

## Indoor Container Mushroom Production: A Profitable Urban Agriculture Solution

### Problem/Challenge

Urban areas face challenges of limited arable land and ensuring local food supply, while conventional indoor farming can be energy-intensive. There is a need for high-yield, economically viable, and space-efficient food production methods that contribute to urban food security and resource management within the Water-Energy-Food-Ecosystem (WEFE) Nexus.

### Our Solution/Key Finding

The FrontAg Nexus project highlights the feasibility of cultivating mushrooms, such as *Pleurotus eryngii* (King Oyster mushroom), within controlled-environment shipping containers in urban settings. This innovative solution leverages vertical farming techniques and precise environmental controls to enable high-density, year-round production of valuable crops in a compact footprint.

### Benefits & Impact

Containerized mushroom farming offers significant advantages: estimated annual profits of over €36,000 based on an Italian case study, high yields (e.g., 6,426 kg FW/year for *Pleurotus eryngii*) in a small space, and consistent production independent of external climate [1]. This represents a profit margin of approximately 47.5% (Profit/Earnings). Its controlled environment minimizes pest/disease risks and optimizes resource use, contributing to urban food systems and efficient resource allocation within the WEFE Nexus.

### Practical Recommendations

Urban farmers and SMEs should consider shipping containers for mushroom cultivation, focusing on species like *Pleurotus eryngii*. Optimize environmental conditions (e.g., 17°C temperature, 80-85% humidity, 12h photoperiod) for maximum yield. Before setup, conduct a preliminary feasibility study or a detailed cost-benefit analysis to carefully assess energy

### Applicability Box

**Theme:** Urban Agriculture, Controlled Environment Farming, Economic Viability

**Keywords:** Mushrooms, Urban Farming, Shipping Container, *Pleurotus eryngii*, Controlled Environment, Economic Profitability

**Context:** Urban environments, small businesses, local food supply chains, controlled agricultural systems.

**Required Resources:** Shipping container (12m), HVAC system, ready-to-grow mushroom bags, electricity, water, labour.

**Scalability:** Highly scalable through modular container units.

**Readiness Levels:** High TRL (demonstrated technology), BRL dependent on energy costs and market price, SRL moderate but growing with urban interest [2].

**Risk Management/Considerations:** Potential for high energy consumption; requires careful optimization of HVAC systems and lighting schedules to ensure profitability, initial capital expenditure, maintaining sterile conditions to prevent contamination, and market demand for specific mushroom varieties.

consumption and the cost of cultivation inputs (e.g., mushroom bags) for economic viability.

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### References and Further Information

- [1] A. D’Aprile, E. Appolloni and F. Orsini, “How to produce mushrooms inside a shipping container in an urban environment,” FrontAg Nexus Implementation Guide, Bologna, 2024.
- [2] E. Appolloni, V. Cerasola, G. Pennisi, W. Biru, G. Buchenrieder, T. Uyar and Y. Yavuz, “D1.1: Systematic literature review (SLR) of frontier agriculture systems and empirical evidence in the Mediterranean Region,” FrontAg Nexus Project Deliverable, Bologna, 2023.

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### About this practice abstract

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**FrontAg Nexus:** The project was launched in May 2023 to promote sustainable agri-food practices by applying the Water-Energy-Food-Ecosystems (WEFE) Nexus approach. Focusing on six Mediterranean countries—Israel, Italy, Morocco, Tunisia, Turkey, and Jordan—the project addresses climate change, resource scarcity, and food insecurity through collaborative research and innovation.

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**Project Website:** <https://frontagnexus.eu>

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