



**Plant Physiological Ecology
The Holden Arboretum
Postdoctoral Position**

Description: Holden Forests & Gardens (HF&G)

Holden Forests & Gardens is made up of two of Northeast Ohio's most important environmental and cultural institutions — [Holden Arboretum](#) and [Cleveland Botanical Garden](#) — whose mission is to connect people with the wonder, beauty, and value of trees and plants, to inspire action for healthy communities. The 12th largest public garden in the country, HF&G has close to 15,000 member households and more than 350,000 annual visitors who enjoy inspirational and educational experiences. HF&G is making a positive impact in the region and beyond through urban greening and forestry initiatives, environmental research, nature-based educational programs, and world-class visitor experiences at its two campuses.

When you join HF&G, you join a team of professionals who are passionate about improving Northeast Ohio's communities through our mission-driven programs. By joining HF&G, you will not only have the opportunity to work in a beautiful setting, but you will also have the opportunity to contribute to our fulfilling and groundbreaking work.

Opportunity:

The Research department seeks to fill an NSF-funded Postdoctoral Position available immediately at Holden Forests & Gardens. This position will study the physiological climate tolerance of Red Cedar (*Juniperus virginiana*) in relation to recent range expansion of the species. We are looking for a highly motivated PhD with experience in eco-physiological techniques such as gas exchange, water relations, plant hydraulics, and field-based sensor deployment. This position will offer opportunities to develop complementary research in plant physiology.

Key Responsibilities:

Key responsibilities of the Plant Physiological Ecology postdoctoral position include:

- Conduct research on plant physiological ecology
- Mentor undergraduate students working on the project
- Participate in or lead public outreach activities
- Performs other duties as required by supervisor

This is a collaborative project between faculty at Kent State University, Denison University, The Ohio University and Holden Forests & Gardens. The successful candidate will join the research team based at the Holden Arboretum campus (www.holdenarb.org), located in NE Ohio (east of Cleveland), and work will be conducted in the labs at the Holden Arboretum and/or at field locations within the species range in the continental United States, depending on the candidate's particular research interests. The duration of the funding for this position is 1.5 years. This position is open to US citizens and permanent residents.

Qualifications and Skills:

- PhD in biology, ecology, plant science or related discipline by the starting date
- This position is open to US citizens and permanent residents
- Pass a criminal background check

Project Abstract:

*Project Abstract: Eastern Red Cedar (*Juniperus virginiana*) is native to the eastern United States, where this attractive tree has been a popular choice for landscaping. But out in the Great Plains, Red Cedar is known as the "green glacier", because this slow-growing species is taking over once-productive grasslands. Ranchers face substantial economic costs in removing Red Cedar from grazing lands, and it reduces grassland biodiversity through competition with native species. But how do you stop a "green glacier"? Populations might be expanding because environmental variability has altered frost and drought regimes, or because humans have implemented prairie management practices such as fire suppression, or even because of changes in the migration patterns of seed-dispersing birds. It is more likely, however, that many factors are at work. For example, environmental variability might allow plants to move into a new region, but seed dispersal by birds could promote population expansion within a region. Rather than focus on one factor, this study will determine the relative importance of several causal factors. Data from experiments will be used in a model that predicts the rate and locations where Red Cedar range expansion is likely to occur. Findings will be presented to the public at the Holden Arboretum Scientist Lecture Series and incorporated into Holden Arboretum's "Working with Nature" K-12 Camp and "Tree Corp" adult workforce development program.*

Uncovering scale-dependent mechanisms controlling range and niche expansion of plants is a key issue in biodiversity research. This work integrates physiological and ecological processes across scales to determine the potential for further range expansion. The central hypothesis is that, at a large spatial scale, changes in prairie management are more important than physiological climate tolerance for promoting range expansion, while at smaller scales, biotic

factors such as avian dispersal, competition and facilitation are more important. The spatial scale of variation will be determined using microsattellites in historical, encroaching and niche expanding populations. The effects of fire will be examined using long-term data from the Konza Prairie NSF-LTER, while manipulative and field experiments will determine how the interaction of frost and drought impact Red Cedar performance. Seed dispersal by birds and changes in bird migration over time will be examined to determine how far, and where, birds disseminate Red Cedar. Empirical data will be integrated into a spatially explicit population-level age/stage matrix model, based on inputs from structural equation modeling at all three spatial scales, with spatial resolution determined by the results of microsattelite studies.

Apply:

Review of applications will begin immediately and continue until the position is filled.

Qualified applicants should send cover letter, curriculum vitae, a two-page statement of research and outreach interests and the contact information for 3 professional references to both employment@holdenfg.org and jmedeiros@holdenfg.org for review.

For questions concerning the position please contact Juliana Medeiros (jmedeiros@holdenfg.org).

Holden Forests & Gardens (Holden Arboretum and Cleveland Botanical Garden) is an Equal Opportunity Employer committed to hiring a diverse and talented workforce. We seek skilled, knowledgeable, and experienced individuals to join our staff and enhance our reputation as one of the country's foremost public gardens.