

SCIENCE

2019 YEAR IN REVIEW

Biodiversity is fundamental to life, from the air that we breathe to the food that we eat. The scientific study of biodiversity is the foundation of botanic gardens as it allows us to conserve diversity at home and around the world through greater documentation and understanding. Thus, science serves as a key programmatic element at Denver Botanic Gardens.



ON THE COVER

Cleaning seeds to be deposited in our seed bank as part of our partnership with the Center for Plant Conservation.



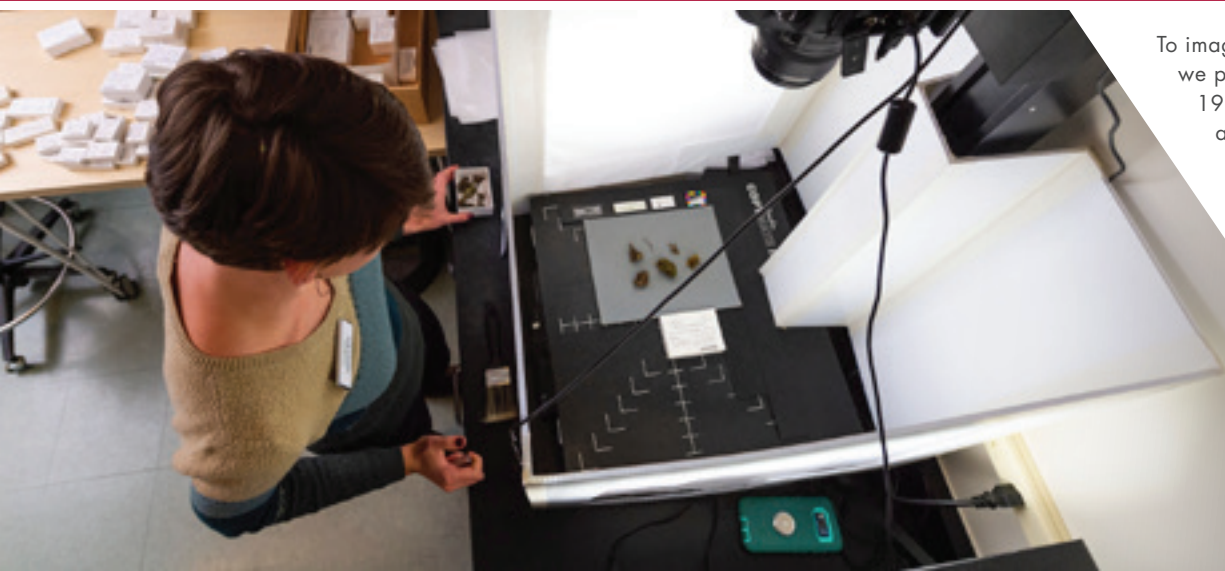
Historical watercolor paintings of fungal specimens will be transferred to archival storage in the Freyer – Newman Center (Artist: Shirley Chapman).

Planning for the Freyer – Newman Center

In 2019, we watched the long-awaited Freyer – Newman Center rise from the ground up. Scheduled to open its doors in spring 2020, the Center celebrates the intersection of science, art and education by housing new research laboratories and herbaria in addition to six classrooms, four galleries and an expanded library.

The Institute of Museum and Library Services awarded us nearly \$250,000 (Federal Award Identification Number MA-30-18-0410-18) to support the **re-housing of the Gardens' non-living collections** – natural history, art and archives – within the Center.

While construction of the Center carried on outside, **our team spent most of 2019 in preparation and anticipation for our move** to the Center. This involved considering taxonomic updates to our natural history collections, planning new herbaria layouts, imaging and wrapping fungal specimens in archival tissue paper, and finalizing designs for new ecology and genetic laboratories. To plan for the Center's expanded library, we worked closely with our Education Department to add our own resources to the Gardens' collections of books, scientific literature and archives. We assessed institutional files from those who laid the foundation of our programs. Files documenting the projects and visions of our past will be housed in the new archive space preserving these institutional records for future generations.



To image our fungal collection, we photograph each of our 19,000+ specimens next to their associated data and wrap each one in archival tissue paper. As of December 2019, we were 95% complete with this process.

