



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(5): 2826-2828
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www.thepharmajournal.com

Received: 11-02-2023

Accepted: 27-03-2023

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Introducing Jaggery mushroom product for rural entrepreneurship development and youth empowerment besides contributing to nutritional security

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Abstract

A natural sweetener called Jaggery is made by concentrating sugarcane juice. It includes vitamins, minerals like iron and copper, as well as nutrients like protein. Jaggery is well recognized for treating digestive issues, accelerating the process of purifying the blood, and boosting the nutritional qualities in human nutrition. It is also used as a medicinal sweetening agent for the creation of pharmaceutical formulations. Similar to this, the oyster mushroom, (*Pleurotus florida*), is an excellent source of protein and can help with many human nutritional issues. Despite this, the cultivation and use of mushrooms are not progressing adequately due to their highly perishable nature. In order to increase the nutritional value of the produce and meet the needs of the general population for high-quality protein and micronutrients, a modified technology for mushroom production involving the addition of Jaggery during the process has been developed. This technology also addresses the problems with shelf life and post-harvest losses of mushrooms. In order to produce mushrooms with added value, the Krishi Vigyan Kendra, ICAR-Indian Institute of Sugarcane Research, Lucknow has successfully devised and introduced a technique that uses Jaggery. According to the nine-point hedonic scale, this product's colour, look, flavour, taste, texture, and general acceptability were all deemed to be organoleptically acceptable. The fungus with extra value above had the highest sensory rating as regular Jaggery. In addition to lowering post-harvest mushroom losses, the preparation of this product will increase the income of farmers and rural youth due to value addition and improved marketing of this crop in the event of excess production.

Keywords: Jaggery, mushroom, rural entrepreneurship, nutritional

Introduction

Depending on the storage circumstances, oyster mushrooms (*Pleurotus florida*) are highly perishable and begin to deteriorate after a few hours. Due to its high moisture content, delicate texture, and special physiology, this mushroom has a shelf life that fluctuates between one and two days at room temperature (Saxena and Rai, 1990) [6]. Therefore, it is essential to create appropriate post-harvest methods for its long-term preservation and utilization. Fresh mushrooms have a limited shelf life under ambient conditions of temperature and humidity, making it challenging to sell them. In general, canning, drying, and certain technology for value addition are used to store mushrooms for a long time. Rarely is the quality of the preserved product comparable to that of fresh mushrooms and not all types of mushrooms can be processed using these methods. (Manikandan, 2010) [3]. Markets soon become saturated at the height of harvest, forcing growers to turn to distress sales. As a result, any mushrooms that go unsold are a complete loss. Therefore, techniques for creating processed mushroom products must be developed. In addition to lowering losses, the preparation of these items will increase revenue by adding value and improving the marketing of this horticulture produce. Mushroom protein is of a quality that is halfway between that of vegetable and animal proteins, and its importance as a supplement to a vegetarian diet cannot be overstated. Typically, people eat mushrooms either cooked or raw as a meal garnish.

They have also been utilised in Oriental medicine for millennia, but only recently have their potential as "health potentiators" and "immune system elicitors" been recognised. They are a significant source of potent new pharmaceutical products and have gained popularity as functional foods and a source for the creation of pharmaceuticals and nutraceuticals (Lakhanpal and Rana, 2005) [2] due to their antioxidant, antitumor, and antimicrobial properties (Jones and Janardhanan, 2000) [1].

According to Pardeshi and Pardeshi (2009) [4], the active the direct and indirect effects both at genotypic and ingredients in mushrooms include polysaccharides (β-glucans), dietary fibres, oligosaccharides, triterpenoids, peptides and glycoproteins, proteins, alcohols, phenols, and mineral elements like zinc, copper, iodine, iron, Ca, P, K, Se, vitamins, amino acids, and others.

The fresh mushroom market in India is mostly fueled by marginal and small producers who, due to their lack of resources, have relied on local markets to sell their products. Growers frequently struggle with market saturation and distress sales at egregiously low rates. However, by implementing suitable post-harvest technology to process surplus mushrooms in the form of novel value-added product, i.e. Jaggery mushrooms, it is possible to reduce the amount of surplus mushroom production during peak harvesting periods. This not only reduces post-harvest losses but also increases the additional income for youths and nutritional security by providing nutraceutical low fat, protein, sucrose, iron, vitamins, and minerals, etc.

Materials and Methods

Krishi Vigyan Kendra, ICAR-IISR, Lucknow focuses on the creation of value-added products such Jaggery mushrooms made from oyster mushrooms and sugarcane Jaggery. In 5 to 6 days of bright sunshine, the first surplus of fresh mushrooms was sun dried. Then, to add value, grind and sieve dried mushrooms. The second phase involved boiling sugarcane juice to transform it into a semi-liquid state. Jaggery is blended with mushroom powder in various concentrations, i.e. 4, 6, 8, and 9% as per weight of semi-liquid Jaggery, to create a cube with a frame. Jaggery mushrooms, a prepared value-added product, were assessed using an organoleptic evaluation on a nine-point hedonic scale for colour, appearance, flavour, taste, texture, and overall acceptability. (Rangana, 1994) [5].

