HARDWOOD TREE IMPROVEMENT
& REGENERATION CENTER E-NEWSLETTER – July 2017

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Articles in this issue:

Drs. Ginzel and Jacobs Enter New Leadership Roles with the HTIRC and Tropical HTIRC

The HTIRC is a partnership between Purdue University Department of Forestry and Natural Resources (FNR) and the USDA Forest Service Northern Research Station (NRS), with many other agencies, organizations, and individuals contributing time and resources to make the work we do possible. As part of a reorganization and strategic planning process, Dr. Robert Wagner, FNR Department Head, recently announced Dr. Matthew Ginzel as the new Co-Director of the HTIRC. Matt will be directing the Purdue FNR portion of the HTIRC partnership.

Dr. Matt Ginzel is an Associate Professor in the Departments of Entomology and Forestry & Natural Resources at Purdue University. Matt received his B.S. in Organismal Biology from Beloit College in 1994. He received an M.S. (1999) and Ph.D. (2003) from the Department of Entomology at the University of Illinois at Urbana-Champaign. He then spent two and a half years as a post-doctoral fellow in the Department of Biochemistry and Molecular Biology at the University of Nevada, Reno before coming to Purdue in 2006.

Dr. Ginzel is broadly interested in the chemically-mediated host colonization and mating behaviors of wood-boring beetles. North American hardwood forests are increasingly threatened by a litany of indigenous and invasive wood-boring insect pests. In fact, wood-boring beetles are among the most economically important pests of woody plants in natural and managed systems. Unfortunately, the destructive nature of

many wood-boring insects is exacerbated by difficulty in controlling their populations. Because they spend the majority of their lives concealed beneath the bark of trees, these insects are physically protected from sprayed pesticides. The long term goal of his research program is to develop effective pest management tactics targeting the chemically-mediated mating system of the beetles. This information will be useful in establishing effective management programs, such as by optimizing survey strategies, developing arboricultural techniques to bolster resistance, and improving methods for detecting invasive species to improve the health, quality, and productivity of North American hardwood forests. Matt has been very active in research on beetles that transport the fungus causing Thousand Cankers Disease in walnut species.

In the December, 2016 HTIRC email newsletter Dr. Mark Coggeshall was announced as the new Co-Director for the USDA Forest Service portion of the partnership. Mark and Matt will work closely together to provide one voice regarding leadership decisions for HTIRC.

Dr. Douglass Jacobs has accepted the position of Director for the Tropical HTIRC. Doug Jacobs is the Fred M. van Eck Professor of Forest Biology and Associate Head in the Department of Forestry and Natural Resources at Purdue University. His research interests are in the reforestation and restoration of forest trees, with emphasis on understanding the eco-physiology of forest regeneration in response to management and environmental stress. His research group focuses on themes including nursery propagation of native forest trees and seedling quality, site preparation and plantation establishment, use of physiological tools to understand developmental mechanisms in trees, and the restoration of threatened species

Dr. Jacobs teaches courses in Dendrology, Forest Regeneration, and summer forestry field practicum. Since 2010, he has served as Editor-in-Chief of New Forests, an international journal on the biology, biotechnology, and management of afforestation and reforestation. In 2011, Dr. Jacobs was named a Purdue University Faculty Scholar, an award recognizing outstanding faculty members on an accelerated path for academic distinction. In 2012, he was named the Fred M. van Eck Endowed Chair of Forest Biology.

The Tropical Hardwood Tree Improvement and Regeneration Center (TropHTIRC) is a collaborative research, development and extension partnership. Established in 2010, TropHTIRC's mission is to advance the science of tropical hardwood tree improvement, regeneration, and conservation genetics. The Center goal is to develop and disseminate knowledge to foster sustainable tropical hardwood forestry, production of forest products, restoration, and maintenance of genetically diverse ecosystems. TropHTIRC works with a diversity of partners to increase knowledge and develop strategies for breeding, conservation, utilization, silviculture, and marketing of tropical hardwoods. Through application of classical selection, genomics, advanced propagation, seed and nursery production technologies, they are developing improved lines of native trees. The current focus is on Hawaii's premier timber tree, koa (*Acacia koa*), an endemic Hawaiian species of substantial cultural, economic, and ecological importance. Dr. Jacobs has been involved with TropHTIRC research since the inception of the Center.

