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## Standardization and evaluation of jaggery based nutriment bars

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### Abstract

A wholesome diet containing fruits and vegetables play a major role as they are micronutrient dense foods and protects from many life style diseases. Different formulations were developed with 30% jaggery, groundnuts, and oats and pumpkin seeds as constant. Pineapple, beetroot and dates were varied for preparation of nutriment bars. Bar with more amount of dates was please able followed by high amount of dates, then high amount of pineapple and least with beetroot. As the amount of beetroot increased the acceptability was low compared to the other formulations due to its poor appearance. All the sensory parameters and its acceptance in the descending order dates>equal amounts of pineapple, beetroot and high amounts of dates>pineapple>beetroot.

**Keywords:** Pineapple, beetroot, dry dates, sensory evaluation, snack bars, fruit bars, nutriment bars and nutritive value.

### Introduction

Food choices are mainly based on the socio-economic conditions, personal preferences, convenience and ease of preparation. Foods which are more toothsome are high in energy due to their processing and the modern life style has brought in the intake of these energy rich foods (Darmon *et al.*, 2005) [3]. Due to inadequate time, there is an increase in the access to convenience foods in the modern era. Snacking needs were more composite due to factors like personal choices, social, cultural and religious influences (Philip and Peter, 2018) [13].

Health consciousness has become one of the major factors in choosing of fruits and vegetables. The consumption of these have increased now-a-days due to increased knowledge about the foods that promote health and their ease of consumption. Fruits do not require any preparation and some of the vegetables are consumed directly as salads.

Pineapple is a tropical fruit rich in calcium, fibre, vitamin C, B<sub>1</sub>, B<sub>6</sub>, copper and is low in fat content. It has several medicinal uses, bromelain present in the stem acts as a proteolytic agent and is mostly used as anti-inflammatory and anti-parasitic agent. Due to its anti-inflammatory properties it is generally used in treating arthritis, sports injuries and to reduce the pains after the surgery. It helps in building healthy bones and connective tissues as it contains manganese. It conceals the cold and cough due to the action of bromelain. It helps in relieving the gastrointestinal disorders, improves circulation and stops body cramps (Bhakta *et al.*, 2012).

Beetroot is rich in carbohydrates, protein, fibre and minerals. It is used as food dye due to the pigment betalains, used in preparation of nutritious pasta and helpful in preservation of chicken meat (Bawa *et al.*, 2016) [7]. The biological activity of the red beetroot has been increasing due to its disease cessation and health assisting properties. The nitric oxide in it helps in reducing hypertension and improves endothelial functions. The betalains also acts as anti-oxidative agent and aids in preventing the inflammation due to oxidative stress (Clifford *et al.*, 2015) [2].

Dates contains 70% of the carbohydrates in the form of invert sugars. It contains dietary fibre that helps in maintaining the digestive system and is a good source of iron, potassium and calcium. It contains anti-oxidants which acts as a protective agent from the major mortality causing diseases (Lee and Farsi, 2008) [5].

Dates and other dry fruits are dense in their polyphenol contents with good nutritive value and protects lipoprotein from the oxidation. Nuts and seeds are good sources of oil and plays important role in babies' growth. Pumpkin seeds are good source of zinc preventing osteoporosis. It contains many minerals in large amounts with antioxidant and anti-mutagenic properties (Alla and Jithendran *et al.*, 2018) [11].

Oats due to its high soluble fibre and  $\beta$ -glucan content have the ability to lower the serum cholesterol levels in the body. It is a good source of calcium, protein and other essential fatty acids. It is used in multiple ways as breakfast, snacks and meal replacement (Omran, 2018) [11].

## Materials and methods

**Procurement of raw materials:** Pineapples, beetroot, dates, sugar, jaggery, oats, pumpkin seeds and honey were procured from the local market of Hyderabad.

**Osmo-dehydration of pineapples:** Pineapples were washed, peeled, sliced into small cubes, soaked in sugar syrup for 24 hours in the ratio of 1:2 (pineapple: sugar) and dried in tray dryer at 60 °C for 24 hours (Narendra *et al.*, 2015) [9].

**Drying of Beetroot:** Beetroots were washed, peeled, grated and dried in tray dryer at 50 °C for 26 hours.

**Soaking of dry dates:** Dry dates was cut to small pieces and soaked in honey for 48 hours before use to soften their texture.

**Standardization of fruit bars:** Bars were standardised by using different combinations of pineapple, beetroot and dates whereas 30% jaggery, 10% groundnuts, 5% oats and 5% pumpkin seeds were kept constant. The fruit and vegetable content were varied as given below:

- **Combination 1:** Dates-20% with pineapple and beetroot-15%
- **Combination 2:** Pineapple-25%, dates-15% and beetroot-10%

- **Combination 3:** Beetroot-25%, dates-15% and pineapple-10%

- **Combination 4:** Dates-30% with pineapple and beetroot-10%

**Sensory evaluation:** The prepared bars were subjected to sensory evaluation by coding each of the combination with three-digit numbers and water was provided to rinse their mouth such that the taste of one product does not interfere with the others. Sensory evaluation was conducted at PG&RC, PJTSAU. Products were ranked according to 9 points hedonic scale where it contains grades from extremely liking of the product to extremely disliking the product. It was done by 15 semi-trained panellist and was scored according to the sensory parameters like appearance, colour, texture, chewiness, flavour, taste and overall acceptability. The bars were scored from 1-9 with 1 being I dislike extremely *i.e.*, very bad and 9 being I like extremely *i.e.*, the product is excellent in that particular attribute (Meilgaard *et al.*, 1999) [9].

