Research & Education Committee Report
Prepared by: Hallie Dozier, Chair
Date Submitted: May 9, 2016

The Research & Education Committee is charged with the following

Basic Function: Review and selection of research grant, scholarship, and education grant applications.

Responsibilities: Meet regularly with Research and Education sub-committees to review and select applications for scholarships and educational grants.

Related Strategic Initiatives:

Goal 2.1: Determine what we should fund in education and research
Goal 2.2: Manage the processes around making grants and awarding scholarships

Committee Activities.
- The **Research Sub-Committee** met via telephone on **April 29, 2016.**
- We reviewed 20 Hyland R. Johns applications
- We added four new Education Committee members:
    - Anne Spafford (North Carolina State)
    - Peggy Coates (Louisiana State University Hilltop Arboretum)
    - Jennifer Grimes (Aspen Tree)
    - Shirl McMayon (TF Liason, Western Chapter)
- The **Education Sub-Committee** met via telephone on **May 5 2016.**
- We reviewed 6 Robert Felix Memorial Scholarship applications
- We reviewed 12 Arboriculture Education Award applications

Accomplishments:
- We wish to welcome Anne Spafford, Peggy Coates, Jennifer Grimes and Shirl McMayon to the Education Sub-Committee.
- Both sub-committees continue to enjoy the ease using the online submission and review/ranking software (Wizehive). The software continues to prove its value for archiving reviewer comments, abstracts and other grant-related information. Facilitating the staff and committee access to this information and the ease of use is freeing up time to direct towards improving the grant review and evaluation process as well as conducting needs assessment surveys.

    As the "newness" of this system wears off, though, committee members have come up with some suggestions for changes that will facilitate ease of use. Sharon Lenza has the suggestions and will work with the software company on this.

Other items:

- In December 2015 the Executive Committee and Research Chairman requested BOT approval to require match (in-kind or cash) to be included in the budgets of grant proposals to TREE Fund. Providing match as part of a grant proposal reflects buy-in from the researcher and his/her home institution. This request was discussed and approved by the BOT. The Research Chairman also requested approval to allow grant awards to include a modest indirect charge (up to 10% of the total award) in their budgets. After a lively discussion, the BOT tabled this vote and we will revisit the item during the May 16, 2016 meeting. The BOT also approved Chairman Dozier's request to approve increasing grant awards (see minutes for details).

  We believe that these funding changes better meet the needs of the TREE Fund and the researchers, especially academic researchers. While it is too early to tell, this move seems to have attracted new (to TREE Fund) researchers (e.g., Kathy Wolf), as well as other, established researchers (e.g., Glynn Percival). Moreover, the proportion of high quality, innovative projects seems to be rising. Overall, the committee is quite pleased with what we hope will be a trend: TREE Fund grant programs appealing to a growing number of researchers with quality programs.

- One Research sub-Committee member suggested privately to Chairman Dozier that we consider quantifying the dissemination of research results section. We request a dissemination of results explanation, but it is not formally quantified. As a result, some of the proposals give only minimal attention to this component. Putting greater emphasis on this component would not be novel for granting agencies, but would be for TREE Fund.

- The Education Sub-Committee also noted that the quality of the Arboriculture Education projects is improving - significantly. It was challenging to select the top candidate projects.

- Warren Hoselton applied for an Arboricultural Education grant to support the **Professor Pricklethorn Program**. He had called Chairman Dozier to inquire about the viability of an application from him – she encouraged submission of an application not realizing he did not intend to partner with a non-profit organization. This project – unless submitted through a legitimate 501(c)(3) or other recognized non-profit organization is not eligible to receive these funds. I would like to request that the Board discuss the possibility of funding this project through another funding stream.

Funding Recommendations:

We evaluated four projects as grant-worthy and will request re-submissions of project for the next cycle from four others. **The committee recommends the following projects for funding through the Hyland R. Johns Research Grant Program in the order of priority** (see **Appendix A** for project summaries):

1. Dr. Bryant Scharenbroch – *A Soil Management Toolbox for Urban Trees* $48,583

2. Dr. Glynn Percival – *Can Soil Amendments Reduce Disease Severity in Trees?* (pending clarification regarding one or two methodological details) $40,000

3. Dr. Susan Day – *Urban Forests as Stormwater Systems—The role of canopy structure and ground cover in stormwater mitigation* (pending more detail regarding site selection) $50,000

4. Dr. Kathleen Wolf – *Urban Forests and Human Health: Science Review & Economic Valuation* $36,512.

The committee recommends the following projects for funding through the Arboriculture Education Award Program in priority order (see **Appendix B** for project summaries):