To learn more about the Tropical HTIRC visit: http://www.trophtirc.org/

Dr. Matthew Ginzel

Dr. Douglass Jacobs

HTIRC Alumnus Davis Takes New Leadership Position and Honors from Purdue

Dr. Anthony Davis

The Oregon State University College of Forestry has named Purdue FNR and HTIRC alumnus Dr. Anthony S. Davis as associate dean for research. Davis joins OSU from the University of Idaho, where he served as the director of the Center for Forest Nursery and Seedling Research and as an associate professor of native plant regeneration and silviculture in the Department of Forest, Rangeland, and Fire Science. Anthony received his MS degree in 2003 and a PhD in 2006 from Purdue University, working with HTIRC under Dr. Doug Jacobs on a broad range of tree regeneration and nursery production research.

“An engaging and collaborative leader, we are thrilled to have Anthony (Davis) join the team,” said Thomas Maness, Cheryl Ramberg-Ford and Allyn C. Ford Dean of the OSU College of Forestry. “I am confident he will advance our research programs and continue

the College's proud tradition as an internationally-recognized leader in addressing forest management, natural resources, and environmental-related issues."

Under Davis' guidance at Idaho, the Center for Forest Nursery and Seedling Research became a world-recognized leader in forest nursery science. Davis, who earned his doctorate at Purdue University, has conducted research to improve nursery production practices of native plants, restoration of degraded forests, and has studied the effects of environmental stresses on seedling growth and development.

"I am truly excited to join the OSU College of Forestry. The research conducted by the faculty in the College is recognized as leading both regionally and globally," Davis said. "We face grand challenges in forestry-related issues. Working with the diverse group of faculty, staff, students and stakeholders to address these is an amazing opportunity. I'm looking forward to getting started."

While at Idaho, Davis received a number of honors. In 2015 he received the Dr. Arthur Maxwell Taylor Excellence in Diversity Award and in 2013 was named the Tom Alberg and Judith Beck Chair in Natural Resources, the first endowed chair at the institution.

Anthony was recently recognized as a Purdue University Distinguished Agricultural Alumnus by the College of Agriculture and Department of Forestry and Natural Resources, with ceremonies and presentations at West Lafayette, Indiana campus in March, 2017.

Dean Akridge and Donya Lester presenting the award to Dr. Anthony Davis

Drs. Douglass Jacobs, Anthony Davis, and Bob Wagner

Some selected publications authored in part by Anthony while he was with the HTIRC:

Evaluating chemical indices of growing media for nursery production of *Quercus rubra* seedlings. 2006. Salifu, K.F., Nicodemus, M.A., Jacobs, D.F., and Davis, A.S. HortScience 41(5):1342-1346.

Organic matter added to bareroot nursery beds influences soil properties and morphology of *Fraxinus pennsylvanica* and *Quercus rubra* seedlings. 2006. Davis, A.S., Jacobs, D.F., Wightman, K.E., and Birge, Z.K.D. New Forests 31:293-303.

Stocktype and harvest gap size influence northern red oak regeneration success. 2006. Jacobs, D.F., Rathfon, R.A., Davis, A.S., Carlson, D.E. Connor, Kristina F., ed. Proceedings of the 13th biennial southern silvicultural research conference. Gen. Tech. Rep. SRS-92. Asheville, NC: US Department of Agriculture, Forest Service, Southern Research Stations 640 p.

Afforestation in the Central Hardwood Forest Region of the USA. 2005. Davis, A.S. and Jacobs, D.F. The Thin Green Line: A symposium on the state-of-the-art in reforestation Proceedings. Thunder Bay, ON. 26-28 July 2005. Ont. Min. Nat. Resour. Ont. For. Res. Inst. Sault Ste. Marie, On. For. Res. Inf. Pap. No. 160 p. Pp. 48-53.

Afforestation Motivations of Private Landowners: An Examination of Hardwood Tree Plantings in Indiana. 2005. Ross-Davis, A.L., Broussard, S.R., Jacobs, D.F. and Davis, A.S. Northern Journal of Applied Forestry 23(3):149-153.

