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Optimization of fermentation parameters to produce Palm wine from toddy sample using Saccharomyces cerevisiae species

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ABSTRACT

The study investigated that toddy is popular for the essential tropical alcoholic beverage fermented from the sap collected from coconut trees in the coastal region of Maharashtra. The main species used for this purpose are oil palm (*Elaeis guineensis*), raffia (*Raphia vinifera*), coconut (*Cocos nucifera*) and oil palm (*Arenga pinnata*). The beverage is fermented by a combination of alcohol, lactic acid and acetic acid. When toddy is fermented, it becomes alcohol, commonly called palm wine. This study aims of providing palm wine by using *Saccharomyces cerevisiae isolates* focusing on their characteristics, their beneficial role in the industry, especially in relation to palm wine production and products. This toddy or palm wine has many health beneficial properties ,like improvement of Digestion., Boosts Immunity, Heart Health., Bone Health. Energy Boost., Stress Reduction. This study was with aim to produces palm wine from toddy using *Saccharomyces cerevisiae isolate.*

Keywords: *Toddy , Palm wine , Saccharomyces cerevisiae spp.*

1. INTRODUCTION

Toddy is a typical tropical alcoholic beverage, produced by fermentation of sugary sap the coconut sap is trapped from palm tree that grow at the coastal region of maharastra. the trees commonly used for this purpose are *Elaeis guineensis. Raphia Vinifera, Cococus nucifra and Arenga pinnata*.Manzi is a whiteshish effervescent,acidic alcoholic brevrage (Swins, *et al*.1977) trapping process of toddy used in this study was as explained by Kadare *et al*.(2004).It is a product of mixed alcoholic lactic and acetic fermentation. AAB (acetic acid bacteria utilizing the glucose and sucrose might be present in an earlier stage of the manzi fermentation (okafar1975) Manzi When it goes through the fermentation process, it becomes an alcoholic beverage which is known as palm wine. It contains zinc, potassium, magnesium, iron, sugar, protein, amino acids, vitamin C, and vitamins B1, B2, B3, and B6 which are very beneficial to our health. The unfermentable sap commonly referred to as sweet toddy or Neera contain 10-1605w/v sugar mainly in the form of sucrose the sucrose is converted into alcohol using *saccharomyces cervices spp*. freshly collected toddy sample pH is 4.0 to 4.5 they are collected in sterilised container. and kept at the 4^0c temp with dry ice. then will be use the wine production with respectively maintain parameter. Palm toddy, the fermented sap, is whitish and has a pH of about 3.6 and alcohol contents of 3.3–4.0%, depending on the stage of fermentation at which the wine is consumed. It contains heavy suspension of yeast and bacteria (Ugochukwu, *et al* 1997). Information on the Plam wine, Plam drinks of natural and synthetic palm toddy during production and consumption is increasingly important for the palm toddy industries in determining optimal production and maintenance of acceptable flavours. Palm Toddy, which is primarily an alcoholic beverage made from the sap of different types of palm trees, including date palms, coconut palms, and others. In South India, it is also known as Palm Wine, while in Northern India, it is called Neera. It is considered to have tremendous health benefits when consumed fresh. It has a highly sweet flavour and is not alcoholic until fermented. Plam Wine is one of the functional fermented foods having many health benefits like anti-ageing effects,improvement of lung function (from antioxidants in whitewine), reduction in coronary heart disease, developmentof healthier blood vessels and reduction in ulcer-causing bacteria.and many health banifial effect .

2. MATERIAL & METHODS

The coconut wine or toddy sample for palm wine production were obtained from Shirala coastal region of Maharashtra .The freshly trapped toddy samples were collected in sterile tubes.

1)Isolation of *Saccharomyces cerevisiae from soil*

1)Sample collection:

Soil sample was collected from Islampur Tal-Walwa ,Dist -Sangli, farming soil collected in sterile container (Daniel *et al*.2021).

2) Enrichment of sample:

soil sample was enriched by Malt glucose yeast and peptone Broth In 1week incubation period at a 30°©room temperature. .(Daniel *et al*.2021).

3)Isolation method:

Isolation of microorganisms from soil.it was along enriched sample and spread on MGYP Agar plates Agar plates and incubate at room temperature for 2 to 3 days. (W Scharf *et al*. 2013).

4.Selection of Microorganism –

In todddy sample near about 12-16.5% suagr is present in the from sucrose this sugar get fermentated into sacchromyces cervies and convert to alcohol. The selection of a good yeast strain having desirable properties is a prerequisite for the quality wine production (Degree, 1993).

