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Organoleptic quality of foxtail millet based malt mix

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Abstract

Malt mix prepared using germinated malted foxtail millet, roasted Bengal gram and milk powder were added with jaggery or honey and sensory evaluation carried out by 15 semi-trained panellists. It was found that the sensory parameters of malt mix with jaggery consisting of one part foxtail millet plus two parts roasted Bengal gram dal and with honey two parts foxtail millet and one part roasted Bengal gram dal was most accepted. The more the foxtail millet in the malt mix the better were the sensory attributes. Addition of sweeteners like jaggery and honey instead of table sugar are more beneficial as jaggery is a rich source of minerals and honey is considered a magical food as per Ayurveda. The combination of foxtail millet with jaggery and honey showed nutritional benefits as these are rich sources of fibre, antioxidants and minerals.

Keywords: Malt mix, germinated foxtail millet, energy dense supplementary food, old age people

Introduction

Foxtail millet (*Setaria italic* (L.) P. Beauvois) is one of the oldest cultivated crops in the world and is a native of China. The annual production of foxtail millet was estimated to be five million tons with China being the main producer (3.7 million tons) (Lin, 2005) [8]. It is mainly grown on poor or marginal soils in Southern Europe and in temperate, subtropical and tropical Asia. It requires more water in later stages of the crop growth but cannot tolerate water logging (Jijau, 1989) [6].

Dhananivetha and Gowthami (2014) [3] suggested that millets can enhance active components with nutraceutical properties when incorporated in diets as well as get maximum level of nutrient bioavailability. The changing food habits necessitates to include sprouted grain products to natural diet to these obtain active nutrients.

Pre-treatment like shallow pan roasting reduced the nutrients like protein and phytochemicals whereas there was an effective improvement in the dietary fibre content and resistant starch which delay the gastric emptying and slows down the digestion. Roasting increased the minerals like iron from 2.92 to 3.1 mg/100g, calcium from 41 to 42 mg/100g and phosphorus from 280.1 to 281.7 mg/100g (Doddamani and Yenagi, 2018) [4, 5].

The processing of foxtail millets using roasting, cooking, drying and steaming decreased the cooking time from 11.66 to 5.33 minutes and percent solubility from 6.72 to 2.08%. The cooked weight increased from 28.66 to 37.33g, cooked volume from 23.66 to 32.33ml and swelling power from 5.60 to 6.77 g/g and decreased the visual appearance of grains. Hence, simple processing effectively reduced cooking time and improved the cooking quality without affecting the organoleptic properties (Doddamani and Yenagi, 2018) [4, 5].

Laxmi *et al.* (2015) [7] showed that mix of foxtail millet, wheat and chickpea steeped for 12 hours, germinated for 48 hours, dried and floured mixed in proportions of 40:30:30 contained high amount of proteins and carbohydrates. The maximum value found in this composite foxtail millet flour was protein of 11.16% and carbohydrates of 58.64%.

Malleshi *et al.* (1986) [9] studied the effect of malting on minor millets like foxtail and proso millets. These malts showed higher α amylase activity and lower hot paste viscosity than raw flours including the low gastric emptying time.

Jaggery is rich in minerals like calcium (40-100 mg), magnesium (70-90 mg), potassium (20-90 mg), sodium (19-30mg), iron (10-13mg), manganese (0.2-0.5 mg), zinc (0.2-0.4 mg), copper (0.1-0.9 mg) and chlorine (5.3 mg) per 100g. It is also rich in vitamins like vitamin A (3.8 mg), vitamin B5 (0.01 mg), vitamin B6 (0.01 mg), vitamin C (7.00 mg), vitamin D (2-6.50 mg), vitamin E (111.30 mg) and also protein (280 mg) per 100g. It is easy to digest and dissolved, unique taste, treats throat and lung infections, balances the deficiency of sugar, sulphur less organic compound, used in animal feed, distillery and medicine manufacturing

units (Sahu and Paul, 1998; Anonymous, 2014) [12, 1].

Honey is used as a remedy for stomach disorders, anti-inflammation action, wound healing activity and has antidiabetic, antimicrobial and antioxidant properties in ayurvedic medicine. It is considered as magical food (Arawwala and Hewageegana, 2017) [2].

Milletts are beneficial for old age as they are rich in antioxidants, help in controlling sugar level, good for heart, prevent cancers and maintain bone health and help in digestion. They are rich sources of phytochemicals, minerals mainly like calcium and magnesium along with adequate amount of dietary fibre (Shikha, 2018) [14].

Materials and methods

New released variety of foxtail millet was obtained from Agricultural College, PJTSAU, Polasa, Jagtial. The other ingredients like roasted bengal gram dal, milk powder, jaggery and honey were procured from local market of Hyderabad. The glassware and equipment were from Post

Graduate & Research Centre, PJTSAU, Rajendranagar, Hyderabad.

Five malt mix composite of different formulation of germinated, dehulled and roasted foxtail millet along with roasted Bengal gram dal and milk powder in different proportions were prepared adding 5 g of milk powder along with sweeteners jaggery and honey.

Sensory analysis of malt formulations were germinated carried out by fifteen semi-trained panellists using 9-point hedonic scale and were scored for colour, consistency, taste, after taste, flavour, appearance and overall acceptability.

