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EVALUATING THE ACCEPTABILITY OF TWO READY-TO-DRINK FLAVOURED ICED TISANE BEVERAGES MADE FROM MORINGA OLEIFERA.

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ABSTRACT

The Functional Beverages category is massively expanding as consumers explore diets with well-ness-aligned ingredients such as *Moringa oleifera*. *Moringa oleifera* is among the most valuable plants in the world, recognized for its high protein content, nutraceutical properties and source of micronutrients. The study explored the acceptability of two ready to drink flavoured iced tisanes or herbal infusions made from *Moringa oleifera*- 'Vital Orange'- orange flavoured and 'Root Orange'- orange and ginger flavoured. The processing steps included boiling the Moringa leaves, allowing the extract to steep, followed by sweetening and flavouring with different extracts once cooled. Stability of the product was determined through quality checks over a 21-day shelf-life study. The results demonstrated that over time the colour, pH, and Brix remained relatively stable. Optimum temperature for storage was 4-10°C. Microbial analysis showed zero growth for the presence of coliforms or pathogenic bacteria namely *E. coli* and *Staphylococcus aureus* respectively highlighting efficient pasteurization and sanitation methods employed during processing. Total flavonoid and phenolic content of the beverages were determined. The results showed that both products were a good source of flavonoids and phenols therefore *Moringa oleifera* leaves can be considered as a source of antioxidant compounds with activity sufficient to reduce the activity of free radicals and reactive oxygen species. Sensory evaluation was carried out using a paired comparative test attached to a Hedonic Scale, with the participation of 50 panelists. Collected data were analyzed and the Root Orange flavour was identified as the most preferable sample for each attribute studied; appearance, taste, colour, mouthfeel, flavour profile and overall acceptability. The developed product represents a promising blend of nutrition and refreshment, aligning with consumer trends towards functional beverages.

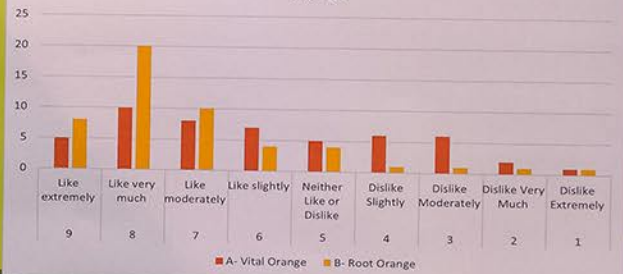
Keywords

Moringa oleifera, iced beverage, tisane, herbal infusion, flavoured beverage, functional beverage

RESULTS

Parameter	Average Values
pH	4.39
Brix	18.1%
Colour	L* 63.83 a* 4.19 b* 28.52
Total Phenolic Compounds	268 mM gallic acid equivalent (mM GAE)
Total Flavonoids	1991 quercetin equivalent (QE) at 100 mg extract
Microbial Testing	
Total Aerobic Plate Count	0 CFU
Presence of coliforms and <i>E. coli</i>	0 CFU
Presence of <i>Staphylococcus aureus</i>	0 CFU

Acceptance- Code 472- Vital Orange vs Code 356-Root Orange



INTRODUCTION

Functional foods are novel foods that have been formulated so that they contain substances or live microorganisms that have a possible health-enhancing or disease-preventing value, and at a concentration that is both safe and sufficiently high to achieve the intended benefit. The added ingredients may include nutrients, dietary fiber, phytochemicals, other substances, or probiotics. The Functional Beverages category is massively expanding as consumers explore diets with wellness-aligned ingredients such as *Moringa oleifera*. *Moringa oleifera* is among the most valuable plants in the world, recognized for its high protein content, nutraceutical properties and source of micronutrients. Commonly referred to as the drumstick tree, the leaves of *Moringa oleifera*, when steeped in hot water release vitamins, minerals, antioxidants and other essential nutrients. Though indigenous to Pakistan and India, it is now widely found in several tropical, Pacific, West African, Central American and Caribbean countries, such as Trinidad and Tobago.

