

Straw Mushroom

Submitted By

Group 4

| | | |
|----------------------|------------|---------------------|
| Piyawat Wiriyayothin | 6710545717 | President |
| Amornrit Sirikham | 6710545989 | Vice-President |
| Paranyu Kittinavakit | 6710545784 | Board |
| Chaiyapat Kumtho | 6710545521 | Treasurer |
| Pasin Tongtip | 6710545741 | Secretary |
| Pattadon Udompaipeuk | 6710545750 | Assistant Secretary |

Faculty of Engineer (IUP) section 450

Submitted to

Teachers Committee of Food for Mankind

**Course 01999011-67 Food for Mankind
Semester 1 / 2567**

Kasetsart University. Bang Khen

Preface

This report on straw mushrooms (*Volvariella volvacea*) reflects our group's shared passion for exploring sustainable food sources. In addition to delving into their history, nutritional value, and cultivation methods, we also consider their potential as a sustainable food option. Straw mushrooms, known for their ability to grow on agricultural by products, offer an eco-friendly and resource-efficient solution for meeting global food demands.

We express gratitude to our instructor, researchers, and collaborators for their support. This report symbolizes our commitment to understanding sustainable agriculture and food security.

Contents

| | |
|--|-----------|
| Preface | I |
| Content | 1 |
| 1 Introduction | 2 |
| 2 History | 3 |
| 3 Nutrition | 5 |
| 4 How to grow | 7 |
| 5 Product | 8 |
| 6 Pros | 9 |
| 6.1 Rich in Nutrients | 9 |
| 6.2 Low in Calories | 9 |
| 6.3 Supports Heart Health | 9 |
| 6.4 Promotes Healthy Digestion | 10 |
| 6.5 Supports Blood Sugar Control | 10 |
| 6.6 Boosts Immune System | 11 |
| 6.7 Sustainability | 11 |
| 7 Cons | 14 |
| Reference | 17 |
| 7.1 Internet Resource | 17 |
| 7.2 Book Resource | 19 |
| 7.3 Journal Resource | 19 |

1 Introduction

Straw mushrooms (*Volvariella volvacea*), native to Asia, have been cultivated since the 18th century, initially grown on paddy straw by Buddhist communities. Over time, their cultivation spread across China, becoming a treasured food and even a royal gift. Today, straw mushrooms are widely consumed throughout Asia and are cultivated using various substrates, such as cotton waste and compost piles.

This report explores the historical background, nutritional composition, cultivation methods, applications, and the benefits and challenges of growing and consuming straw mushrooms, presenting a comprehensive analysis of their significance in food and agriculture.

2 History

Straw mushrooms have been cultivated for thousands of years in Asia, but the earliest record of cultivation dates back to the 18th century. Buddhist monks at the Nanhua Temple in China grew the fungi on paddy straw for the mushroom's high nutritional properties and also used it in traditional medicine. Through exposure at the temple, Straw mushrooms widely increased in popularity across China and even became a gift that was given to Chinese royalty. It has been spread across Southeast Asia, remaining primarily in the areas that they are grown in due to their short shelf life and delicate nature when fresh.

In the modern-day, Straw mushrooms have remained one of the most popular varieties consumed throughout Asia and are cultivated on many different agricultural waste substrates. Besides straw, the mushrooms are grown on cotton waste known locally as 'gin trash'. This substrate is the fiber matter left after cotton is extracted for commercial use. Straw mushrooms are also grown on compost piles, grass, leaves, and wood chips, and can be found growing naturally on termite mounds in Southeast Asia. Straw mushrooms still grow wild in Asia and are also cultivated on a small scale in the Philippines, Malaysia, Thailand, Vietnam, China, and Eastern Europe. Outside of Asia, the mushrooms are available in canned and dried form in Western Europe, North America, and Australia.



Straw mushrooms, botanically classified as *Volvariella volvacea*, are small, edible fungi with a mild, musky flavor that belong to the Pluteaceae family. Also known as Chinese mushrooms, Paddy Straw mushrooms, and Nanhua mushrooms. Straw mushrooms are widely consumed in Asia and are valued for their neutral flavor, versatility, and high nutritional properties. Straw mushrooms are cultivated in the warm, tropical climates of Asia and are often

grown on agricultural wastes such as rice straw, which is where the mushroom also earned its name. The fungi can be harvested in its young or mature state, with the young, unopened mushrooms being labeled as unpeeled and the opened mushrooms labeled as peeled. Unpeeled mushrooms are the most popular version sold in local markets in Asia as they are believed to have higher nutritional properties and a stronger flavor. It is important to note that Straw mushrooms are primarily found in Asia, and in North America, there is a highly toxic look-alike known as the death cap or *amanita phalloides* that can be lethal when consumed.



