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SHORT COMMUNICATION

Effect of carbon sources on radial growth and biomass of *Auricularia cornea*

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Mushrooms are widely recognized not only for their culinary value but also for their medicinal, nutritional, and functional properties. Among the commercially cultivated edible mushrooms, *Auricularia cornea* (syn. *A. polytricha*), commonly referred to as wood ear or cloud ear mushroom, is popular due to its low fat, essential amino acids, dietary fiber, and various bioactive compounds including polysaccharides and polyphenols with demonstrated antioxidant, immunomodulatory activities, anti-inflammatory, lung-clearing, analgesic, and anti-cancer effects (Li *et al*., 2015; Bandara *et al.,* 2017; Thongklang *et al*., 2019; Zakaria *et al*., 2022).

Auricularia mushroom ranks as the third most extensively cultivated species of mushrooms globally (Jahedi *et al*., 2024). Its cultivation has gained momentum in many Asian countries including China, India, and Thailand, particularly on lignocellulosic agro-wastes (Royse *et al*., 2017). Fungal growth is heavily influenced by the type of carbon source utilized in culture media, which provides energy and structural components. In *Auricularia* species, common carbon sources such as glucose, fructose, mannose, and cellulose have proven effective in promoting mycelial expansion and biomass accumulation (Jo *et al*., 2014; Jonathan *et al*., 2009). For instance, submerged cultivation of *A. polytricha* showed that glucose, fructose, mannose, or xylose resulted in the highest dry biomass production (Zurbano, 2018). In *A. cornea*, although a few studies have investigated carbon requirements in submerged cultures, comprehensive data on the effect of diverse carbon sources on radial growth and biomass production under controlled conditions remains limited. The present study aims to evaluate the effect of different carbon sources on radial mycelial growth and biomass production of *A. cornea in vitro*. The findings are expected to support efficient media formulation strategies that enhance cultivation performance and spawn quality.

Auricularia cornea was grown in media with different carbon sources *viz.,* Fructose, Glucose, Maltose, Sucrose, Lactose, Mannitol, and Sorbitol, which were substituted for Dextrose in potato dextrose medium to determine their effect on growth and biomass. Medium without adding any carbon source served as control. Sterilized agar medium (20.0 ml) was poured into petri dishes, inoculated with 5 mm culture discs of actively growing culture and incubated at room temperature (26 ± 2°C). For biomass production each broth prepared in a 250 ml flask containing 100 ml of medium. The inoculated flasks were incubated at 26 ± 2°C. The observations were recorded in respect of radial colony growth and mycelial biomass. Three replications were maintained for each treatment.

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The effect of different carbon sources on the radial growth and biomass production of *Auricularia cornea* showed significant variations (Table 1, Fig 1 and Fig 2). Among the tested carbon sources, sucrose supported the maximum radial growth followed by maltose. Lactose and the control (without additional carbon source) resulted in the least radial growth and biomass production. The results of the present study indicate that sucrose was the most effective carbon source for the radial growth and biomass production of *Auricularia cornea*, followed by maltose and glucose. These findings align with the observations of Xu and Yun (2003) and Zhang *et al.* (2018), who reported that sucrose supported the highest mycelial growth in *A. polytricha*. Similarly, Garasiya (2006) found that starch, followed by sucrose and maltose, enhanced the dry mycelial weight of *A. polytricha*, further supporting the present study's findings regarding the superior performance of disaccharides. Khan *et al.* (1991) reported that maltose and sucrose were more effective than glucose in enhancing mycelial growth, which corresponds with the present findings where maltose promoted higher biomass accumulation compared to glucose. Additionally, Kapoor *et al.* (2011) found that polysaccharides such as starch and disaccharides like maltose significantly enhanced the growth of *A. polytricha*. However, in contrast to previous studies reported glucose as the best carbon sources (Quimio, 1982; Jonathan *et al.*, 2009). In the present study, sucrose and maltose outperformed glucose in terms of biomass production. Lactose and the control (without an additional carbon source) resulted in the lowest radial growth and biomass production, indicating poor substrate utilization. These results align with those of Khan *et al.* (1991), who reported that lactose was a poor carbon source for *A. polytricha*. Similarly, Jo *et al.* (2014) found that *A. auricula-judae* exhibited reduced growth on lactose compared to other carbon sources. The limited fungal growth in the control treatment further highlights the necessity of an external carbon source for optimal mycelial development.

