Poster Presentation Abstracts

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Arthropod diversity across three agroforestry habitats in Monteverde coffee farm, Costa Rica
Sean Cazier
Undergraduate Student Poster

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The objective of this study is to compare taxa diversity and richness across three habitats within an agroforestry managed coffee plantation. In total there were 12 orders in Coffee, 18 orders in Forest, and 13 orders in Windbreak. An analysis using the Shannon diversity index found no statistical difference in the number of taxa between the three sampling sites. Using the Shannon indices we calculated the Shannon entropy or the effective species diversity and found all three sample sites to have the same 6 orders. The models we provided will be useful in estimating the biodiversity and therefore functional groups to determine the usefulness of arthropods in agroforestry plantations. Our study could provide implications for the effectiveness of agroforestry on biodiversity conservation.
Bringing Rangeland Taxonomy Into the 21st Century
Austin R. Kelly
Undergraduate Student Poster

Authors: Austin R. Kelly
Affiliation: Texas A&M University & S.M. Tracy Herbarium

With the advancement of DNA sequencing technology, it is easier than ever to determine the relationships between different species of plants and compare previous morphological taxonomic systems to new evolutionary knowledge we have by comparing genetic material. How these molecular relationships relate to practical rangeland management, however, has mostly been overlooked. Science is advancing through new types of research conducted using the data held in herbaria, including genomics and biogeography. Genomics can distinguish traits in plants like invasiveness and palatability. Taxonomy and systematics are changing very rapidly with modern technologies, so it is important to keep as many practical skills previously taught in rangeland curriculum as an integral part of what students learn. These may include accurate plant identification, understanding of wildlife and livestock utilization, and being able to use taxonomic knowledge as an efficient tool. Easily accessible herbaria databases are growing, and so are large-scale citizen-science projects, like iNaturalist and Pl@ntNet. Utilizing these databases can help develop more accurate local inventories. This would allow managers to make more accurate plant identifications for surveys, enhance data collections, and make more informed decisions on plant selection for various restoration or seeding projects. Learning to convert molecular knowledge into practical, shareable tools is becoming increasingly necessary. Translating a modern view of plant taxonomy into a format that ecological restorationists can use will require long-term transformation, but it starts with illumination of these ideas.
Chariton Hills Conservation Bank Contribution Toward Regional Restoration and Conservation Goals
Ellen L. Pennington
No award consideration

Authors: Josiah Maine

Burns & McDonnell Engineering Company, Inc. has established the Chariton Hills Conservation Bank (CHCB), the first federally approved bank in the nation to provide offsets to Indiana bat, northern long-eared bat, and little brown bat impacts. By working with the United States Fish & Wildlife Service Region 3 (USFWS), Burns & McDonnell has been able to protect and begin enhancing 1,300 acres of summer maternity habitat in northeastern Missouri. Through annual interim management and monitoring activities, Burns & McDonnell is restoring prairie and woodland habitats, conducting prescribed woodland and prairie burns, and planting almost 10,000 trees across the bank properties.
Colonization of Root Endophytes in Central Texas Grasses
Sean Cassingham
Undergraduate Student Poster

Authors: Cassingham, S., Gerick, M., Kopcho, M., Leonard, M., Lyons, K.G.
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Fungal endophytes within plant roots provide an array of benefits to their plant host. Despite growing recognition of the significant role they perform in grassland ecosystems, their presence and distribution among plants is understudied. As Texas grasslands face increasing pressures from invasive species, human disturbance, and climate change, it is critical to understand the interaction and transmission of fungi among plant hosts that may mediate competitive dynamics between native and invasive species. The goal of this study was to identify patterns in the association of fungal morphotypes and OTUs (operational taxonomic units), and compare endophyte composition and diversity among native and invasive grass species. Our research focused on four native grasses, Schizachyrium scoparium (little bluestem), Bothriochloa saccharoides (silver bluestem), Nassella leucotricha (Texas wintergrass), and Aristida purpurea (purple threeawn), as well as the invasive Bothriochba ischaemum (King Ranch bluestem). Root samples from each species were taken from sixteen sites throughout the Edwards Plateau region in Central Texas. Fungal endophytes were cultured from the roots and isolated based on morphotype. In addition, fungal structures within roots were stained and scored. We will present an analysis of root endophyte diversity among the grass species based on morphological differences, as well as our results on the presence, abundance, and diversity of fungal endophyte functional types within root samples. DNA samples from the fungal isolates as well as the root samples are currently being sequenced. Studying key differences in endophyte distribution among grasses will enhance our understanding of ecosystem composition and may aid in wildlife restoration efforts as an indirect means of control.
Data handling from field protocols to data documentation: sharing lessons from hard won experience.
Ashley R. Green
Graduate Student Poster

