Redbud Seedpods Hold Surprises

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As fall advances across the Old Dominion, canopies of redbud, the 2013 VNPS Wildflower of the Year, transform themselves from green to gold, revealing seed pods also changing color from pale green to dark chocolate brown. These seedpods, which may be retained on the tree into winter, are typical legume fruits, the product of the flower’s simple pistil, each containing several seeds. Unlike most legumes, however, redbud seed pods seem disinclined to open and release individual seeds for dispersal. Redbud fruits tend to disperse intact. Once on the ground, the inevitable action of weather and microbes gradually degrades the pod, whereupon the process of seed germination can proceed.

Fresh seeds of redbud, however, are dormant and will not germinate until two different factors, each responsible for different aspects of seed dormancy, are overcome. This double dormancy derives from the presence of an extremely hard, impermeable, seed coat and physiological dormancy of the embryo contained within. For temperate-zone trees, seed dormancy makes good ecological sense. Rapid germination would leave redbud seedlings vulnerable to the harsh rigors of winter; better to remain dormant through the coldest months and germinate during the more favorable weather of spring.

Most legumes have very hard seeds, and redbud is no exception. Anatomically, the stereotypical legume seed coat consists of two (or more) layers of tough sclereid cells: elongate macrosclereids at the surface underlain by one (or more) layers of boxlike brachysclereids directly below. Both of these sclereids are very nearly solid masses of cell-wall material. Together, they tile the surface of the seed, except for a small patch known as the hilum, which marks the

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Redbud seeds that escape being eaten by weevils eventually find themselves in the soil. Time passes, rain and snow come and go, temperatures climb and fall, and ubiquitous microbes secrete their digestive enzymes, all of which gradually break down the seed coat and water gains access to the interior of the previously very dry seed. In this way, nature breaches the physical dormancy of redbud seeds.

Impatient gardeners can speed up seed hydration in a number of ways. Sandpaper, files, or sharp knives can be used to nick into the seed coat, providing pathways for the quick entry of water. For the chemically inclined, brief treatment in a strong acid can also soften the seed coat and promote permeability. These techniques, either mechanical or chemical, are known as scarification. And to hasten water entry, redbud seeds can be soaked in warm water prior to planting.

Mere hydration of redbud seeds, however, is not sufficient to prompt germination of the embryo because there is also a physiological dormancy factor that must be overcome. Hydrated redbud embryos must endure several weeks of cool temperature followed by a return to warmth before they germinate. In a horticultural practice called cold stratification, scarified redbud seeds can be induced to germinate relatively quickly by sowing in moist soil and keeping the pot refrigerated for one or two months before returning to warm conditions. In nature, the physical (seed coat) and physiological (embryo) dormancy may be overcome in the course of a single winter. But based on personal experience, passage through a second winter season yielded many more redbud seedlings than the first—perhaps it took that long for both dormancy factors to be overcome.

It has been said that wishes are like seeds—few ever develop into something. Indeed, we should expect, on average, each redbud tree to succeed in making just one redbud seedling that will survive to maturity—any less and the species would eventually go extinct, any more and we would be overrun with redbuds. It is a sobering proposition to think that despite the elaborate biology of redbud seeds, despite their double dormancy adaptations for proper germination, their structural and chemical defenses notwithstanding, and despite the undeniable fact that each has the genetic potential to become a handsome redbud, only a tiny percentage of the seeds produced can be expected to become trees themselves.

Redbud seeds may seem like such simple little things, but close examination reveals unexpected intricacies. One is reminded of a saying by the Chinese philosopher, Lao Tzu (Laozi), “To see things in the seed, that is genius.”