



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2020; 8(1): 2438-2440

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Received: 07-11-2019

Accepted: 09-12-2019

P Harichandana

Department of Food and Nutrition, Post Graduate & Research Centre, PJTS Agricultural University, Rajendranagar, Hyderabad, Telangana, India

Jessie Suneetha W

Krishi Vigyan Kendra, PJTS Agricultural University, Wyr, Khammam Dt., Telangana, India

B Anila Kumari

Department of Food and Nutrition, Post Graduate & Research Centre, PJTS Agricultural University, Rajendranagar, Hyderabad, Telangana, India

M Tejashree

Department of Agricultural Microbiology & Bioenergy, College of Agriculture, PJTS Agricultural University, Rajendranagar, Hyderabad, Telangana, India

Corresponding Author:**Jessie Suneetha W**

Krishi Vigyan Kendra, PJTS Agricultural University, Wyr, Khammam Dt., Telangana, India

Standardization of fermentation time for rice to blackgram

P Harichandana, Jessie Suneetha W, B Anila Kumari and M Tejashree

DOI: <https://doi.org/10.22271/chemi.2020.v8.i1ak.8631>

Abstract

Instant foods are now a part of Indian cuisine making cooking easier for households and encouraging entrepreneurs into the market who can add variety. Dosa is a common breakfast item which is made from rice and black gram in the ratio of 70:30 respectively and an approach was made to standardize the fermentation timings. The fermentation time of rice and black gram considered for standardization were 6, 12, 18, 24, 30, 36 and 42 hours at a constant temperature of 30 °C. The best fermentation time was selected based on sensory scores of different attributes like appearance, sourness, flavour, texture, taste and overall acceptance. The results showed that 12 hours of fermentation obtained highest scores for all sensory attributes that include appearance with 7.75, texture with 7.44, flavour with 7.50, taste with 7.63 and overall acceptance 7.69. The batter received lower score for sourness as the increase in time increased the sourness. Therefore, 12 hours of fermentation was found optimum to give best dosa batter.

Keywords: Rice, black gram dal, fermentation, instant foods, incubation times, standardisation, sensory evaluation

Introduction

Instant foods provide convenience to consumers and help in reducing preparation time during cooking and drudgery. These types of foods less than five minutes time from food preparation to consumption (Bhattacharya, 2014) [4]. There are many kinds of instant foods available in the market today depending upon the need and demand of the consumers. They offer a wide range of variety to housewives and working women who strive hard to meet the demands at home and workplace. Besides, these foods help bachelors, students and other age groups who live far from home to grab their meal nutritiously (Abaskar and Sundaram, 2012) [1].

Instant food products save time as well as energy and introduction of such foods had revolutionized the lifestyle and eating habits of the people along with paving way for number of companies to enter the market with different food products (Sushmitha *et al.*, 2017) [15].

Dosa is a thin, fairly crisp, fried, pancake-like food indigenous to South India (Soni *et al.*, 1985) [14]. Fermentation is a convenient, easy and economical method to enhance nutritional value as well as sensory and functional properties of foxtail millet (Amadou *et al.*, 2014) [3]. Fermented foods such as dosa, idli, dahi vada, *etc.* are the common breakfast items in India with a potential source of lactic acid bacteria (LAB). Moreover, lactic acid fermentation enhances the shelf life along with improving beneficial enzymes, B-vitamins, omega-3 fatty acids and various strains of probiotics (Sathe and Mandal, 2016) [12]. Fermentation is the traditional method of preserving food which helps in providing characteristic flavour and significantly improving the nutritional properties of the product (Ahmed *et al.*, 2013) [2].

Rice was domesticated around 8000 years ago, now a staple grain and daily necessity for three billion people around the world. Apart from feeding the world, it has proved its significance in building civilizations and shaping societies (Woolston, 2014) [17]. Rice constitutes about 7.3% of protein, 2.2% of fat, 64.3% of carbohydrates, 0.8% of fiber and 1.4% of ash (Zhou *et al.*, 2002) [18].