Science at the Gardens

Efforts of the past year to study biodiversity patterns and processes were broad and varied. The biodiversity and applied conservation teams partnered to analyze and interpret data in ways that inform not just projects focused on *which* species occupy a landscape, but projects examining the dynamics of *how* those species occupy the landscape as well. Multiple presentations blending natural history collections and ecological landscape-level data were shared at national meetings, laying the foundation for new research pursuits.

We owe a depth of gratitude to Melissa Islam, our former associate director of biodiversity research and head curator, who moved on from her position at the Gardens after eight years. She left an indelible mark on our collections in the improved standards and protocols she implemented. She laid the foundation for the capacity to grow our collections, both through staffing and collections space itself. We now welcome Jennifer Ackerfield as head curator of natural history collections and associate director of biodiversity research and anticipate opportunities for new collaborations and expanded programming.

Documentation of plant and fungal diversity continued with targeted studies and outreach. We spent 21 days at Sandstone Ranch in Douglas County conducting a botanical survey to inform future open space use. Fungal specimens were collected through targeted vouchering at both the Colorado Mycological Society Mushroom Fair and the Telluride Mushroom Festival. Citizen scientists joined in efforts to collect fungal specimens at the festival and to document plant diversity along the High Line Canal in targeted bioblitzes. We expanded our seed conservation capacity by participating in the U.S. Bureau of Land Management's Seeds of Success program to support Colorado native plants.

Our team continues to grow and our graduate program through the University of Colorado Denver expanded with the addition of three new students. We now have seven students mentored by three different staff.

As we prepare for the 2020 opening of the Freyer – Newman Center we are reminded of our deep programmatic beginnings. It is a humbling and enlightening experience to go through the documents of those who preceded us. It provides a deeper understanding of our roots and provides motivation and inspiration to keep pursuing our vision of a biodiverse world. As we transition into the Center, we welcome the new visibility and opportunities the space will provide. We look forward to sharing our experience in the studies of biodiversity with an enhanced audience.

| Melissa Islam, former Associate Director of Biodiversity Research.

Using iNaturalist during a bioblitz on the High Line Canal. |



Featured Projects

Field researchers monitoring *Penstemon harringtonii* near Eagle, Colorado.

Rare Plant Demography

After several hot, dry summers 2019 surprised us with a field of blooming *Penstemon harringtonii* and robust plots of *Astragalus microcymbus* bearing thousands of fruits. We collected *A. microcymbus* seeds from three populations and leaf tissue from an additional population to complete sampling of the entire range. Seeds will be used for ex situ conservation and tissue samples will be used to assess the genetic diversity and population structure of *A. microcymbus*. These data contribute to a 25-year-long demographic study to identify management strategies for this endemic species. **In December 2019, the U.S. Fish and Wildlife Service announced that populations of *A. microcymbus* are stable and do not warrant Endangered Species Act protection. We are proud contributors of analyses that led to this ruling.** In our 11th year of monitoring *Sclerocactus glaucus*, we continue to find seedling recruitment despite dry conditions and our analyses show populations are stable for this federally threatened species.



