

Storage and Value Addition of Mushrooms

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SUMMARY

People are consuming mushrooms as food, medicine and even as intoxicant, since time immemorial by collecting them from the wild. The production and consumption of mushrooms is increasing very fast throughout the world, mainly due to greater awareness of their nutritive and medicinal attributes, besides, of course, unique flavour and texture. The appearance of mushrooms in the wild is, however, uncertain and seasonal depending upon many factors like habitat and climate etc. For proper storage and packaging many processing and value-addition technologies of mushrooms have been developed, which we will discuss below.

INTRODUCTION

Mushrooms have very short shelf life – these cannot be stored or transported for more than 24 hours at the ambient conditions prevailing in most parts of year and the country. Browning, veil-opening, weight-loss and microbial spoilage are the most common postharvest changes in the mushrooms which often result into enormous economic losses. Proper, sound and appropriate postharvest practices of storage and processing are needed to sustain the budding mushroom farming and industry in the country. Realizing the importance of mushrooms for ensuring nutritional and social security of the underprivileged small farmers and landless labourers, the Indian Council of Agricultural Research established the National Research Centre for Mushroom (NRCM) in 1983 to conduct research and transfer the technology on all aspects of mushrooms. Improved practices for the storage and processing of mushrooms including value-addition, readymade or ready-to make products are not only be demanded but are added to the returns to the growers as well as processors. Two most common post harvest practices and aspects of mushrooms are: proper packaging and storage for the fresh mushrooms; and processing for long-term storage as well as value addition. Market for the fresh commodities is likely to continue; reverse trend has already started in the countries where processed products were being consumed. Therefore most important of all, it is the proper packaging and storage of the fresh mushrooms which should receive the attention of all the players in the field—researchers, growers and traders. Besides canning, drying, steeping and pickling currently resorted to for the long-term storage and trade, it is the production and consumption of the readymade or ready-to-make value-added mushroom products which have, of late, been receiving the attention of the mushroom research and industry. Mushroom-based soup powder, noodles and biscuits are already on the shelves. Technologies for ready-to make mushroom pizza, mushroom curry in pouches, nuggets, ketchup, preserve in sugar syrup (murabba) have been developed.

Storage of Fresh Mushrooms

Cold-preservation of mushrooms is the most important aspect of the Storage. The temperature of the button mushroom after picking, which varies between 15 and 18⁰C, rises steadily during the storage due to respiration and atmospheric temperature and the heat causes deterioration in quality. Low temperature retards the growth of microorganisms, reduces the rate of postharvest metabolic activities of the mushroom tissues and minimizes the moisture loss. The choice of the cooling system depends upon the quantity to be handled; it may be a refrigerator for a small grower or consumer a cold room with all the facilities for a commercial grower. Forced-chilled air, ice-bank or vacuum cooling systems are the other systems in vogue at commercial level.

Packaging of Mushrooms

Packaging of mushrooms from the production site up to the consumer including packaging for export market is an important aspect of post-harvest handling. Generally, the see-through packaging increases the consumer confidence in the product. If the packaging and storage is not done properly, mushrooms not only deteriorate in their saleable quality but also in nutritional quality due to enzymatic changes.

a.Modified atmosphere packaging (MAP)

Modified atmosphere is created in a sealed package of a fresh horticultural produce as a result of exchange of respiratory gases namely oxygen (O₂) intake and carbon dioxide (CO₂) evolution. Modified atmosphere can be created by two methods: active and passive modifications. Modified atmosphere packaging (MAP) of mushrooms has been shown to delay senescence and maintain quality of mushrooms during post harvest storage by several workers. Mushrooms covered with PVC-film resinite had a shelf-life of 5-7 days at 15-21°C, as compared to those left uncovered which had a shelf-life of 2-4 days under similar conditions.

b. Controlled atmosphere packaging (CAP)

As compared to the conventional MAP (passive modification of atmosphere within the packs due to produce and film property), very few investigations have been carried out on the controlled atmosphere package (CAP) *i.e.* deliberate and active modification of atmosphere by flushing of gases from outside source. Zheng Yong Hua *et al.* (1994) conducted studies on controlled atmosphere storage of fresh button mushrooms and found that 8 per cent O₂ + 10 per cent CO₂ was the best atmosphere for maintaining the quality of fresh mushrooms.

c. Modified humidity packaging (MHP)

Most polymeric films used in the conventional packing have lower water vapour transmission rates relative to transpiration rates of the fresh produce, which often leads to nearly saturated conditions within the packages. Roy *et al.* (1996) found that MAP in combination with MHP further improved the shelf-life of fresh mushrooms. An in-package relative humidity of 87-90 per cent was desirable for best colour in mushrooms during storage. The shelf-life of the mushrooms could be further extended by supplementing some chemicals in addition to modifying the atmosphere inside the package during storage.

Long Term Storage of Mushrooms

All techniques which store mushrooms, processed or unprocessed, longer than normal storage period for the fresh are together called long-term storage. Need for long-term storage may not arise during the off-season, but, to minimise the fall in prices in the peak season and also to avail the high price during the off-season, the grower and processors preserve them by different methods to extend the shelf-life and add value to the product. This long term stored mushroom can be exported as well as made available during the off-season. Commonly followed long-term storage techniques for mushrooms are canning, drying steeping and pickling. Various products that can be prepared from mushrooms are; Mushroom soup powder, Mushroom Biscuits, Mushroom nuggets, Mushroom ketch-up, Mushroom candy, Mushroom Murabba, Mushroom Chips etc. (Wakchaure, 2011)

CONCLUSION

Postharvest losses are very high in mushrooms. Mushrooms even after harvesting continue to grow, respire, mature and senesce resulting in weight loss, veil-opening, browning, wilting and finally in spoilage. Almost all the mushrooms have very short shelf-life but the paddy straw mushroom has the shortest (few hours at the ambient) and Milky has very good shelf-life (3-5 days). Due to very high moisture and rich nutritive value, microbial spoilage in mushrooms is also a problem. Utmost postharvest care of mushrooms is needed not only for the fresh market but also for the processing. Information about proper postharvest care and processing of such a perishable commodity is therefore of vital importance to keep the wheels of this industry moving at the right speed; with the adoption of proper packaging, storage and processing technologies, problems in marketing, like seasonal gluts and distress sales, can also be ameliorated.

REFERENCES

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