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Cultivation, Nutrition and Biochemical Analysis of *Volvariella bombycina*

Senthilkumar G, Ambikapathy. V, and Panneerselvam A
Department of Botany and Microbiology, AVVM Sri Pushpam College(Autonomous) Poondi - 613503, Thanjavur, Tamil nadu, India

ABSTRACT

Obective: To explore the Nutritional and Biochemical constituents present in *Volvariella bombycina* mushroom .

Methods: The crude protein content (N x 4.38) of the sample was estimated by the Macro - kjeldahl method were detect chemical composition (moisture,proteins,fat,carbohydrates and ash) using AOAC procedures. The biochemical test were performed to investigate primary and secondary compounds were analysed .

Results : The nutritional values of the *V. bombycina* dry wight contains, water protein,fat,carbohydrates,crude fiber and ash were analysed and tabulated. The results of Biochemical screening indicates the presence of alkaloids, terpenoids, sugar, saponins, flavonoids, proteins and steriods.

Conclusions: The mushroom possess rich nutritional value and has been widely consumed as one of a delicious food, in many countries. Thus, it seems to be economically nutritionally and pharmaceutically very important and useful species.

Keywords : *Volvariella bombycina*, Nutrition, Biochemical, Paddystraw.

I. INTRODUCTION

The fleshy fungi of class Ascomycetes and Basidiomycetes are generally termed as mushroom are part of fleshy, spore bearing fruiting body of a fungus typically produced above ground an soil or on its food source mushroom has long been valued as delicious and nutritional food in many countries. Mushroom are initially consumed for their flavour, now consumed because of the nutritional and medicinal properties [(1)] *Volveriella bombycina* commonly known as the silky sheath, rosegill, silver silk straw mushroom or tree mushroom is a species in the family Pluteaceae. It is an uncommon but widespread species, having been reported from Asia, Australia, the caribbean, Europe, and North America. *V.bombycina* were reported to have good antioxidant antitumor and hyperchlolesterolemic effects [(2)]

Mushrooms are very low in nucleic acid contents and hence, these are considered best food for patients suffering from hypertension, diabetes and obesity. The biochemical analysis of the mushroom also showed the medicinal attributes in several species, such as anti-viral, anti-bacterial, anti-parasitic, anti-tumor, anti-hypertension, anti-atherosclerosis, hepatoprotective, anti-diabetic, anti-inflammatory and immune modulating effects [(3)]. Cholesterol is absent and in its place ergosterol is present which gets converted to vitamin D by the human body. Mushrooms are fairly good source of vitamin and vitamin B complex , particularly thiamine, riboflavin, niacin, biotin and pantothenic acid, Folic acid and vitamin B12 which are absent in most vegetables are present in the mushrooms which also supply a range of valuable minerals especially potassium and iron [(4)].

II. MATERIALS AND METHODS

2.1. Collection and preparation of mushroom.

The culture of *Volvariella bombycina* (MTCC No: 1345) was purchased from microbial type culture collection centre, Chandigarh. The specific medium of fungi MGYP broth and MGYPA were used and the culture was stored in deep freezer at 4^0C for further studies.

Spawn preparation

Spawn of *V. bombycina* was produced using sorghun grains and the substrate was half boiled after which air dried for 1 hour. Calcium carbonate ($CaCo_3$) was added along with the substrate at the concentration of 20 % per kg. Then the grains were packed using PP (Polypropylene) cover size of 28 x 10 cm PVC Neck and non absorbance cotton and sterilized in an autoclave at 121^0C for 20 min. The bags were cooled at room temperature at least for 4 hours. Bags were inoculated individually using the culture of *V. bombycina* from a single mother spawn, 25 sub spawn bags were prepared.

Bed preparation

Paddy straw was collected selectively and soaked in water for 4- 6 hours and that straw was autoclaved at 121^0C for 30 min. Then the substrate and spawn were packed using 60 x 30 cm size. Polypropylene cover filled the bag 5 times in 5 cm level intervals. The prepared bags were kept in the stretched bamboo frame with in restricting shed.

