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RESEARCH ARTICLE

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Physico-chemical properties and organoleptic evaluation of oyster mushroom (*Pleurotus florida*) powder

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ABSTRACT

The study was conducted on oyster mushroom (*Pleurotus florida*) grown on wheat straw. The powder were prepared using different drying methods *i.e.* sun, solar and oven drying. Mean scores for colour, aroma, texture and overall acceptability of control and blanched mushroom powder varied from 4.40 to 5.40, 3.30 to 4.90, 4.50 to 5.60 and 4.25 to 5.06, respectively. Yield of control and blanched mushroom powder ranged from 5.49 to 7.79 %. Non enzymatic browning was found in the range of 0.01 to 0.13 . water retention of control and blanched mushroom powder ranged from 1.42 to 3.90 ml/g. Hygroscopic water absorption after 5, 10, 15, 20, 25 and 35 min. were found in the range of 0.030 to 0.072, 0.05 to 0.127, 0.068 to 0.201, 0.087 to 0.233, 0.108 to 0.244 and 0.128 to 0.278, respectively.

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Key words : Oyster mushroom (*Pleurotus florida)* colour, Texture, Aroma, Yield, Mushroom powder

INTRODUCTION

Mushroom is the most important source of vegetable protein. It is a low calorie food which contains high content, low fat and carbohydrates. Mushrooms, also known as "wonder vegetables" have a unique growth pattern and are as such a synonym for quick growth and multiplication. Oyster mushroom is the third largest cultivated mushroom in the world and contributes approximately 16 per cent to the total world mushroom production (Upadhayay and Verma, 2000). It grows in flushes and after every 3-5 days, these are harvested in abundance. Oyster mushroom (*Pleurotus florida*) is affected by a number of factors leading to post harvest spoilage and losses. These include infection with microorganisms, spoilage by enzymes and unfavourable conditions of humidity, temperature, atmosphere during picking/harvesting. In India, these are seasonally available as most of the cultivation is seasonal using low cost technology. Drying is one of the oldest techniques of food preservation known to man. It is essential that the moisture content is reduced to a level (<5%) as microorganisms cannot grew at this level. Mushroom can be easily dried and powdered without any change in its organoleptic acceptability. Keeping this in view, the study was planned with the following objectives: to improvise the process for preparation of dried oyster mushroom and to study the nutritional composition, organoleptic acceptability and shelf-life of the dried mushroom powder cultivated on different sources.

MATERIALS AND METHODS

The developed powders were evaluated for sensory characteristics by a panel of 10 semi-trained judges using 6-pont Hedonic Scale for colour, aroma, texture and overall acceptability of powders as per scale given by Ranganna (1986)

The weight of dried powder was recorded and yield was calculated using the formula of McConnell *et al.* (1974). Non-enzymatic browing was measured by method of Sa and Sereno (1999). Water retention was measured by the method prepared by Mc Connell *et al.* (1974). Water absorption was calculated by method of Singh and Singh (1991).

RESULTS AND DISCUSSION

Mushroom cultivated on two different substrates *i.e.*

wheat straw and *Brassica* straw were dried by using different methods. The prepared powders were evaluated for sensory characteristics by a panel of 10 semi-trained judges using 6-Point Hedonic Scale.

Colour is often the first parameter by which a consumer judges a food products to be purchased (Table 1). Among the three drying methods control oven dried powder obtained significantly higher scores for colour *i.e.* 4.80 followed by control solar and sun dried powders *i.e.* 4.40 to 4.10. Blanched oven dried powder secured significantly highest scores for colour *i.e.* 5.40 as compared to mean scores for colour of blanched solar and sun dried powders. The better results were obtained for the colour of mushroom slices which were given blanching treatment. The blanching treatment also resulted in better improved colour of the product (Bano *et al.,* 1997; Chandra and Samsher, 2002). Blanching treatment was found to be effective in order to inactivate the enzyme completely and to prevent browning of dehydrated mushroom (Chandra and Samsher, 2002)

Control (unblanched) oven dried powder secured non-significantly higher mean score for aroma as compared to solar dried and sun dried powders *i.e.* 4.90, 4.80 and 4.60, respectively. Blanched mushroom dried in sun, solar and oven dried powder obtained significantly lower mean scores for aroma *i.e.* 3.30, 3.70 and 3.90 as compared to control samples.

