On the Evolution and Phylogeography of the Southeastern Species of the Genus Dalea L. (Fabaceae) Using a Phylogenetic Approach

Dr. James T. Diggs, Joshua B. Fuller, Corey Garrett, and Destiny Moore
Department of Biology, The University of North Georgia, Oakwood, GA 30566

Abstract
This study was focused on the Genetic Relatedness of the species within the genus Dalea. It aimed to develop PCR procedures to extract DNA and run amplification on the species within the genus. DNA extraction was from tissue samples of Dalea carnea, Dalea carthagenensis var. floridana, Dalea feayi, Dalea pinnata var. pinnata, Dalea pinnata var. trifoliata, Dalea adenopoda, Dalea mountjoyae, and Dalea albida.

Methods & Materials
Tissue samples of Dalea carnea, Dalea carthagenensis var. floridana, Dalea feayi, Dalea pinnata var. pinnata, Dalea pinnata var. trifoliata, Dalea adenopoda, Dalea mountjoyae, and Dalea albida were collected in the field in the summer of 2016, and locality of each individual specimen were noted. DNA was extracted (Fig. 3) from the tissue sample of Dalea carnea, Dalea carthagenensis var. floridana, Dalea feayi, Dalea pinnata var. pinnata, and Dalea adenopoda using a standard CTAB extraction protocol but with a modified CTAB with the addition of 0.18g Spermine, 0.13g Spermidine, and 200ml BME. (Diggs 2013, Doyle and Doyle 1987) PCR amplification has been run on all extracted samples using the chloroplast gene primers matK-xf/malp and a PCR profile of: 4 min at 94°C, 35 cycles of 1 min at 94°C, 1 min at 44°C–48°C, and 3 min at 72°C, followed by a final extension of 5 min at 72°C. (Kuzmina 2013, McMahon and Hufford 2004) DNA amplification products will be sent to a genomic laboratory for gene sequencing, and phylogenetic trees will be constructed using various statistical methods.

Discussion
PCR amplification can be challenging for the Genus Dalea due to high concentrations of volatile organic compounds, and aromatic protein complexes that bind to DNA. New DNA extraction and PCR procedures are currently being developed by our research team. Based on previous studies (Fig. 5), we suspect that there will be three distinct lineages of Dalea, one from a Texas origin, one from Gulf Coastal Plains origin, and an outlier lineage with Dalea carthagenensis var. floridana which origin remains highly speculative. (Diggs 2013)

Literature Cited