

## RESEARCH

# Crop Science Special Issue: Connecting Agriculture, Public Gardens and Science

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## WHY CONNECT AGRICULTURE, PUBLIC GARDENS AND SCIENCE?

North America's agricultural and natural landscapes are vital to feeding humanity—they are home to many populations of important food plants and their wild relatives. Climate change is projected to significantly impact the agricultural sector and any efforts to adapt food and agriculture systems today will benefit us both now and in the future. A key strategy for adaptation is to safeguard biological diversity by protecting plant genetic resources of crops that can be utilized for current and future breeding efforts. However, public efforts to preserve crop diversity cannot be achieved without robust societal engagement, which is made more complicated by demographic trends over the last century which have seen North American populations convert from largely agrarian to highly urbanized (ex., 80% of the US population is now living in urban neighborhoods). The researchers who contributed to this special issue understand the need to conduct cutting edge research about crop diversity while directly engaging a largely urban public. The need to engage urban audiences in agricultural research has never been greater. Urban populations are the largest ultimate consumers of food and are often home to policy makers. Many of the agricultural researchers and farmers of tomorrow will necessarily come from urban locales. We must do everything we can to serve urban markets at all stages of agricultural production, bringing agricultural education to our urban centers both to ensure informed democratic decision-making and to open up agricultural opportunities to urban populations.

Botanic and other public gardens have become key nodes of interface between agricultural sciences and the urban audiences public gardens serve. In order to deepen and enhance the relationship between these stakeholders, we helped convene a meeting titled “*Celebrating Crop Diversity: Connecting Agriculture, Public Gardens and Science*,” jointly run by the Alliance of Crop, Soil and Environmental

Science Societies (ACSESS) and the American Public Gardens Association (APGA). The symposium was hosted by the World Food Prize Foundation and the Greater Des Moines Botanical Garden in Des Moines, IA in April 2019. It drew over 100 participants from more than 26 botanical/public gardens, 18 colleges and universities, and four federal agencies, as well as professionals from science centers, research organizations, plant conservation groups and other non-governmental organizations. Through scientific presentations, keynotes, field trips and networking, participants advanced two key themes: (i) crop diversity, with a focus on crop wild relatives, and (ii) public engagement in agriculture education, with a focus on inclusion and capacity building.

This special issue of *Crop Science* represents the published proceedings from this landmark meeting. The 12 papers contained herein cover topics such as crop wild relative conservation, crop breeding and genetics, research and education, public engagement, plant conservation approaches and more.

In Khoury et al. (2019), a collaborative road map to conserve, use and raise awareness of crop wild relatives in North America is outlined with five priorities for action. These priority areas were co-created with international input across organizations and sectors to conserve crop

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wild relatives and secure their genetic traits for future agricultural production. Volk et al. (2019) document plant genetic resource training needs to support, create and maintain high quality plant collections and the expertise needed in the field. Riordan and Nabhan (2019), explore trans situ conservation of crop wild relatives in Arizona which is a conservation approach that integrates both in situ and ex situ techniques. From Greene et al. (2019), we learn about Seeds of Success, a collaborative approach to collect seeds of wild native species in the US where previous collecting efforts have filled gaps in the conservation of native crop wild relatives. With one-third of the world's flora maintained in botanical garden living collections, Meyer and Barton (2019) assess these collections for global crop wild relatives; their findings highlight the significant role that botanical gardens are playing in backing up crop wild relative diversity. The importance of conservation strategies for woody perennial plants is illustrated by Migicovsky et al. (2019), who identify current strengths and future priorities for collections and conservation.

Three papers focused on specific crops such as carrots, lettuce and cranberry provide an important species-specific approach to plant conservation (Mezghani et al., 2019; Lebeda et al., 2019; Rodríguez-Bonilla et al., 2019). A crop-specific approach can highlight conservation priorities as well as persisting gaps in species-specific knowledge of taxonomy, crossability, distribution and trait characterizations. Crop-specific information is essential to plant breeding which is a key tool for adapting plants for a changing climate.

A number of papers explore educational efforts to build capacity and public awareness of plants, agricultural science and biodiversity in food systems (Fontanier et al., 2019; Meyer et al., 2019; Moreau and Speight, 2019). These examples highlight the many programs, networks and approaches being used across North America through which we can share best practices and learn about potential collaborators for further efforts.

## CONCLUSION

There is much work to be done to safeguard North America's agriculture and food system. Connecting agricultural researchers, botanical gardens and others to bring together diverse perspectives, expertise, approaches and solutions is essential for biodiversity in food and agriculture, and for conserving food plants and their wild relatives in our natural landscapes.

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