# EVALUATION OF PHILRICE PROTOTYPE MUSHROOM SUBSTRATE BAGGER FOR OYSTER MUSHROOM (*Pleurotus Ostreatus*)

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**BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING**
**(AB Machinery and Power Engineering)**

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## ACCEPTANCE SHEET

This undergraduate thesis entitled **"EVALUATION OF PHILRICE PROTOTYPE MUSHROOM SUBSTRATE BAGGER FOR OYSTER MUSHROOM (*Pleurotus Ostreatus*),"** prepared and submitted by **ALDRIN M. GASPAR** and **MELVIN JOHN B. CARA**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB MACHINERY AND POWER ENGINEERING )** is hereby accepted:

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## BIOGRAPHICAL SKETCH

Aldrin M. Gaspar was born on September 21, 2000 in Brgy. Sta Cruz, Guimba, Nueva Ecija. He is the eldest among the two children of Mr. Nemecio S. Gaspar and Mrs. Agnes M. Gaspar. He finished his elementary education at San Bernardino Elementary School in 2013 and continued his secondary education at Our Lady of the Sacred Heart College of Guimba Inc.

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## BIOGRAPHICAL SKETCH

The author, Melvin John B. Cara, is the family's third child raised by her Grandmother Teresita B. Cara. Born in Maria Aurora, Aurora on October 8, 2000, he is currently 23 years old.

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ALDRIN M. GASPAR
MELVIN JOHN B. CARA

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## ABSTRACT

**GASPAR, ALDRIN M.** and **CARA MELVIN JOHN B.,** Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz Nueva Ecija, Philippines. **FEBRUARY 2024, EVALUATION OF PHILRICE PROTOTYPE MUSHROOM SUBSTRATE BAGGER FOR OYSTER MUSHROOM (*Pleurotus Ostreatus*)**

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Mushroom production in the Philippines involves several steps and a considerable amount of time in producing substrates and bagging them for cultivation. Although many mushroom substrate baggers are available in various countries, only a few of them are available in the market, and there is a lack of technical information about them. Developing a machine for filling mushroom bags is one way to increase mushroom production. Therefore, a study was conducted to evaluate a mushroom substrate bagger and compare it with traditional mushroom bagging. The comparison was made based on the capacity, height, weight, and density of substrates produced in polypropylene bags.

Results showed that the mushroom substrate bagger had a capacity of 0.419 bag/min. The time it took to bag the substrate increased by 139%, which affected the machine's capacity. The mushroom substrate bagger finished 40 bags of samples with a mean height, weight, volume, and density of 20.7237 cm, 842.3525 g, 1693.40 $cm^3$, and 0.497 $g/cm^3$ respectively. In contrast, the traditional mushroom substrate bagging can finish 1 bag/min. with a mean of height, weight, volume, and density of 23 cm, 750 g, 1879.34 $cm^3$, and 0.399 $g/cm^3$.

This study highlights the potential of the mushroom substrate bagger in optimizing mushroom production processes. Despite the increase in bagging time, the findings provide valuable insights for the industry, emphasizing the need for further exploration and adoption of advanced technologies to enhance efficiency in mushroom cultivation.

## LITERATURE CITED


*A review on oyster mushroom (pleurotus spp) | International Journal of Current Research.* (n.d.). https://www.journalcra.com/article/review-oyster-mushroom-pleurotus-spp

Catalon, A. F., Corales, R. G., Corales, A. M., Rivera, J. M., & Sajor, J. T. (2018). Rice-based mushroom production manual. https://www.pinoyrice.com/?wpdmdl=6070

Chang, H., Jeon, S., Cosadio, A. L., Icalina, I. L., Panganiban, R., Quirino, R. A. & Song, Y. (2014). Status and Prospect of Mushroom Industry in the Philippines. *JPAIR Multidisciplinary Research Journal, 16*(1).

Cosky, T. (2023). *All in one mushroom grow bag: A guide to cultivating gourmet or exotic mushrooms*. FunGuy Grow Supply. https://www.funguygrowsupply.com/the-black-truffle/all-in-one-mushroom-grow-bag-a-guide-to-cultivating-gourmet-or-exotic-mushrooms/

Das, G., & Sarkar, S. (2016). Oyster mushroom (Pleurotus spp.): Adoption percentage of mushroom trainees of Cooch Behar Krishi Vigyan Kendra-A review. *World J Pharm Life Sci*, *2*(1), 86-92.