Rice is absolutely devoid of gliadin and possesses hypoallergenic properties, due to which it receives continuous attention to develop gluten free products. Secondary processed product like rice flour is used extensively and considered an active ingredient in the preparation of extruded products because it does not add any kind of taste but gives attractive white colour to the product and promotes digestion easily (Kadan *et al.*, 2003) [7].

Pulse consumption is a common and health promoting factor in the human diet. Furthermore, they are the potential way of enhancing the diet with its high protein content along with a decent amount of carbohydrates, dietary fibre, micronutrients and another phytochemicals intake (Kamboj and Nanda, 2016) [8]. Black gram is associated with the family Leguminosae. The dal form of this legume is widely used for preparation of many food products. The protein and fat contents of the black gram range from 12 to 14% and 0.9 to 3.4% respectively (Girish *et al.*, 2012) [6].

Black gram is one of the most important pulse crops grown throughout the country India (Mir *et al.*, 2013) [10]. Apart from being the largest cultivator of black gram, India is also the top most consumer of it. India produces around 1.3 to 1.5 million tonnes of black gram accounting to 10% of total production of pulses in our country. Black gram also known as 'urad dal' is an expensive legume in India and termed as "king of beans" by FAO. It is widely consumed in the country as whole, dehusked and split, is incorporated into many popular dishes like idli, dosa, vada, papad, vadiams, *etc.* and relished extensively (Mogdilet *et al.*, 2019).

As cereals and pulses are limiting in few of the amino acids, their combination can balance all the essential amino acids in daily intake (Kamboj and Nanda, 2016) [8]. Studies on standardization of fermentation times are not available and so the present study was designed to profile the sensory attributes at different incubation times of rice to black gram dal.

Materials and methods

Procurement of raw materials Rice, black gram, salt and oil were procured from the local markets of Hyderabad.

Fermentation of the grains Rice and black gram were mixed in 70:30 ratio and ratio and allowed to ferment for 6, 12, 18, 24, 30, 36 and 42 hours respectively at 30 °C.

Preparation of fermented instant dosa mix the fermented grains were dried in a tray drier at 60 °C until constant weight

was achieved and then grinded into fine flours followed by sieving with a 0.5 mm sieve (Carciochi *et al.*, 2016) [5].

Reconstitution and preparation of dosa from the instant mixes 50.0 g of instant dosa mix at each incubation time was mixed with 70.0 ml of water and left aside for 20 minutes. Salt was added to taste, a scoop of dosa batter was poured on a heated flat griddle, spread from inside out and roasted to golden brown with flipping to the other side if required (Sushmitha *et al.*, 2017) [15].

Sensory evaluation Standardization of rice to black gram dal dosa mix was done by sensory evaluation using 9-point sensory hedonic scale. A semi-trained panel of 15 members from PGRC, PJTSAU were selected for this purpose. The panellists were provided with samples in plates coded with three-digit numbers and were asked to rinse their mouth with water after testing each sample. The instant dosa were evaluated for their appearance, sourness, texture, flavour and overall acceptability. The nine points in the hedonic scale ranged from 1 to 9, 1 being I dislike extremely *i.e.*, very bad and 9 being I like extremely *i.e.*, the product is excellent in particular attribute (Meilgaard *et al.*, 1999) [9].

Results and Discussion

the standard dosa combination of rice to black gram at different incubation times was evaluated for their sensory properties and presented in Figure 1. The sensory scores for 6 hours of fermentation ranged from 7.06 to 7.38, whereas texture was least rated and flavour along with appearance was scored highly. The scores for 12 hours of fermentation ranged from 7.13 to 7.75, sourness being the least scored and appearance being the highest scored. Texture and taste shared the least sensory scores with 7.19 for 18 hours of fermentation whereas appearance showed mean score of 7.50. Sourness of the dosa fermented at 24 hours incubation received least score of 7.00, whereas appearance received highest score of 7.56. Flavour of the dosa made from 30 hours of fermentation obtained least score with 7.13 and appearance received highest score of 7.56.

