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Development and Quality Evaluation of Ready-to-Use Bharwa Spice-Mix Paste

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Abstract: ***Shelf life study of ready to use bharwa spice-mix paste have been carried out by addition of vinegar, citric acid and oil for each treatment. The pH, moisture content, microbial load and sensory attributes were evaluated for 0 to 45 days of storage period. There was significant change in sensory attribute, microbial load, moisture content and pH for all treatments. The acceptability of the sample Considering all the parameters viz. the change in sensory parameter, safety of food and nutritional quality, bharwa spice-mix paste treated with oil can be stored in refrigeration temperature up to 45days of storage period.***

Keywords: Bharwa Spice-Mix Paste, Citric Acid, Vinegar and Oil

1. Introduction

In earlier days, whole spices was purchased and ground at home. Soon after spices powder replaced the whole spice.In early 2000 ready to use spice-mix powders took over large percent of the market place.Now, in recent times the customer is demanding spice-mix paste which consists of dry spice-mix as well as wet components such as ginger, garlic, onion and tomato.Therefore, idea of bharwa spice-mix paste evolved as a complete flavouring component of Indian cuisine.Bharwa spice-mix paste is easy to cook and time saving. In this diligent schedule there is a dire need of working class women. It can also be used in different type of Indian curry. There must be an increasing level of processing may prevent losses of Fruits &Vegetables.West Indian cuisine is famous for stuffed vegetables like bharwabhendi (also known as BharwanBhendi, BhendiSambhariya), stuffed potato, stuffed eggplant & stuffed capsicum. Spices are reported to contain bioactive compounds imparting anti-oxidant, preservative and anti-microbial properties to the food. Therefore, there is a need to develop ready to use bharwa spice-mix paste for enhanced convenience and improved organoleptic properties. The main objective of the work was to study the effect of vinegar, citric acid and oil on shelf-life, physiochemical properties and overall acceptability of Bharwa spice-mix paste

2. Materials and methods

2.1 Raw material and preparation of ginger paste sample

Bharwa spice-mix paste was made from the spices generally available in the market. Whole spices were ground and mixed with other dry spices such as coriander powder, turmeric powder, chili powder, dry mango powder and salt. All these dry spice-mix was mixed with pre-heated onion paste, tomato paste and ginger-garlic paste. Bharwa spice-mix paste was treated by adding (0.1%, 0.2%, 0.3%) vinegar, (0.1%, 0.2%, 0.3%) citric acid and (3%, 5%, 7%)oil. Approximately, 100g of bharwa spice-mix paste was filled into aluminum pouches and stored in refrigerator for storage and shelf-life quality studies. Samples were drawn up to 45 days and were analyzed for quality parameters.

2.2 Sensory Evaluation

Sensory evaluation of bharwa spice-mix paste was carried out for flavor, appearance, texture and overall acceptability by panel members at interval of 0, 5, 10, 20, 30 and 45days.Samples were presented to panel members and were asked to rate evaluation according to 9-point Hedonic scale.

2.3. Microbiological analysis

Microbiological analysis signifies the shelf life stability of the product. Bharwa spice-mix paste samples were examined for microbiological analysis immediately after processing and on days of sample analysis throughout the storage period according to the standard methods for the populations of total mold load.

2.3.1. Total mold count (TMC)

9.7grams of Potato Dextrose Agar (PDA) were suspended in 250 ml distilled water by boiling followed by sterilizing at 15 lbs for 15 min and pH was adjusted to 5.6 at 25°C temperature. The plates were incubated at 37 (±2) °C temperature for 24hrs. All tests were carried out in replications and the mean values were reported. Results were expressed as colony forming units per gram (cfu/g) Jark (1998).

2.4 pH value of ginger garlic paste

The 10g of ginger garlic paste samples were taken along with 50ml-distilled water homogenized in a mixer grinder. The ground sample was filtered and the pH was determined by dipping the combined glass electrode of a digital pH meter **(Khera model, Indian make)** into the filtrate.

2.5 Moisture Content

The moisture content of garlic-ginger paste was determined as **AOAC (1980)** method. Ten grams of sample was transferred to weighed metallic dish which was then transferred to a hot air oven at 100°C and tried till a constant weight was obtained. The dish was kept in desiccators for cooling. After cooling, the loss in weight was determined to calculated moisture content and expressed as %.

$$\text{Moisture(\%)} = \frac{\text{Weight of fresh sample (g) - Weight of dried sample (g)}}{\text{Weight of fresh sample (g)}} \times 100 \quad (2.1)$$

2.6. Analysis of data

The experiments were planned using factorial randomized block design (RBD) with three replications using one factor analysis (Panse and Sukhtame (1967)) The data obtained were submitted to analysis of variance and the least significant differences were used to compare the different treatments individually.

