



MushTube : Innovative Oyster Mushroom Cultivation Tube Developed by Studying Factors Affecting Yield and Quality to Promote Community Enterprises

Phanrawee Kongkaew¹, Arpaphat Srinamon¹ and Wipa Arsingsamanan^{1*}

¹Princess Chulabhorn Science High School Phitsanulok, 86 M 4 86 M.4 Muang District, Phitsanulok, 65000, Thailand

*E-mail: wipa.arsing@gmail.com

Abstract

Oyster mushrooms are an economically important crop whose growth and yield are strongly influenced by environmental factors. Conventional cultivation methods rely heavily on external weather conditions, resulting in inconsistent production, variable quality, and increased production costs. This study aimed to develop an oyster mushroom cultivation tube that can maintain optimal growing conditions regardless of the external climate. The system integrates evaporative cooling with the Internet of Things (IoT) technology, enabling real-time monitoring and control of temperature and humidity through a mobile application. The environmental conditions maintained by the system were established through optimization experiments to determine the optimal temperature, relative humidity, light color, and light intensity for oyster mushroom cultivation. Its tubular design also reduces space requirements and facilitates harvesting. The optimal cultivation conditions were 25°C, 71–80% relative humidity, and blue light at an intensity of 500 lux. Under the optimal conditions, mushrooms grown in the developed system achieved a significantly higher average fresh weight of 86.00 ± 3.31 g than mushrooms cultivated in a conventional greenhouse, which averaged 78.80 ± 2.95 g ($p \leq 0.05$). They also exhibited larger cap diameters and longer stems. These findings demonstrate that the proposed cultivation system effectively improves mushroom yield and quality while reducing production costs and supporting sustainable cultivation.

Keywords: Oyster mushroom, Cultivation tube, Environmental control, Evaporative cooling, Internet of Things (IoT)