Authors: Green, A.R., Fowler, N.L.
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Data collection, management, and analysis is critical for ecological restoration and ecological studies in general. Here we share suggestions from our own experience: “do as we say not as we did!” Topics include (1) designing field data sheets to make sure all critical information is recorded; (2) conversion of paper to electronic records; (3) long-term storage of physical and electronic copies of data and associated information (meta-data); (4) construction and documentation of data files derived from the originals. All of these are too often skimped or even overlooked, especially in project that involve many people and/or long time periods. However, we have seen problems of these sorts even in short, well-designed, projects done by only one or two people. Fortunately, there are usually effective solutions that may seem tedious but actually require few extra resources and do save time in the long run.
Habitat Attributes of Painted Bunting Nest Sites in North Texas
Tessa Boucher
Undergraduate Student Poster

Authors: Boucher, T., Bednarz, J., Gurley, C.
Affiliation: Steigman, K., Freiheit, R., Gregory, T., Porter, D., Boucher, J.

Painted Buntins (Passerina ciris) are common in suitable Texas habitat, woodland edge and savanna, during their breeding season from May through August. Their populations have declined due to habitat modification in parts of their range and they are classified as a species of Conservation Concern. We established two study grids comprising 38 ha with points flagged at 50 m intervals in bunting habitat at the Lewisville Lake Environmental Learning Area in Lewisville, TX. We then conducted systematic nest searching with 3-6 observers by walking linear transects. Nest searching was repeated in all sections of our study area every 1-2 weeks. When nests were found, they were flagged and GPS coordinates were recorded. Occupied nests were checked every 2-4 days to monitor survival. After nesting was completed, we measured 27 habitat attributes within 10 m of each nest and at a paired random site within 70 m of the nest. We analyzed data collected at 19 nest sites and 19 random sites to determine the habitat attributes that may be selected by buntins for their nest locations. We found that nest sites had greater average canopy cover (67.4%) compared to random sites (56.6%). Also, nest sites had more vegetation cover above the ground at the 1.25 m height interval (mean = 53.3%) than random locations (42.8%). Management for a mix of grassland and woodland habitat with about 67% canopy cover and thick understory vegetation cover at the 1.25 m height interval would provide suitable nesting habitat for the Painted Bunting.
Increasing Carbon Sequestration in the Eight-County Gulf-Houston Region
Clarissa Lara
Undergraduate Student Poster

Authors: January-Bevers, D., Gorostieta, K.
Affiliation: Houston Wilderness

The Houston Wilderness (HW) poster is on increasing carbon sequestration in the Gulf-Houston region through targeted large-scale planting of native trees and flora species. This is part of HW’s work on the 3rd key goal of the Gulf-Houston Regional Conservation Plan (Gulf-Houston RCP), which is a long-term collaborative of environmental, business, and governmental entities working together to implement a resilience plan for the Gulf-Houston region. The 3 RCP goals, which overlap and complement current nature-based actions/initiatives taking place regionally, are as follows: (1) reaching 24% by 2040 in protected/preserved nature-based infrastructure in the 8-county region, (2) reaching 50% by 2040 in nature-based stabilization of riparian, developed & undeveloped, agricultural and coastal areas in the region, and (3) working toward a .4% annual increase in nature-based carbon offsets on stabilized regional lands through enhanced native soils, plants and trees throughout the region. Most of the region’s current soils are vertisols and alfisols. The carbon content of the soils contains only 28-33 tons/acre but these soils have the capacity to absorb 64-77 tons/acre. By planting native trees and grasses with high levels of carbon absorption abilities, the region can achieve this an annual 0.4% increase in organic carbon sequestration. If mulch and/or organic compost is added to the base of the trees, the carbon absorption is up to 4 times higher in the soils annually. Furthermore, a no-tillage strategy for farmers is to use green cover crops instead of tilling the soil so it can help future crops and absorb more carbon.
Inoculating invasive species logs with *Trametes versicolor* to improve ecosystem function at Vireo Preserve in Austin, TX