Lenny Farlee Receives Recognition from Wood Industry Group

Lenny Farlee, Extension Forester with the Purdue University Department of Forestry and Natural Resources and the HTIRC, received the President's Award from the Indiana Hardwood Lumbermen's Association for service to the hardwood industry at the IHLA annual meeting, February, 2017.

Farlee served on the IHLA board of directors from 2008 to 2014 and was a member and then chair of the education committee during that period. Farlee's involvement in numerous education programs for landowners, teachers, and land managers was cited as contributing to the advancement of forest management and the hardwood industry. Farlee was previously a recipient of the IHLA President's Award in 2015.

Mista Feist, Indiana Hardwood Lumbermen's Association President, presents Lenny Farlee with the President's Award

Recent Research by Dr. Keith Woeste Highlighted in the AramcoWorld Magazine and Purdue Executive Vice President for Research and Partnerships Annual Report

Dr. Keith Woeste

Dr. Keith Woeste, Research Geneticist with the HTIRC, had some recent research included in an article on the human spread of Persian walnut, also known as English walnut. Investigation by Dr. Woeste and other partners looking at the genetic diversity of Persian walnut across its' range produced evidence of spread by humans traveling the silk road routes and other trade or migration routes. The portability of walnut nuts, their excellent food value, and the high quality of the wood may have encouraged early travelers to move the tree to new locations for future use. This movement of Persian walnut may represent one of the earliest human afforestation efforts and an early example of intentional tree cultivation.

The full article can be found in the AramcoWorld Magazine at:

http://www.aramcoworld.com/en-US/Articles/March-2017/Walnuts-and-the-First-Forest-Farms

The full Executive Vice President for Research and Partnerships Annual Report, which also includes an article on Dr. Shaneka Lawson's *Acacia koa* research:

http://www.purdue.edu/research/publications-data/docs/annual-reports/report_2016.pdf

The original research publication is:

Pollegioni, Paola, Keith E. Woeste, Francesca Chiocchini, Stefano Del Lungo, Irene Olimpieri, Virginia Tortolano, Jo Clark, Gabriel E. Hemery, Sergio Mapelli, and Maria Emilia Malvolti. "Ancient humans influenced the current spatial genetic structure of common walnut populations in Asia." *PloS one* 10, no. 9 (2015): e0135980.

