

Images Offer Clues to Seed Diversity

The Arnold Arboretum has long been sending explorers to remote and biologically rich areas overseas in search of exceptional plant material. One use of this material has been to expand the scope and relevance of its living collections, an important part of the Arboretum's mission throughout its history. Plant propagation plays a major role in the success of this effort, but propagation can be extremely challenging when the material at hand is little known to science or horticulture. Seed-based propagation remains the primary method for building our diverse collections, but the task of identifying seeds has often depended on the intuition of the propagator.

About forty years ago then-propagator Alfred Fordham, finding no published information to help him identify seeds, created the seed herbarium to support his extensive experimentation on seed germination protocols and seed viability. The seed herbarium has subsequently become a valuable asset to Arboretum staff, and currently holds 1,350 samples, 915 of them from plants in the living collection. These specimens are often used to help distinguish seeds from the chaff that accumulates during the process of cleaning and to differentiate among seeds of closely related species. Both of these tasks will now be made easier by an ambitious new effort at the Dana Greenhouses to create high-quality digital images of material in our seed herbarium. These images will improve the accessibility of this rare and important resource and will assist in the documentation of the Arboretum's collections. The work now being done, supported in part by the J. Frank Schmidt Family Charitable Foundation, represents the first stage of a three-year project to document the current seed herbarium and create systems that will incorporate new material. Over the



Julie McIntosh Shapiro captures seed sample images.

last two years, staff and volunteers have reorganized the collection, created an inventory, and collected additional seed material from plants growing at the Arboretum. Since spring, following the purchase of specialized equipment and the outfitting of a work station at the Greenhouses, the staff has taken multiple images of each of the seed samples presently in the herbarium. Corresponding seedlings, when available, are also photographed to help identify plants at a young age. The images, along with other data about the seeds, will be added to the Arboretum's plant records database. Its capacity to integrate images and other information about seeds and seedlings, mature accessions, and herbarium specimens will provide a more detailed description of individual plants on the grounds, a resource easily shared online with international botanical and horticultural communities.

Collecting expeditions, botanical institutions, and nurseries provide the Arboretum with about 200 seed accessions each year, which in turn are grown as possible new accessions for the living collections. Now the digital imaging of these seeds and seedlings adds a significant dimension both to their propagation and to the Arboretum's plant records. Next steps include expanding the seed herbarium itself by incorporating seeds from rare and endangered Arboretum accessions and by adding seed images and related data to our robust profiles of *Acer* (maple), *Carya* (hickory), *Fagus* (beech), *Syringa* (lilac), and *Tsuga* (hemlock).



Three images of European beech (*Fagus sylvatica*) photographed for the Seed Herbarium digitization project. At top, the emergence of the radicle from the seed. Center and bottom photographs depict the development of the cotyledons, or seed leaves.

Julie McIntosh Shapiro