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COMPARATIVE ANALYSIS OF WINE FROM DIFFERENT FRUITS

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ABSTRACT:

Fermentation of fruit juices is a relative and simple avenue for reducing post harvest wastage of mainly perishable fruits, hence perishable fruits can be used for production of wine. In the present investigation we used papaya, banana, orange and lime fruits. Observations were recorded for acidity, microbial count and alcohol content. In this study banana fruits yield good quantity and quality alcohol when compare papaya orange and lime.

Keywords: Fermentation, beverage, *Saccharomyces cerevisiae*, inoculum.

INTRODUCTION:

Fruits are very essential for our health and from ancient time fruits are used for the production of different alcoholic beverages like wine. The term wine is applied to the product made by alcoholic fermentation from fruits or fruit juices using yeast as inoculum. Wine is considered to be the one of the oldest alcoholic beverages produced by the process of fermentation. Fermentation is relatively low energy preservation process which increases the self life and decreases the need of refrigeration or any other forms of food preservation technology. Tropical wine are subjectively perceived as inferior in quality on the basis of flavour, aroma, odour and colour [1]. Many different factors influence the fermentation process and determine the end products obtained [2]. Different strains of yeasts are used in many industrial fermentation processes including alcoholic beverage production. The quality of wine produced greatly depends on the yeasts strains [3].

MATERIALS AND METHODS:

Collection of sample: Over ripened fruits of banana, papaya, orange and lime were collected from local vegetable market.

Collection of culture: Pure culture of *Saccharomyces cerevisiae* was collected from Department of Microbiology laboratory, Yashawantrao Chavan College of Science, Karad, Maharashtra, India and sub-cultured on Glucose yeast extract agar medium and stored at refrigeration.

Inoculum preparation: The inoculum was prepared by inoculating the slant culture in 10ml

test tube incubated overnight then 3% inoculum transferred to 100ml of sterile Glucose yeast extract broth medium taken in 250ml flask and cultured on a rotary shaker (90rpm) for 48 hours. After incubation period the culture was used for inoculation of mash.

Banana wine preparation: One and half kg of banana was taken it was completely peeled off. This yielded 300ml of Banana pulp. The pulp was macerated in blender and pasteurized at 85°C-90°C for 05 minutes. Similar procedure was carried out as like papaya wine preparation.

Citrus wine preparation: One and half kg of orange and one and half kg lime was taken it was completely peeled off. This yielded 300ml of orange and lime pulp. The pulp was macerated in blender and pasteurized at 85°C-90°C for 05 minutes. Similar procedure was carried out as like papaya wine preparation.

Papaya wine preparation:

One and half kg of papaya was taken it was completely peeled off. This yielded 300ml of Papaya pulp. The pulp was macerated in mixer /blender and pasteurized at 85°C-90°C to 5 minutes. After cooling required amount of cane sugar was added to adjust final Total Soluble Solids (TSS) to 24° Brix. The pure culture of the wine yeast *Saccharomyces cerevisiae* was added and mixed thoroughly and was allowed to ferment at controlled temperature of 24°C to 26°C. Potassium metabisulphite (KMS) was added to avoid growth of wild yeast and Diammonium orthophosphate at a source of nitrogen and phosphorus to yeast. The treatment were kept for primary for secondary fermentation with air lack to prevent the entry of external oxygen.

Physico-chemical analysis: The TSS content was determined using Erma hand refractometer. The pH was determined using and ELICO model digital pH meter. The acidity and total sugar were determined as per the standard protocols [4]. The alcohol content was determined as per the standard procedure [5].

Physico-chemical analysis was carried out once in five days during primary fermentation and once after secondary fermentation. The observations were also recorded. Once after aging for one month. The parameter of observations were acidity, alcohol, microbial count and TSS.

RESULTS AND DISCUSSION:

TABLE: 1-Total Soluble Solids (Brix) of must during fruits wine production:-

Sr. No.	Fruits used	Analysis of Total Soluble Solid content during fermentation (in days)				
		05	09	15	25	30
1.	Papaya	12	11	10	10	10
2.	Banana	14	12	11	08	08
3.	Orange	14	14	13	12	12
4.	Lime	13	13	12	12	12

After secondary fermentation the least TSS was recorded in different wines. The final TSS after one month of aging in papaya wine was varied between 12°C Brix to 10°C Brix, banana wine was varied between 14°C Brix to 8°C Brix, orange wine was varied between 14°C Brix to 12°C Brix and lime wine was varied between 13°C Brix to 12°C Brix. Maximum levels of these sugars were found in the wines from non clarified juice and pulp due to slow rate of fermentation. The TSS of the must on the initial day of fermentation was 24°C Brix. It kept on decreasing during fermentation and aging observed in all varieties of wine. As the alcohol content increases, the content of TSS decreases. The results are shown in Table 1.

pH:-

The pH of must on initial day of fermentation was determined. Then the decline of pH was rapid up to 30 days. The results are shown in Table 2.

