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Organoleptic evaluation and shelf-life studies of five species of oyster mushroom

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Abstract

Mushrooms have been used as food and medicines since time immemorial. The last decade has witnessed an overwhelming interest in exploring the medicinal and nutritional qualities of mushroom by scientific community and there was a huge increase in cultivation of mushrooms. It has thus found a prominent part in the diet of common men. Among edible mushrooms, oyster mushroom ranks second in terms of production worldwide and have the maximum number of species available for cultivation. In this context, sensory evaluation of five species of oyster mushrooms viz., *Pleurotus florida*, *Pleurotus djamor*, *Hypsizygus ulmarius*, *Pleurotus sajor-caju* and *Pleurotus citrinopileatus* was done using sauteed mushroom recipe to evaluate the five species for quality attributes. It was observed that *H. ulmarius* excelled in all the sensory parameters followed by *P. florida*. Shelf-life studies of five species of oyster mushrooms were undertaken both in room temperature (26 ± 2 °C) and in refrigerated conditions (15 °C). Observations were recorded based on visual parameters. Higher shelf life was observed on *P. sajor-caju* and *P. djamor* which could be stored for two days after harvesting in room temperature (26 ± 2 °C) and three days in refrigerated conditions (15 °C).

Keywords: Oyster mushroom, *Pleurotus* spp., sensory evaluation, shelf-life studies, sauteed mushroom

Introduction

The relationship between man and mushroom can be traced far back to antiquity. Mushrooms have long been valued as food and medicine by different societies worldwide and they are regarded as vegetable meat ^[1]. They have achieved significant importance because of their nutritional and medicinal attributes and also as an income generating enterprise in most of the countries. It is a good source of protein where people rely heavily on cereal diet ^[2]. Mushrooms are rich in protein, dietary fibre and carbohydrates while only negligible amount of energy, cholesterol and fat is present ^[3, 4, 5]. The protein content of mushrooms is much higher than several meat products and is intermediate between vegetables, egg and meat protein ^[6]. It is also rich in different essential amino acids ^[7-10].

Among the cultivated edible mushrooms, oyster mushroom stands second (19 per cent) in terms of the world's total mushroom production ^[11]. It is characterised by tongue shaped pileus with an eccentric lateral stipe. Oyster mushroom is gaining more importance as health promoter and environmental restorer as compared to other medicinal mushrooms ^[12]. Apart from tasting great, they are also a very nutritious addition to any cuisine ^[13-15]. Mushrooms contain high proportion of water ^[16]. Consumers preferred mushroom products based on different parameters such as appearance, colour, flavour, taste, texture and overall acceptability ^[1]. Sautéed mushroom is an ideal preparation to know the real taste of mushroom ^[17].

Mushrooms are highly perishable and can remain as such only for a few hours under tropical conditions ^[18]. In India, it is mostly sold as fresh and only negligible amount is used for processing. Storage under low temperature is a very good method for restricting deterioration of harvested mushrooms for a limited period of time ^[21]. Hence the present study aims to evaluate different storage conditions for increasing the shelf life of oyster mushrooms.

Methodology

Sensory evaluation

Sautéed mushroom was prepared from five species of oyster mushrooms viz., *P. florida*, *P. djamor*, *H. ulmarius*, *P. sajor-caju* and *P. citrinopileatus* using the standard recipe. They were subjected to organoleptic evaluation using the nine-point Hedonic scale ^[22, 23]. The evaluation was carried out by a panel of twelve judges comprising of the faculty and students of College

of Agriculture, Padannakkad, and Kerala.

Shelf life of five species of oyster mushrooms were undertaken both in room temperature (26±2 °C) and in refrigerated conditions (15 °C). Two sets of sporocarps of freshly harvested oyster mushrooms were collected and packed on polypropylene covers. The packed mushrooms are stored in both room and refrigerated conditions. Observations on the number of days for change in colour, texture and physical appearance were recorded. Observations were taken on 24 h intervals.

Statistical analysis

The data were analyzed using Kruskal Wallis test. The results were tabulated and radar chart was constructed based on the data.

