



Effects of anti-browning agents on quality characters of *Agaricus bitorquis* (Quel.) Sacc.

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ABSTRACT

*In the present study, the effects of anti-browning agents on the quality characters of summerwhite button mushroom *Agaricus bitorquis* was taken up. To enhance the quality and to obtain a better colour, aroma and overall acceptability of *Agaricus bitorquis*, various pre-treatments were given such as blanching (hot water treatment at 96°C for 10 minutes) and control taken as unblanched, and then blanched and unblanched samples were dipped in anti-browning agents of different concentration for 15 minutes. The anti-browning agents used were NaCl at concentration of 0.1, 0.2 and 0.5%, ascorbic acid at 0.5, 0.75 and 1.0% and potassium meta bisulphite at 0.75, 1.0 and 1.5%. Maximum mean score for colour attribute of *Agaricus bitorquis* were observed 3.60 and 3.56 in case of blanched fruit bodies due to treatment of KMS at 1.5 per cent and ascorbic acid at 1 per cent respectively which are at par. Lower score was observed 1.73 in unblanched fruit bodies due to treatment of NaCl at 0.1 and 0.2 per cent which are at par. In case of Aroma maximum mean score for aroma attribute of *Agaricus bitorquis* were observed 3.60 and 3.60 in case of blanched fruit bodies due to treatment of KMS at 1.5 per cent and ascorbic acid at 1 per cent respectively which are at par. Lower score was observed 1.76 in unblanched fruit bodies due to treatment of NaCl at 0.1 per cent. Maximum over all acceptability of *Agaricus bitorquis* were observed 3.60 and 3.58 in blanched fruit bodies due to treatment of KMS at 1.5 per cent and ascorbic acid at 1 per cent respectively which are at par. Minimum over all acceptability were observed 1.74 and 1.76 in unblanched fruit bodies due to treatment of NaCl at 0.1 and 0.2 per cent respectively which are at par. Statistically significant difference was exhibited between anti-browning agents on colour, aroma and overall acceptability of *Agaricus bitorquis*.*

Key Words: *Agaricus bitorquis*, Anti-browning agents, Ascorbic acid, Potassium meta bisulphite and Sodium chloride.

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INTRODUCTION

Mushrooms are an important part of human diet since antiquity because of its attractive colour, flavour and aroma. There are several indicators that determine the quality of mushrooms, such as visual appearance, size, colour, maturity stage, development stage, microbial growth and weight loss. Of these, colour is the most important parameter because it is first perceived by consumers and discoloration decreases the commercial value (Weijn *et al.* 2011). Color, fresh and clean appearance and uniform closed buttons have high importance for mushroom quality and consumer preferences (Gonzalez-Fandos *et al.* 2000). The undesirable browning of mushrooms is of great concern during post-harvest handling, processing and storage of mushrooms. Loss in colour often renders the product unacceptable by the consumer. Polyphenol oxidation which cause the oxidation of phenolic compounds is considered responsible for browning of mushrooms (Kaur and Kapoor 2000). Methods to prevent browning are the subject of a great deal of research in the field of food industry. Several treatments are used to preserve colour. Blanching food is a heat treatment. Blanching treatments are presented according to the heat medium used: blanching in boiling water or in steam. The blanching time varies depending on the technique used, the type of product, size or maturity status. This process inactivates the enzymatic systems responsible for sensory alterations and thus limits the oxidation (Ioannou and Ghouil 2013). Anti-browning agents also inhibited the enzymatic browning of the mushroom and helped to maintaining the color of mushroom during storage. Therefore the objective of the present study was to evaluate the effects of anti-browning agents on quality characters of *Agaricus bitorquis*.

MATERIALS AND METHODS

The present investigations were conducted at Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar during the year 2014-2015. Freshly harvested fruit bodies of uniform size of *Agaricus bitorquis* were taken, trimmed, washed with running cold water to remove dirt and dust particles and given various pre-treatments such as: Blanching (hot water treatment at 96°C for 10 minutes) and control taken as unblanched. Blanched and unblanched samples were kept in anti-browning agents for 15 minutes to minimum enzymatic discolouration such as NaCl (0.1, 0.2, & 0.5%) ascorbic acid (0.5, 0.75, and 1.0%) and potassium meta bisulphite (0.75, 1.0 and 1.5%). All the treatments were replicated thrice. The observations were recorded with respect to colour, aroma and overall acceptability of *Agaricus bitorquis*. The assessment of the organoleptic attributes such as colour, aroma and overall acceptability were based on the response of a panel of judges.

