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Studies on Storage Loss of Oyster Mushroom during the Summer Season

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ABSTRACT

Oyster mushroom can be well stored for three days in Zero energy cool chamber (ZECC), due to differences in temperature and humidity inside the ZECC as compare to normal room condition. Experimental results revealed that oyster mushroom stored in that in ZECC has minimum physiological weight loss and spoilage loss (13 and 18.4 percent respectively) as compare to farmers practice, where it is totally spoiled in three days when stored in polythene bag and dried (29.5% weight loss).

Keywords: Zero energy cool chamber, Oyster Mushroom, physiological loss in weight

INTRODUCTION

Oyster mushroom (*Pleurotu ssajor-caju*) production is getting its recognition due to easy technology and very low input needed for its cultivation (Singh *et al.,* 2018). It becomes popular for its meaty taste, high nutritive value and other medicinal importance (Thakur and Singh, 2013). Farmers are getting a better price from oyster mushroom but the problem arises after harvesting because it is highly perishable in nature. Post-harvest losses is very high in most of the horticultural commodities and it may be one of the highest in mushroom.

Mushroom even after harvesting continues to grow, respire, mature and sense resulting in weight loss, veil – opening, browning, wilting and finally leading to spoilage. Almost all the mushroom have a very short life and need ambient environment just after harvest so that the freshness can be maintained for a longer period. The recommended storage temperature and humidity for mushroom are about 10-15^{0}c and 50-60% respectively to attain their shelf life of around 2-3 days (Ahlawat and Tewari, 2007).

The physiological loss in weight is one of the main indicators in determining the quality of stored fruits and vegetables. The moisture loss is not only loss of weight rather it is a loss of appearance, taste and even nutrients from the produce which ultimately results in poor price of the product.

Keeping this view in mind an attempt has therefore made to conduct an On-Farm Trial to compare the efficiency of zero energy cool chamber in regards to maintaining the freshness of oyster mushroom calculated by physiological weight loss, spoilage loss and physical appearance with farmers practice, to minimize the weight loss and spoilage loss there was a need of storage technology which work on low cost and does not depend on non renewable energy source and high technology. It will largely benefit the small and marginal farmers in farm storage of mushroom. This trial was conducted to assess the efficacy of zero energy cool chambers for oyster mushroom storage in compare to farmers practice.

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MATERIALS AND METHODS

The two young farmers namely Anand Kumar and Vikash Kumar of Basudeopatti village under Saraiya block were selected where zero energy cool chambers were constructed. One other chamber was constructed at KVK campus of Saraiya block.

Both were trained by KVK from 2015-2017 for oyster mushroom production and actually growing oyster mushroom in bulk. Three Zero Energy Cool Chamber (ZECC) as per the specification of Indian Agricultural Research Institute, New Delhi, with modification by gravity fed micro-dripper watering system for uniform and continues wetting of sand bed with double wall chamber having 165 cm length, 115 cm width and 67.5 cm height were constructed. The site selected should be upland. This ZECC works on the principle of evaporating cooling, developed by IARI, New Delhi and can be made by locally available cheap material like brick, sand, bamboo, dry grass, Jute, cement etc. Evaporative cooling has been found to be an effective and economical means of reducing temperature and increasing humidity in an enclosure where the humidity is comparative low (Jain 2007, Jha 2008 and Jadav *et al.,* 2010). The rise in relative humidity (90% or more) and fall in temperature (15 – 18^{o}C) from ambient condition could be achieved by watering the chamber twice a day.

RESULTS AND DISCUSSION

The quality of the stored oyster mushroom with respect to physiological weight loss a spoilage loss and physical appearance have been studied in Zero Energy Cool Chamber, bamboo basket, polythene bag and perforated polythene bag during the month ofMay 2018. Farmers continue the production of Dhingary Mushroom in the month of May and temperature start to increase very sharp from this month with low relative humidity.

The data regarding comparative prevailing temperature, relative humidity, percentage physiological loss in weight, spoilage percentage and physical appearance of stored oyster mushroom in ZECC, and room condition under study were recorded during the month of May are presented in table 1-5

respectively. The physiological weight loss in the range of 10-15% and spoilage percentage to be in the range of 20-30 are allowable for maintaining the freshness and marketability of horticultural produces(Olosunde 2006 and Jha 2008).

From the experiments, it was found that a temperature difference of 3.0 - 6.6°Cand an increase in RH by 17.4 to 32.3 per cent inside the ZECC was recorded at various periods. A maximum of 6.6 ° reduction in temperature and an increase in RH of about 32.3 per cent in comparison to room condition was achieved inside the cool chamber. The highest differences were mostly observed at 2.00pm (Table 1).

Table 1: Comparison of Relative humidity and temperature during the storage period (9th May to 10th May 2018 from 10 am to 4 pm.)