Jack Patrick Rippel
Undergraduate Student Poster

Authors: Rippel, J., O’Donnell, J., O’Donnell, L., & Concilio, A.
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Soil degradation as a result of overgrazing, clearcutting, and poor land management poses a major threat for Central Texas ecosystems. This loss of habitat is a common gateway for the proliferation of invasive species, such as the privet tree *Ligustrum lucidum*. Restoration efforts are underway to remove this aggressive tree and reintroduce native species, but the leftover lumber can pose a fire threat. In 2015, we (J.O. and L.O.) began inoculating *L. lucidum* logs with the native saprophytic fungus *Trametes versicolor* and placing them around the Vireo Preserve with the goal of accelerating decomposition and increasing soil fertility and function. In 2019, we used a chronosequence approach to determine how these treatments affected soil physical and chemical properties. We placed 1m-radius circular plots at five sites that received treatments annually from 2015 to 2019, paired with five control plots that shared similar attributes (slope, aspect, and vegetation). At each plot, four soil samples were collected in September 2019 to determine % soil organic matter (loss-on-ignition), soil pH and essential nutrients. From September to November, we will measure soil moisture biweekly using a gravimetric approach, water infiltration rate using a double ring infiltrometer, and soil compaction using a penetrometer. We hypothesize that each of these soil indicators will have improved with the *T. versicolor* treatments compared to the paired plots, but that several years are likely needed to show signs of improvement. If successful, this approach could be an exciting way to restore soil fertility and function using a low-budget biological approach.
Invasive African grasses in south Texas: are they allelopathic?

Romeo G. Segura
Undergraduate Student Poster

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Megathyrsus maximus (Guinea grass), Dichanthium annulatum (Kleberg bluestem) and Cenchrus ciliaris (Buffel grass) are common invasive grasses in the Tamaulipan thorn forest of southern Texas. These grasses were originally introduced as fodder, but have successfully established in disturbed habitats and have spread to areas in which they were not originally introduced. These grasses can reduce the fitness of native species by competing for resources such as space, water, light, and nutrients; eventually dominating the community, preventing seedling recruitment or hindering reforestation efforts. Factors that contribute to the success of these species are not fully understood. A more complete understanding of these species could aid in efforts to reduce their presence.

The goal of this study is to test the allelopathic potential of these grasses to establish whether or not allelopathy could be a mechanism by which these grasses outcompete native species. Laboratory bioassays will be performed using aqueous extracts of the grasses against sensitive test species. Germination time and seedling elongation will be measured to establish potential allelopathic interference with the germination process and initial growth of seedlings. Upon completion of this experiment there will be more information on these grasses and a better understanding of their success among native species.
Managing a Rare Mint in Urban New York City
Rebecca Carden
Graduate Student Poster

Authors: Carden, R., Holmes, C., Swadek, R., Auyeung, N., Toth, E.
Affiliation: University of Texas at Austin (Carden); Natural Resources Group, New York City Department of Parks & Recreation (Holmes, Swadek, Auyeung, Toth)

