Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env.Pharmacol. Life Sci., Vol 4 [7] June 2015: 95-100

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.533
Universal Impact Factor 0.9804

ORIGINAL ARTICLE

Production of Fermented Beverage from Soursop Fruit

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ABSTRACT
Soursop, Annona muricata, also called guanabana is a fruit with an acidic taste, closely related to custard apple. It is highly susceptible to spoilage, softens very rapidly during ripening, and becomes mushy and difficult to consume fresh. It is sold in local markets and is rejected at market because of external injuries or uneven shape and size. We focus on the investigation of technical factors affecting to soursop juice fermentation. Our results show that pectinase 0.03%, incubation at 40°C in 2 hours, Saccharomyces cerevisiae yeast ratio 8%, pH 4.0, fermentation temperature at 26°C, fermentation time 60 hours, concentrated juice addition 30%, syrup 65°Brix with 8% supplementation, caramel 1.5%, and pasteurization at 80°C in 10 minutes.
Keywords: *Soursop, fermented juice, Saccharomyces cerevisiae, fermentation*

Received 12.02.2015 Revised 09.04.2015 Accepted 21.04. 2015

INTRODUCTION

Soursop fruit contains various types of nutrients beneficial to human health such as vitamins C, B1, and B12. Soursop fruit is also rich in carbohydrates, particularly fructose. Soursop has many therapeutic properties; the juice is diuretic while the other parts have antibacterial, anticancerous, astringent, sedative, and other properties [2]. Soursop, like other tropical fruits, serves as a potential source of raw materials for fruit products such as juice, beverages, wine, jellies, jam puree, power fruit bars, and flakes [1, 3]. They conducted a kinetic evaluation of the fermentation of soursop (Substrate) by *Saccharomyces cerevisiae* [7].

They conducted on the mycoflora associated with the different parts of fresh and rotten fruits of soursop (Annona muricata L.) and the potential of using both indigenous yeast fl ora and commercial yeast extract for wine production [8]. They investigated the proliferation of acetic acid bacteria during various stages of soursop juice fermentation. Preliminary experiment was carried out to identify the genera and species of acetic acid bacteria associated with soursop fruits [9]. The effect of pH, temperature and momentary aeration on the growth of acetic acid bacteria and its effect on the growth of *Saccharomyces cerevisiae* were studied. They evaluated the changes in the microbial profile, physico-chemical and nutritional attributes during the bioconversion of soursop (*Annona muricata*) must to wine [4]. They investigated the microbial quality of locally produced soursop juice and the effect of pasteurization, acidification and chemical preservative on the juice [6]. They carried out a production and microbial evaluation of table wine from tamarind (*Tamarindus indica*) and soursop (*Annona muricata*) [5].

The main purpose of this our research is to investigate technical conditions during soursop juice fermentation such as the yeast proliferation, pectinase, yeast ratio, pH, fermentation time and temperature etc to the quality of soursop fermented juice.

MATERIAL AND METHOD

Material

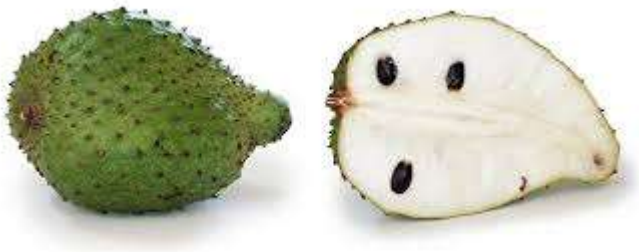

Figure 1. Soursop fruit

Soursop fruits are collected in Mekong River Delta, Vietnam. They are in ripen stage without rotten or damage. *Saccharomyces cerevisiae* is supported from Pasteur Institue, HCMC, Vietnam.

Research method

Yeast proliferation

Prepare 100 ml of medium in erlen 250ml. Proliferate yeast at 25oC in 4-36 hours. By 4 hours, we take 5 ml of samples to centrifuge and count on the counter.

Pectinase supplementation

The soursop juice was obtained manually. Conduct the experiment with 5 samples, each sample 200ml. Investigate different pectinase ratios 0%, 0.01%, 0.02%, 0.03%, and 0.04%.

Sugar supplementation, pH, yeast, and time for fermentation

Soursop fruits are treated with pectinase and then filtered, adjusted pH and oBrix, added yeast. Then the juice is fermented at normal room temperature 25-27oC. During fermentation, we analyse ethanol, soluble dry matter, and total acidity. Experiment is conducted with 200 ml of each sample. Fermentation time: 24h, 36h, 48h, 60h, 72h; pH: 3.0, 3.5, 4.0, 4.5, 5.0; yeast: 4%, 6%, 8%, 10%, 12%; ^{o}Brix: 160g/l, 180g/l, 200g/l, 220g/l, 240g/l. We monitor ethanol formation, ^{o}Brix and total acidity by 12 hours.