Results and discussion

Sensory evaluation of malt mix: The composite of five malt mixes were prepared as porridges using mixture of 20g each to which 10g jaggery and honey and 100ml water were added and cooked for 4 to 5 minutes and the cooked malt mix weight was 85g. They were subjected to sensory evaluation and the results were as given in Table 1.

Table 1: Mean sensory score of malt mix with jaggery

Sample	Colour	Consistency	Taste	After Taste	Flavour	Overall acceptability
MMJ1	7.70±0.23	7.65±0.29	7.65±0.26	7.25±0.28	7.60±0.23	7.70±0.19
MMJ2	7.35±0.25	6.55±0.35	6.85±0.28	6.85±0.26	6.60±0.40	6.75±0.40
MMJ3	7.45±0.21	6.85±0.32	7.15±0.27	7.20±0.26	7.20±0.22	7.35±0.19
MMJ4	7.60±0.23	6.90±0.33	7.20±0.27	7.10±0.29	7.40±0.22	7.45±0.21
MMJ5	7.65±0.25	7.25±0.31	7.60±0.21	7.55±0.19	7.60±0.22	7.70±0.23
Mean	7.55	7.04	7.29	7.19	7.28	7.39
SE of Mean	0.10	0.14	0.11	0.11	0.12	0.11
CD	0.43	0.59	0.48	0.50	0.57	0.60
CV%	9.15	13.33	10.65	11.19	12.55	12.97

Note: Values are expressed as mean ± standard deviation of fifteen determinations.

Means within the same column followed by a common letter do not significantly differ at $p \leq 0.05$

MMJ1 (Control): 95% germinated foxtail millet

MMJ2: 95% roasted bengal gram dal

MMJ3: 1:1 ratio of germinated foxtail millet to roasted Bengal gram

MMJ4: 2:1 ratio of germinated foxtail millet to roasted Bengal gram

MMJ5: 1:2 ratio of germinated foxtail millet to roasted Bengal gram

The best score for colour malt mix with jaggery was given to MMJ1 with 7.70±0.23 followed by MMJ5 7.65±0.35. The

best consistency was for MMJ1 with 7.65±0.29 followed by MMJ5 with 7.25±0.31. Taste which score highest was MMJ1 7.65±0.26 followed by MMJ5 7.60±0.21. The product as malted foxtail was leaving an aftertaste. The best scores for aftertaste were MMJ5 followed by MMJ1 with 7.55±0.19 and 7.25±0.28 respectively. The best flavour acceptance was also for MMJ1 and MMJ5 having same score 7.60±0.23, 7.60±0.22 followed by MMJ4 with 7.40±0.22 respectively. Overall acceptability was highest for MMJ5 7.70±0.23. All the sensory parameters were high for MMJ5 malt mix when compared with control.

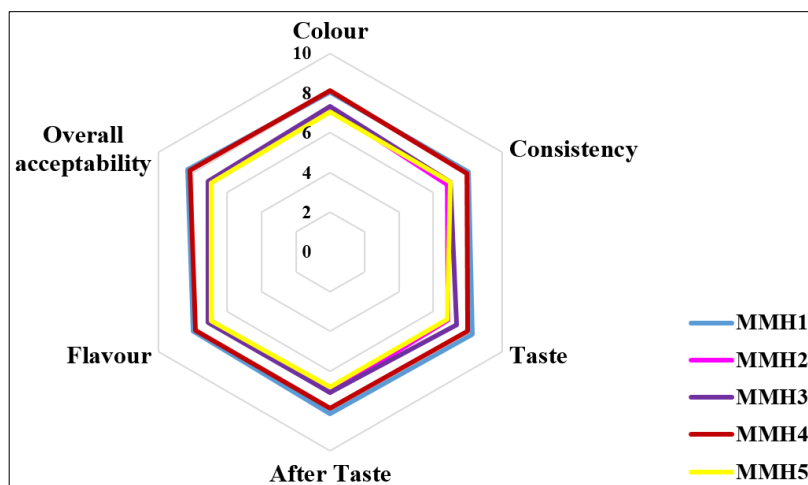


Fig 1: Mean sensory score of malt mix with honey

The best score for colour malt mix with honey was for MMH4 with 8.13 ± 1.06 followed by MMH1 8.06 ± 0.91 . The best consistency was for MMH1 with 8.06 ± 0.88 followed by MMH4 with 7.93 ± 1.10 . Taste was MMH1 8.26 ± 0.70 followed by MMH4 8.00 ± 1.36 . The product was leaving an aftertaste and scores were high for MMH1 followed by MMH4 with 8.13 ± 0.74 and 7.86 ± 1.18 respectively. The best flavour acceptance was also for MMH1 followed by MMH4 with 8.00 ± 1.00 and 7.86 ± 1.24 respectively. Overall acceptability was highest for MMH1 with score 8.33 ± 0.61 followed by MMH4 with score of 8.20 ± 0.86 .

Conclusion

The result shows that the sensory parameters of malt mix with jaggery were best for MMJ5 and with honey for MMH4. Although control of MMH1 had the best overall acceptance, the addition of roasted Bengal gram adds protein to the malt mix and making it more balanced in terms of cereal to pulse ratio.

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