

Development of pomegranate wine with immobilization of yeast on sodium alginate beads

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Abstract

In the present investigations efforts were been made to standardize the process for the production of pomegranate based wine. Bhagwa variety of pomegranate was selected for the production of wine. Bhagwa Variety of pomegranate were assessed for its nutritional composition and selected for the production of wine. Yeast *Saccharomyces Cervisiae* was immobilized in sodium alginate beads as biocatalyst for wine production. Prepared wine was assessed for alcohol content, reducing sugar, Non-Reducing sugar, pH, acidity.

Keywords: wine, pomegranate, sodium alginate beads

Introduction

India is the second largest producing country of pomegranates after Iran. Pomegranates (*Punica granatum* L.) are rich in polyphenols, specifically ellagic acid and punicalagins, both of which can act as potent antioxidants. Ellagic acid is found in the red arils (seeds) of the pomegranate, as well as in other red-coloured berries. It is the punicalagins, however, that have come to the forefront of research. Punicalagins are found only in the outer skin of the pomegranate, and are estimated to have twice the antioxidant capability of red wine and green tea. Pomegranate juice is mainly used as a health drink. However, most phytochemicals can be found in the rind of the fruit (Bakoyianis *et al.*, 1992; Adsule *et al.*, 1992) [2]. Pomegranate juice containing good amount of sugar hence the pomegranate wine containing good amount of alcohol as well as good color.

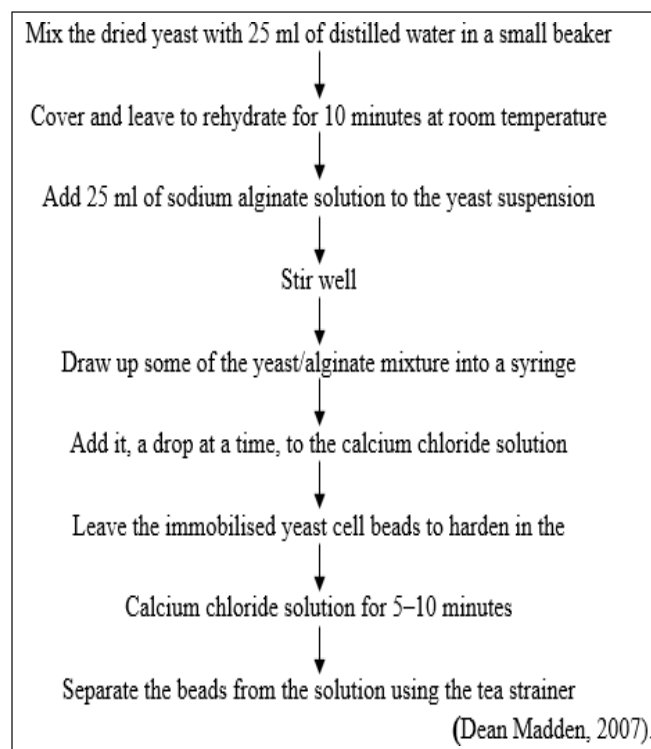
Pomegranate juice as contains good amount of sugar, hence can produce good quality wine as convert sugar into alcohol and gives good colour and appearance. Pomegranate wine is an alcoholic beverage resulting from an anaerobic fermentation of fruit juice by yeast, in which sugars are converted into alcohol and CO₂ (Adsule *et al.*, 1995) [3].

The use of immobilized cells in the making of fruit wine is a rapidly expanding research area with potentially greater advantages as compared to free cell systems (Kourkoutas *et al.*, 2005). Cell immobilization may also protect cells against shear force. Industrial use of immobilized cells is still limited; however, further application will depend on the development of immobilization procedures that can be readily scaled-up (Amutha *et al.*, 2001) [4]. Cell immobilization in alcoholic fermentation is an attractive and rapidly expanding research area because of its technical and Economical advantages compared to the free cell system (Kocher *et al.*, 2006) [7].