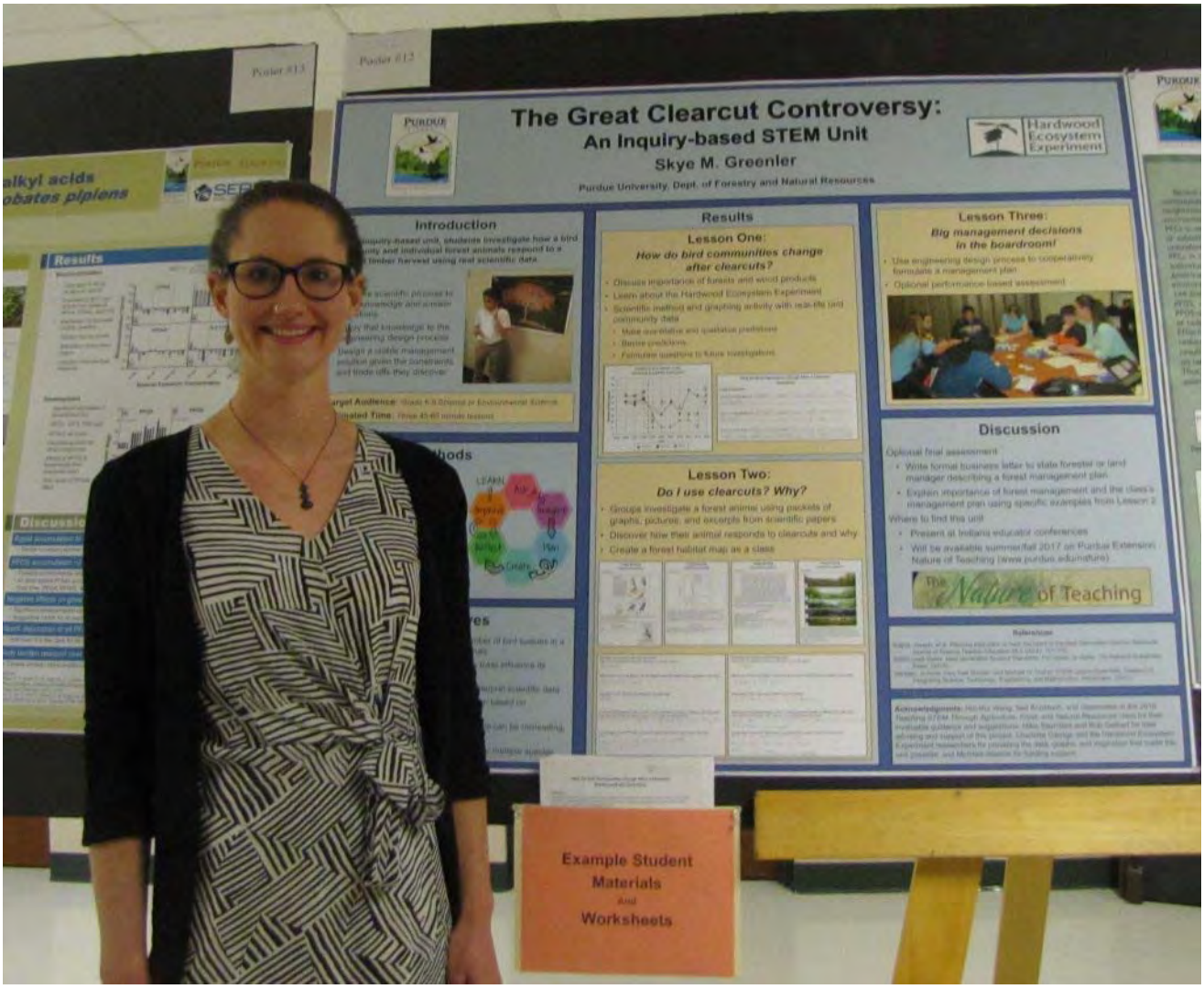
HTIRC Students Participate in 2017 Purdue FNR Research Symposium Poster Competition

Several HTIRC graduate students provided poster presentations for the Purdue Forestry and Natural Resources Research Symposium poster competition. This event provides Forestry and Natural Resources graduate students a forum to present their research and extension work, and answer questions from faculty, staff and other attendees. Several faculty members judge the posters and presenters on their work and provide awards to the top posters from M.S. and PhD. Research, and M.S. and PhD Engagement. HTIRC students participating were Kyle Ernshaw, PhD student with Dr. Jacobs, Skye Greenler, MS student with Drs. Saunders and Swihart, Graham Frank, MS student with Dr. Jenkins, Junhyung "Jun" Lee, PhD student with Dr. Pijut, and Shannon Stanis, MS student with Dr. Saunders.

Poster titles and links to those available on-line are below:

- K. Earnshaw, J.A. Oliet Pala, J.B. Friday and D.F. Jacobs.
  Restoration of High-elevation *Acacia koa* Forest Using a Non-native Conifer for Frost Protection
- L.A. Estrada, S.M. Greenler, M.R. Saunders, and R.K. Swihart
  The Influence of Prescribed Fire and Timber Harvest on Acorn Pilferage
- G.S. Frank, M.R. Saunders, D.H. Nakatsu, and M.A. Jenkins
  Above-and Below-ground Responses to Invasive Shrub Removal Methods
- S.M. Greenler
  The Great Clearcut Controversy: An Inquiry-based STEM Unit
- J.H. Lee and P.M. Pijut
  Efficient Agrobacterium-mediated Transformation of Black Ash (*Fraxinus nigra*) for EAB Resistance
- S. Stanis and M. Saunders
  Short-term Effects of Prescribed Fire on Timber Quality: A Two-Year Post-burn Analysis

Skye Greenler has the distinction of winning the MS Engagement poster category. Congratulations Skye!



