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Improvements in veld grape batter quality from rice batter

Chitra Devi
civi555.biotech@gmail.com
Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu

Sathiya Jeeve M.
sathiyajeeve@gmail.com
Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu

Mukesh C.
mukeshreddy1998@gmail.com
Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu

ABSTRACT

The convenience and appeal of battered or breaded products have resulted in a sales increase of 100%. Because of the rapid growth of the population and increasing consumption of rice and rice products, rice flour is a logical alternative for wheat flour in traditional batter formulation. Cultivating and new product development by using veld grape gives more nutrients compared to rice batter. This creeper crop needs very less amount of water, where people can even grow at drought cornering situation. And moreover, it has more number of health benefits like, ability to solve bone problem, obesity reduction, curing digestion problem. The effects of both rice batter and veld grape rice batter were analyzed for proximate analysis. The batter rheology and its fermentation behaviour were studied. Quality parameters such as taste, texture, colour and acceptability were also analysed using sensory analysis. The highest value for sensorial acceptability corresponded to the batter produced with a mixture of rice flour (60 g/100 g) and veld grape flour (40 g/100 g)

Keywords— *Rice flour, Veld grape flour, Dosa batter, Rheology, Sensory Evaluation*

1. INTRODUCTION

Cissus quadrangularis has been used as a medicinal plant since antiquity. Cissus has been used in various Ayurvedic classical medicines to heal broken bones and injured ligaments and tendons. The supplement helped reduce body weight by 4–8% (placebo 2.4%) a clinically significant weight loss. The convenience and appeal of battered or breaded products have resulted in a sales increase of 100%. Because of the rapid growth of the population and increasing consumption of rice and rice products, rice flour is a logical alternative for wheat flour in traditional batter formulation. Cultivating and new product development by using veld grape gives more nutrients compared to rice batter. This creeper crop needs very less amount of water, where people can even grow at drought cornering situation. And moreover, it has more number of health benefits like, ability to solve bone problem, obesity reduction, curing digestion problem. The effects of both rice batter and veld grape rice batter were analyzed for proximate analysis. The batter rheology and its fermentation behaviour were studied. Quality parameters such as taste, texture, colour and acceptability were also analysed using sensory analysis. The highest value for sensorial acceptability corresponded to the batter produced with a mixture of rice flour (60 g/100 g) and veld grape flour (40 g/100 g).

2. MATERIALS AND METHODS

2.1 Collection of Raw Material

As per the discussion and assessment on the underutilized crop *Cissus quadrangularis* (veld grape)the crop was collected from the local village called Krishnankoil. The other ingredients for the preparation of the batter were taken from the place called Madurai and the materials includes polished parboiled rice, decorticated black gram and the veld grape flour.

2.2 Preparation of the veld grape powder

The veld grape was collected and shadow dried. The shadow dried flakes of veld grape was further grinded to form powder. The gained product was a mixture of fiber and the veld grape powder. The mixture was further sieved to remove the fiber and get a fine veld grape powder.

2.3 Preparation of the batter

The polished parboiled rice and the decorticated black gram were taken in the ratio of 4:1 to ensure the better texture and the organoleptic properties of the product. Both the ingredients were washed and soaked for 5 hours separately. Further the water in which the ingredients were drained and wet grinded. The veld grape powder was added to the batter is stored further a control batter was prepared without the veld grape powder for analysis.

2.4 Fermentation of batter

Salt (NaCl) 2% of the total weight was calculated and added to the batter. The batter was further set for fermentation process at the temperature of 20°C to 26°C and the volume of the batter was recorded at 0, 4, 8, 12, 16 hours of fermentation period with the help of a measuring cylinder.

2.5 Determination of batter properties

The batter prepared controlled and veld grape improved both were analyzed for chemical properties, rheological properties and microbial properties.

2.5.1 Determination of pH: The pH of batter was measured using a digital pH-meter according to A.O.A.C method (Official Method of Analysis of A.O.A.C International – 18th Edition, 2005).