Ferdousi, J., Riyadh, Z. A., Hossain, M. I., Saha, S. R., & Zakaria, M. (2020). Mushroom Production Benefits, Status, Challenges and Opportunities in Bangladesh: A Review. *Annual Research & Review in Biology*, *34*(6), 1-13. https://doi.org/10.9734/arrb/2019/v34i630169

Girmay, Z., Gorems, W., Birhanu, G. et al. Growth and yield performance of *Pleurotus ostreatus* (Jacq. Fr.) Kumm (oyster mushroom) on different substrates. *AMB Expr* 6, 87 (2016). https://doi.org/10.1186/s13568-016-0265-1

Kahandage, P. D., Weerasooriya, G. V. T. V., & Rupasinghe, C. P. (2016). *Mechanization of growing media preparation and poly bags filling in ...* researchgate.net. https://www.researchgate.net/profile/P-D-Kahandage/publication/341279751_MECHANIZATION_OF_GROWING_MEDIA_PREPARATION_AND_POLY_BAGS_FILLING_IN_OYSTER_MUSHROOM_Pleurotus_ostreatus_CULTIVATION/links/5eb816224585152169c14e44/MECHANIZATION-OF-GROWING-MEDIA-PREPARATION-AND-POLY-BAGS-FILLING-IN-OYSTER-MUSHROOM-Pleurotus-ostreatus-CULTIVATION.pdf

Limted, W. E. C. (n.d.). *Using sawdust for mushroom growing.* //worldexport.com.vn/. https://worldexport.com.vn/using-sawdust-for-mushroom-growing

Mercado, J. A. (2013). A Preliminary Study on Manually Operated Substrate Bagger for Mushroom Substrate Production. (Bachelor's thesis, Central Luzon State University).

Mushroom Cultivation Using Rice Straw as a Culture Media. *Business Diary Philippines*. https://businessdiary.com.ph/907/mushroom-cultivation-using-rice-straw-as-a-culture-media/

OECD (2006), "Section 11 - Oyster Mushroom (PLEUROTUS SPP.)", in Safety Assessment of Transgenic Organisms, Volume 1: OECD Consensus Documents, OECD Publishing, Paris. https://doi.org/10.1787/9789264095380-en

Paul, R. K., Bhattacharjya, D. K., Kabir, A. K. L., Harun-Or-Rashid, M., Rahaman, M. S., Rahaman, M. S., … Ahmed, K. U. (2015). Effect of different saw dust substrates on the nutritional composition of oyster mushroom (Pleurotus Florida) and its applications in human health. *Dhaka University Journal of Pharmaceutical Sciences*, *14*(2), 215–223. https://doi.org/10.3329/dujps.v14i2.28513

Peng, Jin-Torng. (2008). AGRO-WASTE FOR CULTIVATION OF EDIBLE MUSHROOMS IN TAIWAN. https://www.researchgate.net/publication/283117256_AGRO WASTE_FOR_CULTIVATION_OF_EDIBLE_MUSHROOMS_IN_TAIWAN

Rosmiza, M., Davies, W., Aznie CR, R., Jabil, M., & Mazdi, M. (2016). Prospects for Increasing Commercial Mushroom Production in Malaysia: Challenges and Opportunities. *Mediterranean Journal of Social Sciences*, *7*(1 S1), 406. Retrieved from https://www.richtmann.org/journal/index.php/mjss/article/view/8766

Sathyanarayana, S. (2020). *Oyster mushroom cultivation using sawdust and paddy straw as substrate* ... research gate. https://www.researchgate.net/publication/346967848_Oyster_mushroom_cultivation_using_sawdust_and_paddy_straw_as_substrate_and_quality_analysis

Sayner, A. (2023, May 15). *How to grow mushrooms in a bag*. GroCycle. https://grocycle.com/grow-mushrooms-in-a-bag/

Thomas, A. S. S., Arivu, S., Shanmugam, V., Gundupalli, M. P., & Amornraksa, S. (2022). Paddy straw: An economical substrate for oyster mushroom (Pleurotus ostreatus) cultivation. In *E3S Web of Conferences* (Vol. 355). EDP Sciences. https://doi.org/10.1051/e3sconf/202235502019

Wan Mahari, W. A., Peng, W., Nam, W. L., Yang, H., Lee, X. Y., Lee, Y. K., … Lam, S. S. (2020). A review on valorization of oyster mushrooms and waste generated in the mushroom cultivation industry. *Journal of Hazardous Materials*, *400*. https://doi.org/10.1016/j.jhazmat.2020.123156

Suraweera, R. W. P. H., Kahandage, P. D., Kosgollagedara, E. J., & Dissanayake, D. M. D. (2020). A review of mechanization and automation of mushroom cultivation.