3. Results and discussion

3.1. Effect on Sensory attributes during storage

Bharwa spice-mix paste samples stored at refrigeration temperature were sensory evaluated at 0 to 45 days for flavor, appearance, texture and overall acceptability. A decreasing trend in sensory scores of bharwa paste was observed with the length of time.

According to the market/consumer review survey the overall acceptability of the sample among the few which had the sensory score above 7.5 after 45th days of storage period was observed in 5% oil and 7% oil levels. The closest was 3% oil and 0.3% vinegar. The manufacturer/business owner would like to select the one that has highest score after 45 days of storage period or the one which is economical.

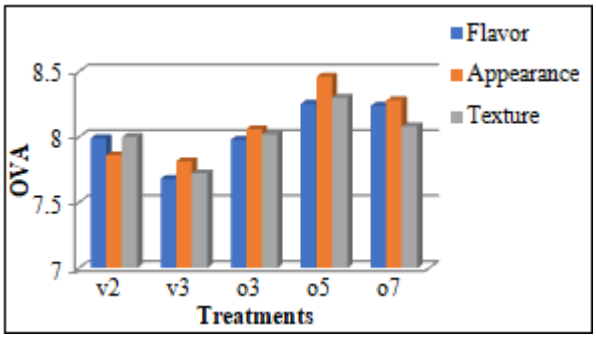

Figure 3.1: Effect of vinegar, citric acid and oil on overall acceptability

3.2 Effect on microbial load during storage

Fig. 3.2 shows that there is a significant difference in microbial load in samples treated with vinegar, citric acid and oil for storage periods starting from 0 to 45 days. Molds are aerobic organisms and cannot grow well under conditions where oxygen is limited. Vinegar and citric acid is works against bacteria but bacteria dose-not grow in spice due to its, bacterio-static and fungi-static property. Due to the presence of oxygen in the sample there might be growth of mold in the samples however sample with oil dose-not provide oxygen for the growth of mold, therefore, there is no growth or very microscopic growth of mold inside the sample and might be seen with further increasing the storage days.

Sample V3, V2, C2, O3, O5, O7 has no yeast and mold growth and V1, C1, C3 shows negligible growth. At the 45th day, microbial analysis of the samples resulting in growth of yeast and mold of V1-6 $\times 10^5$, V2 and V3 -5.67$\times 10^5$, C1-8$\times 10^5$, C2-8.67$\times 10^5$, C3-7.33$\times 10^5$, O3-5$\times 10^5$,O5-3.3$\times 10^5$,O7-2.67$\times 10^5$. The acceptable limit of the total mold count is 10^4 to 105 cfu/g for herbs and spices and for the foods that needs further cooking before consumption (Anonymous, 1995).Similar observations were also reported by Dash (2016)for ginger paste in different packaging materials and temperature conditions that The total mould count of the paste changed from the initial value of 0.33 (±0.03) × 10^5 to 1.33(±0.15) $\times 10^5$cfu/g in different packaging conditions.

Few accepted samples with lowest mold growth after 45th days of storage period was observed in 5% oil and 7% oil levels. The close third was 0.3% oil.

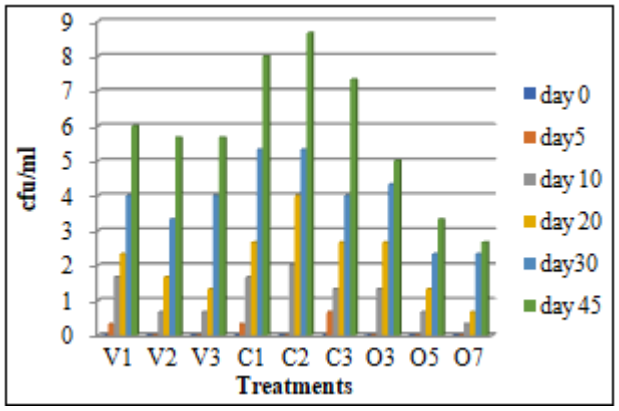

Figure 3.2 Effect of vinegar, citric acid and oil on yeast and mold count of bharwa spice-mix paste at varying storage days