Skye Greenler received first place for MS Engagement poster category

FNR Symposium Group photo

HTIRC Hosts Combined Walnut Council and Thousand Cankers Disease Meetings

The HTIRC hosted the Walnut Council Annual Meeting and the Thousand Cankers Disease Research and Management Operational Meeting as overlapping consecutive programs in early June 2017. The Walnut Council is a science-based organization that encourages research, discussion, and application of knowledge about growing hardwood trees. This international association represents nearly 900 woodland owners, foresters, forest scientists, and wood-producing industry representatives promoting sustainable forest management, conservation, reforestation, and utilization of American black walnut (*Juglans nigra*) and other fine hardwoods. The Walnut Council meeting featured HTIRC research plots for field tours and several HTIRC researchers and graduate students as presenters. Over 100 Walnut Council members, including landowners, natural resource managers, industry members and researchers attended the program.

The Thousand Cankers Disease Research and Management Operational Meeting brought together over 60 public and private land managers, regulatory agencies, researchers, industry members and landowners to review the current status of thousand cankers disease in affected states and share the most current research findings. To conclude the meeting, an interactive session provided opportunities for participants to suggest direction to future efforts in research, management, and regulations. The presentations provided during the program were video-recorded and we hope to have them available on the HTIRC website soon.

Matt Ginzel and Bart Nelson inspect TCD symptoms on a tree in Washington State

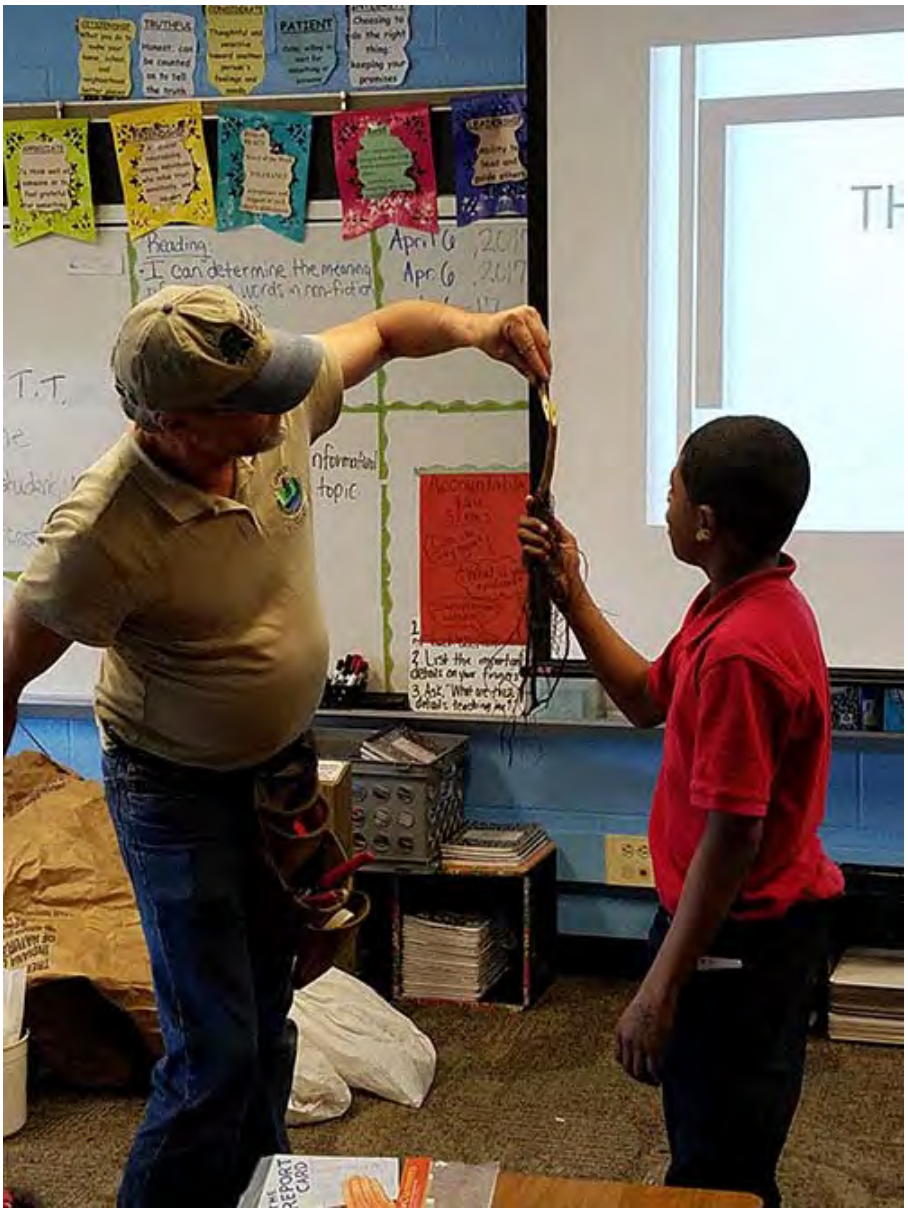
HTIRC and Hoosier National Forest Provide Forest Education and Trees to Indianapolis Schools

