

FREEZING METHOD OF STRAW MUSHROOM (*Volvariella volvaceae*) USING DRY ICE**Kurnia Novianti¹, Sutrisno², and Emmy Darmawati³**¹ Student of Master Program, Postharvest Technology of Agricultural Bogor University
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Bogor, Indonesia**ABSTRACT**

The purpose of this study was to assess freezing method of straw mushroom (*Volvariella volvaceae*) using dry ice, which one of refrigerant with boiling point at -78.5°C . Freezing rate of using dry ice is faster than using freezer. Ratio of 1:2 of straw mushroom with dry ice, has freezing rate of $0.27^{\circ}\text{C}/\text{min}$ and freezer has $0.05^{\circ}\text{C}/\text{min}$. Freezing method by dry ice influenced straw mushroom tissue after thawing. Histological of straw mushroom showed that the tissue loss of fluid, resulting shrinkage and cell attachment, and greater dehydration due to differences in humidity. From the results can be concluded that freezing method of straw mushroom using dry ice has slow freezing rate, but with the assumption that smaller ice crystals formed than using freezers, based on the time needs to exceed the critical freezing zone $0-(-3.9)^{\circ}\text{C}$.

Keywords: straw mushroom, *Volvariella volvaceae*, freezing, thawing, dry ice.

INTRODUCTION

Straw mushroom (*Volvariella volvaceae*) is the most cultivated mushroom commodity in Indonesia which reaches 55-60% of national production and also a highly demanded product for its nutrient content, especially protein content. Straw mushroom is very perishable commodity with high moisture and the respiration rate (Julianti, 1997), thus affecting shelf life. On room temperature, mushroom will stay undamaged up to 24 hours. Consequently, the distribution is chosen to places which only take time less than 24 hours. In fact, the consumers prefer the fresh products compared with dried, canned, or pickle mushroom, to extend the shelf life of fresh mushroom need suitable postharvest handling. Postharvest handling of fresh mushroom that is commonly used is cooling method. The refrigerator, packing with ice cubes, and packaging with dry ice usually use and could prolong the shelf life until 4-5 days (Suharjo, 2000).

Other preservation is freezing, that has advantages to provide better quality of safety, nutritional value, sensory quality, and convenience. The freezing rate influenced freezing method that rapid freezing can produce a high quality of frozen product, which will produce small ice crystals and avoiding tissue damage caused by large ice crystals. One of the cryogen that is commonly used is carbon dioxide. Liquid carbon dioxide is used for cryogenic freezing, but requires more expensive equipment, while requiring the handling of solid carbon dioxide is much simpler. Freezing by using dry ice was proved effective for saskaton berry and strawberry, therefore it necessary to apply straw mushroom freezing by using dry ice. The purpose of this study was to determine the ratio of straw mushroom with dry ice, and comparing freezing methods by using freezers and dry ice.

MATERIALS AND METHODS

500 grams of straw mushroom in egg phase packed in perforated polyethylene plastic. Dry ice will wrapped with a paper after reduced in size. Styrofoam box was used to freezing mushroom that is not firmly closed, compiled by order of dry ice, mushroom, and dry ice. This research was conducted in two stages; the first was determination of straw mushroom with dry ice ratio. The ratio