Results and Discussions

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads, Table 1, Fig. 1 and Plates 1 to 12.

Sensory evaluation

Sautéed mushroom were prepared following the standard procedure uniformly for all the five species of oyster mushroom. The products were evaluated by a panel of 12 semi trained members. The parameters of appearance, colour, flavour, texture, taste and overall acceptability were rated on a nine-point hedonic scale. Each of the 12 members were given the score card and they rated the sautéed mushroom on a scale of 0 to 9. The mean scores and mean rank were worked out (Kruskal-Wallis test) and is presented in Fig. 1 and Table 1.

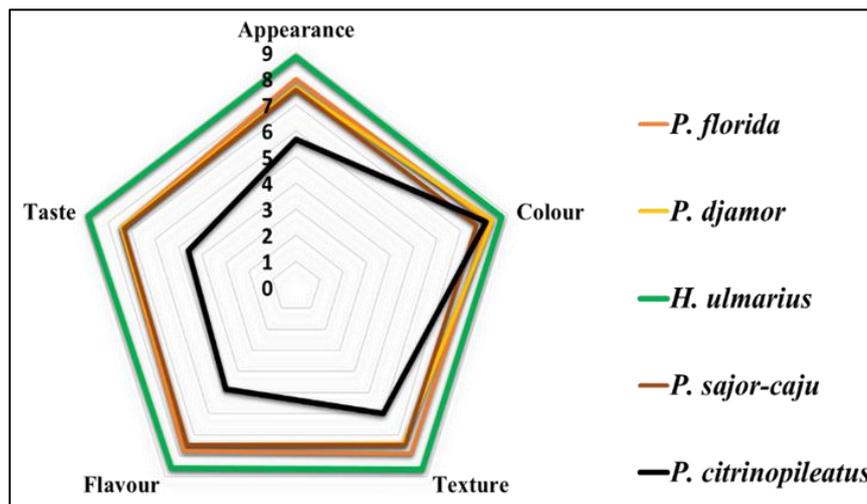
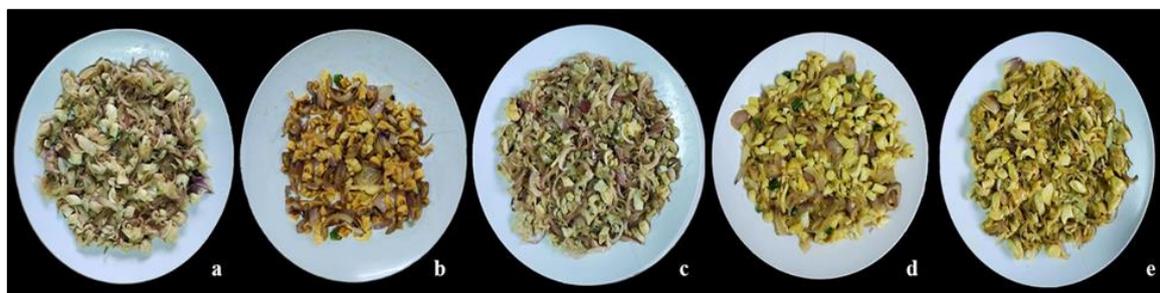


Fig 1: Mean score of organoleptic evaluation of saute developed from five species of oyster mushroom



a) *P. florida* b) *P. djamor* c) *H. ulmarius* d) *P. sajor-saju* e) *P. citrinopileatus*

Plate 1: Saute developed from Oyster mushrooms

It was observed that among the five species of oyster mushrooms evaluated *H. ulmarius* excelled in all the sensory parameters such as appearance (8.83), colour (8.75), texture (8.66), flavour (8.58) and taste (8.83) on a maximum score of 9. *H. ulmarius* scored 8.80 in terms of overall acceptability followed by *P. florida* (7.60). *P. florida* ranked second in

terms of appearance (8.00), texture (7.91) and flavour (7.75). Eventhough *P. djamor* and *P. citrinopileatus* were appreciated by consumers for their attractive colour, their overall acceptability was significantly lower. *H. ulmarius* was the most preferred oyster mushroom species among the five species studied.

