

ABSTRACT:

Chili peppers from South America (Chile, Bolivia and Peru) were characterized in order to see the differences in their DNA. We hypothesized that there would be few, but distinct differences between the species. Our objective was to view the differences using DNA analysis, and categorize these differences. We wanted to find out what species of peppers we were working with and what their phylogenetic tree looked like. We used PCR analysis to amplify the DNA and gel electrophoresis to determine the samples we have collected. We found that all of our pepper samples contained DNA and they were all distinctly different, no two peppers were the same species. This tells us that there are distinct differences between types of chili peppers. This also tells us that even though peppers originate from the same country they are very different, we also obtained the phylogenetic tree and found that some of our samples originated from other samples. The three peppers were different species although they looked almost identical and all came from South America.

INTRODUCTION:

Chili's are a staple in many hispanic and asian cuisines. However, we don't really know what we are eating and how the peppers vary based on the country they originated in. In our project, we will be extracting DNA from chili spice samples from 3 different countries in South America. The goal of the project is to look for differences in the DNA sequences of the chili peppers grown in different countries. There are 26 different species of chili peppers in the world and they all originate from South and Central America. All 26 types of chili peppers started from the same original species, and by sequencing the DNA we can see where the species began to change and what differences in their environments caused these changes. Over time chili peppers have increased in size due to their genome sequence. The molecular patterns have changed as well. Peppers are one of the oldest crops in the Western Hemisphere, giving the species more time to evolve and change throughout its existence. *Capsicum annuum* is a species of chili pepper that originates in North and South America. This type of pepper can survive through many seasons and differing weather conditions. This species thrives especially in warm climates. Another type of pepper, *Capsicum baccatum* yields from Bolivia and Peru. This type of pepper has black seeds and hairy leaves, showing that the climate it is grown in differs from other places of origin for the pepper. All the *Capsicum baccatum* peppers have a very specific capsaicinoid content, which makes them possess a different flavor and heat than other species. This species is known for being able to thrive in very cold temperatures which other chili species can not grow in. Even though these peppers all originate from the same original species, they have evolved and become very different. Our project will look to see where these changes are in their DNA and if the different environments they grow in effect these differences.

MATERIALS AND METHODS:

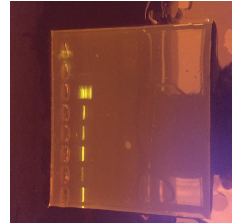
Our peppers were all purchased at a local grocery store, under the common name chilli peppers, we did not know the species of the peppers purchased. We bought four different types of chilli peppers, all different colors and sizes, that were presumed to be different species.

We used PCR analysis to isolate DNA and gel electrophoresis to confirm that there was DNA present in our samples.

Results

After extracting the DNA from the Chilli peppers, we uploaded pictures of the Gel electrophoresis to our database and sent the samples to be analyzed. It was clear that the species had originated from each other.

DNA EXTRACTION OF CHILI PEPPERS BY THE SPICE GIRLS



RESULTS:

Sample	Country of Origin	Species Identified
Sample 1	Brazil/Central America	Capsicum annuum
Sample 2	Brazil/Central America	Capsicum baccatum
Sample 3	Brazil	Capsicum praetermissum
Sample 4	Brazil/Central America	Capsicum chinense



In this phylogenetic tree shown above, KHP-002 is *Capsicum annuum*, KHP-003 is *Capsicum frutescens*, KHP-004 is *Capsicum praetermissum* and KHP-005 is *Capsicum chinense*. This clearly shows that there is a phylogenetic tree that can link the peppers, and they have a lot of similarities, specifically samples KHP-003 and KHP-005.

DISCUSSION

From our findings, it is evident that all samples are related and we can see that they are all different species. Our hypothesis that these peppers are all different species that are related, was supported. The significance of our findings was that all four types of chili peppers are different species that are phylogenetically related, which supports our initial hypothesis.

ACKNOWLEDGMENTS:

Dr Andrade

World of Chillies The hottest chillies from around the world. (n.d.). Retrieved November 10, 2015, from <http://www.worldofchillies.com/Chilli-plant-varieties/Chilli-plant-varieties-Baccatum/Chilli-plants-Capsicum-Baccatum.html>

World of Chillies The hottest chillies from around the world. (n.d.). Retrieved November 10, 2015, from <http://www.worldofchillies.com/Chilli-plant-varieties/Chilli-plant-varieties-Capsicum/Chilli-plants-Capsicum-Annuum.html>

Genome sequence of the hot pepper provides insights into the evolution of pungency in *Capsicum* species. (n.d.). Retrieved November 10, 2015, from <http://www.nature.com/ng/journal/v46/n3/full/ng.2877.html>