3 Nutrition

Table 1: Nutritional Composition of Dried Straw Mushrooms

| Nutritional Component | Percentage (%) |
|-----------------------|----------------------------|
| Moisture | 88.4 |
| Crude Protein | 33.1 (on dry weight basis) |
| Fat | 4.6 (on dry weight basis) |
| Total Carbohydrate | 60.0 (on dry weight basis) |
| Fiber | 11.9 (on dry weight basis) |
| Ash | 12.6 (on dry weight basis) |
| Energy Value | 338 kilocalories |

Table 2: Nutritional Composition of Fresh Straw Mushrooms

| Nutritional Component | Percentage (%) |
|-----------------------|-----------------------------|
| Moisture | 88.9 |
| Crude Protein | 3.4 (on fresh weight basis) |
| Fat | 0.8 (on fresh weight basis) |
| Total Carbohydrate | 1.8 (on fresh weight basis) |
| Fiber | 0.6 (on fresh weight basis) |
| Ash | 0.6 (on fresh weight basis) |
| Energy Value | 4.4 kilocalories |

Table 3: Mineral and Vitamin Content in 100g of Straw Mushrooms

| Nutrient/Vitamin | Amount (mg per 100g) |
|-------------------------|----------------------|
| Calcium (Ca) | 71 |
| Phosphorus (P) | 667 |
| Iron (Fe) | 17.1 |
| Sodium (Na) | 374 |
| Potassium (K) | 3,455.00 |
| Vitamin B1 (Thiamine) | 1.2 |
| Vitamin B2 (Riboflavin) | 3.3 |

4 How to grow

5 Product

6 Pros

6.1 Rich in Nutrients

Straw mushrooms are a good source of protein, fiber, and essential vitamins like B-complex vitamins, as well as minerals such as potassium, phosphorus, and iron.



6.2 Low in Calories

They are low in fat and calories, making them a healthy choice for weight management or low-calorie diets.



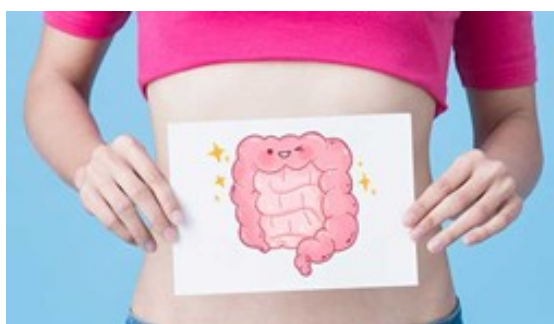
6.3 Supports Heart Health

The potassium content in straw mushrooms can help regulate blood pressure, contributing to overall cardiovascular health.



6.4 Promotes Healthy Digestion

The dietary fiber in these mushrooms aids in digestion and helps maintain bowel health.



6.5 Supports Blood Sugar Control

The low glycemic index and fiber content can help stabilize blood sugar levels.



6.6 Boosts Immune System

Straw mushrooms contain antioxidants such as selenium and beta-glucans, which may help strengthen the immune system and fight free radicals.



6.7 Sustainability

Mushroom cultivation presents significant environmental and economic benefits, making it an exemplary model for sustainable agriculture. By utilizing low-value materials such as sawdust, tree branches, straw, and agricultural residues, the process turns waste into a valuable resource. This not only minimizes environmental pollution, such as that caused by incineration, but also exemplifies circular agriculture by efficiently recycling by-products into productive outputs.



Figure 6.1: https://www.saferbrand.com/media/Articles/Safer-Brand/sb_us_bale_2_iStock_000078010145_Small.jpg

The farming process has a minimal environmental footprint, as it typically avoids the use of pesticides and chemical fertilizers. This practice helps preserve soil health, reduces chemical runoff, and ensures a more eco-friendly approach to food production. Furthermore, mushroom cultivation offers economic advantages, particularly for rural and developing regions. It creates profitable opportunities by transforming inexpensive resources into marketable products, thereby supporting local economies and improving livelihoods.



Figure 6.2: <https://mushroomgrowing.co.uk/wp-content/uploads/2021/10/straw-mushroom-.jpg>

These combined advantages highlight the potential of mushroom cultivation to contribute significantly to sustainable development and resource management.



Figure 6.3: <https://www.tamborasi.com/wp-content/uploads/2021/06/50-Most-Sustainable-Foods-main.jpg>

7 Cons

Eating straw mushrooms has some very uncommon side effects. The species has a small chance of causing fungal infection in immunocompromised patients, which could lead to severe consequences such as brain abscesses.



Figure 7.1: Brain abscesses

Some individuals may experience allergic reactions to straw mushrooms. Symptoms can range from mild, such as skin rashes and itching, to severe, including difficulty breathing and anaphylaxis. Those trying these mushrooms for the first time should proceed cautiously.



