

Impact of pulsed light treatment on enzyme inactivation and quality attributes of whole white button mushroom (*Agaricus bisporus*) and its storage study

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Abstract

Whole white button mushrooms (WWBM) exhibit a limited shelf-life owing to the oxidative enzymatic browning [1]. Inactivation of polyphenol oxidase-PPO and peroxidase-POD in WWBM and its kinetic behaviour were studied using pulsed light (PL) treatment (0.13–1.11 J/cm²). The first-order kinetics explained the PL-induced enzyme inactivation. Rate constants (k) for PPO and POD were 3.84 and 2.55 cm²/J. FTIR analysis revealed secondary structural changes in partially-purified enzyme. PL-treatment retarded browning, retained phenolics and enhanced vitamin D². PL-treatment at 1.11 J/cm² rendered WWBM both microbially and enzymatically stable. The PL-treated WWBM's shelf-life at 4, 20, and 37 °C was 5, 3, and 1 day, respectively. At 4 °C, browning increased by 6.1 %; firmness decreased by 55.2 %, while PL-treated mushrooms retained 90.6 % phenolics, 78.9 % antioxidant capacity, and 64.2 % D₂ after 5 days. A higher activation energy value confirmed that phenolics were most sensitive during storage. PL-technology supports UN Sustainable Development Goals by reducing chemical use, lowering carbon footprints, minimising pollution, and enhancing shelf-life, promoting sustainable global trade [2].

References

- [1] E. Pogorzelska-Nowicka *et al.*, “Packaging in a high O₂ or air atmospheres and in microperforated films effects on quality of button mushrooms stored at room temperature,” *Agriculture*, vol. 10, no. 10, p. 479, Oct. 2020.
- [2] N. J. Rowan, “Pulsed light as an emerging technology to cause disruption for food and adjacent industries – Quo vadis?,” *Trends in Food Science & Technology*, vol. 88, pp. 316–332, Mar. 2019.