Date	Time	Temperature			Relative humidity		
		ZECC	Rom condition	Difference in temp.	ZECC	Room condition	Difference in RH
8.5.2018	10 a.m.	27.0	30.0	3.0	93.1	75.7	17.4
	12 noon	28.6	33.2	3.6	92.5	71.1	21.4
	2 p.m.	28.9	35.5	6.6	90.6	64.6	26.0
	4p.m.	28.7	34.0	5.3	93.4	74.0	19.4
9.5.2018	10 a.m.	25.4	28.0	2.6	90.4	65.1	25.3
	12 noon	28.8	32.7	3.9	89.3	63.4	25.9
	2 p.m.	30.1	36.6	6.5	87.3	55.0	32.3
	4p.m.	29.5	35.1	5.6	89.1	62.7	26.4
10.5.2018	10 a.m.	24.2	27.7	3.5	93.0	74.1	18.9
	12 noon	26.9	31.8	4.9	93.0	70.1	22.9
	2 p.m.	30.0	35.9	5.9	89.6	62.0	27.6
	4p.m.	30.5	34,0	4.5	89.0	75.0	24.0

The physiological loss in weight recorded (Table 2) for oyster mushroom inside the Zero Energy Cool Chamber (ZECC) after four days of storage was only 18.7 per cent as against 37.7 per cent recorded in open room storage in the basket. The weight loss for oyster mushroom stored in polythene bag was only 8 and 8.2 percent for 2nd day of storage. But it is totally spoiled after three days of storage whereas in the cool chamber this spoiled after five days.

Table 2: Physiological loss in weight percent of oyster mushroom stored at different condition

Treatment	1st day (after 24 hours of harvesting)	2nd day (after 48 hours of harvesting)	3rd day (after 72 hours of harvesting)	4th day (after 96 hours of harvesting)	5th day (after 120 hours of harvesting)
Storage at the bamboo basket in room condition.	10%	17.8%	29.5%	37.7%	41.5%
Storage in a polythene bag in room condition.	5%	8%	spoiled	-	-
Storage in a perforated polythene bag in room condition.	5.5%	8.2%	spoiled	-	-
Storage in zero energy cool chamber plastic carate	3.5%	9%	13%	18.7%	spoiled

Table 3: Spoilage loss percent of one kg. mushroom stored at different condition

Treatment	1st day after 24 hours	2nd day after 48 hours	3rd day after 72 hours	4th day after 96 hours	5th day after 96 hours
Storage in the bamboo basket	-	2%	5.2%	5.2%	dried
Storage in a polythene bag	4.5%	20.0%	spoiled		
Storage in a perforated polythene bag	2%	15.8 %	spoiled		
Storage in zero energy cool chamber plastic carate	-	2%	18.4%	47.8%	spoiled

As the consumer buy the product on the basis of physical appearance also, so it was also recorded (Table 4)during storage. It was found that the mushroom stored in bamboo basket became light yellow after the 1st day and looking yellow and dull after the 2nd day. The mushroom stored in a polythene bag and perforated polythene bag was looking fresh after the 1st day and became fragile and less fragile respectively after 2nd day. After the 3rd day of storage, it was totally black, sticky and smelling very bad. In ZECC the mushroom appeared fresh after 2nd day also and became fragile after the 3rd day.

Table 4: Physical appearance of mushroom stored in different condition

Treatment	1st day after 24 hours	2nd day after 48 hours	3rd day after 72 hours	4th day after 96 hours	5th day after 96 hours
Storage at the bamboo basket	Light yellow	Yellow and not looking fresh	dry	Drier	Drier
Storage in a polythene bag	fresh	Fragile	Sticky and black with bad smell, (spoiled)	-	-
Storage in a perforated polythene bag	fresh	Less fragile	Sticky and black with the bad smell (spoiled)	-	-
Storage in zero energy cool chamber plastic carate	fresh	fresh	fragile	fragile and lusterless	spoiled

Table 5: Physical appearance of mushroom stored in different condition (Photographs)

Storage practice	Physical appearance after the 2nd day of storage	Physical appearance after the 3rd day of storage
Storage in Basket		
Storage in Polythene bag		
Storage in a Perforated Polythene bag		
Storage in Zero Energy cool chamber		

CONCLUSION

One of the major constraints faced by marginal and small farmers engaged in the cultivation of mushroom is the perishability of the produce which forces them to sell the produce to whatever prices offered in the nearby market point. It starts to spoil after 48 hours of storage at room temperature. Yellowing of colour, fragile, stickiness, physiological weight loss and microbial spoilage are the most common losses which result in economical losses to the grower. Storage in Zero Energy Cool Chamber which works on the principle of evaporative cooling is very suitable to a small and marginal farmer for on-farm storage of oyster mushroom for at least two to three days. It not only reduces the storage temperature but also increases the relative humidity of the storage space which keeps the product fresh.

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