Mushrooms have very delicate texture and require special attention during dehydration process. It was found that control sun, solar and oven dried powders obtained mean scores for texture *i.e.* 5.0., 5.10, and 5.60, respectively. It was also observed that control oven dried powder secured significantly higher means score for texture as compared to mean scores for texture of sun and solar dried powder. Significantly lower means scores of texture were observed in blanched powders as compared to their control powders. Blanched oven dried powder secured significantly highest mean scores for overall acceptability as compared mean scores for overall acceptability of other dried powders.

Similar trend was also observed in case of powder prepared from mushroom grown on *Brassica* straw using three drying methods *i.e.* sun, solar and oven drying. Oven dried blanched powder obtained higher mean scores of colour (5.30) and overall acceptability (4.90).

Yield of control and blanched powder prepared from mushroom grown on wheat straw obtained after various drying methods varied from 5.49 to 7.79 per cent (Table 2). Non-significant difference was observed in yield of control sun, solar and oven dried powders. Among the blanched powders sun, solar and oven dried, yield was 5.49, 5.53 and 5.78 per cent. Lower yield in blanched powder may be due to the loss in mushroom weight after blanching because removal of water as well as solid waste from the mushroom tissues (Singh *et al.,* 1982 and Arumuganathan *et al.* (2003 and 2004).

Similarly, the yield of powders prepared from mushroom grown on *Brassica* straw using different drying

Table 1 : Overall mean scores of organoleptic acceptability of mushroom powders

Substrate/Treatment		Colour	Aroma	Texture	Overall acceptability
WS					
Direct sun	Control	4.10±0.16	4.60±0.15	5.00±0.10	4.25±0.15
	Blanched	5.10±0.01	3.30±0.01	4.50±0.26	4.40±0.20
Solar drying	Control	4.40±0.16	4.80±0.16	5.10±0.10	4.53±0.11
	Blanched	5.15±0.10	3.70±0.23	4.70±0.05	4.70±0.25
Oven drying	Control	4.80±0.15	4.90±0.10	5.60±0.16	4.83±0.29
	Blanched	5.40±0.02	3.90±0.15	4.90±1.0	5.06±0.08
	C.D. (P=0.05)	0.35	0.56	0.35	0.41
BS					
Direct sun	Control	4.80±0.10	4.95±0.25	5.10±0.10	4.40±0.17
	Blanched	5.10±0.20	3.70±0.10	4.50±0.10	4.70±0.15
Solar drying	Control	4.90±0.36	5.10±0.10	5.15±0.25	4.50±0.23
	Blanched	5.20±0.20	3.80±0.20	4.65±0.15	4.80±0.20
Oven drying	Control	5.10±0.15	5.20±0.15	5.20±0.05	4.60±0.20
	Blanched	5.30±0.20	3.90±0.35	4.75±0.05	4.90±0.15
	C.D. (P=0.05)	0.39	0.51	0.30	0.60

Values are mean ± SE of three replicates
WS = Wheat straw grown mushroom BS = *Brassica* straw grown mushroom