Table 1. Effect of different carbon sources on radial growth and biomass of *Auricularia cornea*

S. No.	Carbon source	Radial growth (mm)*	Mycelial character	Biomass*	
				Fresh weight (g)	Dry weight (g)
1.	**Glucose**	76±0.05[bc]	White, Uniform and dense cottony mycelial growth with extensive radial expansion.	3.87±0.01[c]	0.87±0.01[c]
2.	**Sorbitol**	75±0.05[bc]	Light brown at center, Moderate mycelial growth with slightly restricted expansion at edges.	3.19±0.01[d]	0.38±0.01[d]
3.	**Lactose**	70±0.11[d]	Pale white, with Sparse and restricted growth with limited radial spread.	2.71±0.01[f]	0.24[f]
4.	**Fructose**	74.3±0.03[bc]	White, Dense and well-spread growth	3.22±0.03[d]	0.33±0.01[de]
5.	**Maltose**	77±0.11[b]	Light brown at center, Segmented ring-like growth pattern	4.69±0.01[b]	1.04±0.03[b]
6.	**Mannitol**	73±0.15[cd]	Light brown at center, Mycelial expansion with thin and less dense growth.	3.9±0.01[c]	0.3±0.01[ef]
7.	**Sucrose**	85.7±0.12[a]	White, Strong mycelial growth with uniform distribution.	6.12±0.01[a]	1.14±0.01[a]
8	**Control**	71±0.05[d]	White, Minimal growth with least spread	2.91±0.01[e]	0.27±0.01[f]

*All values are mean ± SE. Mean values in a column followed by different superscript letters differ significantly at $p \leq 0.05$ according to Duncan's Multiple Range Test (DMRT).

