

Conserving Genetic Diversity Ex Situ – How Much Do We Need?

Sean Hoban

Abstract

The world's botanic gardens and seed banks collectively safeguard millions of plants from more than 100,000 species. However it is not known how many individuals should be preserved ex situ of each species to conserve genetic diversity and adaptive potential. At The Morton Arboretum, with many collaborators, we have investigated this question over the past few years with datasets from fifteen rare taxa in five genera (oaks, cycads, magnolias, hibiscus and palms), as well as with computational simulations, plus a case study in a common tree species. We have found wide variation among species in the percentage of genetic diversity conserved in ex situ collections today - from 40% to 95%. Alas, the majority of taxa are well below a target of 95% of diversity conserved and thus there is room for improvement. We have also shown that current collections are not optimal - collections could remain the same size and capture up to twice as much genetic diversity, with improved collection strategies. There are also opportunities for allocating resources dependent on a collector's constraints. In summary, many current plant collections are not (yet!) reaching targets, but new guidance can be achieved with data and models. I hope these results spark discussion and resolution on critical next steps for the plant conservation community.