RESULTS AND DISCUSSION

The data (Table-1) reveals that colour, aroma and overall acceptability (OAA) of *Agaricus bitorquis* after pre-treatments like blanching at 96°C for 10 minutes, and control taken as unblanched, both were dipped in anti-browning agents like NaCl, Ascorbic acid and KMS for 15 minutes. Maximum mean score for colour attribute of *Agaricus bitorquis* were observed 3.60 and 3.56 in case of blanched fruit bodies due to treatment of KMS at 1.5 per cent and ascorbic acid at 1 per cent respectively which are at par. Lower score was observed 1.73 in unblanched fruit bodies due to treatment of NaCl at 0.1 and 0.2 per cent which are at par. In case of Aroma maximum mean score for aroma attribute of *Agaricus bitorquis* were observed 3.60 and 3.60 in case of blanched fruit bodies due to treatment of KMS at 1.5 per cent and ascorbic acid at 1 per cent respectively which are at par. Lower score was observed 1.76 in unblanched fruit bodies due to treatment of NaCl at 0.1 per cent. Maximum over all acceptability of *Agaricus bitorquis* were observed 3.60 and 3.58 in blanched fruit bodies due to treatment of KMS at 1.5 per cent and ascorbic acid at 1 per cent respectively which are at par. Minimum over all acceptability (OAA) were observed 1.74 and 1.76 in unblanched fruit bodies due to treatment of NaCl at 0.1 and 0.2 per cent respectively which are at par. Statistically significant difference was exhibited between anti-browning agents on colour, aroma and overall acceptability of *Agaricus bitorquis*. KMS solution showed best colour, aroma and overall acceptability of *Agaricus bitorquis* and this is due to sulphuring or sulphiting, a process to prevent the enzyme catalysed oxidative changes and inhibit microbial deterioration. The present findings pertaining to quality parameters viz. colour aroma and overall acceptability are in agreement to findings of various workers viz. Arumuganthan, Hemkar and Rai (2004), Bhat *et al.* (2005), Lidhoo *et al.* (2011) and Zhenqiang Xia (2013).

CONCLUSION

To maintain the quality and availability of mushrooms and to extend its acceptability, they were treated with aqueous solution of different anti-browning agents. Treatment of mushrooms with various anti-browning agents viz: sodium chloride, ascorbic acid and potassium meta bisulphite were effective in retaining the quality parameters of mushrooms. From the observations it was observed that potassium meta bisulphite is the most effective. In conclusion, it is recommended that treatment with 1.5 % or 1 % KMS is suitable for getting better colour, aroma and over all acceptability of *Agaricus bitorquis* mushroom.

REFERENCES

1. Arumuganathan T, Hemkar A K and Rai R D 2004. Studies on drying characteristics and effect of pre-treatments on the quality of sun-dried oyster mushroom *Pleurotus florida*. *Mushroom Research* **13**: 35-38
2. Bhat A M, Beigh G M, Munshi N A and Mir M A 2005. Influence of post-harvest chemical treatment and packing material on shelf life of white button mushroom (*Agaricus bisporus*)-I colour, texture and spoilage. *SKUAST-J Research* **7**: 254-260
3. Gonzalez- Fandos E, Gimenez M, Olarte C, Sanz S 2000. Effect of packaging condition on the growth of microorganisms and the quality characteristics of fresh mushrooms (*A. bisporus*) stored at inadequate temperature. *Journal of Applied Microbiology* **88**: 624-632
4. Ioannou I, and Ghoul M 2013. Prevention of enzymatic browning in fruits and vegetables. *European scientific journal* **9**: 310-341
5. Kaur, C and Kapoor, H C 2000. Inhibition of enzymatic browning in Apples, Potatoes and Mushrooms. *Journal of scientific and Industrial research* **59**: 389-394
6. Lidhoo C K and Agarwal Y C 2011. Evaluation of various pre-drying treatments for button mushroom quality. *Mushroom Research* **20**: 103-110

7. Tewari RP 1986. Mushroom cultivation. Extension Bulletin. *Indian Institute of Horticulture Research. Bangalore, India* **8**: 36
8. Thakur M P 1998. Food and medicinal values of mushrooms. **In:** *Health Care and Development of Medicinal Plants*(Eds. S. Puri and W.J William), Baba Printers, Raipur, pp. 107-119
9. Weijn A, Tomassen M M M, Bastiaan-Net S, Wigham M L I , Boer E P J 2011. A new method to apply and quantify bruising sensitivity of button mushrooms. *Journal of Food Science and Technology* **47**: 308-314
10. Xia Z 2013. Anti-browning agents of mushroom (*Agaricus bitorquis*) slices by glutathione during hot air drying. *Advance Journal of Food Science and Technology* **5**:1110-1104

Table-1: Effect of anti-browning agents on colour, aroma and over all acceptability of *Agaricus bitorquis*.

Anti-browning agents	Concentration (%)	Blanched			Unblanched		
		Colour	Aroma	OAA	Colour	Aroma	OAA
NaCl	0.1	2.73	2.73	2.73	1.73	1.76	1.75
	0.2	2.73	2.76	2.75	1.73	1.80	1.76
	0.5	3.10	3.06	3.08	2.10	2.10	2.10
Mean		2.85	2.85	2.85	1.85	1.88	1.87
Ascorbicacid	0.5	3.33	3.46	3.39	2.33	2.50	2.41
	0.75	3.46	3.46	3.46	2.46	2.56	2.51
	1	3.56	3.60	3.58	2.76	2.76	2.76
Mean		3.46	3.50	3.48	2.51	2.60	2.55
KMS	0.75	3.33	3.50	3.41	2.60	2.60	2.60
	1	3.53	3.53	3.53	2.73	2.70	2.71
	1.5	3.60	3.60	3.60	2.80	2.80	2.80
Mean		3.48	3.54	3.51	2.71	2.70	2.70
Overall Mean		3.26	3.29	3.27	2.35	2.39	2.37

C.D. (p≤0.05)	Colour	Aroma	OAA
Blanched and unblanched	0.027	0.023	0.018
Anti-browning agents	0.033	0.028	0.022
Concentration	0.033	0.028	0.022

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