Table 1: Shows the scale score

Sl. No.	Score	Scale
1	0-1	Dislike Extremely
2	1-2	Dislike Very much
3	2-3	Dislike Moderately
4	3-4	Dislike Slightly
5	4-5	Nighter like nor dislike
6	5-6	Like Slightly
7	6-7	Like Moderately
8	7-8	Like Very much
9	8-9	Like Extremely

Results and Discussion

For preparation of mushroom based value added products,

mushroom powder is only the way so, drying is essential for make it powder form. Fresh mushrooms contain 90% water. Sun drying must be done with caution. Mushrooms should be dried in a dust-free environment and in containers that will not blow away in the wind. The mushroom's increased vitamin D concentration is another benefit of sun drying. Open-gill mushrooms should first be dried with the gill side up, ideally in shade, and then dried in the sun. You may utilize a solar-powered heater. However, it is crucial to keep an eye on the drying temperature. Temperatures above 60 °C are undesirable because they cause sugars to burn, flavors to deteriorate, and they also reduce a product's capacity to rehydrate without gaining weight. The dried mushrooms can be ground into a powder and used to create a variety of goods. In this study, filtered Jaggery juice was cooked in an open pan at 114–1180 °C sticking temperature, and at the point of mass concentration, it was placed for chilling, where it solidified into slurry. At this point, add various concentrations of mushroom powder 4%, 6%, 8%, and 9% separately to the slurry and thoroughly mix it. These liquids were put into the mould to set. On a nine-point hedonic scale, these prepared Jaggery mushroom cubes of varying content were evaluated. The outcome showed that value addition. Jaggery that contained 4% mushroom powder was quite popular since its colour was a golden yellow, it looked wonderful, and it tasted and felt just like regular Jaggery. As a result, it was very much liked and highly acceptable. Jaggery with 6% mushroom powder had a bright, dark appearance, a bland flavour, and a fairly pungent aftertaste. It was only mildly enjoyed. Because Jaggery loses some of its properties at this concentration, the mixture of eight and nine percent mushroom powder with Jaggery was dark in colour, dull in appearance, and flavorful as well as tasting extremely pungent. This value-added jiggery needed only 20–25 days to maintain its quality. Testers did not appreciate Jaggery mushrooms with concentrations of 8% and 9%. Value-added Jaggery mushrooms with a four percent concentration were identical to regular Jaggery and also had higher nutrition.

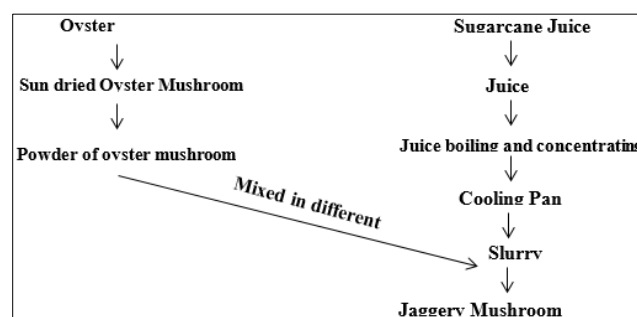


Fig 1: Flow chart of Jaggery Mushroom Preparation

Table 2: Organoleptic evaluation of value added product i.e. mushroom Jaggery.

Different concentration of mushroom powder in Jaggery	Color	Appearance	Flavor	Taste	Texture	Mean
9%	1.2	1.6	1.5	1.3	1.5	1.42
8%	2.2	3.2	2.1	1.8	2.3	2.32
6%	6.6	5.8	5.4	6.3	6.8	6.18
4%	7.5	7.5	8.9	8.4	8.6	7.66
Normal Jaggery	7.7	6.9	8.2	8.4	8.3	7.90

Table 3: Organoleptic evaluation of value added product i.e. mushroom Jaggery

Different concentration of mushroom powder in Jaggery	Dislike Extremely (0-1)	Dislike very much (1-2)	Dislike Moderately (2-3)	Dislike Slightly (3-4)	Nighter like nor dislike (4-5)	Like Slightly (5-6)	Like Moderately (6-7)	Like very much (7-8)	Like Extremely (8-9)
9%	-	✓	-	-	-	-	-	-	-
8%	-	-	✓	-	-	-	-	-	-
6%	-	-	-	-	-	-	✓	-	-
4%	-	-	-	-	-	-	-	-	✓
Normal Jaggery	-	-	-	-	-	-	-	-	✓

Conclusion

The retention of fresh mushrooms at various levels such as with growers, whole seller, retailers and consumers results in deterioration in the quality of the mushrooms and great economic loss. To overcome all these problems, adaption of appropriate post-harvest technologies and processing of surplus mushrooms in the form of novel value added products is required. Although, mushrooms are considered rich source of protein, vitamins, minerals (Ca, P, K, Mg, Zn, Se etc.) and nutraceuticals, the presence of strong smell due to the various volatile compounds is relished by some and not liked that much by others. The processing of these mushrooms into Jaggery may be the novel initiative towards their consumption among all people in various age groups. The value added Jaggery mushroom was rated with the highest sensory score as normal Jaggery. Preparation of this product will not only reduce post-harvest mushroom losses but will also enhance the income of farmers and rural youth on account of value addition and better marketing of this crop in the event of surplus production. So, youth may establish an entrepreneur. On another hand Jaggery mushroom will also contribute in nutritional security of rural people.

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