

## Seed Collections and Documentation: A Propagator's Perspective<sup>©</sup>

**Julie McIntosh Shapiro**

Garden PHI, 25 T Street, Hull, Massachusetts 02045-1519, U.S.A

Email: j.mci.shapiro@gmail.com; julie@gardenphi.com; jshapiro@oeb.harvard.edu

There are many techniques for propagating woody plants. I am going to talk about an aid to the traditional way of growing seed, the digital image. This is the fusing of digital seed imagery to part of the protocol in plant production work, research, education, and propagation. This can be a positive step in ensuring the virtual preservation of plant material, and an increase in plant knowledge with insights in morphology, phenology, and even cytology.

Before the growing season begins, I photograph the taxa I will be sowing (Fig. 1). I do this for two reasons — one, I am building a visual virtual propagule database, detailing and magnifying the diversity of seed shape, color, and size. I cannot always commit this to memory. And two, I am also able at times to visually pinpoint disease or other phenomena in these seed batches.

They may not germinate, or they may demonstrate some kind of unusual quality that becomes worthy of documentation. This kind of digital capture gives me more clues to the seed, as well as additional information that may be interesting, beneficial or germane to colleagues. This image-based component is one part of a puzzle that needs to be studied and implemented in various manners. Of course this could also go hand-in-hand with lab testing for seed viability, germination and vigor. But a high resolution image leaves behind a visual record for future study.

In the digital lab, I use three separate photo stages. The stages depend on the size of the seed or fruit, the larger the seed, the larger the copy stand. The standard procedure I employ is to photograph a seed; a group of seeds; seed plus fruit; and any anomalies that might be present or that may need further imaging at closer magnification. When seeds of closely allied species are available, comparisons of these are photographed as well. This is a quick, visually precise, and in no way a cost prohibitive routine. The equipment and supplies necessary for this type of project could easily be integrated into any existing protocol, or procedural methodology within the propagation, and nursery industry.

I have imaged over 1,000 seed species from 35 genera, including digitally documenting the seed of the Arnold Arboretum's seven North American Plant Collection Consortium collections (NAPCC). Here genus and species are observed and conserved. The evolution and development of my digital imaging seedwork comes from various assignments — collections of historic value, rare and endangered seed, native and nursery seed, as well as the capturing of seed for research purposes.

These images create online access with documentation, a digital voucher of an image, one directly tied to an identified specimen, able to be viewed, studied, and visually dissected at any time. Along with this, a hard copy of archival images could be maintained as well. These image datasets could be uploaded to mobile devices with apps producing millions of scientific interactions.

Maybe the genetic integrity of a collection batch was at stake? Possibly just the presence of too much chaff and not enough seed was the answer? What does the seed look like? The visual image of a seed can be vital to the engineering of its



**Figure 1.** Digital seed image of *Chionanthus virginicus*.

use. With this in mind, the prospects of seed image cross sections, with lateral and transverse views, work in swaths of genera to create functional visual databases.

The possibilities exist with seed imaging to document clonal relationships between seed, and even the possibility of color relationships between seed and flower. Seed images would be a benefit to seed science. Having an accurate digital image online could reduce the need of sending specimens back and forth. And by attaching accompanying documentation, such as provenance, accession, specimen numbers, and qualifiers this extensive data, through a plant collections system, could be available. This would aptly facilitate information-sharing, linking the images of seed with data, including those seed demonstrating disease-damaging characteristics.

I think that incorporating propagule digital photo technology as an adjunct to phases of procedure and protocol in the plant sciences, nursery work, and education, will aid in verification of collections, documentation of morphology, the creation of a new diagnostic tool, as well as help to verify seed shipments. This could be a positive step, with enormous importance to ornamental horticulture.

Seeds ubiquitous in nature are neither standardized, nor uniform. Like snowflakes each one is different. With these qualities in mind, I developed a system with a simplified schema so that users could easily get the visual information they are looking for.