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Utilization of sand pear and orange peel to develop value added smoothie

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Abstract

The fruits of sand pear are available in ample amount all over the mid hill Himalayan regions but, very few attempts has been made to use the fruit for processing and developing value added products. Therefore, the present study was carried out to develop value added product from sand pear incorporated with beet root juice and orange peel, to enhance the functional as well as sensory properties of the product and to utilize the waste. Smoothie is a suitable and convenient way to consume fruits, and widely known for its antioxidant property. Results revealed that use of orange peel in excess increase bitterness of the product. However, antioxidant activity and appearance are positively affected by increasing concentration of beet root juice, so beet root juice can be used to mask the dull colour of the smoothie and so, this combination can prove to be a better way to utilize sand pear to develop value added smoothie.

Keywords: Sand pear, orange peel, smoothie, beet root juice

1. Introduction

Nowadays people are going through hectic life schedule and because of this they are not paying proper attention to maintain their health and immunity as well. So, this necessitates the consumption of food products that enhance the energy, mental as well as physical health along with amplified immunity, without causing obesity and related health problems. Fruits are best option as they are the main source of essential dietary nutrients and regarded as excellent food for health. Vitamins, carbohydrates, antioxidants, dietary fibres and minerals are the major nutrients present in fruits. Smoothie is a such product type, it is a thick and smooth, fruit-based ideal product consisting whole fruit and provide customers with health-promoting polyphenols, antioxidants and dietary fibers to serve as a functional food. Smoothie can be prepared by single fruit, combination of fruits, combination of fruit and milk, fruit with yogurt or in other different ways.

Sand pear (*Pyrus pyrifolia* L.) is also known by name wild pear/ oriental pear and in local language it is called as "pathernakh" since it bears hard and grainy texture. In India sand pear is found in the semi-temperate regions of the Punjab, Haryana, Uttar Pradesh, some of the Nilgris region and some of the North East region (Kumar and Ghuman, 2007) [1]. The nutritional value of pear remains utmost at its full maturity. The fruit is known for its crispness, sweetness, flavor and specific aroma. It has some stone cells or grits which enhance its eating quality. The fruit contains good amounts of carbohydrates, vitamins, fiber, polyphenols and minerals. Since the fruit is seasonal in nature, it is typically eaten as fresh (Atrri *et al.*, 1998, Kumar and Ghuman, 2007) [2, 1]. Sand pear acquires grittiness, higher acidity and astringent taste (Raj *et al.*, 2011) [3]. Pears are sodium-free, fat-free, and good source of potassium, all plays important role in cardiovascular disease prevention. It can be used in different way to consume it.

Fruits and vegetable wastes are of great concern from the environmental point of view. There are many types of waste from fruit and vegetable industries that can be utilize to produce various essential and functional components. Orange peel is one of the major wastes as it comprises 20-25 % of whole fruit. A waste remains a waste until we utilize it in a better way. Orange peel comprise of vitamin C, carotenoids, phenolics, dietary fibres and polyphenolic antioxidants having free radical scavenging activity, cancer chemo preventive, anti-inflammatory, neuroprotective and anti-helicobacter pylori agents. (Anwar *et al.*, 2008, Devatkal *et al.* 2010, Benamrouchea and Madania 2013) [4, 5, 6]. This waste can become precious ingredient for therapeutic diets, for special people and accord an approach for value added and innovative food products.

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Although pear it is full of nutrition, there is huge waste of sand pear on the hilly region due to lack of knowledge and awareness about the value addition as well as waste product utilization. Due to lack of cold chain, refrigerated storage and transportation facility there is fair amount of wastage of sand pear. So keeping in the mind all the attributes and outcome an attempt was made to develop the smoothie from sand pear and orange peel.