Table 2 : Physico-chemical properties of mushroom (*Pleurotus florida*) powders

Substrate/ Treatment		Yield (%)	Non-enzymatic browning	Water retention (ml/g)
WS				
Direct sun	Control	7.33±0.05	0.13±0.01	3.34±0.06
	Blanched	5.49±0.02	0.05±0.00	1.42±0.26
Solar drying	Control	7.55±0.06	0.11±0.00	3.65±0.05
	Blanched	5.53±0.08	0.03±0.00	1.50±0.01
Oven drying	Control	7.79±0.07	0.08±0.01	3.90±0.07
	Blanched	5.78±0.03	0.01±0.01	1.60±0.08
	C.D. (P=0.05)	0.88	0.01	0.26
BS				
Direct sun	Control	8.38±0.10	0.15±0.01	2.10±0.01
	Blanched	6.55±0.10	0.08±0.01	1.33±0.38
Solar drying	Control	8.60±0.08	0.13±0.01	2.30±0.02
	Blanched	6.60±0.10	0.06±0.01	1.40±0.01
Oven drying	Control	8.80±0.05	0.07±0.01	2.50±0.30
	Blanched	6.70±0.01	0.04±0.01	1.50±0.25
	C.D. (P=0.05)	0.61	0.01	0.30

Values are mean ± SE of three replicates WS = Wheat straw grown mushroom BS = *Brassica* straw grown mushroom

methods ranged from 6.55 to 8.80 per cent. The yield of powders prepared after blanching using sun, solar and oven dried methods was significantly lower than that of other control powders. However, non-significant differences were observed in yield among the control samples of sun, solar and oven dried powders. Similar trend was observed in blanched sample prepared by using different drying treatment.

The results showed that control (unblanched) samples *i.e.* sun, solar and oven dried yielded higher values of non-enzymatic browning *i.e.* 0.08 to 0.13 while on other hand significant decline in non-enzymatic browning was noticed with blanching treatments *i.e.* 0.01 to 0.05. This may be due to inactivation of enzymes during blanching (Chandra and Samsher, 2002; Chandra and Samsher, 2006). Similar trend was also observed in the values of non-enzymatic browning of powders prepared from mushroom grown on *Brassica* straw. It ranged from 0.04 to 0.15. It was observed that blanching powders prior to sun, solar and oven drying resulted in the lowest value of non-enzymatic

Table 3 : Hygroscopic water absorption (%) of *Pleurotus florida* mushroom powder

Treatment/ substrate	Time (min.)					
	5	10	15	20	25	30
WS						
Sun dried	0.068±0.01	0.123±0.01	0.195±0.02	0.229±0.01	0.240±0.01	0.273±0.02
Blanched and Sun dried	0.030±0.02	0.60±0.01	0.068±0.02	0.087±0.02	0.108±0.03	0.128±0.01
Solar dried	0.070±0.02	0.125±0.02	0.198±0.01	0.231±0.03	0.242±0.03	0.276±0.02
Blanched and Solar dried	0.031±0.04	0.057±0.01	0.072±0.09	0.090±0.02	0.112±0.02	0.132±0.03
Oven dried	0.72±0.01	0.127±0.02	0.201±0.02	0.233±0.01	0.244±0.01	0.278±0.01
Blanched and Oven dried	0.032±0.02	0.055±0.03	0.075±0.01	0.093±0.01	0.114±0.02	0.135±0.02
C.D. (P=0.05)	0.01	0.02	0.02	0.02	0.02	0.01
BS						
Sun Dried	0.067±0.02	0.120±0.01	0.192±0.01	0.212±0.01	0.239±0.01	0.254±0.02
Blanched and Sun dried	0.038±0.03	0.057±0.02	0.060±0.03	0.076±0.02	0.088±0.03	0.095±0.01
Solar Dried	0.068±0.02	0.122±0.02	0.193±0.02	0.213±0.03	0.240±0.03	0.256±0.02
Blanched and Solar dried	0.037±0.04	0.055±0.02	0.063±0.01	0.078±0.02	0.089±0.02	0.096±0.02
Oven Dried	0.069±0.02	0.124±0.02	0.215±0.01	0.215±0.01	0.241±0.02	0.258±0.03
Blanched and Oven dried	0.036±0.01	0.053±0.02	0.079±0.02	0.079±0.02	0.090±0.03	0.098±0.02
C.D. (P=0.05)	0.01	0.01	0.02	0.02	0.02	0.01

Values are mean ± SE of three replicates W= Wheat flour
WS = Wheat straw grown mushroom BS = *Brassica* straw grown mushroom

browning than those of other pretreatments, irrespective of drying methods (Zhang and Flurkey, 1997; Chandra and Samsher, 2002).