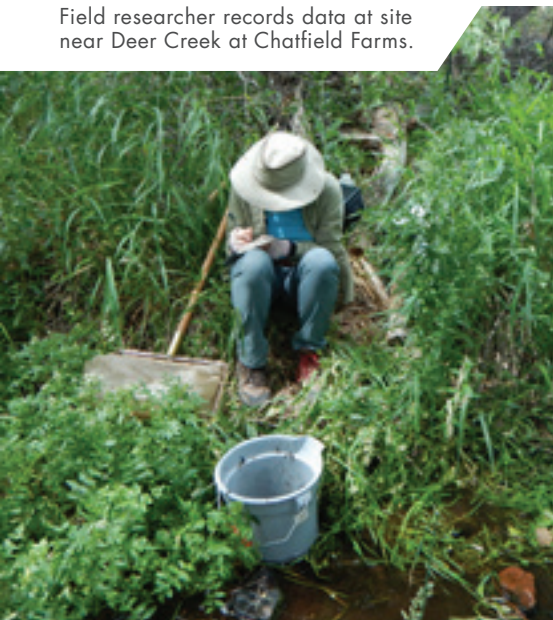
Alpine Conservation

Placing seeds in seed banks (below-freezing storage facilities) has become the primary method of ex situ conservation of plants around the world. However, not all seeds are able to survive these dry, subzero conditions. **These “exceptional species” require a different form of ex situ conservation.** Along with 11 other collaborating institutions, the Gardens received an Institute of Museum and Library Services award (MG-30-17-0055-17) for Endangered Exceptional Plant Research led by the Cincinnati Zoo and Botanical Garden. Alpine plants are adapted to extremely cold conditions, leading one to assume that they could survive the below-freezing temperatures in seed banks. However, studies have shown that alpine species are short-lived in seed banks compared to lower elevation species. **We are researching rare alpine species of Colorado to understand if they should be considered exceptional.**

Physaria alpina – an exceptional alpine species?



Field researcher records data at site near Deer Creek at Chatfield Farms.



Scientific Data

Upon returning from the prairies and mountains, **the next step in documenting Colorado's biodiversity is to curate and publish the scientific data collected in the field.** The Gardens' researchers are dedicated to making data accessible for not only our own research, but for scientists and the general public across the globe. For example, in 2019 we published the Deer Creek Riparian Restoration Ecological Monitoring dataset on the Global Biodiversity Information Facility (GBIF). The dataset describes the ground vegetation, tree canopy, aquatic invertebrate community and any specimens collected at sites along Deer Creek at Chatfield Farms where an effort to restore the stream's natural hydrology is underway. Any and all of these data can now be incorporated into studies at any scale, as well as our own, to test the success of the restoration project and more.

Outreach seasonal talks about plant identification with a volunteer.



Outreach on the High Line Canal

This summer our staff had a great time botanizing with members of the public who love their local greenway, the High Line Canal. **Nearly 100 people spent their Saturday mornings photo-documenting plant species along this 71-mile corridor,** learning about biodiversity and how to identify plants. Using iNaturalist, volunteers logged nearly 220 different species during more than 750 combined hours of work. A survey revealed that **a key motivating factor among participants was simply the opportunity to spend time outside learning about plants** and the greenway itself. As an institution that benefits greatly from our volunteers, we found it interesting that half of the people who converged on this wild, urban classroom were not current volunteers. We were gratified to see this expanded reach.

Graduate student collecting plant data near a beaver dam at Denver Botanic Gardens Chatfield Farms.



University Partnerships

The opportunity to collaborate with colleges and universities and support students allows us to expand our capacity and explore new areas of research beyond what our current staff can accomplish. **The Gardens has strong partnerships with several area universities that help broaden our reach, expand research initiatives and guide innovation.** Four of our scientists are adjoint faculty with the University of Colorado Denver. We have had one master's student graduate from our program and we currently advise two Ph.D. and four master's students. We have a growing relationship with Regis University and their graduate program in Environmental Biology. This winter will be our fourth year hosting a Regis intern to assist in analyzing field data associated with one of our restoration projects. Our partnership with Metro State University of Denver includes the One World One Water Center, which incorporates multiple departments and disciplines. In addition to these formal partnerships, we continually host interns and provide class tours for several of the colleges and universities across the Front Range.

Restoration

Denver Botanic Gardens Chatfield Farms is a 700-acre property in Jefferson County, Colorado. While a major focus of the property is sustainable agriculture, we also conduct research and restoration on the property's riparian and grassland areas. In 2019, we expanded restoration efforts from Chatfield Farms to wildlands throughout Colorado by participating in the U.S. Bureau of Land Management's Seeds of Success (SOS) program. The program employs botanists to collect seeds from native Colorado plants, which are stored for future restoration needs. Though different, the SOS project and the various initiatives at Chatfield Farms all represent our dedication to restoring Colorado's plant communities.