Endangered plant conservation is a challenge in urban areas, where there are often diverse plant communities whose conservation is hindered by urban development. Pycnanthemum verticillatum var. verticillatum (Lamiaceae), a New York State S1S2-Endangered perennial forb, was discovered at a single site on Staten Island, NY, in 2003. Following the development of much of the site, the New York City Department of Parks & Recreation (NYC Parks) led an initiative to protect this plant population and augment it with locally-sourced transplants. Several transplantings in new sites were highly successful. However, the habitat preferences of this species and therefore management priorities are still unclear due to disturbance at the site of the parent population. In 2017, NYC Parks began annual field monitoring of the target species, neighboring plant species, and environmental factors to determine P. verticillatum habitat preferences. In 2018, a shade house study measured plant size and morphology under three levels of shade that represented levels commonly observed in the field. Combined results from field observations and the experiment indicate that P. verticillatum is able to thrive in up to ~ 60% cover; plants produced less biomass under 60% cover. The results of this ongoing project have improved canopy management at high quality sites.
Metabolic characterization and community composition of soil microbes associated with the rhizosphere of Sideoats grama when growing in competition with Bermuda grass

Marissa Narvaez
Undergraduate Student Poster

Authors: Marissa Narvaez, Brenda Rushing, J. Rodolfo Valdez Barillas
Affiliation: Texas A&M University San Antonio

The establishment of native plants in areas dominated by non-native invasives is often influenced by belowground feedbacks that inhibit native seed germination and seedling growth. Belowground inhibitory feedbacks may be driven by non-native invasives that compete for soil nutrients or alter the microbial community composition. Based on this assumption, native plant communities can also inhibit the non-native species establishment by altering soil nutrients and changing the soil microbe community. We studied both assumptions by collecting soil samples from well-established populations of invasive plants and well-established population of native plant in South San Antonio. For each soil sample we characterized the soil microbe composition and conducted a soil microbe community metabolic characterization assay. We also designed an indoor controlled experiment using plastic containers filled with sand to study seed germination and seedling establishment of the native species Sideoats grama (Bouteloua curtipendula) when growing in competition with Bermuda grass (Cynodon dactylon). The study assessed the effect to Bermuda grass on Sideoats grama seed germination and seedling growth when treated with the soil collected from the non-native species population, and when treat with soil collected from the native species population. Results from this study show the differences in community composition and metabolic characterization of soil microbes collected from the field and from the controlled experiment. Our results suggest that changes in microbial composition may facilitate the establishment of Sideoats gramma and inhibit the growth of Bermuda grass when grown in competition.
Nutrient additions may restructure dune plant communities
Scott Clark
Graduate Student Poster

Authors: Busch, M., Crawford, K.M.
Affiliation: Busch (University of Oklahoma); Crawford, Clark (University of Houston)

While vegetation is essential to the restoration of coastal sand dunes, the harsh environment makes its establishment difficult. Coastal soils are often saline, low in nutrients and deficient in moisture. Our project evaluated three potential approaches to ameliorating these stresses: (1) choosing more tolerant plant species, (2) adding nutrients to the soil and (3) sourcing sand rich in native microbiota that facilitate the uptake of water and nutrients and that reduce salt stress in some species. We planted two common native dune grasses – Uniola paniculata and Panicum amarum – in sterile soil and soil amended with sand from existing vegetated dunes. We then subjected them to one of two treatments: a salinity gradient (0-2.5%) and a range of nutrient additions (phosphorus, nitrogen, nitrogen + phosphorus, and a commercial fertilizer). At harvest, we measured live above-ground biomass and mycorrhizal fungal hyphae in the soil. Uniola paniculata was moderately more tolerant of high salinity, while P. amarum responded much more robustly to nutrient additions, producing more than double the growth in biomass. Surprisingly, the nutrient additions did not significantly reduce mycorrhizal fungal growth, and in fact, a slow-release balanced fertilizer promoted it. Fertilizing P. amarum therefore may support rapid biomass accumulation without impairing beneficial mutualisms. However, because of the weaker response of U. paniculata, fertilization may foster P. amarum’s dominance at the cost of community diversity. Because of U. paniculata’s greater salt tolerance, maintaining both species in restoration work would likely increase overall community resilience.
Physiological adaptations of two shade tolerant species, Carapa guianensis and Otoba novogranatensis, to microclimatic conditions at two elevations, in Costa Rica
Jacqueline Ferrato
No award consideration

