Plants and Antibiotic Bacteria

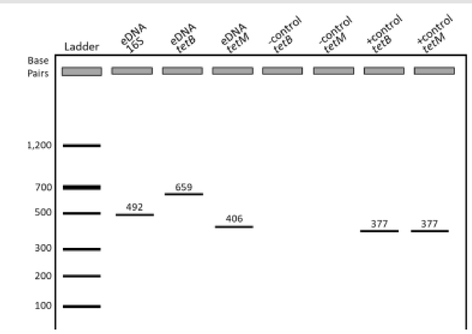
Madison Davis

Research Question:

Can we find the perfect soil conditions for antibiotic growth using different plants to shrink the issue of antibiotic resistance in the medical field?

Introduction

The quantity of antibiotic medication for bacterial infections have been decreasing due to the misuse and overuse of antibiotics in the medical field. This results in the rise of antibiotic resistance in bacteria, causing bacterial infection to become significantly more dangerous. Moreover, the market for antibiotics is still low, averting peoples' interest in discovering new ones. In this experiment, I would like to find a precedent where a soil type would be able to produce the most antibiotic material using tetracycline primers.

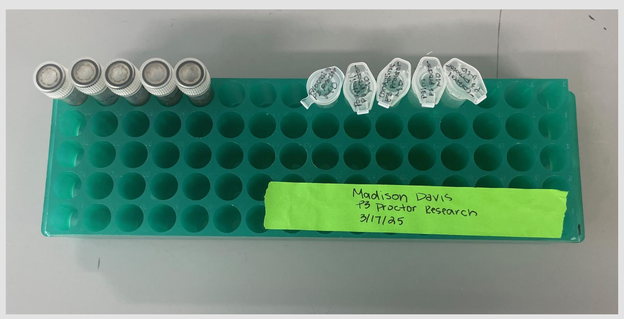


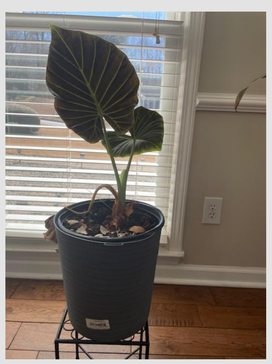
Tetracycline Background:

Tetracycline is a bacteria that is often found in soil; however, it was soon isolated from soil bacteria, and able to work as an antibiotic. It works by blocking translation in bacteria cells, but not animal cells, resulting in the antibiotic killing bacterial infections, but not harming humans. Tetracycline is extremely useful, and inexpensive, which has caused it to become an antibiotic that is frequently used for different types of bacterial infections. For instance, doxycycline is an antibiotic commonly used to treat acne, while minocycline is an antibiotic use to treat bacterial infections like pneumonia. Both are from the sample tetracycline family, but they perform 2 completely different task. Furthermore, 2 examples of tetracycline resistance genes that are being used for this experiment are tetB and tetM. TetB is a resistance gene that works by binding to the ribosomes, blocking translation, and pumping tetracycline out of the cell. While tetM does not prohibit translation, it produces a protein that binds to the ribosome and blocks tetracycline from binding. Both resistance genes are an important components that help tetracycline function.

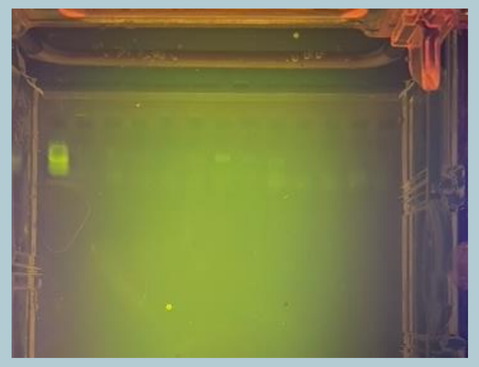
Methodology:

To test for antibiotic growth in the soil, I extracted DNA from 4 different soil samples, each with a different type of plant in them. After extracting and purifying the DNA from my soil, I then started PCR-prep using 2 different tetracycline primers to test for the two most common tetracycline resistance genes: tetB and tetM. I also used a 16S primer to test if any bacteria at all existed in the samples. After PCR, I ran my samples using gel electrophoresis to determine if any of the samples contained tetB, or tetM. If the samples had a 492 base pair band, it would be determined that bacteria existed in the soil. If the sample had a 659 base pair band, the tetB resistance gene would have been found. If the sample had a 406 base pair band, then the tetM resistance gene would have been found. If all 3 bands exsist, then it could be determined that, that soil sample has both tetB, tetM and bacteria in its DNA.





Results:



After running the samples on gel electrophoresis, no bands were discovered under any of the wells. While there were slight, barely visible bands in the beginning, they disappeared after a few minutes. This means that non of the samples contained any antibiotics.

Conclusion

Overall, no antibiotic material was able to be found in any of the samples. This was possibly because a mistake might have occurred during PCR. When completing PCR, a diluted sample of the DNA needs to be used. However, pipetting errors could have resulted in a too little or to large of a concentration of DNA, messing with the gel electrophoresis, and resulting in no bands being found in any of the samples. It is not likely that there was just no bacteria found in the samples because the positive control also did not have any bands. When completing this project again, I would put more focus on pipetting correctly and making sure every sample has the correct solution concentrations to ensure the results are accurate and conclusive

Acknowledgements:

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