TABLE: 2 pH of must during fruits wine production:-

Sr. No.	Fruits used	Analysis of pH changes during fermentation (in days)				
		05	09	15	25	30
1.	Papaya	04	04	03	03	03
2.	Banana	05	04	03	03	03
3.	Orange	05	04	03	03	03
4.	Lime	05	04	03	03	03

The pH of the different fruits wine must be varied, Papaya wine was varied between 4 to 3,

Banana wine was varied between 5 to 3, Orange wine was varied between 5 to 3 and Lime wine also was varied between 5 to 3. It is shown in the Table No.2. Subsequently this value is decreased in all the various fruits wine indicating an increase in acidity (Table 2).

3. Studies on Microbial count (Yeast cell count by Heamocytometer) during wine fermentation:

Microbial count (yeast cell count) during primary and secondary fermentation was determined by haemocytometer. Then the decline of microbial count was rapid up to 30 days. The results are recorded in Table 3.

TABLE 3: Microbial count (Heamocytometer) of must during fruits wine production:

Sr. no.	Fruits used	Analysis of microbial count during fermentation (in days)				
		05	09	15	25	30
1.	Papaya	460×10^3	400×10^3	320×10^3	322×10^3	320×10^3
2.	Banana	480×10^3	489×10^3	388×10^3	320×10^3	240×10^3
3.	Orange	320×10^3	310×10^3	240×10^3	189×10^3	180×10^3
4.	Lime	330×10^3	220×10^3	222×10^3	210×10^3	200×10^3

The microbial population showed logarithmic increased during primary fermentation subsequently there was decreased in its populations. This could be due to the fact that higher concentration of sugar substrates inhibited the growth and multiplication of yeast during secondary fermentation. Microbial count during fermentation is decreasing in number .In banana wine, it was decreases up to 480×10^3 to 240×10^3 and papaya wine up to 460×10^3 to 320×10^3 and in orange wine up to 320×10^3 to 180×10^3 and in lime wine up to 330×10^3 to 200×10^3. Microbial count shown in Table No. 3.

4. Acidity:

The volatile acidity constituted majority of the total acidity was determined. Then the decline of acidity was rapid up to 30 days. The results are recorded in Table 4.

TABLE 4: Percentage Acidity of must during fruits wine production:

Sr. No	Fruits used	Analysis of Acidity during fermentation (in days)				
		05	09	15	25	30
1.	Papaya	4.95	4.65	4.80	4.50	4.00
2.	Banana	5.40	5.25	5.25	5.20	4.50
3.	Orange	6.15	5.70	5.70	4.80	4.20
4.	Lime	4.95	4.80	4.80	4.35	4.30

In all the treatment the trend of volatile acidity was similar to that of Total acidity. The Non-volatile acidity showed an initial increase followed by decrease in all fruits wine. The decreased in the acidity during fermentation in the juice could be due to its utilization by the yeast for production of carbon dioxide and water.

5. Alcohol content:

The alcohol content of wine was determined .It was shown in Table No. 5.

TABLE: 5 Alcohol (%) content of must during fruits wine production:-

Sr.No.	Fruits used	Analysis of alcohol content during fermentation
1.	Papaya wine	8.73
2.	Banana wine	15.49
3.	Orange wine	8.65
4.	Lime wine	0.93

The alcohol content in fruit wine showed an increasing trend during fermentation. Maximum development of alcohol was found within period of primary fermentation subsequently during secondary fermentation, the alcohol development was sluggish.

From above table results, it was shown that, the alcohol content after one month aging papaya wine was **8.73%**, banana wine was **15.49%**, orange wine was **8.65%** and lime was **0.93%.**

In these fruits wine significant differences in the content of TSS, acidity, pH and alcohol content was noticed. This also depends upon content of alcohol in the wine. As the alcohol content increases in the wine, the content of the TSS, microbial count and pH decreases. Other parameters such as acidity increases at initial stage and gradually decreases during fermentation storage [6].

These results are due to either precipitate as tartarates or decarboxylated to yield some other products like esters. [7].

CONCLUSION :

It can be concluded that all the fruits are suitable for wine production, but in this study the banana fruits given more alcohol production compared to other fruits wine.

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