2. Materials and methods

The main ingredients used in this study were sand pears (from local farmer of Udham Singh Nagar district, Uttarakhand, India) having TSS around 10 to 10.5°Brix, orange peels (collected from Food Processing Centre, Department of Food Science and Technology, College of Agriculture, GB Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, Uttarakhand, India), beet roots (from local market Pantnagar, Udham Singh Nagar, Uttarakhand, India). The tools and equipments used were blender, pH meter, weighing balance, hand refractometer, spectrophotometer, refrigerator and corking machine. Preliminary trials were executed using sand pear, orange peel, sugar and citric acid. The prepared smoothie was analyzed for taste and appearance for its acceptability by students of food technology and faculty members. The panel of students and faculty members liked the taste but they were little unsatisfied

with colour of smoothie as it was dull and pale yellow. So to improve the colour of smoothie an attempt was made by the addition of beet root juice.

Smoothie samples were prepared using sand pear (TSS range between 10-11 °Brix), orange peel, beet root juice, citric acid and sugar. Response surface methodology (RSM) was used to design the experiment. The present investigation was comprised of 20 runs of experiment. In different runs different combination of three independent variables were used to develop the product. Table 1 shows the coded values of variables i.e. beet root juice (2 to 5 %), pasteurization temperature (80-90 °C) and pasteurization time (6-10 min) as designed by RSM. Orange peel as the ingredient kept constant and was used at the rate of 10 %, determined by preliminary trials.

All the ingredients were washed and weighed, then sliced pear and orange peel was blended along citric acid and a little amount of sugar. After blending, beet root juice was added according to the amount given by RSM. Then bottling and corking was done. At last pasteurization of all the samples was done as per the design and after cooling smoothie samples were chilled. These samples were subjected to organoleptic evaluation for selecting the best combination of variables for making smoothie. Antioxidant activity, TSS and acidity of all the samples were also obtained.

Table 1: Response Surface experiments to prepare smoothie

| Sample | Beet juice (%) | Temperature (°C) | Time (min) |
|--------|----------------|------------------|------------|
| S1 | +1 | +1 | -1 |
| S2 | +1 | -1 | +1 |
| S3 | -1 | +1 | + 1 |
| S4 | 0 | -2 | 0 |
| S5 | 0 | 0 | 0 |
| S6 | -1 | -1 | -1 |
| S7 | 0 | 0 | -2 |
| S8 | 0 | 0 | 0 |
| S9 | -2 | 0 | 0 |
| S10 | 0 | 0 | 0 |
| S11 | 0 | 0 | 0 |
| S12 | +2 | 0 | 0 |
| S13 | 0 | 0 | +2 |
| S14 | -1 | +1 | -1 |
| S15 | +1 | +1 | +1 |
| S16 | -1 | -1 | +1 |
| S17 | 0 | 0 | 0 |
| S18 | 0 | 0 | 0 |
| S19 | 0 | +2 | 0 |
| S20 | +1 | -1 | -1 |

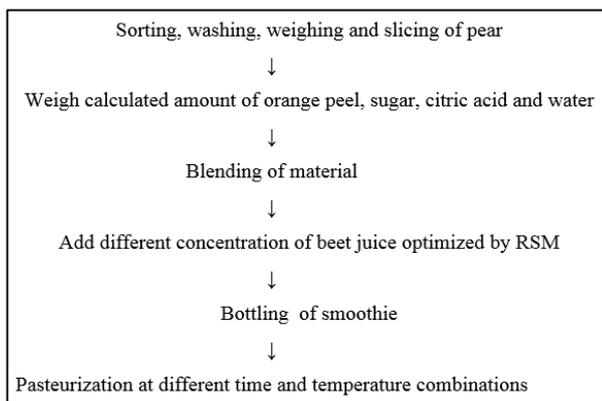


Fig 1: Flowchart for preparation of smoothie

3. Results and discussion

All the prepared samples were analyzed for organoleptic evaluation by the panelists on nine point hedonic scale. Each sample got approximately similar score for taste, mouthfeel and aroma. Use of orange peel gives a refreshing aroma to the product and beet root juice mask the enzymatic browning of smoothie. Because by the addition of beet root juice, with enhanced colour also the nutrition quality of smoothie was amplified and it also helps to increased shelf-life of the product due to presence of antioxidants.

