

RARE PLANT

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Bresnan, McCracken and Knoke honored for volunteer service

This spring, Rare Care trained more than 40 rare plant monitoring volunteers in Seattle, White Salmon and Spokane, expanding the ranks to 200. Also, Rare Care conducted a seed collecting training in White Salmon for the first time. To keep in touch with veteran volunteers, Rare Care staff meet with volunteers during annual forums across the state. At this spring's forums, three volunteers were recognized for outstanding contributions.

Julie Bresnan has volunteered for Rare Care since 2003. In 2010, she devoted 204 hours to Rare Care, completing 8 rare seed collecting assignments and one monitoring assignment. She has participated in Rare Care's monitoring weekends, helped with newsletter mailings

and written for Rare Care's series in the Washington Native Plant Society's publication, *Douglasia*.

Volunteering since 2007, Brenda McCracken serves as the regional volunteer coordinator for eastern Washington, providing valuable support for area volunteers, recruiting new volunteers and organizing events and special monitoring projects. She also participates in the *Howellia* monitoring project as well as taking on other monitoring assignments.

A volunteer since 2006, Don Knoke has been instrumental in identifying plants during Rare Care's monitoring weekends, mentoring other volunteers and participating in the Seeds of Success project. Last year, he devoted 148 hours to Rare Care and checked fruit maturity and collected seeds and vouchers for more than 10 Seeds of Success collections.

Ex situ collection undergoes germination testing

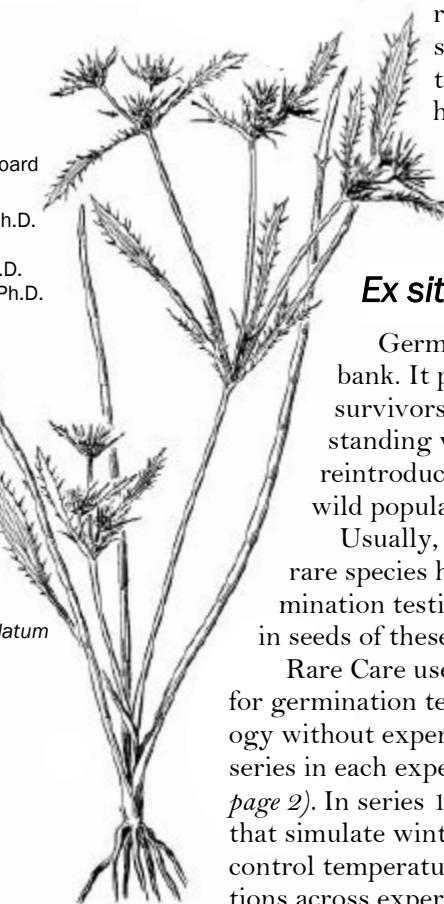
Germination testing is an important component of maintaining a seed bank. It provides information on the viability of the collections and seed survivorship over time. Both pieces of information are essential to understanding whether the current collections are adequate to support future reintroduction efforts and when fresh seeds need to be collected from the wild populations to replace aging seeds.

Usually, no information exists on the germination requirements for the rare species held in the Miller Seed Vault. Therefore, another objective for germination testing is to gain a better grasp of what types of dormancy are exhibited in seeds of these species and how to break dormancy and initiate germination.

Rare Care uses move-along experiments (developed by Carol and Jerry Baskin) for germination testing. These experiments allow us to explore the germination ecology without expending large amounts of seed and time. Rare Care uses four different series in each experiment: two move-along series and two controls (*see diagram on page 2*). In series 1 and 2, the seeds are moved through three temperature regimes that simulate winter, spring, summer and fall. Incubation chambers allow us to tightly control temperature and light to simulate seasonal patterns and replicate the conditions across experiments.

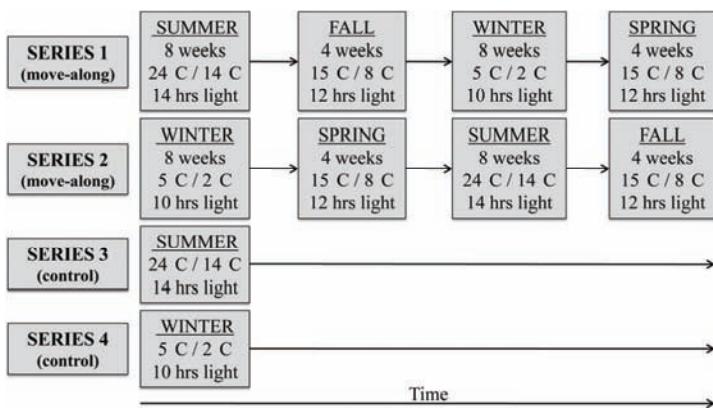
Running two move-along series concurrently helps determine whether warmth is required before cold. For instance, *Synthyridia pinnatifida* var. *lanuginosa*, an alpine plant endemic to the Olympic Mountains, exhibited germination in series 2 only after the second cycle of winter. This might imply that the initial 8 weeks of cold were insufficient to break dormancy. However, greater than 90% germination was achieved in series 1 after only 8 weeks of summer followed by 8 weeks

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Counterclockwise from top right: Spokane training, Seattle training, White Salmon training, *Silene spaldingii* seedling in pot, incubator with seed dishes & potted seedlings, *Erigeron salishii* seedlings in dish. View online to enlarge your view of the photos at <http://depts.washington.edu/rarecare/Links.htm>.



Viability and survivorship assessed

(continued from page 1)

of winter, indicating that warmth must precede cold to break dormancy. *Synthyris* flowers right after snow melt and produces seeds by July. In its natural habitat, its seeds experience summer before winter.

The two control series provide valuable information that the move-along series do not. For instance, for species that require cold to break dormancy, the move-along series may not clearly indicate whether warmer temperatures are required for germination after dormancy is broken, because the seeds are automatically moved to spring after 8 weeks. In contrast, if germination starts in the winter control, we know that warmer temperatures are not needed to initiate germination.

The winter control is also extremely useful for elucidating the optimal period of cold. In the move-along series 2, the germination rates for *Castilleja cryptantha*, an endemic paintbrush found in subalpine meadows and parklands of Mt. Rainier, were approximately 40 to 50%. However, in the winter control the seeds did not start germinating until the seventh month, and nearly 100% germination was achieved over the next 3 months! From a survival perspective, this makes sense. In their natural habitat, these seeds must persist over the long alpine winter and not germinate too early; otherwise, the seedlings would emerge under snow.

Once no further germination is observed, we terminate the tests and check remaining seeds for viability by cutting them open to examine the embryos. White, firm embryos are probably alive, indicating that our treatments may not have successfully broken dormancy. Gray or tan-colored embryos that are soft indicate that the seeds are nonviable. In many instances we also find empty seeds consisting of nothing more than seed coats. The percentage of nonviable and empty seeds in each lot tested gives us a better understanding of the effective size of the collections in the seed bank.

Germination requirements and viability rates can vary between populations for the same species and can even vary between collections for the same population. The variation may result from differing environmental conditions each population has been exposed to, chance changes in population genetics, local pollinator type and abundance, and seasonal changes. For these reasons, germination testing of

every population provides new insight into the reproduction health and seed ecology of these rare plants. By tracking changes in germination rates over time for each collection, we can assess survivorship of the seeds in our seed bank and determine when a new collection from the wild population is necessary.

Setting up a germination test

Each germination experiment includes four series. Each season provides day and night temperatures typical of Washington habitats. The cycle can be repeated if more time is needed to break dormancy.