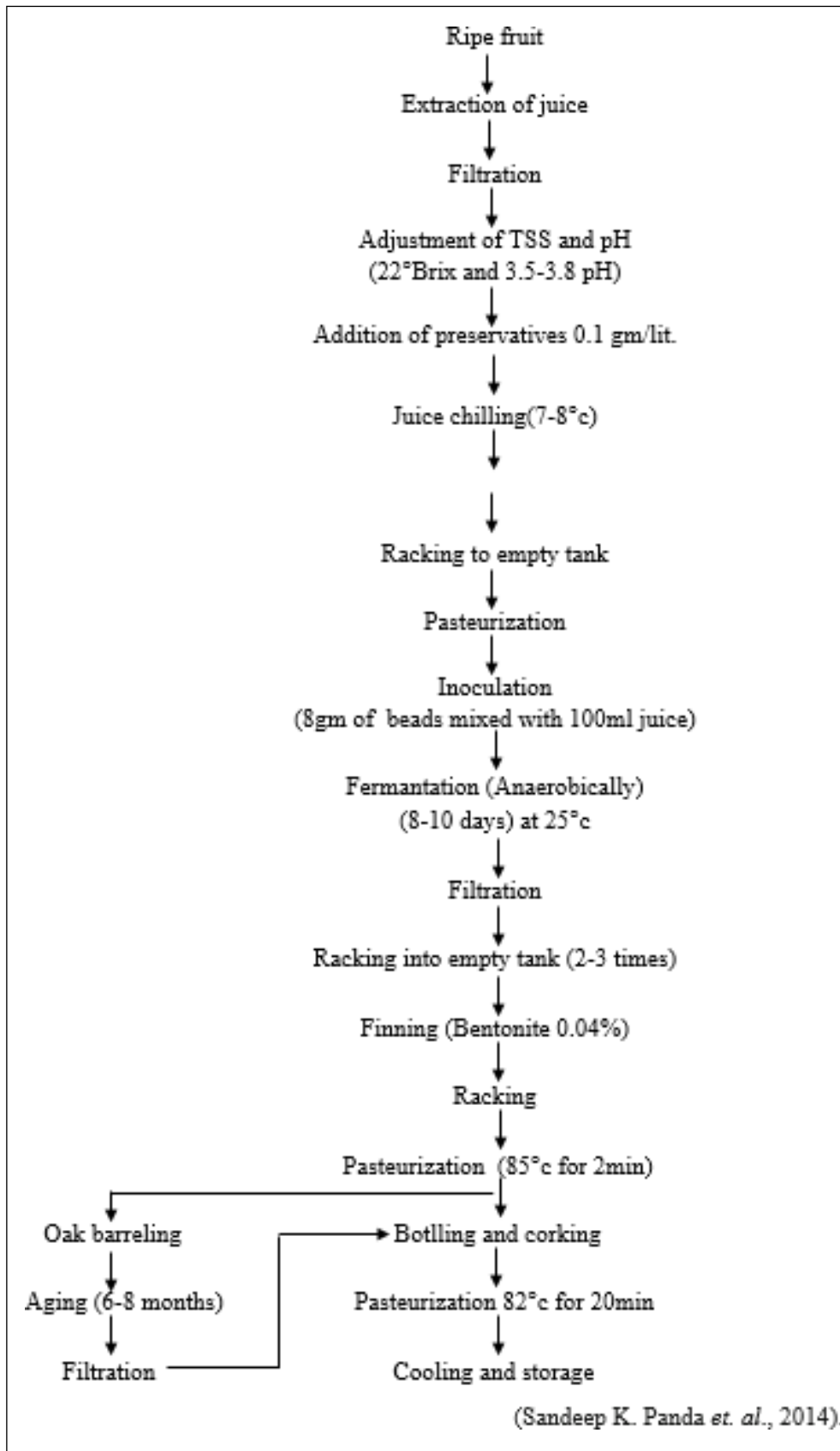
Materials and Methods

Raw materials required for pomegranate wine such as pomegranate, sugar, yeast were purchased from Sangamner market and required chemicals were taken from FCN (Food Chemistry and Nutrition) and FST (Food Science and Technology) laboratories of the Shramshakti Collage of Food Technology, Maldad.

Method for yeast Immobilization



Method for wine Preparation



Physico-Chemical Analysis of raw juice and wine

Chemical constituents like TSS, density, specific gravity, viscosity, pH, titratable acidity and alcohol content, was determined (AOAC, 1990 and Thimmaiah, 2012) ^[10].

Microbial examination of wine

Total plate count and yeast and mould count were examined by FSSAI, 2012 ^[6].

