CULTIVATION TECHNOLOGY OF CHAMPIGNON MUSHROOMS IN PROTECTED AREAS

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Annotation. The cultivation of mushrooms has become one of the promising areas of modern agriculture due to their high nutritional value and economic efficiency. Champignon mushrooms are widely cultivated in many countries of the world because of their high demand and relatively simple cultivation technology. This article examines the technological aspects of growing champignon mushrooms in protected environments such as greenhouses, special mushroom houses, and controlled indoor facilities. Particular attention is paid to substrate preparation, composting technology, environmental conditions, and factors influencing yield. The results show that maintaining optimal temperature, humidity, and proper substrate composition significantly improves productivity and product quality.

Keywords: champignon mushroom, protected cultivation, compost, substrate, mushroom production, environmental control.

Introduction. Mushrooms are considered an important food product due to their high content of proteins, vitamins, minerals, and biologically active compounds. They play a significant role in human nutrition and are often used as a dietary food. Among cultivated mushrooms, the champignon mushroom is one of the most widely produced species worldwide.

Champignon mushrooms belong to the species *Agaricus bisporus*, which adapts well to artificial cultivation conditions. The cultivation of this mushroom has gained

popularity because it does not require large land areas and can be grown year-round in controlled environments.

Protected cultivation allows farmers to regulate environmental factors such as temperature, humidity, and air circulation. These factors are essential for successful mushroom growth and high yield. The use of modern technologies in mushroom cultivation contributes to improved productivity and product quality.

The aim of this study is to analyze the technological aspects of cultivating champignon mushrooms in protected environments and to determine the optimal conditions for achieving high yields.

Materials and Methods. The study was conducted to evaluate the cultivation technology of champignon mushrooms in protected growing facilities. Experiments were carried out in controlled indoor environments designed for mushroom production.

The main material used for mushroom cultivation was compost prepared from organic components. The substrate composition included:

- wheat straw
- horse or cattle manure
- mineral additives such as gypsum and lime

The compost preparation process lasted approximately 20–25 days. During composting, microbial activity decomposes organic materials and creates a nutrient-rich medium suitable for mushroom growth.

After the compost was fully prepared, mushroom spawn (mycelium) was introduced into the substrate. The inoculated compost was placed in growing containers or shelves within the cultivation room.

The following environmental conditions were maintained during the mycelium development stage:

- temperature: 22–25 °C
- relative humidity: 80–90%
- proper ventilation and air exchange

After the mycelium colonized the substrate, a casing layer consisting of peat and soil mixture was applied. During the fruiting stage, the temperature was reduced to 16–18 °C to stimulate mushroom formation.

Results. The results of the study indicate that the success of champignon cultivation largely depends on substrate quality and environmental management. Proper compost preparation ensures sufficient nutrients for mycelium growth and development.

During the vegetative growth phase, higher temperatures promote rapid mycelial colonization of the substrate. However, for fruit body formation, a slightly lower temperature is required. Maintaining high humidity levels is also important because mushroom fruiting bodies contain a large amount of water.

Table 1.

Optimal environmental conditions for champignon mushroom cultivation in protected environments

Growth stage	Temperature (°C)	Relative humidity (%)	CO_2 level	Duration (days)	Description
Compost preparation	60–70	70–75	High	20–25	Organic materials decompose and form a nutrient-rich compost suitable for mushroom growth
Mycelium colonization (spawn run)	22–25	85–90	High	12–16	Mycelium spreads through the compost and fully colonizes the substrate
Casing layer stage	20–22	85–90	Moderate	5–7	A casing layer is applied to stimulate mushroom formation
Fruiting stage	16–18	80–90	Low	20–30	

Ventilation plays a critical role in removing excess carbon dioxide produced during mushroom growth. Insufficient air exchange may negatively affect mushroom development and reduce yield.

The main advantages of cultivating champignon mushrooms in protected environments include:

- year-round production, efficient use of limited space, stable and high yields improved product quality

Under optimal conditions, it is possible to obtain approximately 20–25 kg of mushrooms per square meter of cultivation area.

These results confirm that controlled environmental conditions significantly enhance productivity in mushroom cultivation systems.

Conclusion. The cultivation of champignon mushrooms in protected environments is an efficient and profitable agricultural practice. Proper substrate preparation, optimal temperature and humidity control, and adequate ventilation are key factors for successful mushroom production.

The application of modern cultivation technologies and improved management practices can significantly increase mushroom yield and quality. Future research should focus on improving substrate formulations, introducing high-yielding mushroom strains, and implementing automated environmental control systems.

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