Jim McKenna with the HTIRC and Teena Ligman with the Hoosier National Forest provided forest education programming and planted trees at six Indianapolis Public Schools this Spring. Students in 15 classes were provided with a presentation on changes in eastern forests caused by invasive plants, insects and diseases, and what the US Forest Service is doing to address these forest threats. This includes tree breeding work on chestnut and butternut currently being carried out at the HTIRC.

Students were encouraged to take action by looking out for invasive species and other changes in the forest, planting and caring for a tree, and writing an essay on how they have seen a natural area change.

Chestnut and butternut trees from the HTIRC tree breeding program were planted on the grounds of each school to remind them of the lessons they learned and to serve as a source of seed for the future.

We would like to acknowledge the assistance in coordinating this event with Ashlee Scherwinski, District K-12 Science Coach, Indianapolis Public Schools, and each of the teachers and classrooms participating in the program.



Jim McKenna and a student demonstrate a piece of scion wood and rootstock prepared for grafting

Jim McKenna and students prepare the site for planting a seedling

Teena Ligman stands behind a freshly planted American chestnut seedling

HTIRC Publication Highlight: Enrichment Planting of Oaks

Reliably regenerating oaks on good sites in the Central Hardwood Region has been one of the great challenges for landowners and forest managers. Although many of our forests are dominated by mature oaks, changes in forest understory, disturbances like fires, harvesting intensity, and deer population have resulted in poor regeneration of new oak seedlings to replace the veteran trees. Part of the challenge is timing management designed to favor the regeneration of new oak seedlings with heavy oak

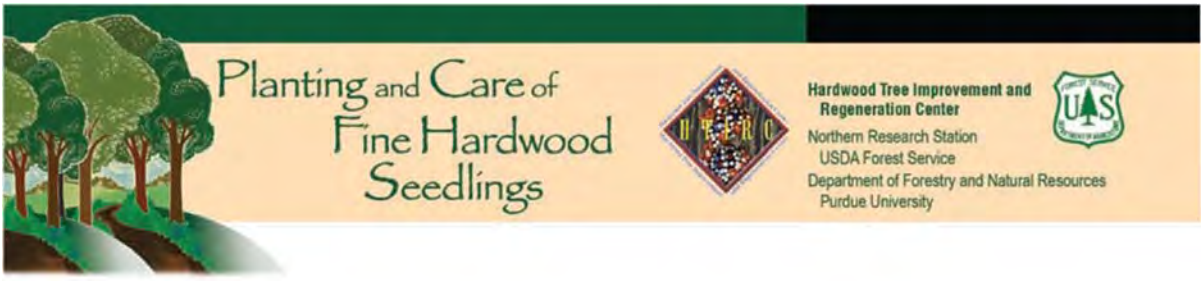
seed crops, known as masting events. If seed crops are light to moderate, most of the seed is eaten by a wide range of wildlife species. With a heavy seed crop, some seed may escape to create new oaks, given the right forest conditions.

This need for careful timing with a masting event is often not practical for the scheduling of management practices. Another option to increase the chances for successful oak regeneration is enrichment plantings of oaks to provide seedlings through planting that may be absent when depending on seed alone. The HTIRC has developed a publication to walk you through the process of planning and executing an enrichment planting of oaks. Site assessment, harvest practices, site preparation, planting, and maintenance are outlined in a stepwise fashion to help you increase your chances of establishing oak regeneration.