**Results and discussion:** The sensory scores of developed bars with varying amounts of pineapple, beetroot and dates were shown in Figure 1. The sensory scores of 30% dates bars with regard to appearance, colour, texture, flavour, taste, chewiness and overall acceptability was 7.73, 7.73, 7.60, 7.66, 7.66, 7.80 and 7.73 respectively.

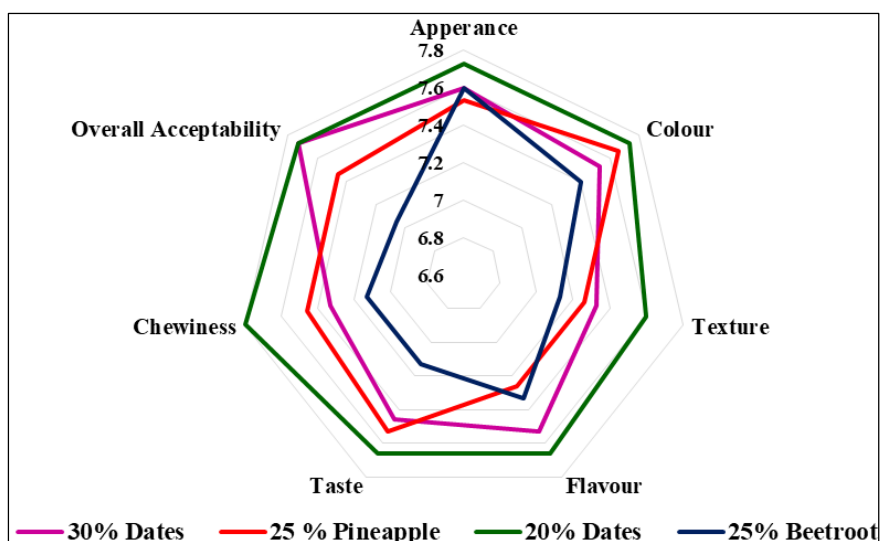


Fig 1: Sensory parameters of 30% jaggery nutrient bars

The next bar with good scores was one with 20% dates with equal amount of pineapple to beetroot in appearance, colour, texture, flavour, chewiness and overall acceptability were 6.00, 7.53, 7.33, 7.53, 7.33 and 7.33. Then followed by the sensory parameters for the bar with 25% pineapple with regard to appearance, colour, texture, flavour, chewiness and overall acceptability was 7.53, 7.66, 7.26, 7.26, 7.46 and 7.46.

The least sensory scores for the bars with 25% beetroot for appearance, colour, texture, flavour, taste, chewiness and overall acceptability was 7.60, 7.40, 7.13, 7.33, 7.13, 7.13 and 7.06. The combination with 30% of dates and equal amounts of pineapple to beetroot had the good overall acceptability followed by the bar with 20% dates, next was with 25% pineapple and least was for the bar with 25% beetroot in it.

Table 1: Nutritive value of 30% jaggery nutrient bars

Product	Moisture (g)	Ash (g)	Protein (g)	Fat (g)	Fibre (g)	Carbohydrates (g)	Energy (Kcal)	Iron (mg)
Combination 1	9.57	2.98	4.49	5.64	4.35	48.66	598.52	2.95
Combination 2	9.98	2.51	4.33	5.64	3.80	45.54	585.03	2.78
Combination 3	9.03	3.64	4.54	5.63	4.07	45.06	583.92	2.85
Combination 4	9.74	2.78	4.49	5.66	4.62	55.37	626.62	3.21

**Note:** The values are expressed for 100g of bar using Nutritive Value of Indian Foods, 1989

**Combination 1:** Dates-20% with pineapple and beetroot-15%

**Combination 2:** Pineapple-25%, dates-15% and beetroot-10%

**Combination 3:** Beetroot-25%, dates-15% and pineapple-10%

**Combination 4:** Dates-30% with pineapple and beetroot-10%

The four combinations had good amounts of ash, fat and fiber as shown in Table 1 for 100g of the nutriment bars. The iron content of each combination is also good. The adequate

amounts of fiber in these bars make them healthy bars for all age groups.

**Table 2:** Nutritive value per size of 25g nutriment bar

Product	Moisture (g)	Ash (g)	Protein (g)	Fat (g)	Fibre (g)	Carbohydrates (g)	Energy (Kcal)	Iron (mg)
Combination 1	2.39	0.74	1.09	1.38	1.06	12.14	149.61	0.72
Combination 2	2.49	0.62	1.05	1.39	0.92	11.35	143.83	0.67
Combination 3	2.25	0.91	1.11	1.38	0.99	11.23	143.55	0.69
Combination 4	2.43	0.69	1.09	1.37	1.13	13.81	156.63	0.78

**Note:** The values are expressed for 25g of bar using Nutritive Value of Indian Foods, 1989

The usual serve size for any snack bar is 25g and Table 2 shows the amounts provided as per serve size for each combination. Combination 4 has the highest amount of fiber in it whereas combination 2 has highest mineral content. The protein, fat and energy content for each of these combinations was more or less similar.

### Conclusion

The combinations developed showed that bar with 30% dates with equal amount of pineapple to beetroot was highly acceptable followed by one with 20% dates and 25% pineapple in it. The least was for the one with 25% beetroot in it especially due to its appearance and colour. The acceptability of other combinations was highly acceptable due to their taste, colour, appearance and overall acceptability. The acceptability order was accordingly as 30% dates > 20% dates > 25% pineapple > 25% beetroot.

In conclusion, even though beetroot is highly nutritious, its acceptability was low due to its distinct taste, flavour and appearance when compared to others and hence other favourable ingredients were added to not only blind its distinct taste and flavour but prepare a delicious nutriment bar.

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