NicoTeam

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Abstract

Using the technologies at the lab's disposal, samples of each cigarette were to be tested and the various strands of DNA found within the cigarette would be documented. After testing each brand and documenting the DNA's found within, data would be sent to a lab, whereupon DNA results would be paired with a species of organic material. With this knowledge, the contents of different cigarettes could be compared and tallied. Researching the labeled species would allow conclusions regarding their significance within the cigarettes' formula to be found. For example, some species of *nicotiana* have many times more nicotine than others. *Nicotiana Rustica* contains up to nine times more nicotine than traditional tobacco. If significant amounts of *N. rustica* are present within a cigarette composition, it may be concluded that the *N. rustica* is being used as filler, which would allow for higher nicotine concentration per cigarette.

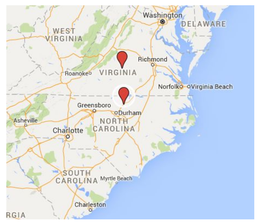
Introduction

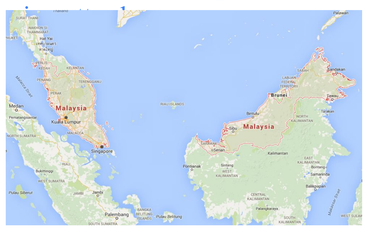
In this experiment we tested the contents of different brands of cigarette for several key distinguishing factors. Our goal was to identify different species of nicotiana and also to find and classify other organic material (beside traditional *Nicotiana Tobacum*) which may have been present in brands of cigarette. Cigarettes are commonly used as a device for stress relief. In most individuals, nicotine induces relaxation and mental sharpness. Nicotine is a highly addictive drug. With continued ingestion, users grow dependent upon the chemical, requiring it to function at a normal mental capacity. Prolonged absence of nicotine in an addicted user's 'diet' will cause negative effects such as headaches, nausea and depression.

Materials & Methods

Some of the cigarettes we were supplied with came from sources outside of the United States (purchased and delivered legally by adults), and were made locally in the countries they were sent from. We used these cigarettes to look for other species of tobacco not grown in the U.S.. These cigarettes helped us broaden the species of *nicotiana* that we were able to test for.

We followed the lab procedures outlined in the DNA Barcoding 101 manual from the Urban Barcode Project. We isolated the DNA using a centrifuge, incubation, lysis solution, and silica resin. We then amplified the DNA by PCR(Polymerase Chain Reaction). We used *rbc*L primers to find plant materials. We then isolated the amplified DNA using Gel Electrophoresis. We compared the bands on our samples to the bands on control samples to see if we have plant DNA. We would then have done a BLAST search after sending in our samples to see what DNA the samples we have collected from the





Results

Unfortunately we did not get results from our DNA extraction and could not redo the extraction in time. If we had gotten DNA, we would have been able to tell what species of tobacco was in the cigarettes, which would allow us to make conclusions about whether companies are using filler tobacco to increase nicotine content in the cigarettes. We would also have been able to see if foreign brands use the same or different species of tobacco. Lastly we would have seen if there was foreign material used as filler in the cigarettes, which may have saved companies money.

Discussion

The curing the process of the tobacco may have resulted in damage done to the plant's DNA. If this is true, the DNA may have been untraceable to a specific plant or strain of tobacco. Damage to DNA, if any, may be consistently present in certain parts of the *nicotiana.* Damage to other organic material found in the cigarettes, if any, may be consistently present in certain part of the foreign plants' DNA strand. Another error that could have occurred is if after the DNA was mixed with lysis solution, some excess lysis solution could have been in the 1.5 mL tube overnight, resulting in denaturation of DNA. Another error that may have occurred is the error of the segmentation of the process of extracting DNA. We used multiple class periods to conduct the DNA extracting, and since the process is supposed to take place in a single day, the percentage of DNA that one would get from segmenting the DNA extraction is unknown. One error that may have occurred is the crushing of the plant to get the cells to break to get the DNA inside. As plant cells have a hard cellulose wall, it would be harder to access the DNA from inside the cell if the plant was not crushed enough. That would affect the data by lowering the percentage of DNA that we got comparatively to what we should have gotten.

References

Nicotiana Rustica. *Nicotiana Rustica*. U.S. National Plant Germplasm System, n.d. Web. Apr.-May 2016.

Nicotine Side Effects in Detail - Drugs.com. *Nicotine Side Effects in Detail - Drugs.com*. N. p., n.d. Web. 31 May 2016.

Using DNA Barcodes to Identify and Classify Living Things. *Using DNA Barcodes to Identify and Classify Living Things*. DNA Barcoding 101, n.d. Web. Apr.-May 2016.

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