Letter from the Director

Fall is trying its best to take hold, but summer isn’t giving up without a fight. Seasonal change is always a reminder of life’s cycles, the pulse of nature, with the daily rhythms investigated at EREC by Professor Cassone, and the annual cycles of sparrow behavior (Professor Westneat with doctoral student Allison McLaughlin) and of native Bluegrass trees (Professor Gleeson and doctoral student Jim Shaffer). The UK and Transylvania University ecology classes are busy with sampling and data analysis, with the semester in full swing. Our field station planning grant project from the National Science Foundation has enabled us to begin a series of research workshops (last April: Linking Front-Line Research with K-12 Education; in November: Experimental Urban Ecology). We have welcomed the participation of our neighbors in EREC’s community garden, which closed for the season November 1 but will re-open next spring. And we have conducted a citizen science project, now finishing, on Monarch butterflies and milkweed plants. An art exhibit by UK undergraduate and graduate students in April was impressive and was, we hope, the first of many, building on the buzz created by the Hitnes mural on the patio. Instructional opportunities for the community (birding and beekeeping) and for K-12 students (garden science, math tutoring) are slated to continue. Many of these and other activities are described in this edition of EcoLink, and as always we invite your expressions of interest and suggestions on what you would like to have happening at EREC. We plan to stay busy and gradually expand our facilities, activities, and collaborations with researchers, teachers, students, and neighbors.

Best wishes for the colorful fall in progress.

Philip H. Crowley, Director of EREC
Research Recap

**NSF-Sponsored Workshop On Experimental Urban Ecology**

It is well known that urbanization alters the structure and function of ecosystems. Yet, ecological investigations in urban areas have led to novel insights in both basic and applied ecology. EREC is hosting a workshop on Saturday, November 12 with a focus on experimental urban ecology. Along with faculty members from the University of Kentucky, presenters include Dr. Steward Pickett (Cary Institute of Ecosystem Studies), Dr. Margaret Carreiro (University of Louisville), Dr. Stan Gehrt (Ohio State University) and Dr. Sarah Bray (Transylvania University). Students and faculty members at UK, local universities and colleges are invited to attend. Email Dr. Steven Price (steven.price@uky.edu) for more information.

**Finding Food In A Complicated World**
by David Westneat, UK Department of Biology

Each day in summer, parent birds leave the nest, head out into fields or woods to search for good food items for hungry offspring. Often, they return within 5 minutes with a beak full of insects. They do this hundreds of times a day! How can they be so efficient at finding food? How do they deal with sudden and unpredictable changes in where food is and what it looks like?

This past summer, my research group carried out some experiments with a common local bird, the house sparrow (*Passer domesticus*), in order to find out more about what cues parents use to find food. The experiment consisted of hiding crickets in little cups, covered with both sand and a colored lid. Different colors represented different levels of uncertainty about food—some colors had food in every cup, but other colors had some really good cups and some totally empty ones. Our subjects learned quickly how to flip lids and dig through sand, and it looks like they formed preferences for certain colors. It is too soon to tell why they seem to like those colors. We suspect it may be due to the variation in number of crickets, but we’ll test among several other possibilities. To know for certain, we are now busy watching videos of them to measure their behavior throughout the experiment, and we hope to have a full answer soon.

**Emerald Ash Borer Threatens Native Ash Trees**
by Jim Shaffer, UK Department of Biology

An ecological disaster is occurring in the Central Kentucky Woodlands—the Emerald Ash Borer (EAB; *Agrilus planipennis*) has descended upon the Bluegrass. Dying ash (*Fraxinus spp.*) trees populate horse pastures and dead stems extend above forest edges. Ash trees have opposite branching, making their dead canopies recognizable. Larval feeding galleries of EAB girdle upper portions of the tree causing canopy dieback. This initiates epicormic branching from the tree’s base—a last attempt at photosynthesis. What will be the fate of Kentucky’s ash trees? Research indicates that White and Green Ash (*F. americana and F. pennsylvanica*) are most preferred by EAB. Central Kentucky forests are distinguished from other regional woodlands by having high abundances of Blue Ash (*F. quadrangulata*), which is least preferred. Only time will indicate if our woodlands will maintain this unique species, though it is likely that overall abundance of ash will decline. Learn more about UK-led research on EAB: https://entomology.ca.uky.edu/ef453.

**Allelopathic Effects Of Amur Honeysuckle and Wintercreeper**

Wintercreeper (*Euonymus fortunei*) and Amur honeysuckle (*Lonicera maackii*) are invasive plants in Kentucky and pose a significant threat to native biodiversity. Dr. Sarah Bray and numerous students from Transylvania University (TU) are exploring the ecological impact of these plants at EREC.

Allelopathic plants release chemicals into the surrounding environment and these chemicals reduce the germination or growth of other competitor plant species. This toxic trait may be an important component contributing to the success of invasive species. In summer of 2016, five TU students studied the potential role of allelopathy in the invasiveness of wintercreeper and Amur honeysuckle. The two studies showed some interesting patterns: wintercreeper and honeysuckle extracts reduced shoot development of Fast Plants (*Brassica rapa*) suggesting that wintercreeper may possess allelopathic capability; the concentration of wintercreeper and honeysuckle extracts effected the strength of germination and growth after germination inhibition of Kentucky 31 fescue (*Festuca arundinacea*), with higher concentrations having the larger effect. For additional information contact Dr. Sarah Bray (sbray@transy.edu).
K-12 Interaction

Workshop: Strengthening the Connection Between Ecological Research & K-12

EREC hosted a workshop on Saturday, April 2nd to explore effective strategies in forming productive research collaborations and education engagement activities between researchers and K-12 STEM classrooms. Teachers, researchers and educators attended and heard from Dr. Pat Marstellar, the Associate Dean for Undergraduate Research and Scholarship at Emory University, Dr. Ginny Shepherd, the Director of the Center for Science Outreach at Vanderbilt University, and Dr. Robin Cooper, Associate Professor of Biology at the University of Kentucky. Email Dr. Hirsch at robert.hirsch@uky.edu for more information.

