Research Article

# Sensory Profiling Of Germinated Little Millet at Different Incubation Times

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**Abstract**

Little millet is one of the oldest crops domesticated in India and is well adapted to varied soil and environmental conditions. Although little millet like any other millet is nutritionally superior to cereals, yet its utilization is limited. Hence, there is a need to restore the lost interest in little millet due to its potential nutritional qualities and health benefits. Consumption of sprouted grains is beneficial to human health as germination induces activation and *de novo* synthesis of hydrolytic enzymes that enhances nutrient bioavailability and digestibility along with reduction of antinutritional factors. In the present study, the effect of germination on sensory parameters of little millet was investigated. It was observed that best score for appearance and texture of cooked millets were for 0 and 24 hours respectively. The best scores for flavour, taste and overall acceptability were for 24 hours. The scores for all the sensory parameters of cooked germinated millets decreased with increase in time of germination to 36, 42 and 48 hours.

**Keywords:** Millets, germination, little millets, cooking time, sensory evaluation, nutrient bioavailability, antinutritional factors

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## Introduction

Millets due to their nutritive value have potential health benefits to prevent cancers, decrease the occurrence of cardiovascular diseases, reduce tumor proliferation, lower blood pressure, risk of heart diseases, cholesterol content, rate of fat absorption, delay gastric emptying and increase gastrointestinal bulk [1, 2].

Little millet, *Panicum sumatrense* Roth. ex Roem. & Schult. (Syn. *Panicum miliare*) was domesticated in India from 5000 years [3]. In India, the area under little millet cultivation has reduced from about 0.5 to 0.3-0.4 million hectares during 2001-2006 with a production of around 0.1 million tonnes [4].

Little millet is a quick growing crop possessing excellent rejuvenating capacity and is staple food for the low-income groups in some parts of world [5]. As this crop is eco-friendly, it is suitable for fragile and vulnerable agro-ecosystems growing in tropical and sub-tropical climates, elevated areas up to 2100 m along with plains and hilly regions [6].

Indian little millet has a short crop cycle, is mostly cultivated under natural rainfed irrigation and suitable for both dry and waterlogged conditions. It also grows well in adverse environments such as salty and dry soils as well as at high temperatures [7]. This crop gives consistent yields on marginal lands in drought prone arid and semiarid regions providing regional food stability [3].

Storage feasibility and high nutritional value of little millets together led to this kernel as an important staple food for ancient people. Insect pests do not attack these grains under prolonged storage at room temperature due to its proteinaceous defence factors in the endosperm [8].

Little millet is a natural source of antioxidants like gallic acid, p-hydroxybenzoic acid, vanillic acid, caffeic acid, chlorogenic acid, ferulic acid and p-coumaric acid with food applications as nutraceutical and functional food ingredient for health promotion and reduction of disease risk [9]. It also contains γ-amino butyric acid (GABA), lignans, resistant starch, sterols and phytates exhibiting hypoglycaemic, hypercholesteraemic and hypolipidemic properties [10].

The seeds of little millet are very small but easy to harvest. The dehusked grains can be cooked and consumed like rice or milled into flour for making secondary products like roti, baked items, fried items and so on. The whole

cooked grains are gelatinous and not easily assimilated by digestive system due to small seed size. The whole grains are sprouted and used in salads [11].

The growing consumer awareness towards sprouted grains in the past decade resulted in the launch of many novel foods with their incorporation. The parallel interest from scientific community in their nutritional and phytochemical components resulted in development of dehydrated sprouted cereals and millet products like noodles, pasta, laddu, unleavened bread and porridge [12]. Sprouted millet based probiotic beverages represents a possible future perspective [13].

In sprouted grains, almost all nutrients are fully available and enhances the digestibility as germination leads to development of hydrolytic enzymes with significant decline in antinutritional factors like phytate, trypsin inhibitor and tannins. There is a rise in bioactive compounds such as phenols, phytosterols, folates, GABA and various antioxidants that define sprouts as "functional foods" [14].

## Materials and Methods

### *Sample preparation*

The present study was carried out in the Post Graduate & Research Centre, PJTSAU, Rajendranagar, Hyderabad. Raw little millets were soaked for 12 hours at room temperature, germinated at 30℃ for 12, 18, 24, 36, 42 and 48 hours. The different grains germinated at various times were dried at 60℃ to a moisture content of below 12% and stored till use.

### *Cooking quality of germinated little millet*

Germinated, dried and dehulled little millet to water in the ratio of 1:6 was cooked for 25 min before evaluating the sensory properties using a semi-trained panel of 15 members from PGRC, PJTSAU with 9-point hedonic scale for colour, texture, flavour, taste and overall acceptability for all time intervals of germination. The samples were presented in plates coded with three digits in individual booths of sensory evaluation lab. Panellists rinsed their mouth after evaluating each sample. The scores were based on a hedonic rating of 1 to 9 where: 1 indicated disliked extremely (very bad) and 9 was liked extremely (excellent) [15].