Results and Discussion

Physico- Chemical Analysis of Pomegranate Juice

Extracted Juice form Pomegrenate Were analyzed for physic- chemical properties and from analysis following results obtained. Obtained results are summarized in following tab.

Table 1: Physico- Chemical Properties of pomegranate juice

Sr. No.	Physico-chemical properties	Pomegranate Juice
1.	Juice Yield	73 %
1.	TSS	22°bx
2.	pH	4.5
3.	Alcohol	0%
4.	Density	1.02 gm/ml
5.	Specific Gravity	1.086
6.	Viscosity	2.51 cp

Effect of alginate concentration

In this investigation effects of alginate concentration on alcohol production were analysed. Different concentration of alginate solutions were prepared viz., 2 to 7%. Wine prepared from Alginate beads of 3 % alginate solution showed maximum reduction in TSS thereby producing highest alcohol among other wine samples of about 8.0 v/v.

Sensory Evaluation of Pomegranate Wine

Prepared wine with different concentration of sodium alginate beads were analysed for sensory evaluation. With varied concentration of inoculum contained within immobilized sodium alginate beads has the effect on pH, TSS and alcohol percent of prepared wine. Wine prepared with 10 per cent of inoculum with 22 BX have the Good sensorial properties.

Physico-Chemical Properties of Pomegranate wine prepared from Bhagava Variety

Data from following table showing the physico- chemical Properties. Pomegranate wine assessed for its quality parameter Viz., pH, TSS, titrable acidity, vit C content and Alcohol content.

From the quality evaluation of pomegranate wine prepared from bhagwa variety it was evident that wine having the pH 3.4, Tss 9.16 (°brix) Acidity- 0.56 (%), Ascorbic acid 100mg/ml, alcohol 8%.

Table 2: Physico- chemical properties of pomegranate wine

Sr. No.	Parameters	Pomegranate Wine
1	pH	3.4
2	TSS (°brix)	9.16
3	Titrable acidity (%)	0.56
4	Ascorbic acid (100mg/ml)	7.25
5	Alcohol (%)	8

Conclusion

From the present investigation it was concluded that wine prepared from immobilized yeast showed maximum productivity as compared to free cells. The antioxidative and nutritional properties of fruit were preserved in the form of wine. It was also evident that bhagwa variety of pomegranate can be easily explored at commercial level for wine production.

References

1. A.O.A.C. Official Methods of Analysis. 15th Edition, Washington D. C., Association of Analytical Chemists 1990,1546.
2. Adsule RN, Kotecha PM, Kadam SS. Preparation Wine from Pomegranate. Beverage and Food World, 1992:18:13-14.
3. Adsule RN, Patil NB. Handbook of Fruit Science and Technology. In: Salunke D.K. And Kadam S.S.,

Editors. Pomegranate. New York: Marcel Dekkar 1995, 455-64.

4. Amutha R, Gunasekaran P Production Of Ethanol From Liquefied Cassava Starch Using Co-Immobilized Cells of Zymomonas Mobilis And Saccharomyces Diastaticus. J. Biosci. Bioeng,2001:92(6):560-564.
5. Muhammad N, Uddin N, Liu M, Ali N. Ethno medicine, antioxidant potential and inter-specific variations of Punica L. species growing in Swat District, KP, Pakistan. Int J Botany Stud. 2019;4(4):36-46.
6. FSSAI. Manual of Methods of Analysis of Food, Beverages Sugar and Confectionary Products, Lab. Manual-4, 2012.
7. Kocher GS, Kalra KL, Phutela RP. Comparative Production of Sugarcane Vinegar By Different Immobilization Techniques. J. Inst. Brew,2006:112(3):264-266.
8. Kourkoutas Y, Bekatorou A, Banat IM, Marchant R, Koutinas AA. Food Microbiol,2004:21:377-397.
9. Sandeep K, Panda, Umesh C, Sahu, Sunil K, Behera. Fermentation of Sapota (*Achras Sapota* Linn.) Fruits To Functional Wine, 2014. Nutra Foodsdoi 10.1007/S13749-014-0034.
10. Thimmaiah S. Standard Methods of Biochemical Analysis, Kalyani Publishers, 2012. ISBN 81-7663-067-5.
11. Dean Madden Immobilization Of Yeast In Calcium Alginate Beads, *Www.Eurovolvox.Org*, 2007.