Authors: Ferrato, J., Reemts, C.
Affiliation: The Nature Conservancy

The endangered Tobusch fishhook cactus (Sclerocactus brevihamatus ssp. tobuschii) is endemic to rocky, open habitats in central Texas. These open habitats are threatened by woody plant encroachment. Prescribed fire is a common tool used to prevent woody encroachment, but little is known about the effects of fire on Tobusch fishhook cactus. We studied cacti in long-term monitoring plots that were burned in winter prescribed fires (3 plots in Nov/Dec 2016; 1 plot in Jan 2018). The fires visibly damaged 11-28% of the cacti in each plot. By the first spring after fire, fire-damaged cacti grew less and were less likely to produce fruit than undamaged cacti. These effects were stronger for the 2016 fire. By the second spring after fire, these effects disappeared. Even though a small number of cacti were harmed by the fire, the long-term benefits of maintaining open habitat likely outweighs the damage to a few individuals.
Prescribed fire causes only short-term damage to endangered cactus

Carolyn Whiting
Graduate Student Poster

Authors: Fowler, N., Best, C.
Affiliation: University of Texas at Austin (Whiting and Fowler); US Fish and Wildlife Service (Best)

To accurately assess the success of restoration methods and projects, high quality field data is essential. However, limited time and funds usually constrain the sampling protocols used to collect these data. Here we present two examples of sampling protocols where a grid was used to place either transects or plots. We successfully used each of these methods to collect field data that simultaneously met several goals. (1) The sampling universe, which in these examples was the habitat and locations to which our conclusions applied, was clearly and objectively defined. (2) The measured variables could be accurately and repeatedly measured in the field, could be measured rapidly so that large enough samples could be collected, and fit the goals of the projects. (3) Both transects and plots required less time to survey and could be more easily located and re-located than randomly-placed plots, and were therefore an efficient use of limited personnel and time. Great care was taken to ensure that (4) transect and plot locations were completely unbiased, by locating them without consideration to the spatial variation within the pre-defined sampling universe. As discussed in Fowler's talk (at this conference), both transects and plots properly implemented produce unbiased variable estimates. These two examples can be readily generalized to fit many different situations and goals.
Real-world examples of plant sampling protocols that balance efficiency and statistical power while avoiding bias

Sean Cassingham
Undergraduate Student Poster

Authors: Cassingham, S., Gerick, M., Kopcho, M., Leonard, M., Lyons, K.G.
Affiliation: Department of Biology, Trinity University

Fungal endophytes are overlooked in research despite their critical role in grassland ecology. These organisms have conferred multiple advantages, such as providing host plants with drought tolerance, nutrient acquisition, and anti-herbivore compounds. Regardless of their function, the correlation between symbiont and host association is understudied. As Texas grasslands face increasing degradation it is crucial that the relationships between fungal endophytes and their plant hosts are better understood. We aimed to identify patterns in the association of fungal morphotypes and OTUs (operational taxonomic units) and compare endophyte diversity between native and invasive grass species. Our research focused on four native grasses, Schizachyrium scoparium (little bluestem), Bothriochloa saccharoides (silver bluestem), Nassella leucotricha (Texas wintergrass), and Aristida purpurea (purple three awn), as well as the invasive Bothriochloa ischaemum (King Ranch bluestem). Root samples from each species were taken from sixteen sites throughout the Edwards Plateau, Central Texas. Fungal endophytes were cultured from the roots on MEA/antibacterial agar and isolated based on morphotype. DNA samples from the fungal isolates as well as the root samples will also be sequenced. We will present data on root endophyte diversity based on morphological and DNA differences. Future studies of competitive dynamics and functional groups will be performed to determine if these endophytes confer a competitive advantage to native grasses.
Root Endophyte Diversity Among Texas Grasses
Yeji Kang
Undergraduate Student Poster