You can view or download the full publication at https://www.extension.purdue.edu/extmedia/FNR/FNR-225.pdf

Additional publications in this series are available at the HTIRC website under Resources tab.

https://htirc.org/resources/landowner-information/



HTIRC to Participate in Forestry Intern Project

The HTIRC will help the Purdue University Department of Forestry and Natural Resources provide students with valuable forest management experience through a Summer Intern program. Students will participate in forest management tasks, including tree improvement and plantation management with the HTIRC. The students will earn some money and practical experience and the HTIRC and Purdue will have additional hands to accomplish more work this summer.

Jim McKenna, Operational Tree Breeder with the HTIRC, will cooperate with Brian Beheler, Don Carlson, and Ron Rathfon of Purdue University to direct the work of the students as they learn hands-on skills managing native forests, plantations, and wildlife habitats on Purdue FNR properties. Many natural resources students have not had an opportunity to operate equipment associated with woodland management, or spend significant time practicing field skills. This program offers them an opportunity to learn from the HTIRC and Purdue FNR field staff, while also contributing to our property management and field research programs, a winning situation for both parties.

Invasive plant control using brush saws and spray equipment

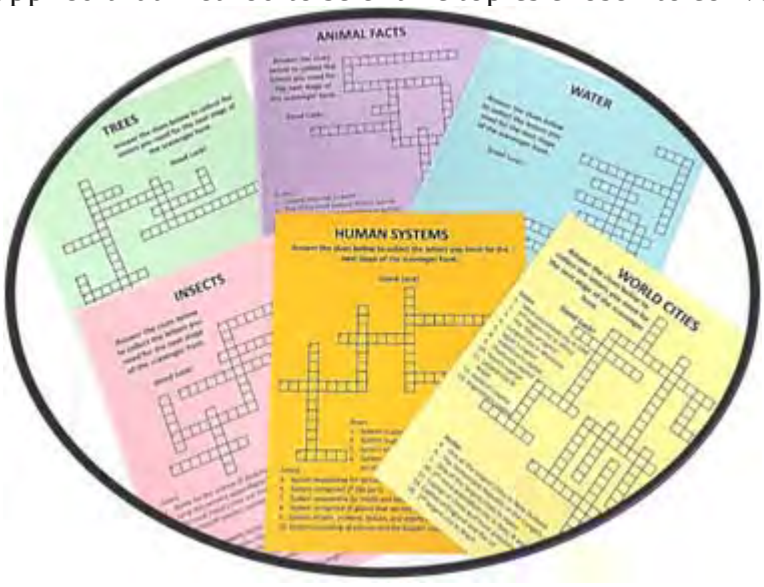
Measuring black walnut trees in test plantings

Using prescribed fire to manage prairie plantings

Puzzle Power: A Useful Method for Linking Scientific Topics

By: Dr. Shaneka Lawson

Six degrees of separation is a phrase used to convey the idea that all living things are six or fewer steps (or degrees) away from each other. In ongoing work initiated this spring, Dr. Shaneka Lawson has applied that method to scientific topics chosen to convey the



connectivity of seemingly unrelated areas of research using puzzles that she created on her own. She has worked

with students at summer camps and several schools in Indianapolis, IN. These students were introduced to a myriad of topics over the course of several lectures that describe forestry and natural resource careers in a new way. For example, when going over the lecture of water, students were invited to describe all of the potential uses for water and to come up with an area of research that relies heavily on water resources to complete their job. Responses from the students ranged from geologist to Culligan water treatment engineer. The responses were thought-provoking and showed a true understanding of the role of water as part of a larger system, rather than a single topic.

The lessons began with 'water' and information gleaned from that lecture carried over into the topics of human systems, animal facts, insects, trees, and world cities. The world cities lecture emphasized the role of each topic on a global rather than local scale. It also provided points of reference  when describing deforestation worldwide and in selected regions such as Brazil, invasive animals and insects, and how trees and plants can be used for medicines. The information provided on the self-defense mechanisms used by trees and plants to deter predators was a big hit. In fact, they were shocked to see that some tropical tomato plants (*Solanum pyracanthum*) had dangerous thorns and toxic fruit or that chestnut (*Castanea dentata*) trees have extremely sharp burs for protection.