1. McCrory Gardens (with South Dakota State University) – *Junior Arborist Camp* $5,000
2. Asheville GreenWorks – *Tree Detective Kits* $5,000
3. The Greening of Detroit – *Our LAND* $5,000 (should additional funding become available)

The committee recommends the following applicants to receive funding through the Robert Felix Memorial Scholarship Program:
1. Jamilee Kempton – University of Hawaii at Manoa
2. Daniel Hedden – California Polytechnic State University, San Luis Obispo
3. Savannah Haines – University of Maine

Objectives for next 5 months:
- Review education, scholarship and research applications for fall cycle;
- Assist with online application program modifications (if needed) based on committee feedback.
- Revise research and education award submission guidelines and post;
- Prepare a white paper/Arborist News manuscript summarizing the body of work funded by Tree Fund;
- Continue developing succession plan for committee chairmanship.

Appendix A: Hyland R. Johns – summaries for projects recommended for funding

Dr. Bryant Scharenbroch – *A Soil Management Toolbox for Urban Trees* **$48,583**
    In order to improve soil management for urban trees we need better assessment tools. However, not all urban tree managers require and can utilize the same soil assessments. For example, urban foresters may require coarser information on many planting sites. They would use this information to better match site conditions with species preferences to maximize diversity. Alternatively, arborists may be interested in seasonal patterns in the concentrations of nutrients in soil and tissues to develop prescription growth management recommendations. The goal of the proposed research is to develop three soil assessment models for urban tree managers to be included in a soil management toolbox. The first model, Urban Site Index (USI) is a field-based model that could be employed by the urban forester for a planting plan. Our most detailed model (USI++) would fulfill the objectives of an arborist wishing to develop a prescription fertilization plan. The last model (USI+) is intermediate in detail and cost and might be used by either the arborist or urban forester to assess soil conditions for urban trees. We have designed three experiments to develop and test these models. We also describe plans for collecting additional data for future refinement of the models. The models will be packaged in a user friendly and freely-available platform. Products from this research including three scientific manuscripts, workshops and presentations are described. Lastly, the research will train two graduate students and many undergraduates to grow the field of scientists in urban forestry, arboriculture and urban soil science.

Dr. Glynn Percival – *Can Soil Amendments Reduce Disease Severity in Trees?* **$40,000**
    During their life cycle, urban trees are susceptible to attacks by many pathogenic fungi and bacteria that, if uncontrolled, can result in high mortality rates. Control of these diseases is primarily through the use of synthetic agrochemicals. Increased tolerance to commercially available agrochemicals, failure of many chemicals to adequately control diseases once a tree is infected and increased legislative restrictions regarding agrochemical use and application means new techniques of disease control are now of fundamental and economic importance. It is widely known that trees can defend themselves against pathogen infection through a wide variety of mechanisms that can be either local, constitutive or inducible. Developments in plant protection technology have led to the formulation of several soil amendments that have been shown to induce or "switch on" a plant's own defence mechanisms. These include chitin, phosphites, biochar (a form of activated charcoal) and pure mulches i.e. a mulch made from a single tree species such as willow or eucalyptus. Preliminary studies have found a single soil application of these amendments provides long lasting, broad spectrum control of several fungal, bacterial and viral pathogens. Importantly these amendments act by organic means so are not subject to government legislative restrictions that relate to synthetic agrochemicals. Aims of this investigation are to investigate the efficacy of a range of commercially available soil amendments singly and in combination on controlling two worldwide economically important tree diseases i) apple scab (Venturia inaequalis) a foliar biotrophic pathogens and ii) Phytophthora root rot (a root invasive pathogen). *(Pending clarification regarding one or two methodological details)*

Dr. Susan Day – Urban Forests as Stormwater Systems—The role of canopy structure and ground cover in stormwater mitigation $50,000

Can planting design and tree management be used to significantly increase stormwater mitigation by trees? Does presence of an urban forest understory or site maintenance practices such as leaf removal or mulching influence water infiltration and capture? Stormwater attenuation by urban forests is provided by a complex structural system that includes canopy interception, stemflow, and transmission into the soil. Plant characteristics, such as leaf morphology, architecture, and stem characteristics dictate canopy interception and stemflow. However, we hypothesize that the overall urban forest canopy structure, rather than characteristics of individual trees, has a greater effect on stormwater mitigation. Specifically, the addition of understory plantings could increase both canopy density and lead to soil surface traits that have already been identified as beneficial to stormwater capture, such as the presence of litter or mulch layers. We will examine three landscape structures in urbanized areas: trees only, trees plus understory, and understory only (defined as low shrubs or herbaceous plants) and evaluate them in terms of their effects on this stormwater mitigation complex. Sites will also be compared to a natural forest reference site, often used in policy development. This analysis will be replicated in a greenhouse study using the three plant structures in bioinfiltration cells with engineered soils where we will analyze changes in soil physical characteristics over time as well as rainfall partitioning using a rainfall simulator and lysimeters. Results can be used to optimize groundcover management beneath trees as well as to inform stormwater policy and runoff estimation models. *(Pending more detail regarding site selection)*