Plate 1: Cooked little millet samples

Plate 2: Sensory evaluation

## Results and Discussion

Germination can be a promising method to improve the nutrient density of millets and combined with fermentation can reduced phytic acid content significantly [16]. The enzyme inhibitors, chemical and natural pesticides were removed by soaking, rinsing and germination along with making them easy to digest and assimilate by the body [17].

The sensory response was analysed and the mean values of each of the sensory attributes was presented in **Figure 1**. The best score for appearance and texture of cooked millets were for 0 hour and 24 hours with scores of 8.67±0.49 and 8.73±0.46 respectively. The best scores for flavour, taste and overall acceptability were for 24 hours with same scores of 8.73±0.46. The scores for all the sensory parameters were least with a decreasing trend at 36, 42

and 48 hours of germination probably due to production of fatty acids due to high lipase activity resulting in off flavours [18].

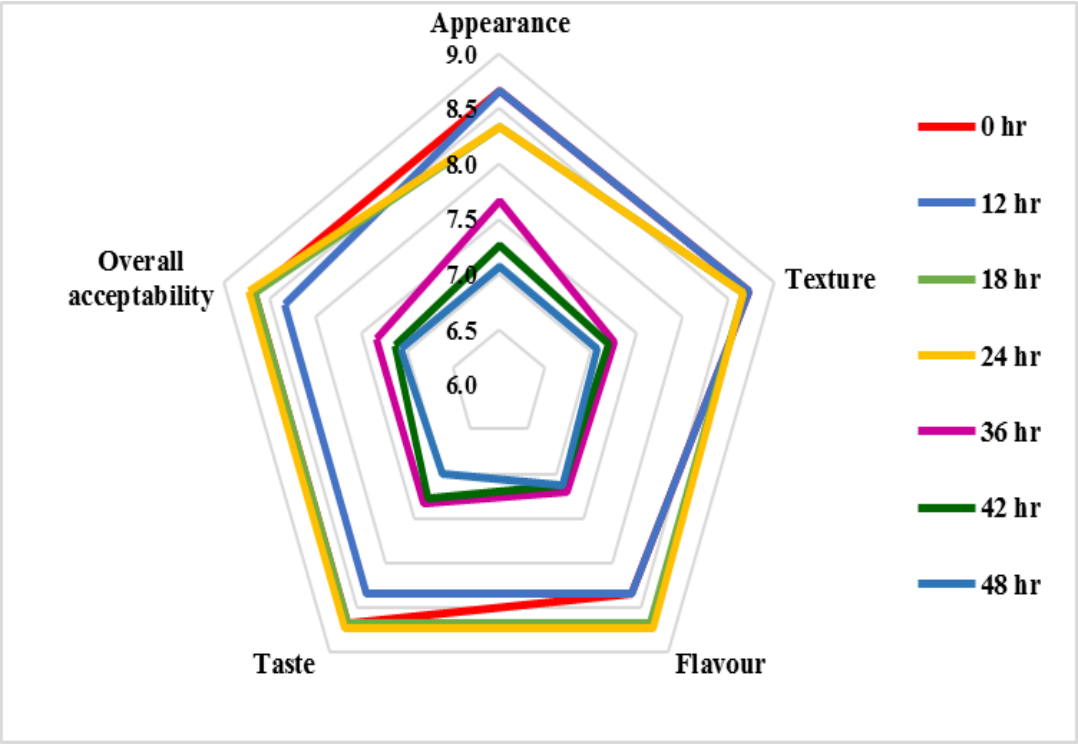


**Figure 1** Sensory evaluation of cooked germinated little millets
(Values are expressed as mean ± standard deviation of fifteen determinations)

During germination, amylolytic activity occurred with the production of maltose, maltotriose and dextrin due to starch hydrolysis [19]. Long sprouting times of 3 to 5 days and/or high-processing temperatures can make the grains unfit for use in traditional food processing due to high enzymatic activity. The increased amylase content can decrease starch pasting peak viscosity, proteases breaks down the gluten-forming proteins thereby reducing overall stability of dough and increase in lipase can cause autoxidation of lipids producing off-flavours in the final products. Thus, it can be challenging to use sprouted grains as ingredients without compromising on their nutrient quality [20].

## Conclusion

Little millet is an underutilised minor millet that is highly nutritious with a potential health perspective. In recent years, the food industry has increasingly launched products with sprouted grains or flours made thereof. An increasing positive attitude of consumers toward such products due to them being from natural source with better taste, are more nutritious and healthier. However, it is challenging to utilise germinated little millet as a functional food without compromising on its sensory qualities. The present study revealed that the sensory parameters of little millet were highly acceptable at 24 hours of germination compared to other durations.

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