

A woman wearing a wide-brimmed straw hat, glasses, and a pink t-shirt is working in a field of tall green plants with yellow flowers. She is holding a blue tool and a white cloth. The background is a bright blue sky with white clouds.

# Plant Biology and Conservation Program Celebrates its Ten-Year Anniversary and Graduates its First Two Ph.D.s

“I think it is an extremely unique program—a nurturing, community driven, collaborative environment in which to learn. I can’t imagine having gone anywhere else.”

— Rebecca Tonietto,  
Ph.D. candidate

In May 2015, Rebecca Tonietto and Paul Hartzog became the first two graduates to earn their doctoral degrees from the Chicago Botanic Garden's plant biology and conservation program with Northwestern University. Both candidates credit the program, now in its tenth year, with nurturing their research interests through field work and lab investigation, providing exceptional faculty mentorship, and giving them the freedom to pursue original questions about which they are passionate. The graduate program had also conferred 50 master's degrees by the end of May.

The graduate program, directed by associate conservation scientist Nyree Zerega, Ph.D., began in 2005 as a partnership between Northwestern University and the Garden, intended to leverage the assets of each to offer a master's degree in plant biology and conservation. At the time, Northwestern lacked a plant biology department and the Garden sought to expand its education and training efforts in plant conservation science through a professionally oriented master's program.

"We knew how to run a graduate program and grant degrees, but we didn't have subject-matter experts," said Daniel Linzer, Ph.D., provost of Northwestern University and professor of molecular biosciences. "It was an ideal partnership, which expanded our work in biology, anthropology, and other fields." The program accepted its first cohort of Ph.D. students in 2009, the same year the Daniel F. and Ada L. Rice Plant Conservation Science Center opened. Recently, the program added a one-year internship-based master's degree in land management and conservation to its offerings.

*(Left) Rebecca Tonietto, Ph.D., is studying the effects of tallgrass prairie restoration on native bee communities. (Top) The Daniel F. and Ada L. Rice Plant Conservation Science Center is home to the Chicago Botanic Garden's graduate program in plant biology and conservation, offered in partnership with Northwestern University.*



## What's the Buzz?

Tonietto's research focuses on bees—specifically, the effect tallgrass prairie restoration is having on native bee communities. At research sites throughout north-eastern Illinois, she collects them—more than 6,000 to date—in fine nets or small, condiment-sized cups painted ultraviolet colors and filled with soapy

water. After washing and drying the captured bees, she does the delicate work of classifying them with the aid of a tea straw and a microscope in the Plant Science Center's Abbott Ecology Laboratory. She then works with expert taxonomists to identify the bee species. Many of the collected bees are preserved in the Garden's Nancy Poole Rich Herbarium.

For her master's work in the program, Tonietto documented bee species new to green roofs in Chicago, traced the occurrence of Old World bee species, and compared bee communities of Chicago green roofs, parks, and prairies. For her doctoral work, she investigated how tallgrass prairie restoration in former agricultural fields is affecting native bee communities and their diversity, abundance, and community composition.

## Delving Deep

While Tonietto's research involves the collection and study of bees, Hartzog's is rooted in the measurement of something equally important if perhaps less tangible—nitrogen. Hartzog's dissertation, which includes analyses of 270 soil, water, and plant extract samples collected from 10 locations in southern Wisconsin wetlands, sheds light on the complex relationships among invasive species, land restoration, and denitrification.

By comparing denitrification in undisturbed sedge meadows, restored wetlands, and plant communities invaded by reed canary grass (*Phalaris arundinacea*), Hartzog is learning how these distinct plant communities perform, or fail to perform, important ecological services that support biodiversity, mitigate water pollution from fertilizer runoff, and sustain suitable habitat for rare and endangered species. "If we restore wetland area where it has been lost, we can offset the effects of fertilizer from farmland; wetlands

*(continued)*



*Paul Hartzog, Ph.D., studies denitrification potential of soil samples extracted from 10 different wetlands in southern Wisconsin.*

provide conditions for bacteria to live and be happy,” Hartzog said. “Through denitrification, these bacteria convert biologically available nitrogen from wetlands into a gas that returns to the atmosphere.”

Conservation scientist Dan Larkin, Ph.D., one of 14 Garden scientists with a faculty appointment at Northwestern University, mentored Tonietto and Hartzog. Both graduates credit him for being a consistent source of inspiration, advice, and encouragement. Going forward, Tonietto plans to enter academia, teaching at a university and conducting research. Hartzog plans to transition out of academia into more of an industry role, and is exploring options relating to data science and consulting.

Graduates from the master’s degree program in plant biology and conservation also pursued projects for which they have a passion. Alicia Foxx, now in the doctoral program, studied invasive species in the Colorado Plateau. Byron Tsang, is a project manager and ecologist with the Chicago Park District, investigated environmental factors that affect the reintroduction of two native woodland legume species in the Garden’s McDonald Woods. As part of her master’s thesis, Tracy Misiewicz did field work in a rainforest in Cameroon to

learn about the reproductive ecology of the plant species *Dorstenia ciliata*. Misiewicz went on to get her Ph.D. at the University of California, Berkeley, and works as a science project specialist for the Organic Center, a nonprofit organization in Washington, D.C.

Eighty-four percent of graduate-program alumni have gone on to jobs in the field of plant biology, including as a natural resources coordinator for the Illinois Department of Natural Resources, a collections and research assistant at Chicago’s Field Museum, and an energy analyst at the U.S. Department of Energy.

The graduate program continues to gain recognition as it moves into its second decade. In early 2015 two current Ph.D. students, Elliot Gardner and Aleks Radosavljevic, received prestigious Doctoral Dissertation Improvement Grants from the National Science Foundation—two of only 100 awarded nationally each year.

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