Authors: Kang, Y., Rome, O., Walker, J., Quinn, W., and Concilio, A.
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Grasslands of the Texas Hill Country were once incredibly diverse, but many have become depleted after years of overgrazing and development. There is now a need for restoration to bring back native plant species and associated organisms. For over 30 years, Environmental Survey Consulting has been working on restoration of native Texas Hill Country ecosystems at the Harte family's Spicewood. The ranch started with 280 acres of land that was overgrazed and had lost native plant diversity, but has since expanded to ~1300 acres of land, much of which has received restoration treatments such as prescribed burning and seeding of native plants. Some patches of invasive grasses still remain in areas that will receive burns in the coming year, which makes for a good opportunity for us to compare seedbank dynamics and vegetation response to burns. In September 2019, we collected soil samples in three meadows across a gradient of invasive to native-dominated sites and began growing them out in the greenhouse at St. Edward's University to determine seedbank composition. We also collected data on plant species composition across the same gradient using 1m quadrants and Daubenmire cover classes. A prescribed fire is planned for the fall season, and we will collect data on vegetation and seedbank response post-fire. We anticipate that seedbank composition will be important in determining species composition post-fire. This study will provide land managers with useful information about how seed banks affect restoration success. We will present preliminary data from our Fall 2019 sampling season.
Soil seedbank composition before and after prescribed fire in the Texas Hill Country
Charlotte Reemts
No award consideration

Authors: Reemts, C., Neill, R., Neill, C.
Affiliation: The Nature Conservancy

Solarization (covering soil and vegetation with clear or black plastic) has long been used in agriculture to control undesirable plants and their seeds, but its effectiveness in rangelands has been mixed and species-specific. We tested solarization (tarping) with black plastic as a control method for King Ranch bluestem (Bothriochloa ischaemum var. songarica). We applied three treatments to a grassland in central Texas: solarization (from August to November), trimming, and a control. By the second growing season after treatment, King Ranch bluestem cover in solarized plots was reduced to 54% ± 10% (mean ± standard error), clearly different from control (78% ± 6%, p=0.01) and trimmed plots (82% ± 5%, p=0.002). Forb cover in solarized plots (15% ± 4%) was much higher compared to trimmed (4% ± 1%, p=0.001) and control plots (3% ± 1%, p<0.001). Forb richness was also slightly higher in solarized plots (16 ± 2 species) compared to control (10 ± 2 species, p=0.08) and trimmed plots (10 ± 1 species, p=0.08). Solarized plots had more bare ground (7% ± 1%) compared to both control (2% ± 1%, p<0.001) and trimmed plots (1% ± 1%, p<0.001), providing an opportunity for seeding or planting but also for other non-native species to establish. Solarization can be used to create islands of diversity, especially if combined with seeding or planting of native species. However, repeated treatments or alternative techniques (e.g., applying clear plastic over wet soils) will be needed for full control of King Ranch bluestem.
Solarization doesn't kill King Ranch bluestem, but still increases diversity
Stephen Benigno
No award consideration

Authors: Benigno, S., Vega, R., Snoza, R., Fang, N.
Affiliation: S. Benigno, R. Vega, R. Snoza - Harris County Flood Control District, N. Fang - University of Texas at Arlington

The Harris County Flood Control District restored two backslope swales from turfgrass to native coastal prairie vegetation to assess potential 1. Enhancement of Water Quality, and 2. Reduction in Volume and Flow Rate of Runoff. As part of this study, HCFCD partnered with the University of Texas at Arlington to implement cutting-edge techniques to assess potential improvements in soil infiltration rates using multi-spectral photography captured by unmanned aerial vehicle (drone). Initial soil infiltration data from both traditional on-ground methodology and drone methodology will be discussed and compared.
Using Drones to Assess the Soil Infiltration Rate of Restored Coastal Prairie Bioswales

