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Development and Sensory Evaluation of Soy Milk and Tofu using Black Soyabeans and Comparison against the Yellow Soybeans

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ABSTRACT

Black soybean (*Glycine soja*), one type of crop legumes, a variety with a black seed coat, has been widely utilized as food supplement and key ingredient in Chinese herbal medicine for hundreds of years. The seed coats of black soybeans are darker than the seed coats of other types of soybean because they contain anthocyanins, which is why they show several therapeutic effects. Black soybeans are rich in dietary fibre and provide eight human essential amino acids, which can enhance gastrointestinal function and reduce discomfort caused by flatus. soyabean can be used for producing large variety of food products. After giving proper treatments and evaluating its organoleptic acceptability, black soya bean which is less popular among masses can be propogated to take advanatage of its nutritional content.

Keywords: Anthocyanins, Black soyabean, Organoleptic, Tofu, Fibre

INTRODUCTION

Black soybean is native tropical Asia and Southeast Asia, which widely used as food ingredients. It has a protein content varies between 37-41 per cent, and 11-21 per cent fat content. Amino acids glutamate in the black soybean slightly higher than yellow soybeans, thus it has the more savory taste than yellow soybeans. Anthocyanin from soy skin can inhibit oxidation of LDL cholesterol, which is the beginning of the formation of plaques in blood vessels that will trigger the development of high blood pressure and coronary heart disease (Cheng *et al.,* 2011; Choung *et al.,* 2001).

Soyabeans also contain isoflavones, and other bioactive compounds like flavonoids and saponins, which exhibit biological functions such as free radical scavenging activity, antitumour activity, inhibition of low density lipoprotein (LDL) oxidation, and reduction of DNA damage (Kwon *et al.,* 2007; Nagata *et al.,* 2001).

Soy milk is fit for lactose intolerant people and also doesn't contain starch and cholesterol. It has about 3.2-4% protein and 1.6-1.8% fat. *Tofu* is prepared by coagulating soymilk with $CaCl_2$, $CaSO_4$ and $MgSO_4$. Also, citric acid, tartaric acid, lactic acid etc. may be used for coagulation. It is a very good alternative for the *Paneer* made from animal milk (Cotter and Cashman, 2003; Esaki, 1998; Goodman-Gruen and Kritz-Silverstein, 2001).

Keeping in view the health benefits of black soybeans, the present study was conducted with following objectives.

- To develop soy milk and Tofu using black soybeans.
- To conduct organoleptic evaluation of the developed products.
- To compare the developed products against the yellow soybean products.

METHODOLOGY

The yellow and black soybeans were procured from the local market. Soy milk and Tofu were prepared using the standard recipes and then organoleptic evaluation of

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the products was done using the 9-point Hedonic Rating Scale.

The recipes used are as follows-

Soy milk:

- Take whole soybeans (yellow or black)
- Clean them efficiently.
- Soak in water at room temperature (about 12-16 hrs.). use water in the ratio of 1:3. Grains would absorb moisture and become softer.
- Dehulling of the grains by rubbing between the palms.
- Wash the dehulled beans repeatedly until they are free from husk and froth. This repeated washing would remove oligosaccharides from soybeans which is responsible for flatulence related with the consumption of soybean.
- Grind the cotyledons with hot water at (85-90^{0}C) in the ratio of 1:8 (soybeans : water)
- Hot water grinding helps in reduction of trypsin inhibitors and lipoxygenase enzyme.
- Filter the slurry through double muslin cloth and the residual okra is obtained.
- Filtered soymilk is also obtained. Boil it for 5-10 min.
- Add about 7-8% sugar.
- Cool it and Add flavor, if desired.

Tofu:

The steps used are:

- Boil the soy milk for 15 min.
- Coagulation of the milk using organic acids or mineral salts at about 80-85^{0}C.
- The contents should be left undisturbed for about 30 min and allowed to cool at room temperature.
- Filter the contents using double muslin cloth. The filtrate whey is obtained.
- The coagulated mass is then transferred to wooden box lined woth double layer of cheese cloth. it is then pressed by loading weight on it.
- Soy paneer is then removed from wooden box and free moisture adhering to it must be wiped off by using filter paper. It can then be cut into desirable size.
- Stored in chilled water or refrigerated for later use.

RESULTS AND DISCUSSION

The sensory evaluation of the developed soy milk and *Tofu* was done using 9-point hedonic rating scale from a panel of 10 judges. The data was analysed using one-way ANOVA classification, mean and standard error.

The results (Mean $\pm$ SE)of the sensory evaluation data are as follows:

The results for organoleptic evaluation indicate that for soy milk, there was difference between the milk prepared from yellow and black soybeans, in which the milk from yellow soybeans scored higher in terms of all the parameters of sensory evaluation but, all were not statistically significant. The scores for color, flavor and texture non-significantly higher for milk prepared from yellow beans. The scores for appearance, taste and overall acceptability were significantly higher ($pd \leq 0.05$) than black soybean's milk. The overall acceptability scores (8.2 ± 0.22) indicate that the soymilk from yellow beans is highly acceptable and liked very much while the soymilk from black beans was liked moderately with a mean score of 7.5 ± 0.13.

The results from the organoletic evaluation of Tofu indicate non-significant difference ($pd \leq 0.05$) in terms of all the parameters of sensory evaluation, but the scores

Table 1 : The results (Mean $\pm$ SE)of the sensory evaluation data

Levels	Colour	Appearance	Flavor	Texture	Taste	Overall Accceptability
Soy Milk						
M_1 (Control)	8.2 ± 0.22	8.1 ± 0.13	8.4 ± 0.41	8.0 ± 0.18	8.5 ± 0.22	8.2 ± 0.22
M_2	7.8 ± 0.14	7.6 ± 0.13	7.7 ± 0.12	7.5 ± 0.22	7.7 ± 0.13	7.5 ± 0.13
F-ratio	4.05	6.82**	3.53	2.65	6.70**	7.23**
CD (5%)	8.44	.402	10.35	8.87	.649	.547
Tofu						
T_1(Control)	7.6 ± 0.22	7.8 ± 0.44	7.1 ± 0.22	7.4 ± 0.23	7.1 ± 0.67	7.3 ± 0.45
T_2	7.5 ± 0.21	7.7 ± 0.12	7.6 ± 0.11	7.5 ± 0.21	7.5 ± 0.11	7.7 ± 0.11
F-ratio	0.08	0.09	2.42	0.10	0.83	1.76
CD(5%)	10.31	9.47	9.78	9.44	13.47	9.00

being relatively higher for tofu made from black soybeans. The results for both were comparable but higher scores were obtained for black beans' tofu.

The overall acceptability scores suggest that tofu from black soybeans was liked very much (7.7±0.11) while the tofu from yellow beans was liked moderately with a mean score of 7.3±0.45.

Conclusion:

The soymilk from yellow beans was preferred over black soybeans. This may be due to higher anthocyanin content of the black beans. The Tofu from black soybeans was found to have better acceptability during the trials.

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