Table 1: Sensory scores (mean values) of Saute developed from five species of oyster mushrooms - Kruskal Wallis test statistics

Sample	Appearance		Colour		Texture		Flavour		Taste	
	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score	Mean Rank	Mean Score
<i>P. florida</i>	35.54	8.00 ^b	29.41	8.16 ^{ab}	35.08	7.91 ^{ab}	35.29	7.75 ^{ab}	30.50	7.41 ^b
<i>P. djamor</i>	29.50	7.66 ^b	32.50	8.33 ^{ab}	26.58	7.41 ^{bc}	31.33	7.50 ^b	32.33	7.41 ^b
<i>H. ulmarius</i>	50.91	8.83 ^a	43.12	8.75 ^a	48.33	8.66 ^a	48.04	8.58 ^a	52.00	8.83 ^a
<i>P. sajor-caju</i>	28.75	7.58 ^b	20.16	7.66 ^b	30.41	7.50 ^b	30.33	7.50 ^b	29.16	7.33 ^b
<i>P. citrinopileatus</i>	7.79	5.66 ^c	27.29	8.08 ^{ab}	12.08	6.00 ^c	7.50	4.83 ^c	8.50	4.58 ^c
K Value	41.33		13.26		29.53		35.95		39.40	

Shelf-life studies

Freshly harvested bunch of *P. florida* was pure white in colour and remained fresh for one day after harvest in room condition and on the second day the colour began to fade and the bunch started to shrink and decay (Plate 3). *P Florida* had lost the marketability on day two. The bunch kept under refrigerated condition remained fresh for two days after harvest (Plate 4). The bunch of *P. djamor* was pink in colour and remained fresh for two days after harvest in room condition and three days after harvest, the colour changed to pale pink and slight crinkling and rotting was observed (Plate 5). The bunch kept under refrigerated condition (15 °C) remained fresh for three days after which the colour began to fade (Plate 6).

H. ulmarius was white and remained fresh for only one day after harvest in room condition and on the second day, colour changed to pale white (Plate 7). It had lost its marketability due to loss of weight and shrivelling. The bunch kept under refrigerated condition remained fresh for two days after harvest (Plate 8). *P. sajor-caju* was greyish white in colour and remained fresh for two days after harvest in room

condition and three days after harvest, the bunch became unfit for consumption (Plate 9). Three days after harvest, colour of the bunch turned to slight yellow with rotted appearance. The bunch kept under refrigerated condition remained fresh for four days (Plate 10). Freshly harvested *P. citrinopileatus* was golden yellow in colour and remained fresh for one day after harvest in room condition and on the second day after harvest, the colour began to fade and slight smell started to emerge and lost the marketability (Plate 11). The bunch kept under refrigerated condition remained fresh for two days after which the colour began to fade and the bunch started to crinkle (Plate 12).

In the present study, comparatively higher shelf life was observed on *P. djamor* and *P. sajor-caju* which could be stored for two days after harvesting in room temperature (26±2 °C) and three days in refrigerated conditions (15 °C). This may be due to the higher fiber content and lower moisture content in their fruiting bodies. *P Florida*, *H. ulmarius* and *P. citrinopileatus* can be stored under room conditions up to only one day after harvest. Higher shelf life was observed on *P. djamor* followed by *P. sajor-caju*.



Plate 2: Five species of oyster mushrooms packed in Polypropylene covers for shelf-life studies a) *Pleurotus florida* b) *P. djamor* c) *Hypsizygus ulmarius* d) *P. sajor-caju* e) *P. citrinopileatus*

