of durian pulp were examined in the study. Due to the low pH and high acetic acid synthesis by *bifidobacteria*, which causes early mortality of the yeast, the addition of *W. saturnus* had no influence on the survivability of *bifidobacteria* or on substrate transformation and metabolite creation. While the sulfur-containing compounds that were initially present in durian were reduced to trace levels, the addition of *W. saturnus* improved the viability of *L. casei* L26 and produced various volatile compounds (alcohols, esters, and aldehydes) that may improve the aroma profiles of the fermented durian pulp (Lu, *et al.*, 2018) [7].

Durian fudge was prepared from nine formulations of sugar and flesh combination. The production of durian fudge from 9 compositions ranged from 487 to 603 gram, with versions containing 160 g of durian producing the maximum yield. The evaluation of consumer preferences for the colour, scent, flavour, and texture of durian fudge revealed that the panellists generally appreciated the durian fudge from nine formulations. The formulations that consumers liked the most were sugar combination (S: G) 396: 4 g and durian 160 g, according to the average value of all quality indicators (Lesmayati, *et al.*, 2022) [6].

1.4. Avocado

A functional non-dairy based avocado ice-cream was prepared using probiotic bacteria *Lactiplantibacillus plantarum* 299v. The product's ability to support bacterial growth under various settings was examined and the probiotic's impact on the physicochemical and organoleptic characteristics of non-dairy ice cream was evaluated. The probiotic dessert maintained the therapeutic minimum established for probiotic food products for the duration of storage (8 weeks). The product (90 g) has roughly 109 kcal, comprising 5 g of fat, 1 g of protein and 16 g of carbohydrates. Non-dairy ice cream desserts are a good source of vitamin C, pyridoxine, and folic acid. It was discovered that the probiotic's use did not affect the product's overall quality, including its sensory evaluation. This variation had an average of 7.4 log CFU/g of LABs after several weeks of freezing (Krawęcka, *et al.*, 2021) [5].

The flavour and colour of the roasted avocado seed were tested, along with various time-temperature protocols for drying and roasting. The powdered avocado seed roasted at 180°C for 25 minutes by making an infusion with hot water and 7 percent of the powder. The conditioning process resulted in a decrease in the avocado seed's overall polyphenol content, but a notable rise in acidity and total carotenoid concentration. The presence of carotenoid components or flavonoids may have contributed to the innovative drink's high antioxidant capacity of 90.27 RSA percent DPPH inhibition. The innovative beverage had a lower concentration of total polyphenolic components than the raw or conditioned seed (17.55± 0.70 mg GAE/100 g vs. 179.07±4.09 mg GAE/100 g in the drink), mostly because the beverage only contains 7 percent of roasted avocado seed powder. The innovative beverage also showed cytotoxic

qualities by reducing cell viability when given to DLD-1 and Hs27 cells during the (4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) cytotoxicity assay at a concentration of 40% (Puşcaş, *et al.*, 2022) [12].

Avocado is used to create a milkshake powder that is freeze-dried. By combining avocado pulp, pasteurised milk, maltodextrin, and sugar in the amounts of 84, 28, 10 and 6 percent, respectively, butter fruit milkshake powder (BFMS) was created. Powder for avocado milkshakes flows well. This kind of BFMS powder may expand the market for food products with bioactive goodness, serve as an immunity booster, and benefit people of all ages. The amount of protein, fat, ash, and crude fibre in milk increased when avocado pulp was added, but its low moisture content and water activity indicated that it has a longer shelf life with a low wettability time and is instantaneously soluble in water. The phenolic, flavonoid and beta-carotene content of BFMS is high, which is beneficial for maintaining good health and treating a variety of communicable diseases (Pandey, *et al.*, 2020) [11].

Extraction of oils from avocado peels was studied, and the oils were then characterised to determine whether they were suitable for eating and other applications. N-hexane was chosen as the extraction solvent since it has a very low toxicity value and a high extraction rate and the Soxhlet apparatus was employed for the extraction process. Investigations were conducted into the extracted oil's physical and chemical characteristics. It was discovered that the oil output from the peel was 40.6 percent. The ideal operating conditions for the extraction of oil from avocado peel oil were taken into consideration for 2.6 mm particle size, N-hexane solvent type and extraction period of 3-5 hr (Bullo, 2021) [13].

1.5. Star fruit

In a study apple and star fruit juices were inoculated with two probiotic *Lactobacillus* strains, including *Lactobacillus fermentum* and *Lactobacillus plantarum*. Three probiotic juice samples were made for each fruit juice by inoculating them with 1 percent *L. plantarum*, 1 percent *L. fermentum* and a mixture of both (0.5% each). These samples were then compared to the control sample (juice with no lactobacillus strain). Every seven days at 4 °C for three weeks, the samples' changes in pH, acidity, protein, total soluble solid, total cell count, and sensory characteristics were examined. The findings showed that both probiotic juices' pH, protein content, and total soluble solids (TSS) marginally reduced with longer storage periods. Acidity contents, meanwhile, displayed a contrary tendency. Both *L. fermentum* and *L. plantarum* were found to survive well in fruit juices, while the peak bacterial cell count for both probiotic liquids was discovered on the seventh day of storage. In contrast to juice samples with *L. plantarum*, fruit juices with *L. fermentum* sustained more cell proliferation. When it comes to organoleptic examination, the overall sensory ratings of fermented apple and star fruit juices, including control samples, marginally declined with longer storage times (Hossain, *et al.*, 2022) [4].

