STUDIES ON DRYING OF OSMOSED OYESTER MUSHROOM (PLEUROTUS FLORIDA)

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ABSTRACT

To find the effect of osmosis on drying of Oyster mushroom (Pleurotus florida) two different drying methods were followed viz., Solar cabinet and Microwave-oven. The results revealed that with the increase in the osmotic brine concentration weight loss of the mushrooms increased; drying rate of osmosed samples indicated that the entire drying process took place in the falling rate period. The drying rate of osmosed mushrooms was less as compared to the un-osmosed mushrooms. The total time taken to dry the osmosed mushrooms was less as compared to un-osmosed mushrooms.

Key words : Solar cabinet dryer, Microwave-oven method, Osmosed, Blanching, Weight loss, Drying characteristics, Drying time.

INTRODUCTION

Mushrooms are edible fungi, which belong to Basidiomycetes and Ascomycetes. People consume mushrooms because of their flavour, texture and nutritive value. Among naturally occurring mushrooms, some species are popular for consumption such as Agaricus bisporus, Prolelus, Morchella, Tuber, Sparassis Lactarius, Cantharellus clavaria, Ramomuria etc. (Hemant Mahure, 2002). Production of mushrooms in the world is estimated to be around 5 million tonnes per annum and at present it is increasing at a rate of 7 per cent per annum (Tewari and Meera Pandey, 2002). In India mushroom production is about 50,000 tonnes per annum (Tewari, 2004). Mushrooms contain high quality proteins compared to fruits and vegetables and rich in lysine and tryptophan amino acids, which are deficit in cereals. Apart from proteins and amino acids, mushrooms also contain good amount of vitamin C, vitamins B–complex (thiamine, riboflavin, niacin and biotin) and minerals (potassium, phosphorus, sodium and iron). Due to the low calorie content- mushrooms are suitable for patients suffering from high cholesterol (Hemant Mohure, 2002). Mushrooms contain about 90 per cent moisture. Like all fleshy fruits and vegetables, mushrooms also keep respiring after harvest, hence many changes like browning, liquefaction, loss of moisture and texture occurs resulting in reduced market value and acceptability. Because of their high moisture and delicate nature, they cannot be stored for more than 24 hours at ambient temperature. As all the mushrooms produced can not be marketed immediately, effective preservation methods are

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necessary to improve the shelf life. Hence, the best post harvest techniques should be adopted.

In recent years osmotic dehydration has become more popular as compared to other conventional methods of drying. Since it removes the water partially without thermal stress, it results in minimizing the loss of colour and flavour leading to improvement in product quality. Apart from improving the quality it also reduces the drying time. The impregnated solutes during osmosis act as a preservatives during storage of dried osmosed produce. The present research work was under taken to determine the effect of osmosis on weight loss, drying time and drying rate characteristics.

MATERIALS AND METHODS
Freshly harvested Oyster mushroom (Pleurotus florida) cultivated during winter on paddy straw substrate, at the University of Agricultural Sciences, GKVK, Bangalore were procured. Mushroom with 90.56 % (wb) was sorted to obtain products of good quality. The brown and affected portions of the mushroom were discarded. Quality mushrooms were sliced to 12 mm thickness (Pruthi et al. 1978) and washed with potable water to remove dirt and foreign materials, so as to reduce the initial microbial load. Cleaned mushrooms weighing 200g were given the following osmotic pretreatments:

i). Control (no pre-treatment)

ii). Blanching: Blanching was done by wrapping the fresh mushrooms in a clean white cloth and immersing in boiling water for 3 - 4 min. (Pruthi et al. 1978). Immediately after blanching, they were immersed in cold water. The water was drained by spreading the mushrooms on perforated containers.

iii). Soaking in 5 per cent brine solution (NaCl) for 1 hour.

iv). Soaking in 10 per cent brine solution (NaCl) for 1 hour.

v). Soaking in 15 per cent brine solution (NaCl) for 1 hour.

Mushroom samples were subjected to osmosis in a beaker, containing brine solutions of the desired concentrations and a solution to sample ratio of 6 : 1 was maintained in all the samples. Care was taken to ensure the complete submergence of the mushroom samples in the brine solution at ambient conditions. The mushroom samples were taken out of the beaker after one hour of osmosis (Abijit Kar and Gupta, 2001). The material was drained on a sieve (8 holes per linear inch) for 10 min. to remove the adhering brine. It was subsequently put on a blotting paper to ensure complete removal of unbound surface moisture. The weight of each sample was measured. The weight loss and reduction of moisture content (wb) in the samples due to osmotic treatment at different brine concentration levels was calculated in percentage.

Moisture content of the mushroom samples was determined as per the procedure mentioned in AOAC method (1995) for fruits and vegetables. Samples were dried in solar cabinet dryer at 40-70°C and in microwave oven at a power level-1, hot air temperature of 40±2°C. The dried samples from all the methods were immediately packed in polythene bag and kept in desiccators to prevent further accumulation of moisture from surroundings.

RESULTS AND DISCUSSION

Weight loss: Effect of blanching and osmosis pre-treatments on the weight of mushrooms is presented in the Table 1. It was observed that with the increase in the osmotic brine concentration, weight loss of the mushrooms increased. Similar results were obtained by Amuthan et al. (1999). Higher weight loss with increased salt concentration may be attributed to the increase in osmotic pressure in the brine solution at higher concentrations, which increases the driving force available for water transport. Maximum weight loss (51.92 %) was observed in mushrooms osmosed with 15 per cent brine solution. Similar observations were recorded by Kaleemullah et al. (2002), Abhijit Kar and Gupta. (2001), Sudheer and Dash (1999) and Vijay Sethi et al. (1999).
It was also observed that, samples osmosed with 15 per cent brine concentration reduced to the maximum moisture (wb) of 79.80 per cent from an initial moisture content (wb) of 90.56 per cent. This is in agreement with the result obtained by Frederic Prothon et al. (2001), Pandey et al. (2000) and Amuthan et al. (1999).

**Drying characteristics:** The drying behaviour of osmosed and blanched mushroom in solar and micro wave oven method is presented in Table 2. Also the drying rate of osmosed samples in solar cabinet and microwave-oven dryers are shown in Figs. 1 & 2 respectively (DR(g/min g) V/s MC (db)). It indicates that the entire drying process took place in the falling rate period. This observation is supported by the finding of Abhijit Kar and Gupta (2003).

It was also observed that the drying rate of osmosed mushrooms was less as compared to the unosmosed mushrooms. This may be due to decrease in water diffusivity in osmosed samples (Walde et al., 1992). The total time taken to dry the osmosed mushrooms was less as compared to unosmosed mushrooms. This may be due to initial moisture reduction during the osmosis. This is in agreement with the results obtained by Kaleemullah et al. (2002), Pandey et al. (2000) and Amuthan et al. (1999).

**CONCLUSION**

The results revealed that blanching reduced the initial weight of the mushrooms to approximately 28 per cent whereas osmosis reduced the initial weight of mushroom by about 50 per cent. Solar cabinet drying needs 6 to 8 hours to dry the mushroom from an initial moisture content of 90.56 per cent (wb) to 8 to 9 per cent (wb), while the time taken in microwave-oven drying ranged from 1.58 to 1.83 hours for control and blanched samples. Where as osmosed mushrooms took 5.0 to 5.5 hours to dry in solar cabinet drying, while in microwave-
oven it was 1.25 to 1.33 hours. So by drying of osmosed mushrooms in micro wave oven, the drying time can be reduced with reducing the effects of deterioration on the quality.

REFERENCES