

VALUE ADDITION TO RICE WINE BY INCORPORATING FRUITS RICH IN
ANTIOXIDANTS

By

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Abstract

Suitability of twelve yeast isolates from coconut sap and one yeast isolate from palmyrah sap for rice fermentation was studied. All the isolates were identified as *Saccharomyces* species and categorized into three groups based on the shape and size characteristics of single cells. The ethanol content was calculated during fermentation on 15 % glucose medium. The three groups showing, round, oval and ellipsoidal shaped single cells exhibited comparatively fast, medium and slow rates of ethanol production, respectively, on glucose medium. The maximum possible ethanol content produced by the isolates on glucose medium at room temperature ($28\pm 2^{\circ}\text{C}$) varied from 7.3 to 8.4 %. Five yeast isolates selected based on the rate or amount of ethanol production on glucose medium were further assessed for their ability to ferment rice. The maximum possible average ethanol content produced during rice fermentation by the five isolates at room temperature ($28\pm 2^{\circ}\text{C}$) varied from 10.5 to 13.5 %.

As a further study, suitability of four high yielding isolates for rice fermentation based on their capacity to produce compounds responsible for aroma and flavor was carried out. Inability to use lysine as a sole nitrogen source confirmed that all isolates obtained from coconut and palmyrah sap were *Saccharomyces cerevisiae*. The volatile compounds in the headspace of four rice wines showed that ethanol, ethyl acetate, acetaldehyde, isoamyl alcohol and two other unknown compounds were the most prominent. Ethanol as the main and final product did not show significant difference with the yeast isolates. Ratio between ethyl acetate to isoamyl alcohol could be considered as a valuable criterion for selecting a yeast isolate for rice fermentation. The lowest ratio was evident in rice wine produced using

the isolate C3. The rice wine also had the highest content of acetaldehyde, which could impart to fruity aroma.

Retention of anthocyanins and other phenolics of dan flesh at 1-6 min steam blanched conditions were analyzed, and the effect of blast freezing and conventional freezing on anthocyanin and total phenolic contents and antioxidant activity was investigated. Fresh fruit contained 211.5 mg /100 g of the total anthocyanin, 237.2 mg/100 g of the total phenolics and 87.1 % the total antioxidant activity. Steam blanching up to 2 min increased the total anthocyanin content and declined thereafter. The anthocyanin content up to fourth minutes of blanching exceeded that of unblanched. The total phenolic content and the total antioxidant activity of fruits steam blanched for 1-4 min were higher than that of the unbalanced fruit and declined thereafter. Two minutes of blanching was selected as it retained maximum level of anthocyanin, the main quality attribute in dan. Fruits blanched for 2 minutes were packaged in a triple laminated (12 μ m polyester, 7 μ m Aluminum and 50 μ m linear low density polyethylene) flexible packaging material and subjected to the conventional and blast frozen storage for six months of period. A significant decline in above factors was evident during the first month of frozen storage regardless of the method of freezing, and only a slight decrease after the first month. A higher retention of anthocyanins, the total phenolic content and the total antioxidant activity was evident in blast frozen fruit samples than in conventional frozen samples throughout the storage period.

Possibility of value addition to rice wine by incorporating a mixture of pulp containing sapodilla, uguressa and dan was studied. The ratio among three fruits was decided based on the quality attributes expected to be imparted. Time taken for optimum extraction of chemical constituents possessing antioxidant capacity into rice

wine was determined. Optimum ratio between the fruit pulp mixture and the base wine was established based on headspace volatiles and other physicochemical properties. The fruit pulp mixture consisted of 50 % sapodilla, and 25 % each dan and uguressa. Antioxidant capacity showed a gradual increase and reached a plateau after 4 hours. Acetaldehyde, ethanol, ethyl acetate, isoamyl alcohol and two other unknown compounds were prominent. Different fruit pulp to rice wine ratios had no significant influence on the headspace composition. The fruit to rice wine at 1:4 ratio giving optimum level of alcohol and health benefits was selected for production of fruit incorporated rice wine. The finished product showed about thirteen times higher antioxidant capacity than the base rice wine and 10.2% alcohol content. Further, the former was significantly higher in sensory attributes of color, odor, taste, after taste effect and overall acceptability than the latter. Therefore, the fruit incorporated rice wine could be considered an acceptable and health beneficial product.