Natural Sugar Substitutes In Sugar Free Ice Cream

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Abstract

Artificial sweeteners have become increasingly more popular over the years as good sucrose substitutes but how do these sweeteners affect ice cream? As most of the population is struggling with obesity and diabetes, is there a way to make an ice cream that is both high in nutritional content and tastes good? The purpose of this experiment is to determine the effect on volume, texture, flavor, aftertaste, and meltability when substituting naturally occurring sugar substitutes for liquid Stevia in vanilla ice cream. This was done by mixing 4 different batches of ice cream using different naturally occurring sweeteners (honey, agave, and date syrup) with liquid stevia as the control. Each ice cream was then tested via sensory evaluation and line spread tests to see how the sweeteners affected the ice cream in taste, texture, flavor, aftertaste, and meltability.

Methods

1. Locate variable either agave, honey, or date syrup
2. Measure heavy whipping cream, half & half, and vanilla, add the assigned variable (3x) Using the same containers of heavy whipping cream, half & half, and vanilla for each variable.
3. Add all ingredients into a large mixing bowl with a whisk attachment.
4. Mix ingredients for 2 minutes on low to ensure everything is well blended. Using the same brand of electric mixer and mixing bowl for each sample.
5. Add ice cream base to an ice cream machine and mix until mix is no longer liquid and holds its shape. Using the same brand of ice cream machine.
6. Place mixed ice cream samples into the freezer and allow to freeze for 40 minutes.
7. Conduct the line spread test. Record the results
8. Place ¼ cup of each ice cream variable into cups for the sensory evaluation.

Results

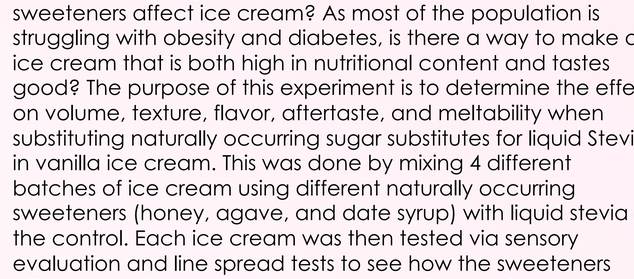

Figure 1: Line Spread Test Result Photos

Samples	Texture	Flavor	Aftertaste	Total
11- agave	4.2	4.4	4.3	12.1
87- honey	2.7	3.1	3.2	8.3
26- date	3.3	3.1	2.7	8

Figure 2: Sensory Evaluation Results

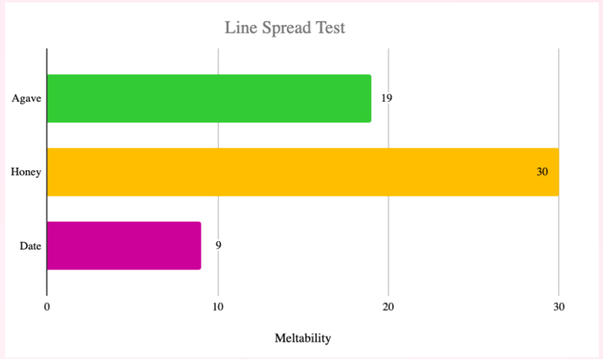

Figure 3: Line Spread Test Graph

After executing our experiments, we found differing results depending on the test sample. The date syrup sample resulted in the lowest meltability, found via the line spread test, as well as the lowest overall sensory evaluation average. The honey sample was found to have the highest meltability, considerably higher than the other samples, while ranking second in the sensory evaluation. The agave sample had the average meltability when compared to honey and date syrup, and resulted in the highest scores in the sensory evaluation.

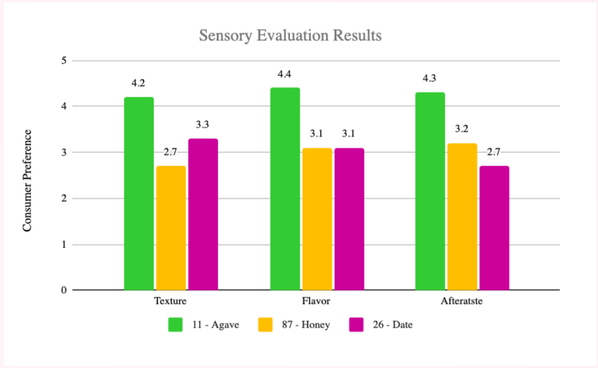

Figure 4: Sensory Evaluation Results

The drastic difference in the honey sample in terms of meltability can be attributed to extraneous variables, due to the lack of ice available at the lab at the time. In light of this, the honey sample did not have adequate materials and time to freeze adequately to produce a desirable texture. The date syrup caused the sample to have a darker appearance, which is likely to have influenced the sensory evaluation in terms of taste, regardless of the fact that they all were vanilla-flavored. Overall, the agave ice cream was determined to be the desirable product when in search of a palatable and satisfying naturally sweetened ice cream, on account of the texture and superior results from the sensory evaluation, being pleasing flavor and aftertaste

Conclusion

Out of the four samples that were created, three of the bases (agave, date syrup, honey) were set correctly after being churned for 30 minutes in an ice cream maker . The control that was created had too much liquid Stevia which caused the ice cream to have a very unpleasant flavor even though the mix set up correctly it was unpalatable. This result shows that the use of liquid Stevia doesn't affect the ability of the ice cream to set correctly. The honey mixture did take twice as long to churn due to lack of ice for ice cream makers, however after adding more ice and spinning it fifteen minutes longer the honey mixture was able to set up correctly. The use of agave and date syrup had no effect on the ice cream's ability to set to the correct consistency. The result of the line spread test concluded that the use of date syrup and agave had no effect on the meltability of the ice creams. The honey ice cream did melt faster due to extraneous variables however, the taste was not affected. All three samples were placed in the freezer for forty minutes to ensure ice cream was frozen for the sensory evaluation, and line spread tests. Agave ranked first in the sensory evaluation with the honey mixture a close second based upon texture, flavor, and aftertaste. The date syrup mixture wasn't far behind but most evaluators found the color of the ice cream to be off putting; however, the use date syrup didn't affect the taste, aftertaste, or texture. Overall all three of the ice creams ranked pretty closely in texture, flavor, and aftertaste which proves the hypothesis that using naturally occurring sweeteners can be a good way to make ice cream bases. Further research is needed to learn about the nutritional impact that these sweeteners can have.

References

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