Research Notes

Impacts of Cotyledon Removal on Survival of Blackbrush (Coleogyne ramosissima: Rosaceae) Seedlings

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Introduction

Despite the ecological importance of the regeneration stage of plant life histories (Grime 2001), some of the factors affecting seedling survival, including the interaction between seedlings and their herbivores, are not well-understood (Hanley and May 2006). Herbivory is a major cause of seedling mortality for many woody plant species (Hanley 1998; Moles and Westoby 2004; Fenner and Thompson 2005). The ability of seedlings to cope with herbivory is likely affected by seed size, the presence or absence of cotyledons, and the time elapsed since germination (Bonfil 1998).

Because seedlings of woody plant species are small, they can suffer high mortality due to herbivory (Kitajima and Augspurger 1989; Howe 1990; Osunkoya et al. 1992; Asquith et al. 1997; Kitajima 2003). Carbohydrate reserves are important for seedling recovery after tissue loss, especially in shaded understories where photosynthesis is limited (McPherson and Williams 1998; Canham et al. 1999). Cotyledons can support energy and nutrient demands of a young seedling either as photosynthetic or reserve organs (Kitajima 2003). Cotyledons have nutritional value, and it is common to find young seedlings in the field with cotyledons that have been partially or completely removed by insects and browsing vertebrates (Smythe 1978). Such removal of cotyledons before development of the first true leaf is usually fatal (Kitajima 2003). However, even after development of the first leaf, cotyledon loss may greatly reduce seedling survival (Kitajima 2003).

Using greenhouse experiments, I investigated how the timing of cotyledon damage and variation in its magnitude influencing survival of young blackbrush (Coleogyne ramosissima Torr.) seedlings through simulated cotyledon herbivory. Specifically, I examined whether differences in the ability of 4-month-old Coleogyne seedlings to survive detachment of cotyledons were related to the timing and extent of cotyledon removal in an environmentally controlled greenhouse.

Methods

Seed Collection and Germination

Coleogyne seeds were collected from late June through early August 2006 in Cold Creek Canyon that lies on the eastern slope of the Spring Mountains (36° 25’N, 115° 28’W; 1,250 to 1,405 m in elevation). The Spring Mountains are located approximately 65 km northwest of the Las Vegas Valley in southern Nevada. A total of 500 potentially viable seeds were collected from nearly monospecific Coleogyne shrublands.