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IMPACT OF DIFFERENT SUBSTRATES AND MEDIA ON RADICAL SCAVENGING ACTIVITY OF LIQUID CULTURE OF THREE SPECIES OF *RUSSULA*, AN EDIBLE MUSHROOM OF ODISHA

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ABSTRACT

The study consolidates in the aspects of the radical scavenging activity of the liquid culture of three species of *Russula* i.e. *Russula lepida*, *Russula brevipes* and *Russula nigricans*. Three different types of media consists of native substrates, basal and chemosynthetic media were used for the liquid culture preparation of the mycelium of three species of *Russula*. Ten days old broth culture of three species was subjected to the extraction and finaly DPPH activity was estimated colorometrically. All three *Russula* sp. preferred wheat extract media and exhibited maximum DPPH scavenging activity. *R. brevipes* and *R. nigricans* grown in Rye extract broth showed good scavenging properties. Culture broth added with native substrate has shown good potential to supporting mushroom fungi for radical scavenging properties.

Key words: Edible mushroom, *Russula*, Antioxidant, DPPH.

INTRODUCTION

Fungi are the good source of antioxidants [1]. It includes polysaccharides, triterpenes and triterpenoids various organic acids, β-glucan, vitamins, alkaloids, phenolics [2]. Mushrooms are also known as good source for the antioxidant and ultimately a potential health care agent. Several attempts have been carried out for the extraction, analysis and evaluation of antioxidant active principle sourced from mushroom fruiting body [3-5]. Very few reports are available on the antioxidant production by mushroom mycelium in the liquid culture condition. It is reported that cellular materials produce effective metabolites under mycelial and liquid culture conditions [6,7]. Friel and Mc Loughlin [8] reported the advantages of culture media in obtaining high amount of mycelia ultimately the product. Hence an attempt has been taken to grow mushroom in the form of mycelia in the laboratory condition and evaluate its potential to produce antioxidant under different media composition.

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MATERIALS AND METHODS

Master culture of mushroom mycelium was prepared in malt extract agar by incubating at 30°C for seven days. Three different types of media (i) Native substrates: Wheat extract broth, Rye extract, Maize extract, Paddy extract and Leaf litter extract. (ii) Basal media: Malt extract broths, Potato dextrose broth, Saboraoud dextrose broth, Yeast extract broth and Glucose yeast peptone. (iii) Chemosynthetic media: Soil extract broth, Czapek dox broth, Peptone yeast extract broth, Fungi Kimmig broth and Corn meal broth were prepared and sterilized at 121°C and 15 lbs pressure for 15 minutes. Stationary liquid culture was established from the solid culture by transferring disc into an Erlenmayer flask by following purely asceptic techniques. Inoculated broth cultures were incubated at 30°C for 10 days. The mycelium thus obtained was removed and the broth was centrifuged. Supernatant obtained served as sample.

DPPH free radical scavenging assay: The DPPH scavenging activity was estimated by means of colorimetric method. 1ml of culture filterate was treated with 2 ml of diphenyl-1-picrylhydrazyl (DPPH) solution (1:2), mixed well and incubated in dark for 30 minutes. The optical density was measured at 517 nm and finaly scavenging % was calculated.

Table 1. DPPH scavenging activity (%) of mycelial culture of three species of *Russula* in different medium

S. no	Type of Substrate	Media	*R. lepida*	*R. brevipes*	*R. nigricans*
1.	Native substrate	a) Wheat extract broth	54.20±10.26	57.69±0.34	50.90±1.74
		b) Rye extract	0.25±0.05	37.79±0.10	25.45±0.61
		c) Maize extract	10.56±0.21	77.66±0.38	24.89±3.64
		d)Paddy extract	4.17±0.03	13.20±1.95	10.29±3.13
		e) Leaf litter extract	14.93±3.63	5.64±1.41	7.87±1.52
2.	Basal media	a)Malt extract broth	2.49±0.47	1.40±0.16	2.79±0.11
		b) Potato dextrose broth	4.32±0.66	41.54±8.68	2.69±1.31
		c)Sabraoud dextrose broth	2.58±2.11	2.91±0.56	2.74±0.32
		d) Yeast extract broth	2.16±0.11	20.90±0.13	19.76±1.36
		e) Glucose yeast peptone	1.23±0.11	9.92±1.26	8.74±0.50
3.	Chemosynthetic media	a) Soil extract broth	1.10±0.13	1.95±0.22	0.98±0.16
		b) Czapek dox broth	9.31±3.21	6.79±3.20	13.11±5.72
		c) Peptone yeast extract broth	9.55±3.57	4.97±0.75	11.49±0.91
		d) Fungi Kimmig broth	21.01±1.88	28.27±8.89	20.47±3.03
		e) Corn meal broth	13.72±4.29	12.55±0.16	28.74±2.09

RESULTS AND DISCUSSION

Results presented in table-1 revealed the antioxidant activity of *Russula* sp. in liquid culture. All three mushroom species exhibited good potential for their production of antioxidant in liquid culture as *R. lepida* showed 54.20%, *R. brevipes* 57.69% and *R. nigricans* 50.90% in the nutritive substrate media of wheat extract. *R. brevipes* exhibited highest DPPH scavenging activity i.e.77.66% in maize extract media. However Rye extract media also supported well *R. brevipes* and *R. nigricans* in this regard. Though basal media were also found to be useful for the antioxidant production by these mushroom mycelium, native substrates were proved to be more beneficial for mycelial growth and ultimately secondary metabolite production in the form of antioxidant compounds (Yang *et al*., 2002). These mushroom mycelia did not performed well in all chemosynthetic media except corn meal broth (28.74%) and fungi kimmig broth. Soil extract broth could not support the growth of these mycelium. Overall, mushroom mycelia exhibited good antioxidant potential in wheat extract broth followed by maize broth. Presence of high radical scavenging activity hence can easily be correlated with the type of media and reveals that wheat extract medium is the best medium for the extraction of antioxidant compounds from the *Russula* species.

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