Nutritional analysis

The sample were analyzed for chemical composition (moisture, proteins,fat, carbohydrates and ash) using AOAC procedure [5]. The crude protein content (N x 4.38) of the sample was estimated by the Macro-kjeldahl method; the crude fat was determined by extracting a known weight of powdered sample with petroleum ether using a soxhlet apparatus; the ash content was determined by incineration at 600 $\pm$ 15^0C. Total carbohydrates were calculated crude by difference (cp+ ash+ crude fat +m) and Energy was calculated according to the following equation.

Energy (Kcal) = 4 x (g protein) +3.75 (g carbohydrate) + 9 x (g fat).

Biochemical analysis

Biochemical test were used to analysis the Primary and Secondary components proteins and common sugars are included in primary constituents and secondary compounds have terpenoids, alkaloids and phenolic compounds[6] which are given below,

Test for Alkaloids

Mayor's test: Dissolved filtrate 1ml treated with mayor's reagent (potassium mercuric iodide).Formation of a yellow coloured precipitate indicated the presence of alkaloids. (Mercuric chloride + few drops of Iodine solution).

Test for Terpenoids

Crude extract 2ml was dissolved in 2ml of chloroform and evaporated to dryness. To this 2ml of Con. H_2SO_4 was added and heated for about 2min. A grayish colour indicated the presence of terpenoids.

Test for Phenol and Tannin

Crude extract was mixed with 2ml of 2% solution of $FeCl_3$. A blue green or black colorization indicated the presence of phenol and tannin.

Test for Sugar

The little amount of substance mixed with equal volume of Fehling's A and B solution heated in water bath. Formation of red colour indicated the prsence of sugar.

Test for Saponin (Froth test)

To 3ml of extract were diluted with 2ml of distilled water and this test tube was shaken in a graduated cylinder for 15min. Formation of 1cm layer of foam indicated the presence of Saponin.

Test for Flavonoids

To 4ml of crude extract was mixed with few fragment of magnesium ribbon and Con. Hcl was added drop wise pink scarlet colour appeared after few minutes which indicated the presence of flavanoids.

Test for Quinines

To the 1% test substance and 2 % Sodium hydroxide was added , Blue green (or) red colour indicated the presence of quinines.

Test for Protein

The 4% extract were treated with few drop of concentrated nitric acid. Formation of yellow colour indicated the presence of protein.

Test for Sterols

The 3mL of crude extract was mixed with 2mL of chloroform and Con. H_2So_4 was added sidewise. A red colour is produced in the lower chloroform layer indicated the presence of steroids.

III. RESULTS

The purchased culture was stored in deep freezer at 4^0C aseptically. Sorghum grains were used for spawn preparation. In sorghum grains substrate spawn developed in short period and produced high yield than other substrate. The circular bed method was a good simple method and gave best yield than others in this study. (Figure1).

These prepared spawns were used to cultivate the *V. bombycina* by using paddy straw as a substratum. Paddy straw an agro waste materials is easily available at Thanjavur Dt. This technique is the oldest and commonest technique. Mushrooms were harvested at three times within 35- 40 days for one time spawn preparation and their yield was calculated. 51 % yield was recorded in first harvest (15 - 20 days) 31% in second harvest (24 - 28 days) and 18 % was recorded in third harvest (30- 35 days) The optimum temperature for the growth of *V.bombycina* was 28 ± 2^0C (Fig 2).

Nutritional value of the mushroom sample were analyzed and tabulated.The moisture 83.10 $\pm$0.57, proteins 54.07 $\pm$0.19, Fiber 11. 23 $\pm$ 0.31, Fat 06.76 $\pm$ 0.27, carbohydrates 44. 85 $\pm$ 0.07, Ash 05, 30 and Energy (Kcal) 384. 01 $\pm$ 40. 24 were analyzed (Table 1). Based on the Biochemical analysis the fungus showed the presence of alkaloids, terpenoids, sugar, sapoins, flavonoids, proteins, and sterols. Phenols, tannins and quinines were absent in the *V.bombycina* species (Table. 2)

Table .1 Nutritional analysis of *V. bombycina*

Nutrition of the mushroom	*V. bombycina*
Moisture (%)	83.10±0.57
Proteins (mg/g)	54.07± 0.19
Fibre (mg/g)	11.23±0.31
Fat (mg/g)	06.76±0.27
Carbohydrates (mg/g)	44.85±0.07
Ash (mg/g)	05.30±0.63
Energy (Kcal)	384.01±40.24