UK EREC Participates In BioBonanza

On October 1, 2016, the University of Kentucky Department of Biology hosted “BioBonanza”, a one-day open house festival meant to engage Lexingtonians in local biology and research happening at the University of Kentucy. Dr. Phil Crowley, Kaylynne Glover and Megan Seifert led the UK EREC display that featured native plant and insect species with a particular focus on insects in the “milkweed community”, such as the monarch, milkweed tussock moth, milkweed bug and aphids. This display also highlighted the Monarch/Milkweed Citizen Science Project at EREC.

Sustainability and Garden Science Gears Up For A Third Year

In collaboration with local partners at UK and Fayette County Public Schools, EREC has spearheaded a program that introduces elementary school students to sustainability through garden science. Plant growth and vegetable production are powerful and approachable analogies for understanding the concepts of sustainability. The Sustainability and Garden Science (SGS) curriculum connects tightly with the Next Generation Science Standards (NGSS) now being implemented in Kentucky Public Schools.

It all started in 2015. Drs. Phil Crowley (EREC), Kim Zeidler (PIMSER) and Patti Works (Regional Teacher Partner/Consultant with PIMSER) designed the SGS curriculum in collaboration with elementary school teachers (Mr. Josh Radner, Yates Elementary; Ms. Cindy Townsend, Mary Todd Elementary) and UK graduate students (Rose Marks, Jim Shaffer). The curriculum was implemented at each school with a teaching team consisting of a teacher, a UK graduate student, and UK undergraduates (Ryan McDuffie, Annie Griggs, Olivia Windhurst, Hejab Malik, Connor English).

After a successful first year, some curricular modifications and keen interest from other schools, SGS was implemented again in 2016. This time at Sandersville Elementary and Deep Springs Elementary with Mr. Matt Noblin and Ms. LaKendra Horton, respectively. The teaching teams this year included a UK graduate student (Ali Slusher), UK staff (Marvin Ruffner, Megan Seifert) and 6 UK undergraduates (Michaela Mullikin, Tosca Hall, Julia Parker, Megan Higgins, Evan Blanford, and Beth Young). Pre- and post-tests from both years indicate high retention of biological and sustainability concepts.

The SGS program is now gearing up for a third year with two graduate students (Dakota Coomes, Allison McLaughlin) applying for funding and in contact with interested teachers and schools. This year the project aims to make a few curricular modifications, formally assess the curriculum for publication and target future extramural funding. We thank the UK Office of Community Engagement and Assistant Vice President Lisa Higgins-Hord and the Student Sustainability Council for funding. Contact Megan Seifert at megan.seifert@uky.edu for more information.
Engaging Lexingtonian’s on Urban Forest Health Assessments and Native Plant Species

Urban trees provide invaluable environmental, economic and social benefits to humans. In Lexington’s Urban Service Area, tree canopy covers ~25% of the area, providing an estimated $50 million in benefits through improved air quality, reduced energy consumption and reduced water pollution and flooding. Urban trees and greenspaces also provide important habitat and food for birds and wildlife species. To maximize the many benefits of our urban trees, it is important to assess and to improve the health of individual urban trees and forest areas. To do this, staff and researchers from the UK Forest Health Research and Education Center (Dr. Ellen Crocker), UK Forestry Extension, and EREC (Dr. Megan Seifert) are collaborating on a year-long project. This project will pilot a new forest health assessment tool developed by the UK Forest Health Research and Education Center to engage the public about Lexington’s urban forest and educate them on improving forest health. The project, funded through a LFUCG Sustainable Environmental Grant, includes implementing citizen-science forest health surveys, educational workshops about invasive species removal/native species selection, and demonstrations of these techniques to address the survey-identified issues. To this end, 12 high school students from the GEAR UP Kentucky Summer Academy - a college/career readiness program for 1st generation college students - visited EREC this summer to learn about and conduct an Urban Tree assessment of trees at EREC. This activity was part of the larger GEAR UP program “Tree Detectives” led by Dr. Crocker. The students presented their assessments at the GEAR UP Final Showcase. Additional activities such as education workshops and demonstration will continue through spring of 2017 with the goal of improving urban forest health and citizen engagement with urban forest threats and management. If you are interested in participating in these activities or have questions, please contact Megan Seifert (megan.seifert@uky.edu) or Ellen Crocker (e.crocker@uky.edu).

Help EREC Grow

The success of EREC depends on the active involvement of scientists, teachers, students, and citizens. This can come in many forms: join the community garden, attend events, participate in research or citizen science projects, share ideas about teaching and learn scientific principles. Once you’ve learned a bit about EREC from this newsletter and the website, please feel free to contact us about ways for you to become involved. We look forward to hearing from you.

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The ongoing research and education activities at EREC hinge on the availability of funds. Please consider making a donation of any amount by writing a check to the UK Department of Biology, indicating “To support activities at EREC” on this check. This can be mailed or delivered to: Department of Biology, 101 Morgan Building, University of Kentucky, Lexington KY.