Angela England
No award consideration

Authors: Eggers, K., England, A., McGarrity, M., Thompson, P.
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Elephant ear (Colocasia esculenta) is a highly invasive, emergent aquatic plant that colonizes river and stream banks forming monoculture stands that can reduce native riparian plant biodiversity and negatively impact habitat quality for wildlife. In Texas, the Upper Llano River in the Colorado River Basin has been identified as one of several Native Fish Conservation Areas and therefore a focal watershed for implementing habitat protection, restoration, and enhancement projects. For approximately eight years, Texas Parks and Wildlife Department has partnered with Texas Tech University’s Llano River Field Station, the Llano River Watershed Alliance, and volunteers to implement a watershed-scale approach to elephant ear control. Two to three times per year, elephant ear along the South and North Llano Rivers is surveyed by kayak, mapped with GPS-enabled cameras, and treated with precise, herbicide spot treatments. Over time, a reduction in number, size, and dominance of elephant ear stands has been observed along with rapid recovery of the native plant community through passive revegetation. Monitoring and control efforts have continued to expand downstream and a total of 52 river miles are now under active management. In the wake of recent devastating floods, future monitoring goals will include assessment of elephant ear dispersal and establishment.
Watershed-scale Approach to Elephant Ear (Colocasia esculenta) Control Efforts in the Upper Llano River, Texas
Clifton Albrecht
Graduate Student Poster

Authors: Herrera, E., Salazar, K.
Affiliation: University of Texas - Rio Grande Valley

Well-documented reforestation of federally managed land in the lower Rio Grande valley has been ongoing since the 1980s, but follow-up surveys of reforested parcels have not been consistently conducted. My colleagues and myself have begun follow-up surveys of a chronosequence of four parcels that have been reforested at intervals throughout the last 23 years in order to assess both the success of past efforts and the time scale over which any consistently observed changes develop. Afterwards, several ecophysiological traits will be measured in species that are particularly successful or unsuccessful in order to assess, first, if any single trait consistently predicts success on the landscape and, secondly, if all successful species show similar values of most or all traits measured. Two traits under consideration for study are k maximum, the maximum hydraulic conductivity of wood and P50, the water potential at which 50% of hydraulic conductivity is lost. I expect that plants which grow slowly and prioritize drought-stress tolerance will be those that persist while those that prioritize rapid growth at the expense of drought stress-tolerance will be those suffer high mortality rates. The results of this study will be directly useful to land managers in southern Texas and northeastern Mexico and will, in general, contribute to the growing literature concerning the relationship between plant traits and persistence on the landscape in arid and semi-arid environments.
Winners and losers in reforestation: Species survivorship along a planting chronosequence.
Manuel Romeo Flores III
Undergraduate Student Poster

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With a high species diversity and distinct topographic features, tropical forests are home to vegetation that is highly adapted to its environment. While this has resulted in many species being confined to certain microclimatic conditions and elevations, certain species are able to survive across environmental gradients. To investigate this plasticity, we assessed differences in leaf physiology/anatomy of Carapa guianensis and Otoba novogranatensis, two shade tolerant plants found across a wide elevational range within the Costa Rican Alajuela province. Utilizing a portable leaf gas exchange system, A/Ci curves were generated for three replicate trees of both species at 600m and 820m elevation. Because trees were growing under varying light conditions, Leaf Area Index (LAI) for each tree was determined from hemispherical photographs. Stomata density was determined for C. guianensis at both sites. A/Ci curves were fitted using a Sharkey model to determine the maximum rate of photosynthesis (Amax), maximum carboxylation rate of Rubisco (Vcmax), maximum rate of electron transport (Jmax), daytime respiration (Rd), and mesophyll conductance (gm). Initial results from the A/Ci curves suggest that Anet of O. novogranatensis is similar between study sites, while Anet in C. guianensis differs between sites with our lower elevation site depicting lower rates of photosynthesis. C. guianensis had lower stomatal density at higher elevations, associated with shaded conditions, despite canopy cover being similar to our lower elevation site. This suggests that lower light intensity, dictated primarily by clouds and fog, could be responsible for the observed differences between elevations.