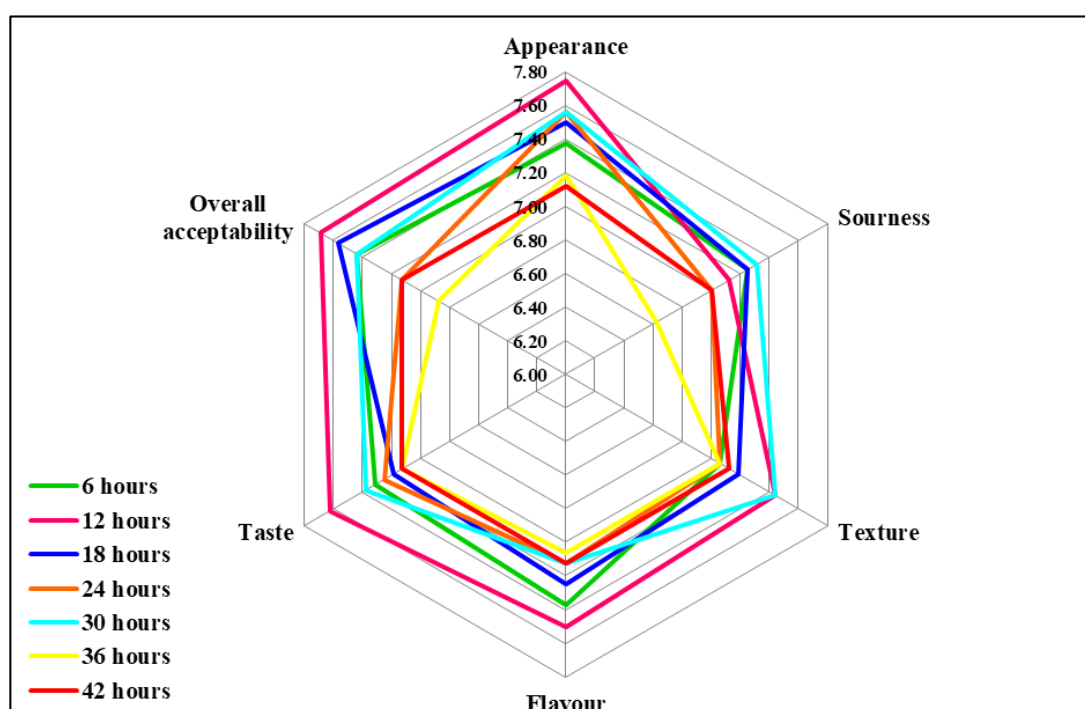


Fig 1: Sensory attributes of black gram to rice

The sensory scores for 36 hours of fermentation ranged from 6.63 to 7.19, where sourness and appearance being the least and highest rated attributes respectively. Appearance, texture, flavour and taste got an equal score of 7.13 for 42 hours of fermentation, whereas sourness was disliked at a mean score of 7.00. However, in terms of overall acceptability of dosa, the values ranged from 6.88 to 7.69, where the highest liking was shown towards dosa at 12 hours fermentation, followed by 18 hours and 6 hours with 7.56 and 7.44 respectively. Besides, 12 hours of fermentation scored better than other incubation times except for sourness. The sourness scores increased as the fermentation times increased.

Conclusion

The study revealed that of all the time periods, 12 hours of fermentation was the optimum time giving best sensory scores in terms of appearance, sourness, texture, flavour, taste and overall acceptability. Appearance gradually decreased from 30 to 42 hours of fermentation. Although 12 hours was given highest sensory scores 6, 18 and 24 hours of fermentation received moderate acceptance. Texture, flavour and taste were highly liked after 12 hours of fermentation whereas 6 and 18 hours of fermented dosa showed best overall acceptance next to 12 hours of fermentation.

Acknowledgement

The authors thank honourable Vice Chancellor of Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad for his encouragement.

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