

Safe Food from Smart Fungi: Harnessing Mushroom Biodiversity and Innovation for Thailand's Climate-Resilient Future

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ABSTRACT:

As climate change intensifies, ensuring both food safety and authenticity has become a shared challenge across ASEAN. Thailand's mushroom sector presents a unique opportunity to demonstrate how biodiversity, science, and community collaboration can work together to build trust in food systems. With hundreds of indigenous species adapted to local climates, mushrooms are not only a sustainable and low-carbon food source but also a model for transparent and traceable production. From wild forests to controlled cultivation, Thailand's integrated approach to fungal biodiversity offers new insights into how authenticity can be scientifically verified and socially sustained.

Research efforts over the past decade have focused on identifying, authenticating, and valorizing Thailand's native mushrooms through molecular phylogenetics, chemical profiling, and applied food innovation. These include studies on *Pseudohydrops*, *Neofomitella*, *Oudemansiella*, and *Ganoderma*, which revealed novel triterpenoids and bioactive compounds with potential applications in safe nutraceuticals. DNA barcoding and species authentication have become core tools for verifying mushroom origin, ensuring the accuracy of species used in both cultivation and trade. At the production level, controlled-environment farms and organic-certified systems integrate traceability from spawn to finished products—combining USDA Organic, ISO 22000, and HACCP standards to minimize contamination risks and guarantee genuine species identity.

Building an authentic community around mushrooms means uniting science, safety, and culture. Thailand's community-based initiatives, such as mushroom food banks and GI registration for local species, bridge traditional knowledge with modern authentication tools. These collaborations turn biodiversity into a foundation of trust—where each mushroom represents both local identity and verified integrity. At ASEANSafe 2025, this message serves as a call to action: **Authenticity begins at the source—and in Thailand, mushrooms are showing how biodiversity, science, and community trust can grow together.** By fostering regional cooperation and sharing tools for authenticity verification, we can ensure that ASEAN's future foods are not only safe and sustainable, but also truly authentic to their origin.

KEYWORDS:

Mushrooms, biodiversity, food safety, climate resilience, alternative protein