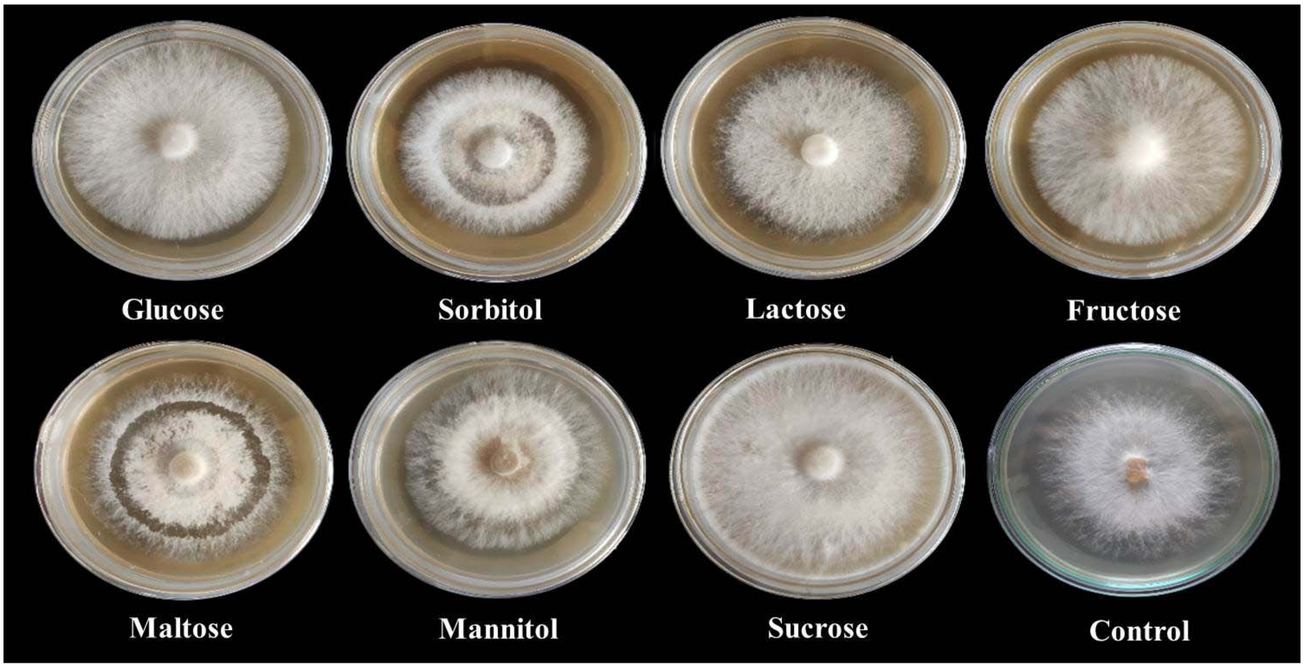

Fig. 1. Effect of different carbon sources on radial growth of *Auricularia cornea*

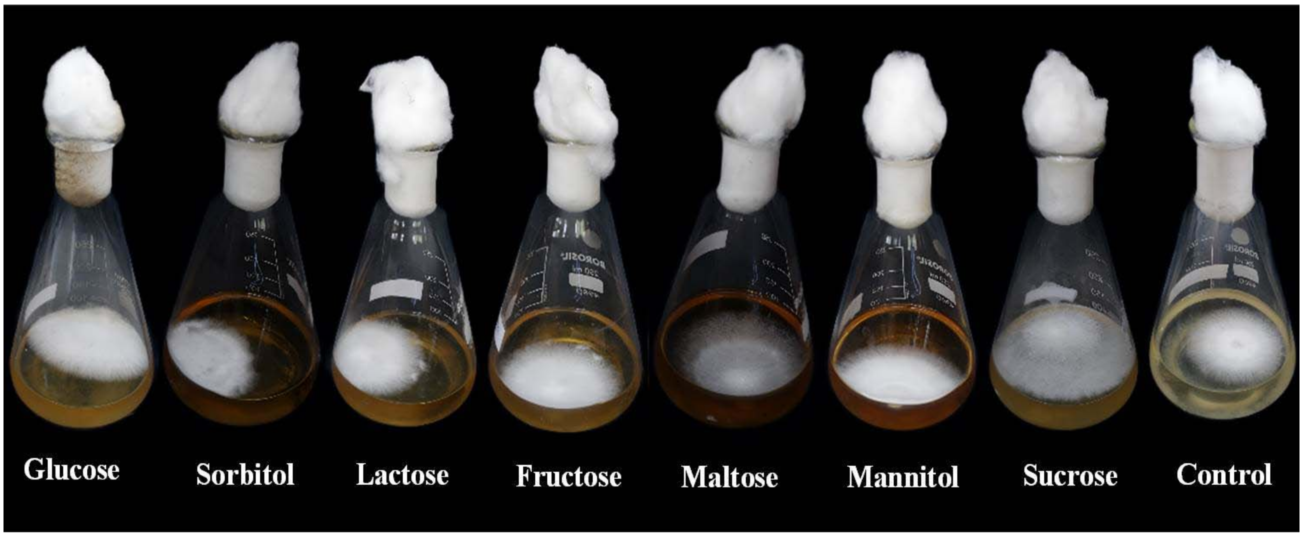

Fig. 2. Effect of different carbon sources on biomass of *Auricularia cornea*

This study highlights the critical role of carbon source selection in optimizing the growth and biomass of *Auricularia cornea*. Sucrose was found to be the most effective, followed by maltose and glucose, while lactose and the control showed poor performance. These results provide valuable insight for improving spawn production and commercial cultivation of *A. cornea*.

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