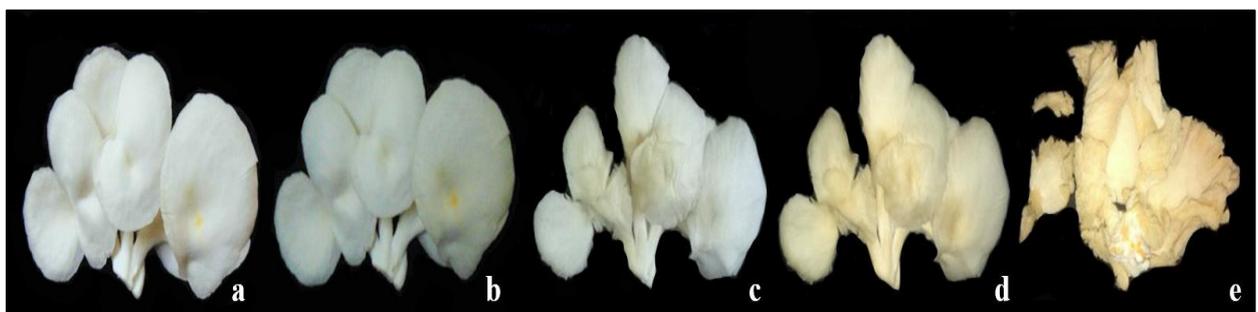


Plate 3: Shelf life of *P Florida* under room condition - a) Fresh mushroom (0 day after harvest), b) 1 day after harvest, c) 2 days after harvest, d) 3 days after harvest e) 4 days after harvest

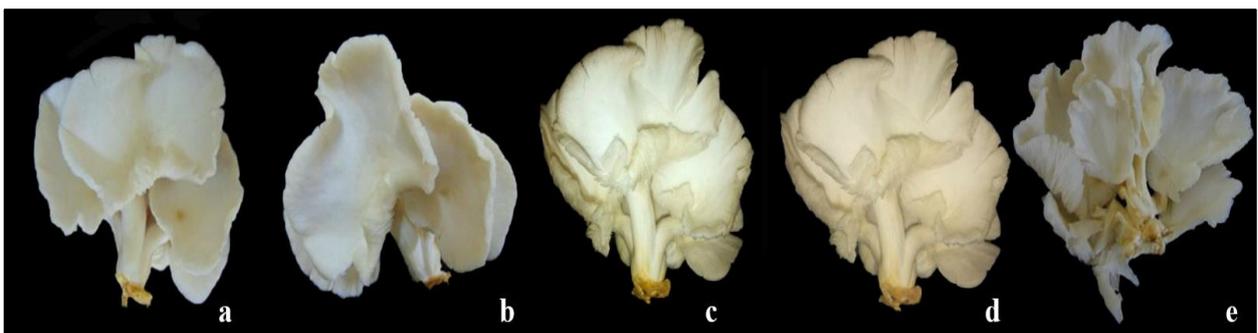


Plate 4: Shelf life of *P Florida* under refrigerated condition - a) Fresh mushroom (0 day after harvest), b) 2 days after harvest, c) 3 days after harvest, d) 4 days after harvest e) 5 days after harvest

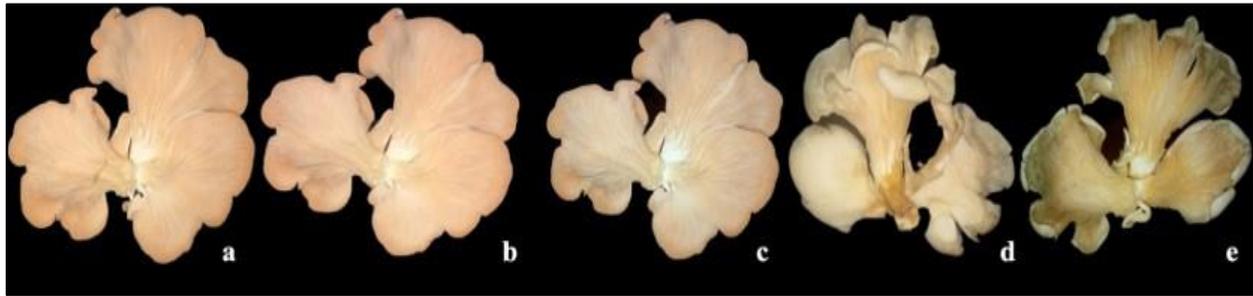


Plate 5: Shelf life of *P. djamor* under room condition - a) Fresh mushroom (0 day after harvest), b) 1 day after harvest, c) 2 days after harvest, d) 3 days after harvest e) 4 days after harvest