2.5.2 Determination of Total Acidity: The total acidity of batter was determined and values expressed in percentage according to A.O.A.C standard method (Official Method of Analysis of A.O.A.C International – 18th Edition, 2005).

2.5.3 Determination of Density: The density of batter was determined by using formula as the ratio of mass to volume of the batter at various time intervals such as 0, 4, 8, 12, 16 hours.

2.5.4 Determination of Protein content: The protein content of batter extract was determined by Biuret method using bovine serum albumin (BSA) as standard (Analytical Techniques in Biochemistry And Molecular Biology; Chap 2.16, Pg: 17, 1981).

2.5.5 Determination of Viscosity: The viscosity of the batter samples was measured by using Brookfield L.V viscometer. A viscometer equipped with a spindle 21 was used to study the viscosity behavior of the batter. About 17mL of sample were transferred into the cup of the viscometer and the bob was lowered until the whole bob surface was covered. About 5 min were allotted to allow the sample temperature to equilibrate to 10°C (Gassem *et al.*, 1991).

2.5.6 Fermentation Study: The bacterial counts of two different samples were determined. 1mL of each batter samples was dissolved in 9mL of peptone water. Serial dilution of batter samples was made. 0.1ml of each prepared dilutions were dispended into petri plates in duplicates. The MRS agar (70g of MRS broth and 15g of agar) was prepared and poured in several petri plates. The plates were rotated clockwise and anticlockwise for equal distributions of the sample. The plates were incubated at 37°C for 72 hours and number of colonies were counted and expressed in CFU/mL.

CFU/mL = Number of colonies/ (dilution factor * volume of sample)

2.5.7 Sensory Evaluation: Sensory evaluation of batter samples were done for appearance, aroma, color, flavor, taste, overall acceptability. A 1-9-point hedonic rating test was performed to assess the degree of acceptability of samples prepared. 25 mL of batter from both the samples was presented to 10 panelists as randomly coded samples at cooled conditions. The panelists were asked to rate the samples for appearance, aroma, color, flavor, taste, overall acceptability on a 1-9 point scale, were 9= Like extremely; 8= Like very much; 7= Like moderately; 6= Like slightly; 5= Neither like nor dislike; 4= Dislike slightly; 3= Dislike moderately, 2= Dislike very much; 1= Dislike extremely. The results were evaluated and comparison chart also drawn.

3. RESULTS AND DISCUSSION

3.1 Determination of pH

The pH of batter sample was determined at 4 hours time intervals and the results are reordered. Initially pH of the batter was 6.65 and it was decreased to 4.02 which mean that indicating the occurrence fermentation process. Finally (16th hour) the pH of batter samples was 4.03±2 for all the samples at the end of the fermentation period (16 hours).

3.2 Determination of Total Acidity

The total acidity of batter sample was determined at 4 hours time intervals and the results are reordered. Initially acidity of the batter was 0.95% and it was increased to 1.43%. The acidity percentage is increasing with respect to time in all the samples which means that indicating the occurrence fermentation process.

3.3 Determination of Density

The density of batter sample was determined at 4 hours time intervals and the results are reordered. Initially density of the batter was 0.93 g/cm^3 and it was decreased to 0.59 g/cm^3. The density of the sample was decreased due to the entrapment of the air in gas pockets and the functions of the microorganisms responsible for the different functionality of the batter density.

3.4 Determination of Protein content

The protein content of batter sample was determined at 4 hours time intervals and the results are reordered. Initially the protein content of the batter was 2.4% and it was increased to 4.02%. From the results, it was concluded that the protein content was increasing with respect to time.

3. 5 Determination of Viscosity

Viscosity of the batter samples was calculated by using the parameters such as shear rate and shear stress. Because of higher shear stress the improved rice batter sample obtained higher viscosity (9.06) than the rice batter sample (4.37). The comparison between both the samples for viscosity was presented in Fig 1.

