Let's consider the topic of ex situ conservation, or the preservation of threatened species outside of their native habitats. Simply put, it takes large numbers to get it right. To maximize diversity and avoid what are known as genetic bottlenecks, collectors must sample populations widely across a species’ range and from many individuals. It is easy to see how impractical it would be to attempt to conserve all this diversity—both among species and within populations—in a living collection of plants like the Arnold Arboretum. There simply isn’t enough room. Fortunately, many conservation species bear seeds that can be dried and stored for long periods at low temperatures, providing a much more space-efficient and cost-effective means of preserving the full complexity of a plant’s genetic character.

Efforts currently underway to preserve our native ashes (Fraxinus spp.) provide an urgent example of this approach to ex situ conservation. Over the past two decades, North American ashes have been devastated by the emerald ash borer (EAB). Since its first appearance in Michigan, this beetle has gradually moved eastward, laying waste to wild and cultivated ashes and threatening the entire genus on this continent with extinction. Tens of millions of trees have already been lost, and perhaps billions more are at risk. To date, no resistance to EAB has been identified among American Fraxinus species.

Grim as the outlook may sound, the Arboretum has joined the federal government’s collaborative effort to document and preserve the genetic diversity of North American ash species in the face of imminent loss. In 2011, I participated in several trips to scout and collect seeds from ash populations in northern Pennsylvania and southern New York, a region known as the Twin Tiers. The relatively recent arrival of EAB to this region means that time is running out to inventory and collect regional ash diversity before the pest exerts its full destructive force on these forests.

Last July, I joined Mark Widrlechner (now retired) of the USDA North Central Regional Plant Introduction Station in Ames, Iowa, to scout for populations of white ash (F. americana), green ash (F. pennsylvanica), and black ash (F. nigra) throughout the Twin Tiers. During this reconnaissance trip, we visited ash populations that met...
several important criteria. First of all, wild ash populations needed to be isolated from those in cultivation, minimizing our risk of contaminating our sample with non-native pollen. Secondly, we looked for sites that were 15 to 20 miles apart from each other, and ideally of different habitat types, in order to maximize genetic diversity among populations. Once we found a population for one of the three species, we conducted a quick survey to make sure there was a sufficient number of accessible, seed-bearing, female trees that would yield large quantities of seed (at least 5,000 healthy seeds per tree). From these select populations, we gathered herbarium specimens, took photographs, obtained GPS coordinates, and collected habitat and other descriptive data. Mark and I were impressed with the number of seed-bearing trees we encountered on our scouting trip—like oaks and some other species, ashes often alternate between heavy and light fruiting years.

In October, I returned to the area to harvest seed from these trees, this time joining Jeff Carstens, also of the USDA-PI Station in Ames, and Andy Schmitz from the Brenton Arboretum in Dallas Center, Iowa. All told, we sampled nearly 200 ash trees, representing 21 populations of the three species. While *Fraxinus* was the primary target, we also managed to collect from a few other genera representing high-priority targets for our respective institutions. Perhaps most notable among these were collections of *Carya*, one of six genera of special interest to the Arboretum in its conservation activities. Because hickory nuts are recalcitrant, meaning they cannot be dried down and stored at low temperatures, our institutions will propagate these seeds for cultivation in our living collections.

The effort to document and collect from threatened ash populations contributes to the Arboretum’s long history of studying and protecting plant biodiversity. Although some of our ash collections from this trip may find their way into the Arboretum landscape, all will be integrated into the USDA’s National Plant Germplasm System for preservation and to supply the research needs of scientists studying the natural history, biology, and plant-insect interactions of ash trees—all of which remain poorly understood. Our greatest hope is that banked seed may help to repopulate *Fraxinus* populations if the threat of EAB diminishes in the future.

*Left*, Collection team member Andy Schmitz from the Brenton Arboretum holds a handful of ripe white ash seeds. *Above*, from left to right, Jeff Carstens of the USDA, the author, and Schmitz display some of the collections from a white ash population in Tioga County, PA. Each bag represents seed collected from a single tree, and 12 trees were sampled from this particular population.