Table 2. Biochemical compounds detected in the mushroom

Test name	*V. bombycina*
Alkaloids	+
Terpenoids	+
Phenol &Tannins	_
Sugar	+
Saponins	+
Flavonoids	+
Quinines	_
Protein	+
Sterols	_

Figure 1. Cultivation of *Volvariella bombycina* using circular bed method

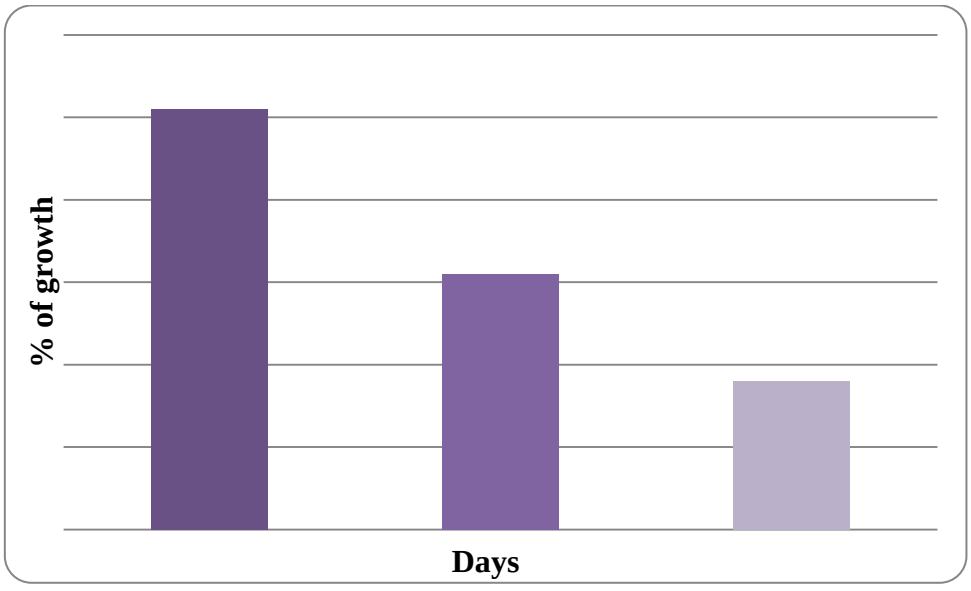

Figure 2. Yield rate of *Volvariella bombycina*

IV. DISCUSSION

Mushroom have rich nutritional value with high content of proteins, vitamins, minerals, fibers, trace elements and low or no calories and cholesterol [7,8]. Many of them have been used in folk medicine for thousands of years. Some of them are nutraceuticals (natural food having potential value in maintaing good health and boosting immune system of the human body) while others can produce potent nutriceuticals (compounds that have medicinal and nutritional attributes and are consumed as medicines in the form of capsules or tablets but not as food [9,10]. Mushrooms are known to be rich sources of various bioactive substances like antibacterial, antifungal, antiviral, antiparasitic, antioxidant, anti inflammatory, antiproliferative, anticancer, antitumours, cytotoxic, anti HIV, hypocholesterolemic, antidiabetic, anticoagulant, hepatoprotective componds, and others [3,11,12]. Several bioactive secondary metabolite have been isolated and identified, from *V.bombycina* fruit bodies, mycelium or pure culture. The compounds ergosterol 4, 6, 8, (14), 22 tetraene 3-one,ergosterol peroxide, indole 3- carboxaldehyde and indazole were found in liquid culture [13].

The fungus also produce compounds that have antioxidative activity (Badalyan, [2]). Jagadeesh *et al.*, [14]. reported that 1.15 and 2.72 % Lipid contents were present in mycelia and fruit body of *V. bombycina* respectively. *V.bombycina* are rich in protein with low lipid content. The results from present study indicated the *V. bombycina* mushroom is considered as ideal food .This edible fungus provide two main benefits to people. They are a source of food and income generation. These have a greater potential in both health and wealth for rural people who cultivate paddy straw as part of integrated farming systems.

V. ACKNOWLEDGEMENT

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