5.Maintain Parameter –

Brix of toddy is 18-19^{0}bx ,ph is toddy sample for wine production to maintain 4.0-4.5 and tempreture is 20-22^{0}c

6.Fermentation –

Carried out the fermentation with adding 5% ***Saccharomyces cerevisiae*** and at 20-22^{0}continuase monitring system. submerged fermentation were studied.

7. **Racking –**

Racking is the process of siphoning the wine into a new,clean barrel. Racking allows clarification and aids instabilization. Wine that is allowed to age on the lees oftendevelops "off-tastes". A racking hose or tubing is used and can be attached to a racking cone to make this task easier. The racking process is repeated several times during the aging of wine. Repeated racking produces the clarity required in wine, especially if it is aged in a barrel (Robinson, 2003).

8. **Ageing-**

The ageing of wine and its ability to potentially improve wine quality for its consumption, is one of the most important step after wine production (Robinson, 2006). The ratio of sugars, acids and phenolics to water is a key determination of how well a wine can be age.

9.Sensory evaluation

The sensory analysis of wine is an important parameter indetermining the quality of wines. It revolves around the taste, feel, aroma and bouquet of the aged wine..

8.Wine quality parameters –

1.Determination of sugar content –

The refractometer was used to determine sugar content of wine. The refractometer was thermostatic at 20^{0}c and calibrated with distilled water. Then the wine sample apply evenly onto the surface of the prism and the refractive index was read after 2 min. The sugar content was determined in each measurement was repeated twice. (Nikola *et al*.,2019)

2.Determination of pH -

pH is measured by using pH meter calibrated with pH 4 and pH 7. **3.Determination of specific gravity -**

Weight of empty specific gravity bottle was taken with the help of electronic balance

$$\textbf{specific gravity} = \frac{\boldsymbol{A-B}}{\boldsymbol{C-B}}$$

Where,

A = weight in gm of specific gravity bottle with wine sample.

B = weight in gm of specific gravity bottle

C = weight in gm of specific gravity bottle with water.

5.Colour –

Colour of the wine was determined by visual observations.

6.Aroma –

Aroma of the wine was determined by smelling.

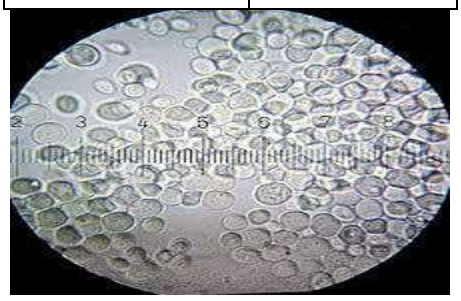
7.Taste –

Taste of the wine was determined by mouth feeling

3. RESULT AND DISSUSION

After incubation to check the staining ,biochemical and marphological characterization.and identified as ***Saccharomyces cerevisiae*** was Acid production, Galactose Mannitol test were negative and Urease Glucose ,Raffinose ,Sucrose ,Lactose ,Maltose according to the standard guidelines of Bergey's manual of Determinative Bacteriology volume II

Fungal strain	S1
Acid production	-
Urease	+
Glucose	+
Raffinose	+
Galactose	-
Sucrose	+
Mannitol	-
Lactose	+
Maltose	+



Gram staining of Saccharomyces cerevisiae

Biochemical test of isolates

Result of determination of specific gravity –

Specific gravity of palm wine Specific gravity was found in range of 0.98 – 1.04

Wine	Isolate code	Weight of wine	Specific gravity
Plam wine	SI	50.309	0.98

Determination of sugar content of wine by using refractometer -

Sugar content of wine after fermentation and before fermentation was determined by using refractometer which shows results such as sugar content after fermentation is less than that of before fermentation that means yeast convert sugar into alcohol and carbon-dioxide as a by product.

Wine	**Isolate code**	Sugar content of fruit juice	Sugar content of juice after fermentation
Plam wine	SI	18%	10%

Determination of pH by using pH meter -

Wine	**Isolate code**	pH of fruit juice	Sugar content of pH juice after fermentation
Plam wine	SI	4.2	3.9

5.Colour –

White Colour of the palm wine.

6.Aroma –

Aroma of the palm wine was pleasant & Alcoholic.

7.Taste –

Plam wine test is sweet.

4. CONCLUSIONS

The study is investigated that showed that palm wine is efficient in reducing disease risk have been performed on rats and not humans. In addition, there are hardly any properly controlled study on humans to demonstrate the nutritional benefit of the drink. Furthermore, there is no consistency in the literature on the concentration of the drink that is beneficial. This may be because the water abundance of the drink varies from location to location and so the actual concentration of palm wine that will facilitate functional benefits is unknown. From currently available data, the evidence that supports palm wine as a multifunctional beverage in humans is weak and needs further research. However, microorganisms and chemical elements and compounds that support nutritional, health and reduction of disease risk in well-known functional foods and beverages are present in palm wine.

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