Appearance and colour got minimum scores of the smoothie samples those having low level of beet root juice As observed, ratings of mouthfeel ranges from 7.9 to 8.10 which is a narrow range i.e. mouthfeel was not affected by beet root juice, pasteurization temperature and time where as colour

and aroma were highly dependent on the three independent variables. Results showed that smoothie S1 and S12 got the highest score for overall acceptability (Table 2).

Table 2: sensory scores of value added smoothie on nine-point hedonic scale

| Sample | Taste | Mouthfeel | Aroma | Colour | Overall acceptability |
|--------|-------|-----------|-------|--------|-----------------------|
| S1 | 8.00 | 8.00 | 8.25 | 8.00 | 8.50 |
| S2 | 7.90 | 8.00 | 8.20 | 7.95 | 8.00 |
| S3 | 7.50 | 8.00 | 7.55 | 6.50 | 7.50 |
| S4 | 7.90 | 8.10 | 8.00 | 8.00 | 8.00 |
| S5 | 7.50 | 8.00 | 8.00 | 7.80 | 7.90 |
| S6 | 7.60 | 7.90 | 8.00 | 6.50 | 7.90 |
| S7 | 7.90 | 8.00 | 8.10 | 7.90 | 7.95 |
| S8 | 7.55 | 8.00 | 8.00 | 7.85 | 7.95 |
| S9 | 7.25 | 8.00 | 7.50 | 6.00 | 7.50 |
| S10 | 7.50 | 7.90 | 8.00 | 7.90 | 7.95 |
| S11 | 7.55 | 8.00 | 8.00 | 7.95 | 7.95 |
| S12 | 8.50 | 8.10 | 8.10 | 9.00 | 8.50 |
| S13 | 8.10 | 8.00 | 8.00 | 8.00 | 8.00 |
| S14 | 7.85 | 8.00 | 7.90 | 6.50 | 7.50 |
| S15 | 7.90 | 8.10 | 8.00 | 8.00 | 8.00 |
| S16 | 7.55 | 8.00 | 7.95 | 6.00 | 7.70 |
| S17 | 7.50 | 7.90 | 8.00 | 7.90 | 7.90 |
| S18 | 7.55 | 8.00 | 8.00 | 7.90 | 7.90 |
| S19 | 7.90 | 7.90 | 8.00 | 7.70 | 7.95 |
| S20 | 8.00 | 7.90 | 8.00 | 8.00 | 8.00 |

Table shows the mean of scores.



Fig 2: Value added smoothie

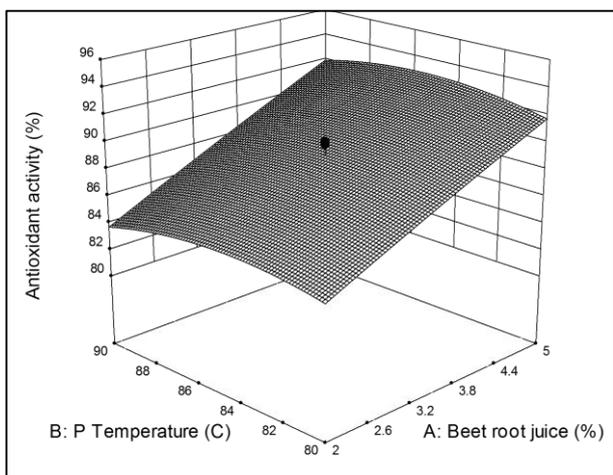


Fig 3: Effect of beet root juice on antioxidant activity of smoothie

The antioxidant activity of smoothie without addition of beet root juice was 75.86 %. Results revealed that antioxidant activity was positively affected by increasing concentration of beet root juice. The product was remained safe for

consumption upto four months at refrigeration condition. The reason behind the extended shelf life of was due to increased antioxidant activity as well as pasteurization since, there was no added preservative in the product.

4. Conclusion

Smoothie is a product which is generally consumed fresh, as fruits are seasonal so we cannot take a particular fruit in every season, so it is a best way to take fruits during off season. This approach can save wastage of fruits during season and it also promotes utilization of fruit waste in a better way. There is need to do more related research to increase shelf life of smoothie without the addition of preservatives and artificial colours as well.

5. Acknowledgment

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