Plate 6: Shelf life of *P. djamor* under refrigerated condition - a) Fresh mushroom (0 day after harvest), b) 2 days after harvest, c) 3 days after harvest, d) 4 days after harvest e) 5 days after harvest



Plate 7: Shelf life of *H. ulmarius* under room condition - a) Fresh mushroom (0 day after harvest), b) 1 day after harvest, c) 2 days after harvest, d) 3 days after harvest e) 4 days after harvest

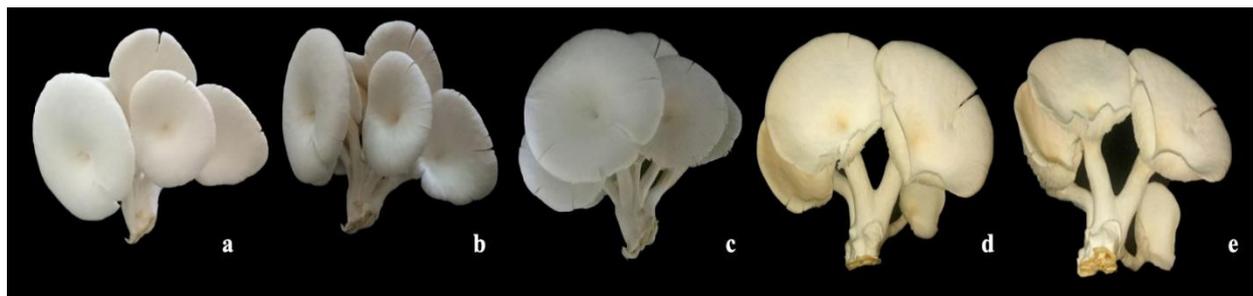


Plate 8: Shelf life of *H. ulmarius* under refrigerated condition - a) Fresh mushroom (0 day after harvest), b) 2 days after harvest, c) 3 days after harvest, d) 4 days after harvest e) 5 days after harvest



Plate 9: Shelf life of *P. sajor-caju* under room condition - a) Fresh mushroom (0 day after harvest), b) 1 day after harvest, c) 2 days after harvest, d) 3 days after harvest e) 4 days after harvest



Plate 10: Shelf life of *P. sajor-caju* under refrigerated condition - a) Fresh mushroom (0 day after harvest), b) 2 days after harvest, c) 3 days after harvest, d) 4 days after harvest e) 5 days after harvest



Plate 11: Shelf life of *P. citrinopileatus* under room condition - a) Fresh mushroom (0 day after harvest), b) 1 days after harvest, c) 2 days after harvest, d) 3 days after harvest e) 4 days after harvest



Plate 12: Shelf life of *P. citrinopileatus* under refrigerated condition - a) Fresh mushroom (0 day after harvest), b) 2 days after harvest, c) 3 days after harvest, d) 4 days after harvest e) 5 days after harvest

Conclusion

Oyster mushrooms are not only nutritive but also highly valued for their excellent taste and flavour. Sensory evaluation of sautéed mushroom was analysed by a panel of 12 semi trained members and it was concluded that sautéed mushroom developed from *H. ulmarius* had better sensory characteristics and found to be superior to those developed from other species studied. It was concluded that oyster mushroom, especially *H. ulmarius* and *P Florida* can be incorporated into the diets of consumers as a promising food item.

Mushrooms are highly perishable in nature and deteriorate within a day after harvesting due to their high respiration rate and higher water content present in the fruiting body. The respiration rate is relatively higher due to the thin and porous epidermal structure of mushrooms [19]. In the present study, comparatively higher shelf life was observed on *P. djamor* and *P. sajor-caju* which could be stored for two days after harvesting in room temperature (26 ± 2 °C) and three days in refrigerated conditions (15 °C). Comparatively longer shelf life of these species may be due to the higher fiber content and lower moisture content in their fruiting bodies. *P Florida*,

H. ulmarius and *P. citrinopileatus* can be stored under room conditions up to only one day after harvest. Storage temperature plays a major role in the rate of metabolic changes which determine the shelf life [20]. Storage under low temperature is a very good method for restricting deterioration of harvested mushrooms for a limited period of time [21].

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