Dr. Kathleen Wolf – *Urban Forests and Human Health: Science Review & Economic Valuation* $36,512

Arborists and urban foresters are often challenged to justify the costs of tree planning and management. Evidence of environmental services (such as carbon sequestration and stormwater management) has generated support in many communities. In addition, nearly 40 years of research indicates the human health benefits gained from experiences of nature in cities. This evidence is now summarized at the Green Cities: Good Health (GCGH) web site (hosted at the University of Washington). The article database that informs GCGH includes studies spanning a wide range of urban greening situations (parks, gardens, school yards, hospital gardens, streetscapes, green roofs, etc.) and a wide range of positive human health responses (work performance, cardiovascular disease, mental health, stress and immune function, etc.). A subset of articles report on responses specifically associated with city trees and urban forestry. The entire article collection has been used to generate several peer-reviewed publications that indicate economic benefit and valuation (see Wolf et al., 2015, and Wolf & Robbins, 2015, in Relevant Citations). This project will extract the articles of previous research about tree and forest response from the GCGH database, synthesize them into a review manuscript, and conduct economic valuation using a benefits transfer approach. The resulting manuscript will be submitted to a peer-reviewed public health or medical journal. Science delivery products will include a results briefing, powerpoint presentation, and urban forestry policy guidelines. The results and outreach tools will be valuable for communicating the important human health and wellness benefits provided by the urban forest.

Appendix B: Arboriculture Education Award – summaries for projects recommended for funding

McCrory Gardens - South Dakota State University for $5,000
The objective of this project is to create, implement and evaluate an arboriculture summer program focused on middle and high school students. The intent to create modules that other summer school programs can use as templates for creating their own programs. The summer camp will consist of four days of field and classroom modules designed to acquaint students with the opportunities and careers within the broad field of arboriculture. The curriculum will be prepared with input and direct involvement by University faculty and industry. The program will be taught by University faculty and ISA certified arborists and Board Certified Master Arborists.

Asheville GreenWorks for $5,000
Asheville GreenWorks is requesting funding to create six "Tree Detective" kits to be used for free at Buncombe County libraries during the summer and fall and at Asheville City and Buncombe County Schools during the spring, reaching pre-school, elementary, and middle school students throughout the county. Asheville GreenWorks environmental education staff and consultants will prepare the kits and partner with staff from NC Arboretum, NC Park Service, Blue Ridge Parkway, Appalachian Highlands Science Learning Center at Great Smoky Mountains National Park and local educators to provide a self-guided, hands-on learning experience correlated to state education standards. Activities will include reading, science, math and the arts. Kits will be curriculum based and include books, hand lenses, binoculars, scavenger hunts, counting games, tree stacking blocks, leaf rubbing plates and specimens of tree cookies, leaves, and seeds to promote hands-on learning.

Each kit will cost $375.00 and be replicable. Asheville GreenWorks' staff will hold workshops for librarians and teachers on how to use the kits, helping to ensure the program's success. GreenWorks staff will also provide pre- and post-visits to students using the kit in order to enrich student learning. Kits will be distributed to libraries in the early fall of 2016, collected during the winter and modified if needed before being available to teachers during the spring when most teach forestry. The "Tree Detective" kits will increase knowledge of urban forestry concepts for residents in Asheville and Buncombe County leading to a greater appreciation of the role trees play in community health.

If additional funding becomes available:

The Greening of Detroit for $5,000
The Greening of Detroit seeks funding for its Our LAND (Learn, Admire, Nurture and Dream) project, servicing students in grades 4-8 in Detroit schools. This program connects students to their local forests through yearlong classroom activities, on-site field experiences and service learning opportunities taking place in River Raisin, their nearby Federal Land, and Rouge Park, Detroit's only section of riparian forest. Our place-based education approach boosts student achievement and demonstrates to youth how local citizens can improve their community's urban forest, environmental quality and social vitality. Our LAND students learn about the factors impacting trees and study forest health surrounding their school, at a Detroit park and nearby federal land. They explore the impacts humans have on the forest

ecosystem and ways to improve these interactions by helping plan and implement a service learning project which may include tree planting or invasive species removal within the forest. The Greening connects students to Citizen Foresters who act as mentors to the youth and provide assistance during plantings. This program engages families by providing take home activities and invitations to all of the field trips, particularly the tree planting event. These program elements provide students a wide environmental view with local context, while also helping to enhance their grasp of required science curriculum content. Teachers love our program and have noticed improved student outcomes as a result of their students' participation.