3.3. Effect on physiochemical properties during storage

3.3.1 Effect on moisture content

Fig 3.3 shows that there is a significant difference for vinegar, citric acid and oil for storage periods starting from 0 to 45 days. The effects of vinegar and citric acid on moisture content at day0, day5 and day10 could be an experimental error. It is observed that with increasing storage period moisture content decrease significantly. The free water present in the paste might have been taken up by the bacteria from the surrounding through their cell wall resulting in reduction in moisture content in the surroundings. Similar finding was reported byAkhtar (2015), the moisture content of ginger garlic paste samples treated with microwave and conventional heating, was examined during the storage decreases from 68% to 60%.

Among the few accepted samples the lowest score for moisture content` after 45th days of storage period was observed in 5% oil and 7% oil levels. The close among them was 3% oil and 0.3% vinegar.

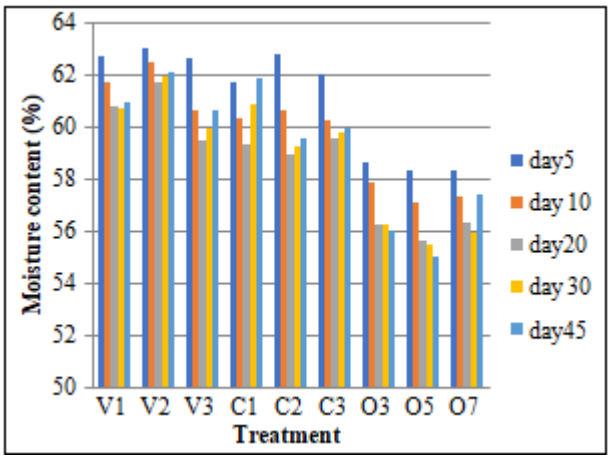

Figure 3.3: Effect of vinegar, citric acid and oil on moisture content of bharwa spice-mix paste at varying storage days

3.3.2 Effect on pH

Fig 3.4 shows that there is a significant difference for all three levels of vinegar, citric acid and oil for storage periods starting from 0 to 45 days. The pH of the product varies from 4±0.2 to 3.7±0.2 from day 0 to day 45. As such the bharwa spice- mix paste was found to be stable against bacterial spoilage up to 45days of storage.

As per the table stated below it can be state that the decrease in pH is due to the growth of the lactic acid forming bacteria producing lactic acid.Vegetables have neutral pH provide a natural medium for microbial development. Similar observations were also reported by Dash (2016) for ginger paste in different packaging materials and temperature conditions that lower the pH resulted in more stability against microbial spoilage of the commodity.

Among the few accepted samples the lowest score for pH after 45th days of storage period was observed in 5% oil and 7% oil levels. The close among them was 3% oil and 0.3% vinegar.

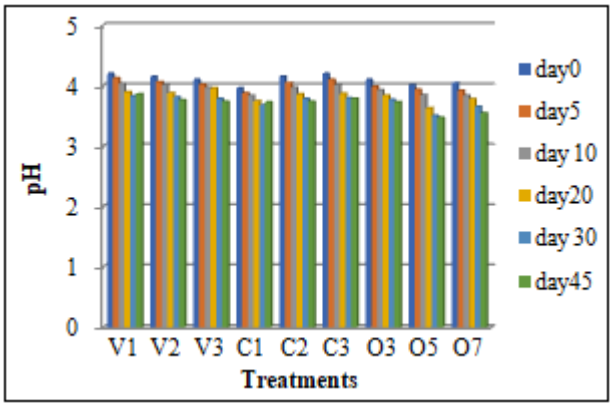

Figure 3.4: Effect of vinegar, citric acid and oil on pH of bharwa spice-mix paste at varying storage days

4. Conclusions

In the study we found that the addition of vinegar, citric acid and oil shows significant difference on the quality of Bharwa spice mix paste. The most effective result is showed by Bharwa spice mix paste treated with oil because the TMC increased with the storage period and sensory attributes are best compared to vinegar and citric acid and can be more acceptable by the consumer. Considering the change in sensory attribute and safety of food, bharwa spice-mix paste treated with oil and vinegar filled in aluminum pouches at refrigeration temperature may be recommended to store up to 45 days. Further, more studies using various advanced techniques of non-thermal processes are needed to extend the shelf life of the bharwa spice-mix paste.

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