In 2015, we began our **riparian restoration** efforts along Deer Creek, which runs through Chatfield Farms. Native plants in riverine ecosystems provide food and habitat for animals, help filter stream water, and act as a buffer during flooding events. In response to historical channelization, which results in a disconnection between the creek and the floodplain, **we installed in-stream structures designed to mimic beaver dams**, which help reconnect the floodplain by pushing water up onto historical channels that were no longer connected to the creek. For the past four summers, we have collected data on plants, aquatic macroinvertebrates and water quality to understand the health of the riparian habitat along the creek and document changes over time resulting from our restoration efforts. The structures are working as planned by pushing water farther up the bank and keeping water in the system for longer periods of time. The habitat surrounding the structures is home to more native plant species than parts of the stream that were not manipulated by restoration efforts.

Long-term monitoring plot along Deer Creek at a beaver dam.



Collecting data at a plant monitoring plot along Deer Creek.



In 2019, we expanded our **grassland restoration** research on the property. Through collaboration with researchers at the University of Colorado Boulder we are experimenting with ways to restore areas of smooth brome (*Bromus inermis*). These experimental methods include **testing tilling, herbicide and seeding with native plants**. The scope of this project allows for graduate students to engage in asking related questions, including the impacts of herbicides on soil microbial and pollinator communities. This project represents the initial phase of larger plans to conduct grassland restoration research at Chatfield Farms.



Grassland restoration experiment at Chatfield Farms.

2019 also saw the expansion of our research and restoration efforts onto wildlands throughout Colorado. **Restoration of wildlands requires the availability of native seed** and knowing which plants are appropriate to plant in which areas. The Bureau of Land Management (BLM) manages the Seeds of Success (SOS) program to ensure the nation has sufficient native seed for research, development, germplasm conservation and ecosystem restoration. This year, **the Gardens served as a contractor for the BLM to collect SOS seeds in Colorado**. A crew of three botanists spent six months travelling the state, exploring BLM properties to find appropriate species and returning at the right time to collect seed. Throughout the season, they spent 73 days in the field and collected seeds during 30 collection events (each of which is more than 10,000 seeds) from 16 species. The **34+ million seeds** collected over the course of the 2019 season will be cleaned and sorted at the U.S. Forest Service's Bend Seed Extractory in Oregon. Ultimately, they will be used for research, conservation and ecosystem restoration in support of the BLM's Native Plant Materials Development Program. In 2020, the Gardens will have two crews collecting seed in Colorado and Wyoming for the SOS program. Using a common garden study at Chatfield Farms, one of our graduate students is using seeds from the SOS program and commercial growers to understand how the source of seeds used in restoration relates to plant performance.



SOS botanists identifying *Chrysothamnus viscidiflorus* near Gypsum, Colorado.



Cercocarpus montanus in fruit.



Making voucher collections in Gilpin County.

Natural History Collections

At their core, natural history collections capture species diversity and distribution. Not only do these collections hold the precious evidence of how landscapes and populations change over time, but they are also physical time capsules of genetics and morphology. These collections express humanity’s interest in the natural world and are on the frontlines of understanding and conserving biodiversity. As a museum, the Gardens’ collections support all who are curious about the natural world from artists to scientists to activists.

Collecting on Open Space Land

Kathryn Kalmbach Herbarium of Vascular Plants

The importance of Open Space land is two-fold, with people benefitting directly from time spent in nature, as well as indirectly from ecosystem services provided by unbuilt, biodiverse land. As Open Space lands are acquired by local and regional municipalities, botanists gain the opportunity to work with engaged stewards and land managers while incorporating what were often previously inaccessible locations into their collections work. Such expanded access serves to robustly refine species distribution ranges, while at the same time providing on-the-ground information to people managing these properties and their habitats. In 2019, we worked on **Sandstone Ranch Open Space**, an approximately 2,000-acre property that was nearly converted for housing before its purchase by Douglas County. The season-long survey yielded just over 500 species and more than 50 county records. **These records were unearthed in one of the most botanized areas in the state, illustrating there is always more to be discovered** and we need ongoing collections work. Beyond growing our collections, we provided guidance to land managers by highlighting the locations of native species that would be particularly sensitive to land use change. We thus view this project as meaningful in both the applied and foundational arenas of botanical knowledge.



Sandstone Ranch Open Space

2019 was one of our most productive years on record for accessioning arthropod and fungal specimens! While many specimens were collected in years past, the nitty gritty work of identifying, cataloging and preserving these specimens was a major goal accomplished in 2019 prior to re-housing these collections in 2020.