Figure 7.2: Allergic

Straw mushrooms are highly perishable. They have a short shelf life and require proper storage to avoid spoilage. Improper handling can lead to bacterial growth, which may cause food poi-

soning if consumed.

Canned or processed straw mushrooms often lose some of their nutritional value due to heat and chemical treatments. Additionally, preservatives added during processing may not be suitable for everyone, especially those with sensitivities or health concerns.



Figure 7.3: Canned straw mushroom

Fresh straw mushrooms can be expensive, particularly in regions where they are not cultivated locally. Import costs and their delicate nature contribute to their high price, making them less accessible to some consumers.



Figure 7.4: Fresh straw mushrooms

Commercial cultivation of straw mushrooms can have environmental implications. The use of pesticides, fertilizers, and water-intensive farming methods may contribute to soil degradation, water pollution, and resource depletion.

Common insect pests of straw mushrooms include phorids and

mites. Nematodes can also cause crop losses.



Figure 7.5: Phorids, Mites and Nematodes

Reference

7.1 Internet Resource

1. Austin, E. (n.d.). Volvariella volvacea: The paddy straw mushroom identification info. Healing Mushrooms. Retrieved October 20, 2024, from <https://healing-mushrooms.net/volvariella-volvacea>
2. Selemin, J. (2023, September 28). The complete guide to paddy straw mushrooms. Shroomer. Retrieved October 20, 2024, from <https://www.shroomer.com/paddy-straw-mushroom/>
3. คณะมนุษยศาสตร์และสังคมศาสตร์ มหาวิทยาลัยราชภัฏสุรินทร์ adminอนันต์. (2016). วิธีการเพาะเห็ดฟางในตะกร้าพลาสติก. Available at: <<http://human.srru.ac.th/2016/08/15/%E0%B8%A7%E0%B8%B4%E0%B8%98%E0%B8%B5%E0%B8%81%E0%B8%B2%E0%B8%A3%E0%B9%80%E0%B8%9E%E0%B8%B2%E0%B8%B0%E0%B9%80%E0%B8%AB%E0%B9%87%E0%B8%94%E0%B8%9F%E0%B8%B2%E0%B8%87%E0%B9%83%E0%B8%99%E0%B8%95%E0%B8%B0%E0%B8%81%E0%B8%A3%E0%B9%89%E0%B8%B2%E0%B8%9E%E0%B8%A5%E0%B8%B2%E0%B8%AA%E0%B8%95%E0%B8%B4%E0%B8%81/>>
4. (2008). 草菇栽培. from <http://www.tari.gov.tw/霧峰總所/植病系/研究室/食用菌類/草菇栽培.htm>
5. Mushroom Mountain. (2020). How to Grow Paddy Straw Mushrooms (Volvariella volvacea). Available at: <<https://mushroommountain.com/how-to-grow-paddy-straw-mushrooms-volvariella-volvacea/>>
6. calforlife. (2015). พลังงานและสารอาหารจากเห็ด, . Available at: <<https://www.calforlife.com/th/calories/mushrooms-straw-canned-drained-solids>>

7. กรมส่งเสริมการเกษตร. (2023). Straw mushroom. Available at: <<https://www.doae.go.th/en/straw-mushroom/>>
8. Syndigo company. (2024). Straw Mushrooms. Available at: <<https://www.nutritionix.com/food/straw-mushrooms>>
9. Specialty produce. n.d. Straw Mushrooms. Available at: <https://specialtyproduce.com/produce/Straw_Mushrooms_18494.php>
10. Phyto biotech. n.d. Volvariella volvacea (Paddy straw mushroom). Available at: <<https://www.phytobiotech.in/volvariella-volvacea.html>>
11. Dr. Nick Becker. (2024). Straw Mushrooms: The Easy Guide to Identify, Use, Cook, and Grow in 2024. Available at: <<https://climatesort.com/straw-mushrooms/>>
12. รักบ้านเกิดทีม. (2009). เห็ดฟาง(straw mushroom). Available at: <<https://www.rakbankerd.com/agriculture/print.php?id=1328&s=tblplant>>
13. Disthai. n.d. เห็ดฟาง ประโยชน์ดีๆ สรรพคุณเด่นๆและข้อมูลงานวิจัย. Available at: <<https://www.disthai.com/17165926/เห็ดฟาง>>
14. Vinmec international hospital. n.d. What is the effect of mushroom?. Available at: <<https://www.vinmec.com/en/article/what-is-the-effect-of-mushroom-en>>
15. ศูนย์วิทยาศาสตร์เพื่อการศึกษา. (2021). กินเห็ดแล้วมีประโยชน์อย่างไร. from <https://sciplanet.org/content/8846>
16. อัมพล สุขเกต. n.d. โรคและปัญหาที่สำคัญในการเพาะเห็ดฟาง. Available at: <https://bassbio.com/index.php?option=com_content&view=article&id=69:2010-10-13-14-57-00>
17. 邹长钱. n.d. Method for processing dried straw mushroom. Available at: <<https://patents.google.com/patent/CN1200249A/en>>
18. cookpad. n.d. สูตร ผัดเห็ดฟาง (53) สูตร. Available at: <<https://cookpad.com/th/search/%E0%B8%9C%E0%B8%B1%E0%B8%94%E0%B9%80%E0%B8%AB%E0%B9%87%E0%B8%94%E0%B8%9F%E0%B8%B2%E0%B8%87>>

