

CONCLUSIONS OF A PLANT BREEDER SURVEY ON GERMPLASM PRESERVATION

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INTRODUCTION

Ornamental plant breeders create new introductions that increase the beauty, interest, and plant performance in our landscapes. As public gardens face the challenges of climate change and seek a more sustainable model of horticulture, plant selections are an important consideration. Yet ornamental plant breeders are struggling to locate and access germplasm, even as public gardens work to build their collections and preserve rare plants. This study assesses the germplasm needs of ornamental plant breeders and the role of the public gardening community in the preservation and distribution of valuable germplasm. An online survey was distributed to 66 ornamental plant breeders around the United States in October 2016. Plant breeders working with woody ornamental plants were targeted in particular. Twenty-seven plant breeders responded to the survey (see Tables 1 and 2 for types of plants and breeding methods used by survey respondents). A summary of responses follows.

WILD-COLLECTED, SPECIES, AND CULTIVAR GERMPLASM NEEDS

The vast majority of ornamental plant breeders who responded to the survey (25 out of 27) use germplasm from all three categories of origin: documented wild-collected, straight species (of cultivated origin), and cultivars. However, when asked which type of germplasm they use most frequently, more than half of breeders responded that they use cultivars the most frequently.

Breeders cited the following benefits of working with cultivars: they already possess desirable characteristics, there is no need to “reinvent the wheel,” and breeding behaviors may already be published. On the other hand, wild-collected material is like “starting from scratch.” It has a less refined habit and needs multiple cycles of improvement before release. Breeders may struggle with wild-collected material when there is a lack of information on propagation values. Phenotyping wild-collected material is also difficult and can lead to a dead end. The benefits of wild-collected germplasm are the possibility of exciting new traits, improved environmental tolerance, and heterosis. Some breeders are concerned that starting with cultivars may lead to progeny that are too similar to previously introduced material. Restrictions due to intellectual property rights must also be considered when working with cultivars. Overall, ornamental plant breeders favor cultivars and see much value in having access to cultivated germplasm for breeding purposes.

CHALLENGES IN LOCATING GERMPLASM

“Sometimes cultivars or species just are not being sold.”

“Can't always find newly advertised cultivars. Old cultivar standards are sometimes hard to come by as well.”

“Online inventories often inaccurate, hard to get to all the botanical gardens I need to during the short window to take cuttings. Nurseries have a small selection and are too pricey.”

“Good passport information. Exactly what is this germplasm? Where did it come from? Often not characterized.”

“Access to wild species, you often know they exist but have no means to acquire. Same for old cultivars - so many small seed companies are closing shop. The legal side of foreign acquisitions is often murky.”

A full 70 percent of the ornamental plant breeders surveyed have been unable to secure germplasm. It may be difficult to find the desired material, especially both new and old cultivars. When material can be located, it may still be difficult to access. Budget and time constraints impact visits to public gardens,

and connection with plant breeders. Plant breeders are a relatively small interest group and their perspective and needs are not always at the forefront, even within the horticulture community.

CONCLUSION

New plant introductions directly benefit the public gardening community. For ornamental plant breeders to create appealing plants that require less resource input (less water, fertilizer, insecticides and herbicides, etc.) and can respond to a changing climate, they must have access to a wide variety of germplasm. Most plant breeders have experienced obstacles with the availability, accessibility, and importation of germplasm. Public gardens are playing a critical role in the preservation and distribution of valuable germplasm, yet opportunities exist to improve collaboration.

Plant Type	Percent of Plant Breeders Using Each Type (Out of 27 Respondents)
Shrubs	89%
Trees	67%
Herbaceous Perennials	48%
Annuals (Asexual)	30%
Food Crops	26%
Annuals (Seed Strains)	22%
Vines	19%

Table 1: Plant Types Used by Survey Respondents

Breeding Method	Percent of Plant Breeders Using Each Method (Out of 27 Respondents)
Controlled Pollination/ Crosses	96%
Chemical/Physical Mutation	78%
Open-Pollination/Chance Seeding Selection	78%
Sport Selection	56%
Embryo Rescue	11%
Ploidy Manipulation	11%

Gene Editing/Marker Assisted Breeding

List of Woody Plant Genera Survey Respondents Are Working On (Currently or Historically):

Acer, Aesculus, Aronia, Berberis, Betula, Buddleja, Buxus, Camellia, Cercidiphyllum, Cercis, Chaenomeles, Clethra, Cornus, Corylus, Cotoneaster, Deutzia, Distylium, Franklinia, Halesia, Hamamelis, Hibiscus, Hydrangea, Ilex, Kalmia, Lagerstroemia, Lantana, Lilac, Liquidambar, Loropetalum, Magnolia, Malus, Nyssa, Osmanthus, Philadelphus, Physocarpus, Platycladus, Prunus, Pyrus, Rhododendron, Rosa, Sambucus, Sarcococca, Spiraea, Stewartia, Styrax, Syringa, Thaphiolpeis, Thuja, Ulmus, Vaccinium, Viburnum, Vitex, and Weigela

ACKNOWLEDGEMENTS

This project was made possible in part by the Institute of Museum and Library Services MA-30-14-0336-14. Thanks are also expressed to Joseph Rothleitner for assistance with the development of this survey.