Name(s)	Project Number
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Project Title

Investigating Regional Plant Evolution with Chloroplast Sequencing

Abstract

Objectives/Goals

The purpose of this experiment is to determine what plant species the French marigold (Tagetes patula), Grandiflora petunia (Petunia grandiflora), Garden pansy (Viola wittrockiana), Douglas-Mugwort (Artemisia douglasiana), and Ash Meadows gumplant (Grindelia fraxino-pratensis) most closely resemble through sequencing of the genome Rubisco within the chloroplast.

Methods/Materials

To extract the plant DNA, I first added various buffers to each plant tissue and vortexed, incubated and centrifuged the lysate until DNA was purified. I then ran the solution through a Polymerase Chain Reaction machine utilizing 2 different primer mixes to amplify the Rubsico enyzme. I then ran a gel electrophoresis analysis of the PCR products and sent the positive PCR products with positive results to Dr. Christopher Baysdorfer at California State University, East Bay to sequence. Once I received the sequencing, I utilized the software program FinchTV to view and convert the cladograms and the software program BLAST to find other similar rubisco sequences.

Results

From the gel electrophoresis, I was able to obtain genetic sequences for the French marigold and the garden pansy. I then determined that the plant most closely related to the French marigold was the Gaillardia aristata (blanketflower) and the plant most closely related to the garden pansy was the Viola arvensis (Field pansy).

Conclusions/Discussion

In conclusion, this experiment is applicable to society since plants have potential medicinal benefits. The French marigold is known to have bug repellant and anti-fungal properties, thus being very useful in gardening. The Garden pansy is used in phytotherapy, the study of the use of extracts of natural origins as medicines. This experiment can also be used to identify other plants that have similar drought-resistant characteristics, a benefit to the region during periods of extreme or prolonged drought conditions.

Summary Statement

Determining which plants are most closely related using chloroplast genome sequencing

Help Received

My teacher supervised the DNA purification, PCR analysis, and gel electrophoresis processes. Professor Christopher Baysdorfer sequenced my PCR products. My dad and mom took pictures during my experiment.