Product Development and Sensory Evaluation of Novel Sparkling Vinegar Beverage
A Healthier Option for Carbonated Beverages
Jericho Turingan, Culinary Science
Rosemary Trout MS, Instructor of Culinary & Food Science

Abstract

Vinegar has historically been recognized as having a number of health benefits due to therapeutic compounds including: gallic acid, catechin, epicatechin, chlorogenic acid, caffeic acid, p-coumaric acid. Benefits from vinegar may include: antioxidative, antimicrobial, antivirus, anti-inflammation, and cholesterol-lowering properties. Due to its effectiveness against mycobacteria, vinegar has been used to treat infections throughout history. Vinegar has many important applications in the culinary world. It adds a sour taste component to savory dishes such as: dressings, flavoring/cooking proteins. It also acts as a natural preservative by lowering pH.

This study focused on developing flavors for carbonated vinegar beverages that would be palatable for the average American consumer as a possible replacement to some of the high sugar, carbonated beverages in the market. The flavor was incorporated into carbonated water with the use of SodaStream technology. A sensory panel of college students and faculty members determined if the product is palatable and can compete with beverages currently available in the market.

Materials & Methods

Recipe Formulation:
All equipment was pre-washed and sanitized in a commercial dish washing machine. Lemons and Limes were cut in half with a chef’s knife and juiced in a juicer. Juices were strained in a mesh, stainless steel strainer in order to remove any seeds and flesh that may have been in the juices. Simple syrup was made with a 1:1 ratio of sugar and distilled water. The simple syrup was then heated in a clean, heavy-bottomed, stainless steel pot until the sugar was completely dissolved. A SodaStream was used in order to carbonate water. Each ingredient was measured out and combined in clean glass beakers.

Input from students and faculty was used to choose a specific sweetener and a type of vinegar, and adjust the formulation in order to reach a base product. Different sweeteners and vinegars were used in development of the product. Sweeteners used in recipe development include: agave, honey and sugar/simple syrup. Simple syrup was used as it did not heavily affect the color of the drink, and is a relatively cheap ingredient to use in beverages. Vinegars used in the development of this drinking vinegar include: white and red wine vinegars, apple cider vinegars, white distilled vinegars, and coconut vinegar. Coconut vinegar was used due to its smoother taste and odor and to give the beverage a more “exotic” label. Apple cider vinegars and white distilled vinegars had very strong aroma and flavors. Red and white vinegars had a more pleasant taste, but were not used, as it did not fit the goal of achieving a “lemon-lime” flavor. The final product’s pH was also recorded.

Final formulation of the drinking vinegar:
- 300mL carbonated water
- 45mL Simple Syrup (1 part water, 1 part sugar)
- 20mL Lime Juice
- 20mL Coconut Vinegar
- 15mL Lemon Juice
- Final pH of vinegar drink

Sensory Analysis/Product Testing
A two-day sensory analysis session was used to analyze the flavor of the final product and to see if the product can compare to other commercial carbonated products in the market. A total of 65 participants consisted of Drexel Students and Drexel Faculty and ranged in age and background (18 years old+). Samples were labeled with 3-digit binding codes presented in a balanced order; all samples were tasted in one session. Participants scored the acceptability of the samples using a 1-10 hedonic scale (0=dislike extremely, 9=like extremely). Participants were also asked if they would buy any of the samples if given the choice as well as to provide any comments explaining why they liked or disliked the sample.

Results

The pH reading for the vinegar beverage resulted in a pH of 2.82, which should be able to have a relatively long shelf life as it is acidic. Each carbonated beverage was assigned their own sample number. Sample 897 contained SanPellegrino Sparkling Water, 211 contained the Sparkling Vinegar Drink, and sample 667 contained 7UP. The overall taste of the Sparkling Vinegar drink was neutral. For taste, the sparkling vinegar beverage had a mean of about 4.77 scoring higher than the SanPellegrino but lower than 7UP. The data shows an overall neutral liking for the taste of the vinegar beverage although about 30% of participants found the taste of the Sparkling Vinegar palatable and gave a score above 7. The appearance of the vinegar beverage was relatively neutral with a mean of 4.01, though not as liked as samples 897 and 667. Unfortunately, the odor for the vinegar beverage was relatively harsh compared to the other samples having a mean of 3.23, scoring lower than SanPellegrino and 7UP. About 75% of participants did not like the odor of the beverage and scored it below a 5.

Some comments by participants included: “[The] vinegar smell slightly set me off…on the contrary, the taste was rather pleasant, though not as liked as samples 897 and 667. Unfortunately, the odor for the vinegar beverage was relatively harsh compared to the other samples having a mean of 3.23, scoring lower than SanPellegrino and 7UP. About 75% of participants did not like the odor of the beverage and scored it below a 5. Overall, the vinegar beverage was neither greatly disliked, nor greatly liked. The vinegar sample can compete with other carbonated beverages currently in the market as its taste is relatively palatable, though its appearance and odor must be adjusted. With the data, the product could be further developed to incorporate more sweetness, have a more pleasant and less cloudy color, as well as use less vinegar and more aromatics to combat its off-putting odor.

Conclusion

Overall, the vinegar beverage was neither greatly disliked, nor greatly liked. The vinegar sample can compete with other carbonated beverages currently in the market as its taste is relatively palatable, though its appearance and odor must be adjusted. With the data, the product could be further developed to incorporate more sweetness, have a more pleasant and less cloudy color, as well as use less vinegar and more aromatics to combat its off-putting odor.

References