Concentrated juice, syrup, caramel supplementation

Ratio of soursop concentrated juice 10%, 20%, 30%, 40%, 50%; syrup 4%, 6%, 8%, 10, 12%; caramel 0.5%, 1%, 1.5%, 2%, 2.5% are verified.

Pasteurization for soursop fermented juice

Soursop fermented juice bottles are pasteurized under 75^{o}C, 80^{o}C, 85^{o}C, 90^{o}C, 95^{o}C in different durations 5, 10, 15, 20, 25 minutes.

Statistical analysis

All data are processed by Excel.

RESULT & DISCUSSION

Yeast proliferation

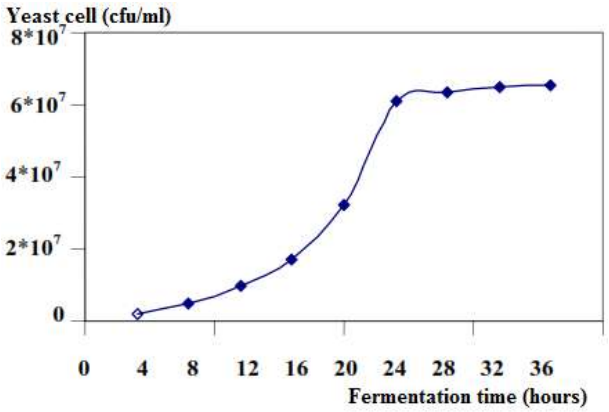

Figure 2. Yeast growth during the soursop fermentation

After 24 hours of fermentation, the yeast cells come to the maximum level with high activity.

Effect of pectinase supplementation

Table 1. Sensory score of the soursop fermented juice

Sample	Pectinase supplementation %)	Sensory score of the fermented juice
1	Control (0%)	Turbid, sendiment, yellow
2	0.01%	Turbid, sendiment, light yellow
3	0.02%	Quite clear, sendiment, light yellow
4	0.03%	Clear, low sendiment, light yellow
5	0.04%	Low sendiment, light yellow

With 0.03% pectinase, it's enough to hydrolize pectin so we get the best soursop juice.

Effect of sugar to soursop juice fermentation

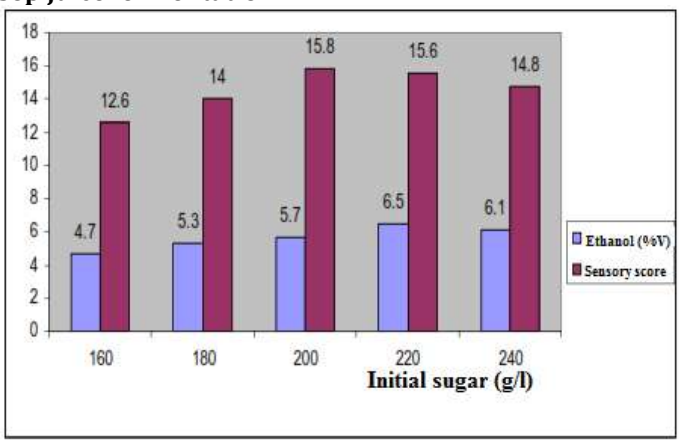

Figure 3. Effect of the initial sugar to fermentation

We notice that sugar 200g/l is suitable for fermentation.