Identifying an arthropod specimen.



A specimen collected at the Telluride Mushroom festival, with proper data.



Astragalus microcybus leaf taken as genetic sample.

Enhancing Specimen Data Standards

Sam Mitchel Herbarium of Fungi

In 2019 we pushed the **Colorado Mycoflora Project** closer to its goal of documenting the diversity of mushrooms, and other macrofungi, in the Southern Rockies. One obstacle we have worked to overcome is ensuring that citizen science contributions count. **Educating our participants on how to properly voucher specimen contributions, and thus make them scientifically useful, has been key.** Without proper data, a specimen is merely a dried fungus in a box – not a record of a species at a specific place and time.

We have been working hard in the Sam Mitchel Herbarium of Fungi to develop protocols and workflows that capture these data in the most efficient ways. In 2019, we promoted our efforts to the amateur mycological community at events such as the meetings of the North American Mycological Association, the Telluride Mushroom Festival and the Colorado Mycological Society's Mushroom Fair. In 2020, we aim to advance these methods through the development of digital tools for citizen science, which will further our progress toward greater documentation of the macrofungi in Colorado and North America.

Biological Assets

As we travel across Colorado documenting biodiversity and studying rare species, we also continue to build our collection of genetic tissue samples. Unlike a specimen that is meant to be kept available and in good condition for hundreds of years, a tissue sample is usually just a leaf or two and can be picked apart and used up for genetic research. In 2019 a graduate student **utilized samples from our tissue collection to begin a genetic study of the critically imperiled *Astragalus microcybus*.** Tissue samples of this species were collected in 2014, 2018 and 2019 and represent roughly 30 plants per population. With these samples, our student will be able to use new cutting-edge techniques to assess genetic diversity of populations through time and space. As we add to our bank of genetic samples, new exciting opportunities for studying the flora of Colorado will steadfastly take root.

Engagement

Outreach

- The Gardens has participated in the Community Collaborative Rain Hail and Snow (CoCoRaHS) citizen science national network since summer 2006. The data inform scientists and resource managers across the U.S. and helps accurately **track our total York Street site precipitation for the year**. In 2019, we received 17.54 inches of precipitation which is 3.54 inches above average.
- Our mycology staff have been teaching at the Aspen Center for Environmental Studies in Aspen, Colorado since 1983. They lead a **multi-day mycology workshop** each year. Our 2019 workshop focused on documenting diversity of macrofungi in Colorado.
- Local high school students have been assisting in our riparian restoration through organized volunteer days. Partnering with Wildlands Restoration Volunteers, **more than 150 students have helped plant willows** and cottonwoods at Chatfield Farms.

Living Collection Expeditions

Horticulture staff traveled throughout the Mountain West making targeted collections to continue building the living collections with wild-sourced material. Collecting trips were made to **South Dakota and Wyoming** (59 collections) and **Central-Northwest Colorado** (20 collections).

Global Engagement

- In 2019, two horticulture **staff travelled to Kazakhstan and Kyrgyzstan** to collect seed for the Gardens' steppe collections. This trip was organized through the Plant Collecting Collaborative and yielded 220 accessions that will be grown by Gardens staff and shared with other gardens.
- The Gardens is partnering with the Alliance of Crop, Soil, and Environmental Science Societies, the American Public Garden Association and agricultural researchers to develop a plan for the conservation, use and public engagement around **North America's crop wild relatives**. The aim is to enhance collaborations to advance crop diversity conservation and research in North America.
- Research staff attended the Conservation Optimism Summit in Oxford, England, learning new ways to communicate science with the public. This included not only **promoting positive conservation advancements** but emphasizing the **use of storytelling** to engage the public and inspire change.
- Mycology staff traveled to Indonesia to participate in a National Science Foundation funded workshop to **increase collaboration between U.S. and Indonesian scientists** in areas of biodiversity and conservation research.



Collecting on a steppe
in Kyrgyzstan.

In 2019, scientists spent the equivalent of 30 hours a week on outreach. Experience science outreach at the Gardens by visiting the new Science Pyramid exhibit, *Welcome Home: Meet Your Habitat*. This exhibit explores the ways in which the lives of Colorado's living things are deeply intertwined through landscapes and the finite resources we share.