At the end of each micro-lecture, there were puzzles that invited the students to ask more questions about the world and about natural resources. Following the puzzles, the students listen to a final lecture about forestry and natural resource careers and how the information they have learned is used in various positions. I can happily report that we have a fresh crop of future botanists (inspired by insects and pollination), future foresters (inspired by the lectures on trees and world cities), water resource engineers (inspired by the lectures on water and human systems), park rangers (inspired by the lecture on animal facts), and tree plantation owners. I would like to say that the future tree plantation owners were inspired by a specific lecture but, it was most likely the question and answer session about how a plantation represents a living investment in their future and that of their families. There are many students out there eager to learn more about the work that we do and what they can do to contribute. Making an effort to reach them only takes a second of your time. This project was done to help supplement the education of high school students in the area and to improve the visibility of the HTIRC and Forest Service within the community.

Liz Jackson and Brian MacGowan received the Woodland Steward Award

Liz Jackson, Engagement Specialist with the HTIRC, was recently recognized as part of a team receiving the Gold Award from the Association of Natural Resources Professionals for their production of the Indiana Woodland Steward Newsletter. The announcement recognized Brian MacGowan, Liz Jackson, *Purdue University*, and Dan Shaver, *The Nature Conservancy*.

Three times annually, over 31,000 copies of the Indiana Woodland Steward are mailed to woodland owners in Indiana. This 16-page, two-color publication includes in-depth articles on forest stewardship and health, invasive species and pests, wildlife habitat management, economics, and more. Subscribers own more woods (71.6 ac) for a longer tenure (33 years) than the average woodland owner in Indiana based on data from the National Woodland Owner Survey. As a group, they also have a higher proportion enrolled in assistance programs and having written stewardship plans. Based on a survey of subscribers, 54 percent regularly utilize information from the Woodland Steward. In addition, 51 percent of respondents have implemented at least one practice they read about from the Woodland Steward, potentially impacting an estimated 1.2 million acres of forestland.

Website for announcement: http://www.anrep.org/resources/awards/ANREP-award-winners-2017.pdf

Some Research Papers Published in 2017 by the HTIRC Investigators:

- Genetic diversity of Persian walnut (*Juglans regia*) in the cold-temperate zone of the United States and Europe (PDF 268 KB) 2017. Ebrahimi, A., Zarei, A., McKenna, J.R., Bujdoso, G., and Woeste, K.E. Scientia Horticulturae 220:36-41.
- Isolation and characterization of a floral homeotic gene in *Fraxinus nigra* causing earlier flowering and homeotic alterations in transgenic *Arabidopsis* (PDF 344 KB) 2017. Lee, J.H. and Pijut, P.M. Plant Gene 10:17-25.
- Pollen gene flow, male reproductive success, and genetic correlations among offspring in a northern red oak (*Quercus rubra* L.) seed orchard (PDF 397 KB) 2017. Alexander, L. and Woeste, K. PLOS ONE 12(2): e0171598. doi: 10.1371/journal.pone.0171598.
- Combining Biodiversity Resurveys across Regions to Advance Global Change Research (PDF 535 KB) 2017. Verheyen, K., De Frenne, P., Baeten, L., Waller, D.M., Hedl, R., Perring, M.P., Blondeel, H., Brunet, J., Chudomelova, M., Decocq, G., De Lombaerde, E., DePauw, L., Dirnbock, T., Durak, T., Eriksson, O., Guilliam, F.S., Heinken, T., Heinrichs, S., Hermy, M., Jaroszewicz, B., Jenkins, M.A., Johnson, S.E., Kirby, K.J., Kopecky, M., Landuyt, D., Lenoir, J., Li, D., Macek, M., Maes, S.L., Malis, F., Mitchell, F.J.G., Naaf, T., Peterken, G., Petrik, P., Reczynska, K., Rogers, D.A., Schei, F.H., Schmidt, W., Standovar, T., Swierkosz, K., Ujhazy, K., Van Calster, H., Vellend, M., Vild, O., Woods, K., Wulf, M., and Bernhardt-Romermann, M. BioScience 67:73-83.
- Response of spring flora to nearly two decades of deer exclusion and resurgent woody understories within exclosures (PDF 220 KB) 2017. Webster, C.R., Rock, J.H., and Jenkins, M.A. Journal of the Torrey Botanical Society 144(1):1-14.

Visit our website at https://htirc.org/research/research-publications/ to see a full listing of our research publications searchable by topic and year.