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Optimizing pickled carrot recipes by integrating tropical fruits and aromatic vinegars

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Abstract: This paper proposes the development of innovative recipes for pickled carrots enriched with tropical fruits and aromatic vinegars in response to the growing demand for clean label products. Six experimental variants were formulated, varying the type of vinegar (wine and rose) and the proportion of mango or pineapple (10-20%). The research aimed to characterize the products by determining titratable acidity, pH values and sensory evaluation by a consumer panel. The results showed that all variants fell below the microbiological safety threshold (pH < 4.5), while those with pineapple 15% and wine vinegar obtained the best sensory scores, indicating an optimal balance between acidity and natural sweetness. Mango formulations, particularly at higher concentrations, showed lower scores, associated with a flavor and visual imbalance. The study highlights the role of ingredients in defining the sensory profile of canned acidic products and provides a scientific basis for optimizing artisanal recipes with potential for valorization in the sustainable food industry.

Introduction

In response to the growing demand for functional, natural, and high-nutritional-value foods, the development of innovative products such as vinegar-preserved vegetables is gaining relevance. Vinegar acidification is a traditional preservation method proven to inhibit microbial growth while maintaining sensory quality. Carrots, rich in carotenoids, fiber, and bioactive compounds, are ideal for such applications. The addition of tropical fruits like pineapple and mango enhances the sensory profile and functional value of the products. The type of vinegar used (wine or rose) influences the aroma, taste, and overall acceptability. Current research supports the potential of these combinations as sustainable, clean-label food solutions aligned with modern consumer preferences.

Ingredients Samples to analyze T4 T5 T6 T2 T1 T3 300g 300g 300g Carrot 300g 300g 300g Pineapple 45 g 60 g 30 g ---45 g 60 g 30 g Mango 5 g 5 g 5 g Onion 5 g 5 g 5 g Garlic 1 g 1 g 1 g 1 g 1 g 1 g 0.3 g Peppercorns 0.3 g 0.3 g 0.3 g 0.3 g 0.3 g 5 g 5 g 5 g 5 g 5 g Mustard 5 g seeds 1 g 1 g 1 g 1 g 1 g Dill 1 g 10 g 10 g 10 g 10 g 10 g Salt 10 g 225 225 225 225 Water 225 225 ml ml ml ml ml ml 50 Wine 50 50 50 vinegar 7º mlml mlml 50 Rose vinegar 50 ml ml70

Results and discussions

The six experimental variants were distinguished by the type and proportion of tropical fruit and vinegar used, with all samples based on a consistent carrot and spice matrix, revealing how these controlled variations shaped the sensory and functional profile of the final product.

From the perspective of pH and titratable acidity, sample T1 (15%) pineapple with wine vinegar) stood out with the highest microbiological stability, showing the lowest pH (3.65) and the highest acidity (2.00%).

Material and method

The study involved six experimental carrot preservation variants, varying vinegar type (wine or rose) and tropical fruit content (mango or pineapple at 10%, 15%, and 20%) to assess their impact on the product's sensory and functional properties.







The sensory evaluation revealed that T1 (pineapple 15% with wine vinegar) consistently achieved the highest scores across all attributes, while T5 and T6 (mango-based) showed lower overall acceptability, highlighting the importance of fruit type and proportion in shaping sensory quality.

The total sensory scores show that sample T1 (pineapple 15% with wine vinegar) was the most appreciated overall (45.58), closely followed by T4 (mango 15%), while samples T5 and T6 had the lowest acceptability, confirming the importance of ingredient balance in sensory perception.

Conclusions

The combination of carrots with tropical fruits, especially pineapple and wine vinegar, proved to be the most effective in achieving microbiologically stable and sensorially appealing products, supporting the development of clean-label, additive-free foods with market potential.