Water retention capacity of control and blanched mushroom powder ranged from 1.42 to 3.90 ml/g (Table 2). Significantly higher values of water retention capacity were observed in control oven samples as compared to water retention of all dried powders. Oven dried samples might have exhibited minimum water retention capacity due to the damage of cell structure and hard texture during blanching (Chandra and Samsher, 2002).

Similar trend was also observed in powder prepared from mushroom gown on *Brassica* straw, where water retention capacity varied from 1.33 to 2.50 ml/g, respectively.

The hygroscopic water absorption (at room temperature 30 ± 2^0C and relative humidity 70%) of mushroom powders was evaluated in 5, 10, 15, 20, 25 and 30 minutes (Table 3). Blanched samples exhibited lowest water absorption capacity as compared to respective control ones. It was also observed that hygroscopic water absorption capacity increased with the increase in time.

Similar trend in hygroscopic water absorption was observed in powder prepared from mushroom grown on *Brassica* straw. Lower absorption capacity in blanched sample might be due to blanching which results in adverse effect on water absorption capacity due to damage of cell structure and hard texture as reported by (Chandra and Samsher, 2002)

Conclusion:

It can, therefore be concluded that mushroom powder prepared from mushroom grown on wheat straw and Brassica straw has better organoleptic acceptability and physico – chemical quality . It can be used for various value added products.

REFERENCES

Arumuganathan, T., Hemakar, A.K. and Rai, R.D. (2003). Studies on drying characteristic and effect of pretreatments on the quality of sun-dried oyster mushroom, *Pleurotus florida. Mushroom Res.* 13 (1) : 35-38

Arumuganathan, T., Rai, R.D., Indurani, C. and Hemakar, A.K. (2004). Rehydration characteristics of button mushroom (*Agaricus bisporus*) dried by different drying methods. *Mushroom Res.,* **12** (2) : 121-123

Bano, Z., Rajarathnam, S., Shashirekha, M.N. and Ghosh, P.K. (1997). Post-harvest physiology, quality and storage of fresh mushrooms. Advances in mushroom biology and production. Mushroom Society of Indian (MSI), Solan, pp 105-130.

Chandra, S. and Samsher (2002). Studies on quality of dehydrated oyster mushroom as influenced by various pretreatments and drying methods. *Mushroom Res.,* **11** (2) : 107-112.

Chandra, S. and Samsher (2006). Dehydration and sensory quality examination of edible mushroom : A critical review. *J. Food Sci. Technol.* 43 : 221-227.

McConnell, A.A., Eastwood, M.A. and Mitchell, W.D. (1974). Physical characteristics of vegetable and food stuff that could influence bowel function. *J. Sci. Food Agric.* 25 : 1457.

Ranganna, S. (1986). *Manual of analysis of fruits and vegetable products*. Tata McGraw Hills Publishing Company Ltd., New Delhi.

Singh, R.P. and Dang, R.L., Bhatia, A.K. and Gupta, A.K. (1982). Water binding additives and canned mushroom yield. *Indian Food Packer,* **36** (1) : 39-43.

Singh, U. and Singh, B. (1991). Functional properties of sorghum peanut composite flour. *Cereal Chem.,* **68** (5) : 460-463.

Sa and Sereno (1999). Effect of non-enzymatic browning on onion and strawberry slices. *J. Food Sci.,* **48** : 1397-1401

Upadhyay, R.C. and Verma, R.N. (2000). Non conventional substrates for growing oyster mushroom. *Mushroom Res.,* 9 (1) : 35-38.

Zhang, Y. and Flurkey, W.H. (1997). Phenol oxidases in *Portabella* mushrooms. *J. Food Sci.,* **62** (1) : 97-100.

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