Herbal tea bags were prepared from cinnamon powder, gotu kola leaves, and starfruit leaves. This study used a fully randomised design with 5 treatments: substitutions of 0, 1, 2, 3 and 4 percent of cinnamon powder, respectively, with 3 replications. The collected data were statistically examined using ANOVA (Analysis of Variance), and if there were any significant differences, the DNMRT (Duncan's News Multiple

Range Test) test was performed at a threshold of 5 percent. The outcomes demonstrated a substantial difference in antioxidant activity, total water-soluble components, total polyphenols, colour, taste, and scent depending on the amount of cinnamon powder substitute used. The pH and water content were not significantly impacted by variations in cinnamon powder concentration. In this study, the therapy that substituted 4 percent cinnamon powder was the most effective. The average value of colour preference was 3.95, 3.65 for taste and 4 for aroma according to the results of the organoleptic analysis. According to the results of the chemical analysis, the amount of water is 7.88 percent, the amount of total polyphenols is 109,32 mg GAE/g, IC50 is 96.71, and the amount of total water-soluble components is 19,66 percent, pH 6.13 and antioxidant activity 36.93 percent when steeping tea (Rozi, *et al.*, 2022) [14].

2. Conclusion

Dragon fruit, mangosteen, durian, avocado and star fruit are exotic fruits of India known for their nutritional and therapeutic properties. These fruits can be processed to increase their shelf life and create value-added products such as functional drinks, fruit yoghurt, fruit jam, jelly and biscuits. These products will have nutritional, proximate and functional properties, making them suitable all year round.

3. References

1. Bai-Ngew S, Therdthai N, Zhou W. Microwave vacuum-dried durian flour and its application in biscuits. *Heliyon*, 2021, 7(11).
2. Budiono R. Nutritional content and preference analysis of red dragon fruit spaghetti. In IOP Conference Series: Earth and Environmental Science. 2022;969(1):012035.
3. Bullo TA. Extraction and Characterization of Oil from Avocado Peels. *International Journal of Chemical and Molecular Engineering*. 2021;15(2):54-58.
4. Hossain MA, Das R, Yasin M, Kabir H, Ahmed T. Potentials of two lactobacilli in probiotic fruit juice development and evaluation of their biochemical and organoleptic stability during refrigerated storage. *Scientific Study & Research. Chemistry & Chemical Engineering, Biotechnology, Food Industry*. 2022;23(2):131-140.
5. Krawęcka A, Libera J, Latoch A. The use of the probiotic lactiplantibacillus plantarum 299v in the technology of non-dairy ice cream based on avocado. *Foods*. 2021;10(10):2492.
6. Lesmayati S, Qomariah R, Anggreany S. Consumer Preferences on Durian Fudge Product from Nine Formulations of Sugar Combination and Durian Flesh. In IOP Conference Series: Earth and Environmental Science. 2022, 985(1).
7. Lu Y, Putra SD, Liu SQ. A novel non-dairy beverage from durian pulp fermented with selected probiotics and yeast. *International journal of food microbiology*. 2018;265:1-8.
8. Lu Y, Tan CW, Chen D, Liu SQ. Potential of three probiotic lactobacilli in transforming star fruit juice into functional beverages. *Food Science & Nutrition*. 2018;6(8):2141-2150.
9. Mongkontanawat N, Phuangborisut S, Chanawanno T, Khunphutthiraphi T. Product development of functional beverage from mangosteen juice supplemented with high

- anti-inflammatory activity herbal plants from Thailand. *Technology*. 2022;18(5):2071-2088.
10. Nisa TC, Marjan AQ, Nasrullah N. Development of Jam Product from Peel and Flesh of Dragon Fruit as High Antioxidant Snack. *Nutri-Sains: Jurnal Gizi, Pangan dan Aplikasinya*. 2018;2(1):42-55.
 11. Pandey S, Aparna K, Chauhan AK, Singh M. Development of phytonutrient enriched avocado milkshake powder and its quality evaluation. *Indian J Dairy Sci*. 2020;73(6):1-7.
 12. Puşcaş A, Tanislav AE, Marc RA, Mureşan V, Mureşan AE, Pall E, *et al.* Cytotoxicity Evaluation and Antioxidant Activity of a Novel Drink Based on Roasted Avocado Seed Powder. *Plants*. 2022;11(8):1083.
 13. Raj GB, Dash KK. Development of Hydrocolloids Incorporated Dragon Fruit Leather by conductive hydro drying: Characterization and Sensory Evaluation. *Food Hydrocolloids for Health*. 2022;2:100086.
 14. Rozi F, Silvy D, Syukri D. Characterization of herbal tea bags made from starfruit leaves (*Averrhoa bilimbi*), Gotu Kola leaves (*Centella asiatica*) and Cinnamon powder (*Cinnamomun burmanii*) as functional drinks. *Andalasian International Journal of Agriculture and Natural Sciences (AIJANS)*. 2022;3(01):47-54.
 15. Wibawanti MW, Zulfanita Z, Runanto D. The Antioxidant Activity of Yogurt Drink by Mangosteen Rind Extract (*Garcinia mangostana* L.). *Journal of Applied Food Technology*. 2019;6(1):15-18.