

Aloe Veracity: DNA Barcodes of Aloe Vera and Different Products Claiming to Contain Aloe Vera

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Abstract

Aloe vera can be found in drinks and topical products and is known for its healing and medical properties. Aloe is most often found in gels and juices. Based on the labeling of the products, it was hypothesized that traces of the aloe that came from the leaves would be present in the products. The purpose of this experiment was to analyze the DNA of two different species of aloe vera leaves and extract DNA from three different products. If DNA is collected from aloe products and plants, then the same aloe vera DNA will be found in each sample. The samples were gathered from drugstores and fresh leaves. Results showed there was no DNA in the products, but there was DNA in the leaves. This means that there was either an experimental error, the DNA in the products was denatured, or that the products did not truly contain aloe.

Introduction

- Aloe is a popular commodity, highly regarded as a common pharmaceutical and cosmetic essential, helpful when treating internal and external problems.
- Although many products claim to aid digestive, immune, skin, and heart problems, “...many experts caution that there is not enough scientific evidence to support all of aloe vera’s uses” (Owens).
- There have been many accusations that question that veracity of products containing aloe vera.
- The purpose of this experiment was to barcode the DNA of two aloe vera leaves from different locations and compare them and extract aloe vera DNA from three different products.
- In doing this, the results from the products were to be compared to each other and the leaves to determine whether or not the product advertising is fraudulent.
- It was hypothesized that the leaves and the products would share the same DNA.

Materials and Methods

- Two samples of aloe leaves were obtained from different locations
- The first was a Brazilian leaf given to the group by Dr. Andrade (our mentor)
- The second was a Mexican leaf purchased from an ethnic supermarket called the Gourmet Garage.
- Three other types of aloe products were purchased from different locations: two different types of gel and a bottle of aloe juice.
- Eleven tubes were washed clean and labeled before use.
- ½ inch pieces of the leaves were used to extract the aloe gel from within
- The gels extracted were then placed in a 1.5 mL tubes.
- The products were put into 1.5 mL tubes as well.
- For each leaf and product, two samples were made. The eleventh tube was used as a plant control.
- The samples were ground up against the inner surface for approximately one minute.
- The gel was then incubated in a 65 degree Celsius bath for 10 minutes
- The sample was placed in a micro centrifuge
- A new set of 1.5 mL tubes were labeled
- 150 µ of the samples were placed into the new set of tubes.
- The samples were then placed back into the centrifuge.
- 100 µL of distilled water was added to the silica resin and incubated at 57 degrees Celsius for 7 minutes
- Then the sample was placed in the micro centrifuge at full speed for 30 seconds
- 90 µL of supernatant was transpired to a freshly labeled tube.
- The samples were stored at -20 degrees Celsius until they were sent to the lab for barcoding.
- The findings were documented using our account on Urban Barcode.
- A chart was used to organize the data in an efficient manner.



Aloe Vera Gel



Aloe Vera Leaves (Cut Open)



Aloe Vera Plant



Aloe Vera Juice

Results

Table 1. Data Collected from the Barcode Subway Analysis

Sample Type	Date Purchased	Location of Purchase	Presence of Plant based DNA	Species Identified
Real Homegrown Aloe Leaves (Control)	January 7, 2016	Mentor's House	Yes	Aloe Vera
Supermarket Aloe Leaves Sample A	January 14, 2016	Gourmet Garage	Yes	Aloe Vera
Aloe Vera Gel A	January 14, 2016	Duane Reade	No	N/A
Aloe Vera Gel B	January 14, 2016	Rite Aid	No	N/A
Aloe Vera Juice	January 20, 2016	Fairway	No	N/A

- Different types gel, juice and leaves claiming to have aloe DNA, were tested for its presence.
- The two gels and the juice were all bought in different places and none of them appeared to have plant DNA.
- It was not possible to test them for aloe DNA.
- Plant based DNA was found in the leaves.
- Both aloe leaf samples had aloe vera DNA and were collected in different places.

Discussion

- From the results it can be concluded that both the Aloe plants have the same DNA, while the Aloe Vera Gels and juice do not. Although the two different leaves were from two different regions of the world, their DNA appeared to be the same.
- Errors that may have occurred during the experiment are
 - Cross contamination between the various samples
 - If this occurred, then one sample’s DNA may have shown up in a different sample.
- The juice and gel samples may have actually contained aloe DNA, however the amount of DNA was too small to be properly synthesized.
- During the extraction process of the DNA there could have also been a mistake, such as, the pellet being punctured in the processes.
- The product may have originally contained DNA, but the DNA may have become denatured during the production process.
- In the future it is a good idea to do further testing on aloe products in order to see if products claiming to contain aloe vera truly do.
- This should be done on aloe products that do not required heating during production (thus minimizing the risk of DNA denaturation).

References

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Photos

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