Tisanes or herbal infusions are beverages made from the infusion or decoction of herbs, spices or any other plant material in hot water. Tisanes can be consumed as a hot or as an iced beverage. Leaf tisanes, for example from *Moringa oleifera*, is gaining increasing popularity among consumers, as they are often consumed for their perceived medicinal effects, relaxant and therapeutic properties. The flavour of tisanes can be enhanced by the addition of fruits, vegetables, herbs and spices.

The current study is aimed at determining the microbial and chemical stability of tisanes made from *Moringa oleifera* and evaluating the sensory attributes and acceptability of two ready to drink flavoured iced tisanes or herbal infusions made from *Moringa oleifera*- 'Vital Orange'- orange flavoured and 'Root Orange'- orange and ginger flavoured by consumers.

DISCUSSION

Stability of the product was determined through quality checks over a 21-day shelf-life period, where samples were stored under temperatures (4 OC, 10 OC and 20 OC). The results demonstrated that over time the colour, pH, and Brix remained relatively stable at the optimum temperature for storage 4-10°C. Colour analysis revealed that there was no significant change (P>0.05) over the 21-day period among initial final values, indicating the relative stability of the chlorophylls and carotenoids post steeping treatment. The quality parameters, Brix and pH, remained relatively constant, with a standard deviation of 0.141 for Brix values measured throughout the testing period and average pH value of 4.39. *Moringa oleifera* leaves can be considered a significant source of antioxidant compounds. Total flavonoid and phenolic content of the beverage was determined and the average total flavonoid value was 1991 quercetin equivalent (QE) at 100 mg extract and the average total phenolic value was 268 mM gallic acid equivalent (mM GAE). The results showed that the tisane retained high levels of both the flavonoid and phenolic compounds, and therefore contribute to activity sufficient to reduce the activity of free radicals and reactive oxygen species. Microbial analysis showed zero growth for the presence of aerobic bacteria, coliforms or pathogenic bacteria namely *E. coli* and *Staphylococcus aureus* respectively highlighting efficient pasteurization and sanitation methods employed during processing. For the sensory evaluation, 64% respondents indicated preference for Code 356 Root Orange over Code 472 Vital Orange, in regards to overall taste and palatability. Panelists indicated acceptance for Code 356, with 40% indicating that it was liked very much, 20% indicating that it was liked extremely and also liked moderately. Panelists found that Code 356 had a good balance of flavour, not medicinal, as commonly associated with herbal infusions or tisanes.

METHOD

Stepwise- Code 472- Vital Orange

- Sort and wash *Moringa oleifera* leaves.
- Soak leaves in a 5.0 ppm chlorine solution for 5 mins.
- Add leaves to water and boil for 6 mins.
- Steep for 25 minutes to allow *Moringa oleifera* mixture to infuse and to cool entirely.
- Strain mixture. Squeeze and crush leaves to ensure maximum flavour extraction
- Flavour mixture with orange extract, sugar and lemon juice.

Stepwise- Code 356- Root Orange

- Sort and wash *Moringa oleifera* leaves.
- Soak leaves in a 5.0 ppm chlorine solution for 5 mins.
- Add leaves and ginger to water and boil for 6 mins.
- Steep for 25 minutes to allow *Moringa oleifera* mixture to infuse and to cool entirely.
- Strain mixture. Squeeze and crush leaves to ensure maximum flavour extraction
- Flavour mixture with orange extract, sugar and lemon juice.

CONCLUSION

Tisanes or herbal infusions made from *Moringa oleifera* provide a refreshing alternative to tea. From this study, a high quality *Moringa oleifera* tisane was developed and assessed through various physicochemical, microbiological and sensory tests to determine its overall acceptability. These results demonstrated the potential for the introduction of a consumer acceptable tisane into the market, in the functional beverages category and further testing and product development should be explored.

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