Select Publications

Alba, C., C. Fahey, S. L. Flory. 2019. Global change stressors alter resources and shift plant interactions from facilitation to competition over time. *Ecology* 100(12): e02859.

Bramel, P and **S. Krishnan**. 2019. Systematic assessment for conservation and utilisation of crop genetic resources. In: Zeigler, R.S (ed.) *Sustaining Global Food Security: The Nexus of Science and Policy*. CSIRO Publishing, Australia. P 1-14.

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Cripps, C. L., U. Eberhardt, N. Schütz, H. J. Beker, **V. S. Evenson**, E. Horak. 2019. The genus *Hebeloma* in the Rocky Mountain Alpine Zone. *MycKeys* 46: 1-54.

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Krishnan, S., T. Moreau, J. Kuehny, A. Novy, S. L. Greene and C. K. Khoury. 2019. Resetting the table for people and plants: Botanic gardens and research organizations collaborate to address food and agricultural plant blindness. *Plants, People, Planet* 1(3): 157-163.

Levy, R. 2019. DBG Tissue and DNA Bank. Version 1.8. VertNet. Global Biodiversity Information Facility. Occurrence dataset <https://doi.org/10.15468/caz5u8>.

Levy, R., R. Hufft, and **M. Paces**. 2019. Deer Creek Riparian Restoration Ecological Monitoring. Version 1.2. Kathryn Kalmbach Herbarium (Denver Botanic Gardens). Global Biodiversity Information Facility. Sampling event dataset <https://doi.org/10.15468/scmp5u>.

Nwosisi, S. K. Dhakal, D. Nandwani, J. I. Raji, **S. Krishnan** and Y. Beovides-García. 2019. Genetic Diversity in Vegetable and Fruit Crops. In: Nandwani, D. (ed) *Genetic Diversity in Horticultural Plants. Sustainable Development and Biodiversity*, Vol 22. Springer, Cham. P 87-125.

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Ullah, S., **A. W. Wilson**, M. Faiz, S. Hussain, G. M. Mueller, and A. N. Khalid. 2019. *Russula shanglaensis* sp. nov. (Basidiomycota: Russulales), a new species from the mixed coniferous forests in district Shangla, Pakistan. *Turkish Journal of Botany*. 44(85): 85-92.

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White, D. M., **M. B. Islam**, and R. J. Mason-Gamer. 2019. Phylogenetic inference in section *Archerythroxyllum* informs taxonomy, biogeography, and the domestication of coca (*Erythroxyllum* species). *American Journal of Botany* 106(1): 154-165.

Select Presentations

Alba, C. 2019. Using botanical collections to find uncommon species and spark new research hypotheses. *Ecological Society of America* 2019. Louisville, KY.

Alba, C., R. Hufft and **R. Levy**. 2019. Describing plant biodiversity: Botanical collections and quantitative ecological data richly complement each other. *Ecological Society of America* 2019. Louisville, KY.

Alba, C., R. Hufft and **R. Levy**. 2019. Describing plant biodiversity: Botanical collections and quantitative ecological data richly complement each other. *Botany* 2019. Tucson, AZ.

DePrenger-Levin, M. 2019. Integrating diverse data sources from herbaria records, population genetic patterns, long-term population trends, and landscape monitoring to inform management decisions. *Ecological Society of America* 2019. Louisville, KY.

DePrenger-Levin, M. 2019. The impacts of spatial uncertainty in herbaria data on species distribution models. *Ecological Society of America* 2019. Louisville, KY.

DePrenger-Levin, M. 2019. *Penstemon* Conservation. American Penstemon Society Annual Meeting. Walden, CO.

Fu, K. 2019. Effects of seed source on drought performance and implications for native prairie restoration: A multispecies drought experiment. High Altitude Revegetation Committee - Society for Ecological Restoration - Rocky Mountains Chapter, 2019 Conference. Fort Collins, CO.

Hufft, R. 2019. Ecological Restoration Alliance of Botanic Gardens. *Ecological Society of America* 2019. Louisville, KY.

Hufft, R. 2019. Ecological Stewardship: Restoration at Denver Botanic Gardens and Beyond. Jefferson County Open Space Research Symposium. Lakewood, CO.