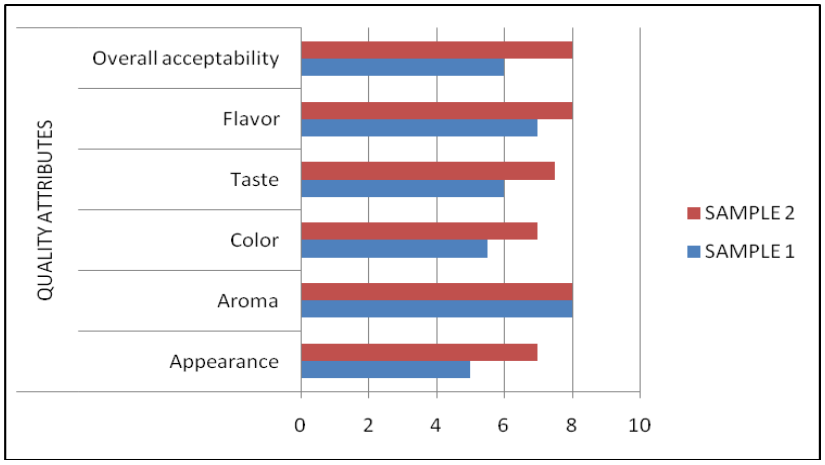

Fig. 1: The comparison between viscosities of tested batter samples

3.6 Fermentation Study

The microbial analysis was done by using spread plate technique for 0^{th} hour and 16^{th} hour sample. The colonies were counted and the results (CFU/mL) are recorded. The counts of bacteria increased during the fermentation process (0^{th} hour to 16^{th} hour). The bacterial counts were increased with respect to time due to fermentation process. The bacterial count of batter was $8.8* 10^{7}$ CFU/mL at 16 hours.

3.7 Sensory Evaluation

A panel of 10 tasters evaluated the appearance, aroma, color, taste, flavor and overall acceptability. And the averages of sensory attributes of both the samples are recorded. The appearance level was high for improved batter sample due to high viscosity than the rice batter sample. The score of color, taste and flavor of improved rice batter (sample 2) was high than the rice batter sample (sample 1). The comparison between both the samples for all quality attributes is presented in Figure 2.

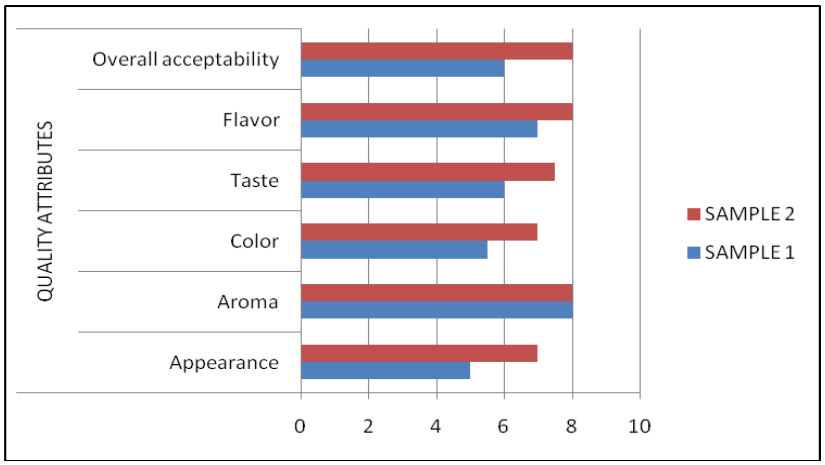

Fig. 2: The comparison for all quality attributes

4. CONCLUSION

The project depicts the use of the underutilized crops to ensure higher utilization by development of well-known local food products. This also ensures to provide a higher nutritional value product by enhancing the nutritional value of the products that existed previously. The incorporation of *Cissus quadrangularis* also enhances the nutraceuticals value of the product. The organoleptic properties of the food product was also tested and well balanced to satisfy the sensory traits of the community. Thus this can have a great impact on the community trends and also in their daily food practices.

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