Effect of pH for soursop fermentation

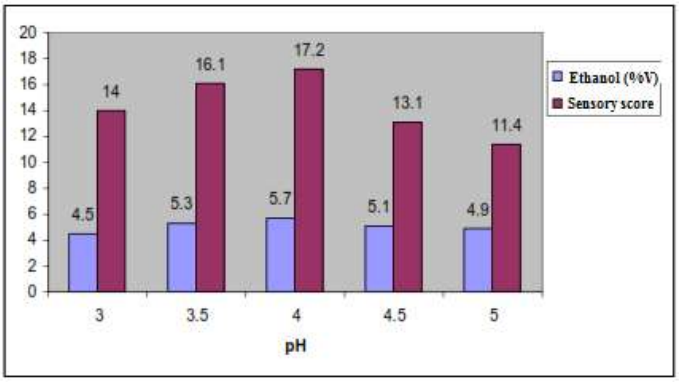

Figure 4. Effect of pH to ethanol formation during soursop fermentation

pH 4 is optimal for soursop fermentation

Effect of yeast ratio for soursop fermentation

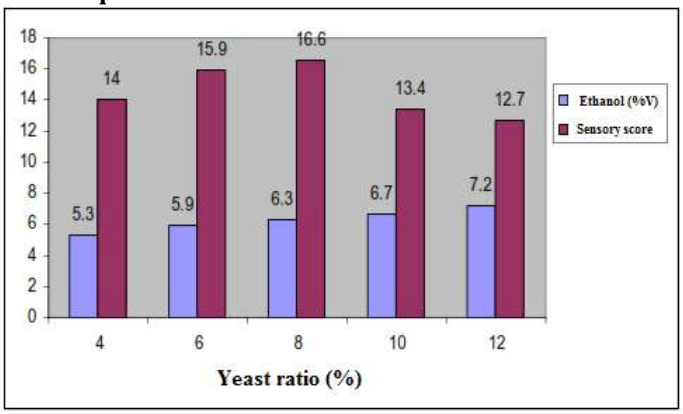

Figure 5. Effect of yeast ratio to soursop fermentation

We see that 5% yeast is appropriated for soursop fermentation

Effect of time to soursop fermentation

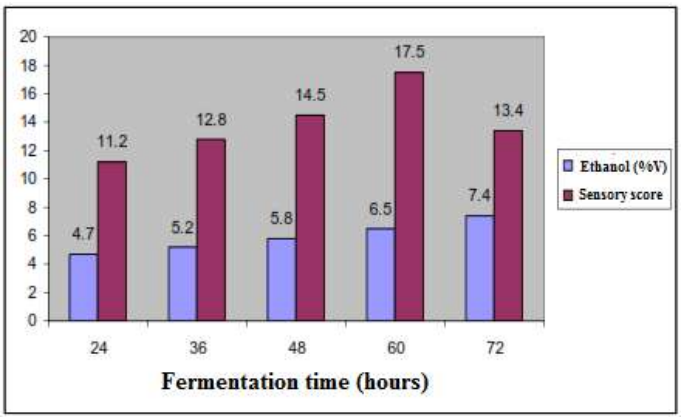

Figure 6. Effect of time to soursop fermentation

After 60 hours of fermentation, we get the best soursop fermented juice.

Effect of concentrated juice supplementation to soursop fermented juice quality

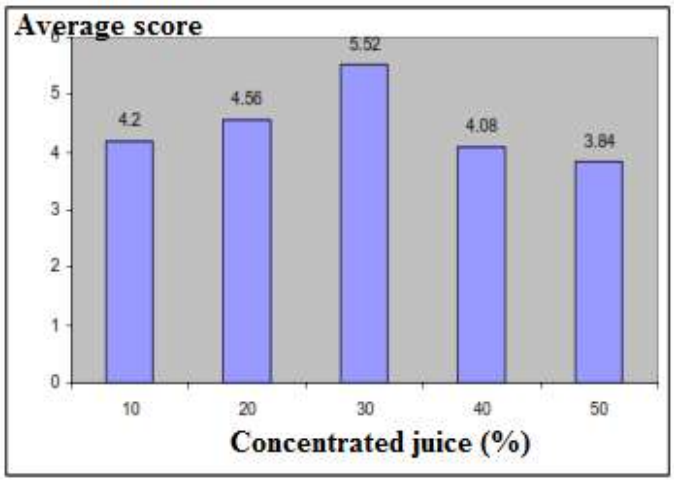

Figure 7. Effect of concentrated juice supplementation to quality of the fermented juice

We see that 30% supplementation of concentrated juice is appropriated to get the best fermented juice.

Effect of syrup supplementation to soursop fermented juice quality

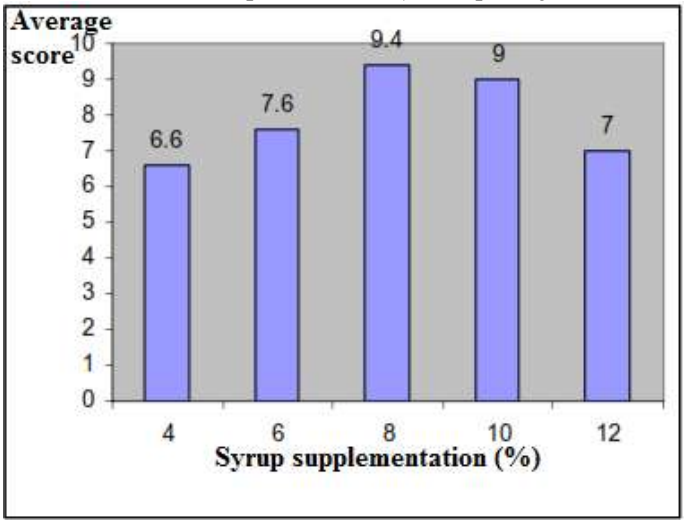

Figure 8. Effect of syrup supplementation to soursop fermented juice quality

With 8% syrup supplementation, we get the best soursop fermented juice.