19. Just Agriculture. (2020). Mushroom cultivation: Pros and cons. Just Agriculture. Retrieved October 20, 2024, from <https://justagriculture.in/files/newsletter/nov/025%20Economic%20importance%20of%20mushroom%20and%20their%20Uses.pdf>

7.2 Book Resource

1. National research center for mushroom. (2007). Cultivation technology of Paddy straw mushroom. Available at: <https://dmrsolan.icar.gov.in/Bull_PSM.pdf>
2. กลุ่มสื่อส่งเสริมการเกษตรสำนักพัฒนาการถ่ายทอดเทคโนโลยีการส่งเสริมการเกษตร. (2547) . การเพาะเห็ดฟาง. สืบค้น 20 ตุลาคม 2567. จาก <http://www.servicelink.doae.go.th/webpage/book%20PDF/mushroom/m009.pdf>
3. อภิชาติ ศรีสอาด. (2023). การเพาะปลูกเห็ดฟางคนเมือง & เพื่อการค้า 5 ภาค. นาคา อินเทอร์เน็ตมีเดีย. สืบค้น 20 ตุลาคม 2567.
4. ดร.จำลอง เพ็งคล้าย. (2550). เห็ดในประเทศไทย. กรุงเทพฯ: ราชบัณฑิตยสถาน. จาก <https://opac.tistr.or.th/storage/LIBRARY/Books/2022/202266466.pdf>
5. วิทยา ทวีนุช. (2565). การเพาะเห็ดแบบเศรษฐกิจพอเพียง. สกายบุ๊กส์. สืบค้น 20 ตุลาคม 2567. https://www.2ebook.com/new/library/book_detail/ldd/02008993
6. Paul Stamets J.S. Chilton. (1983). Mushroom Cultivator A Practical Guide to Growing Mushrooms at Home. Available at: https://library.uniteddiversity.coop/Permaculture/Mushroom_Cultivator-A_Practical_Guide_to_Growing_Mushrooms_at_Home.pdf

7.3 Journal Resource

1. USUBHARATANA, P.- PHUNGRASSAMI, H. (2015, 20 Dec). LIFE CYCLE ASSESSMENT OF THE STRAW MUSHROOM PRODUCTION. Retrieved October 20, 2024, from https://www.aloki.hu/pdf/1401_189200.pdf
2. Sharifuddin, A. S., Ahmad, L. W., Mohamed, A., Sidek, N. J., Yunus, N. M., Yusof, S. C., Osman, N. D., Rusli, I. S. (2023).

- Growth performance and fruiting body characterisation of the paddy straw mushroom (*Volvariella volvacea*) cultivated on different types of solid wastes . *Asia-Pacific Journal of Science and Technology*, 28(06), APST-28. <https://doi.org/10.14456/apst.2023.89>
3. ขนิษฐา พรเจริญโรจน์. (2563). การปรับปรุงพันธุ์ เห็ดฟาง ไฮโมแกรม การผสมพันธุ์ ใน รองศาสตราจารย์ ดร.ณัฐา โพธารมณ์ (บ.ก.), ปีที่ 16 ฉบับที่ 2 (2000): วารสารเกษตร. ม.ป.ท.: ม.ป.พ.
 4. Soravit Jamjumroon, Chalermchai Wongs-Aree, William B. McGlasson, Varit Srilaong, Piya Chalermklin, Sirichai Kanlayanarat, (2012, March). Extending the shelf-life of straw mushroom with high carbon dioxide treatment. *Journal of Food Agriculture and Environment* 10(1):78-84
 5. Preechaya Rungwikrikarn, (2024, 21 Feb). Guidelines for Promoting Low-Stack Straw Mushroom Cultivation with Cassava Pulp: A case study of Ban Suk Samran Straw Mushroom Group Community Enterprise Tha Kasem Sub-District Mueang Sa Kaeo District Sa Kaeo Province. *Journal of Social Science for Local Development Rajabhat Maha Sarakham University* 8(1)
 6. Zaidan, R. (2021). Sustainability perspectives for mushroom production: A case study for mushrooms in Malaysia. *Frontiers in Sustainable Food Systems*. Retrieved October 20, 2024, from <https://doi.org/10.3389/fsals.2021.736368>