Hufft, R. 2019. Using beavers and community partnerships for restoration. Conservation Optimism Summit. Oxford, UK.

Kintgen, M. 2019. Denver Botanic Gardens Alpine Collection. 5th International Congress of Arctic and Alpine Botanic Gardens. Nancy, France.

Krishnan, S. 2019. Adapting to Climate Change: Arming with Knowledge about Coffee Pests and Diseases, Specifically Coffee Leaf Rust. Hawaii Coffee Association Annual Conference. Honolulu, HI.

Krishnan, S. 2019. Conservation and Utilization of Crop Wild Relatives for Food Security. M.S. Swaminathan Research Foundation's 30th Anniversary International Consultation on Achieving Sustainable Development Goals and Strengthening Science for Climate Resilience. Chennai, India.

Krishnan, S. 2019. Global Coffee Conservation Strategy. USDA Agricultural Research Service. Beltsville, MD.

Krishnan, S. 2019. People Pollinating for Crop Diversity: Collective action across food, agriculture and garden networks. American Public Gardens Association Annual Conference. Washington, D.C.

Krishnan, S., A. Kumar and M. Swaminathan. 2019. Development of a master plan and a fund-raising plan for the M.S. Swaminathan Botanical Garden in Wayanad, India. International Society for Horticultural Science First International Symposium on Botanical Gardens and Landscapes. Bangkok, Thailand.

Krishnan, S., S. L. Greene, C.K. Khoury, J. Kuehny, A.J. Miller, T. Moreau and A. Novy. 2019. People pollinating partnerships: Harnessing collaborations between botanic gardens and agricultural research organizations on crop diversity. International Society for Horticultural Science First International Symposium on Botanical Gardens and Landscapes. Bangkok, Thailand.

Neale, J. R. 2019. Denver Botanic Gardens Conservation Genetics Program. Plant Conservation Genetics Workshop. San Diego, CA.

Neale, J. R. and **A. Seglias**. 2019. Conserving the Alpine: From Tiny Seeds to Big Collaboration. Center for Plant Conservation Annual Meeting. Chicago, IL.

Paces, M. 2019. South Platte Riparian Restoration. High Altitude Revegetation Committee - Society for Ecological Restoration - Rocky Mountains Chapter 2019 Conference. Fort Collins, CO.

Seglias, A. 2019. Seed ecology of restoration-relevant forb species: phylogeny and climate influence inter- and intraspecific variation in germination. High Altitude Revegetation Committee - Society for Ecological Restoration - Rocky Mountains Chapter 2019 Conference. Fort Collins, CO.

Vickerman, L., R. Hufft. 2019. Creek Restoration to Support Riparian Habitat and Creek Flow. Society for Ecological Restoration 8th Annual World Conference on Ecological Restoration. Cape Town, South Africa.



Conferences in 2020

We are excited to be organizing and hosting conferences at the Gardens in 2020. In May, we will be hosting the Center for Plant Conservation annual meeting in our newly opened Freyer – Newman Center for Science, Art and Education. Staff are also co-organizing the biennial North American Congress for Conservation Biology that will be held in Denver in July, with a closing reception at the Gardens. We hope to see many of you at one or both of these events.

Thank You to Our Funders

- Aspen Center for Environmental Studies
- Alliance of Crop, Soil, and Environmental Science Societies
- American Penstemon Society
- American Public Garden Association
- Center for Plant Conservation
- Colorado Mycological Society
- Colorado Water Conservation Board
- Douglas County Open Space
- Garden Club of America
- The Garden Club of Denver
- High Line Canal Conservancy
- Integrated Digitized Biocollections
- Institute of Museum and Library Services
- Jefferson County Open Space
- Leichtag Foundation
- Lyda Hill Foundation
- National Science Foundation
- North American Mycoflora Project
- North American Mycological Association
- Plant Collaborating Collective
- Plant Select™
- Sand Creek Regional Greenway Partnership
- Telluride Mushroom Festival
- United Airlines
- US Botanic Garden
- US Bureau of Land Management
- US Department of Agriculture – National Institute of Food and Agriculture
- World Food Prize Foundation

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