Effect of caramel supplementation to soursop fermented juice quality

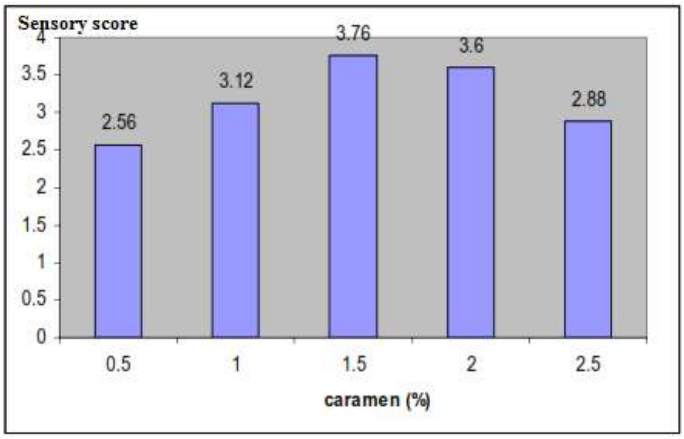

Figure 9. Effect of caramel supplementation to soursop fermented juice quality

With 1.5% caramel addition, we get the best soursop fermented juice.

Effect of the pasteurization temperature to the soursop fermented quality

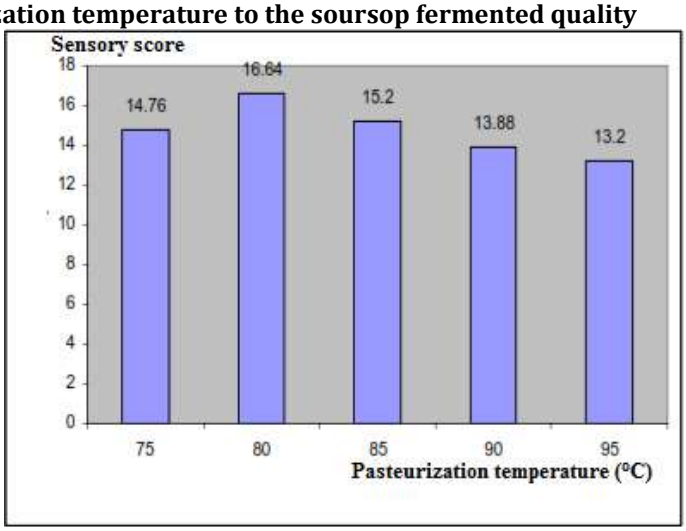

Figure 10. Effect of the pasteurization temperature to the soursop fermented quality

At 80°C of pasteurization we get the best sourop fermented quality so we choose this value for application.

Effect of the pasteurization time to the soursop fermented quality

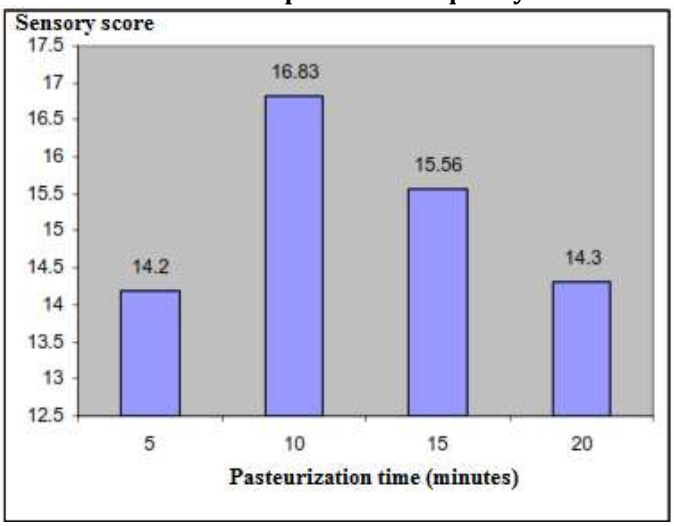

Figure 11. Effect of the pasteurization time to the soursop fermented juice quality

Pasteurization which is conducted within 10 minutes will have the best soursop fermented juice quality.

CONCLUSION

Soursop also known as guanabana (Annona muricata L.) belonging to the family *Annonaceae* and indigenous one of the exotic fruits prized for its very pleasant, sub-acid, aromatic and juicy fl esh which consists of edible white pulp and a core of indigestible black seeds. This study has shown that low

alcoholic wine with appreciable qualities and immense acceptability can be produced from ripe soursop fruit.

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CITATION OF THIS ARTICLE

Nguyen Phuoc Minh. Production of Fermented Beverage from Soursop Fruit. Bull. Env. Pharmacol. Life Sci., Vol 4 [7] June 2015: 95-100