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The Potential of Mushrooms to Develop Healthy Food and Biotech Products

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ABSTRACT

Agaricomycetes and Pezizomycetes mushrooms, which form epigeal and hypogeal sporomata, are considered to have excellent nutritional and medicinal value. They produce various bioactive compounds (polysaccharides, terpenoids, phenolics, polyketides, proteins, etc.) with therapeutic effects, including antimicrobial, anti-inflammatory, antioxidant, antitumor, antiviral, hypocholesterolemic, hypoglycemic, immunomodulatory, neuroprotective, and wound-healing properties. Out of an estimated 1.5 to 3.0 million fungal species, approximately 150,000 are mushroom-forming fungi. Of these, about 14,000–16,000 are taxonomically identified, including about 7,000 edible and 7,000 medicinal species, with 130 species described as having pharmacological activity. Currently, about 200 species are produced biotechnologically, and 50 species are cultivated commercially. The wide spectrum of bioactivities exhibited by mushroom-derived biomolecules is utilized to develop health-promoting biotech products for humans and animals. Species within Agaricomycetes, such as *Coriolus versicolor, Ganoderma lucidum, Grifola frondosa, Hericium erinaceus*, and *Lentinula edodes*, have been reported as prebiotics that regulate gut microbiota through cell wall glucans. Supplementing various food products (dairy beverages, yogurts, bread, pasta, beer, etc.) with mushrooms significantly enhances their quality and nutritional value. Recent advances in biotechnological mushroom cultivation have decreased the costs and increased the availability of mushroom-derived health-enhancing biotech products (pharmaceuticals, nutraceuticals, cosmeceuticals, etc.), making them widely accessible worldwide. These products can be obtained from wild and cultivated mushrooms, as well as from surface and submerged mycelia, sclerotia, mitospores, and meiospores. Progress in fungal biology, biotechnology, myco-pharmacology, genomics, metabolomics, and proteomics has contributed to the application of mushrooms in nanobiotechnology and nanomedicine, promoting food safety and human health, while also generating positive environmental impacts.

Keywords: mushrooms, biotechnology, biomedicine, biotech products, healthy food

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