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## **Germination of Seeds in the Endangered *Abronia macrocarpa***

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GERMINATION OF SEEDS IN THE ENDANGERED *ABRONIA MACROCARPA*

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ABSTRACT—*Abronia macrocarpa* is endemic to Texas and it is listed as endangered by federal and state agencies, but it is believed to have a high potential for recovery. Reintroduction is a potential option for recovery of this species and this could be accomplished using seeds planted in the field or transplanting individuals produced ex situ from seeds. We used a split-plot design to determine the percentage of seeds germinating in the field and to test effects of planting seeds in spring versus autumn. Season of planting significantly influenced percentage of germination. Seeds planted in spring (April 2005) exhibited 27.8% germination, while germination of seeds planted in autumn (November 2005) was only 0.8%. We also investigated the induction of seed germination in the laboratory. Difference in germination was 0–68.6% between the control and treatments. Combining scarification then warm stratification followed by cold stratification resulted in significantly higher germination than other treatments.

RESUMEN—*Abronia macrocarpa* es una especie endémica de Texas y es considerada como en peligro de extinción a nivel federal y estatal, sin embargo se cree que tiene un gran potencial para recuperación. Una de las posibilidades para la recuperación de esta especie es la reintroducción, la cual puede llevarse a cabo usando semillas plantadas en el campo o transplantando individuos producidos ex-situ de semillas. Utilizamos un diseño de lote partido para determinar el porcentaje de semillas germinadas en el campo y para investigar los efectos de siembra en la primavera versus el otoño. La temporada de sembrado influyó significativamente la germinación; las semillas plantadas en la primavera (abril del 2005) tuvieron el 27.8% de germinación, en tanto que sólo germinó el 0.8% de las plantadas en el otoño (noviembre del 2005). También se investigó la inducción de la germinación en el laboratorio. La diferencia fue de 0–68.6% entre los controles y los tratamientos. Se encontró que la escarificación más la subsecuente estratificación cálida seguida por la estratificación fría produjo una germinación significativamente mayor que otros tratamientos.

*Abronia macrocarpa* (Nyctaginaceae) is a rare species that is endemic to Texas. The plant is an herbaceous, spring-blooming, self-incompatible perennial (Williamson and Bazeer, 1997). Flowers are magenta, produced in a head, fragrant, and pollinated primarily by hawkmoths (Williamson et al., 1994). The above-ground portion of the plant dies back by May or early June and the plant remains dormant until a rosette of leaves is produced in autumn (Williamson and Bazeer, 1997). The species is limited in distribution to Leon, Robertson, and Freestone counties and restricted to deep sandy soils in the Post Oak Savannah Woodlands region (United States Fish and Wildlife Service, 1992). Although the plant occupies a narrow geographic range, it exhibits high levels of genetic variability both within and among populations (Williamson and Werth, 1999). The taxon is listed as endangered by

federal and state agencies, and it is given a recovery priority of 2 indicating a high degree of threat, but a high potential for recovery (United States Fish and Wildlife Service, 1988, 1992). Because the taxon has a high potential for recovery, it might be possible to facilitate recovery through reintroduction.

Delisting would require 20 viable populations, each  $\geq 10.11$  ha in size with a population of  $\geq 600$  individuals (United States Fish and Wildlife Service, 1992). These criteria are considered sufficient to protect the species from extinction in the case of a catastrophic event. Currently, nine wild populations are known. If 11 additional wild populations are not discovered, establishing new populations through reintroduction will be crucial for recovery of *A. macrocarpa*. Successful reintroduction of the related *Abronia umbellata* subspecies *breviflora* in beach-dune habitat in