

Establishment and ecophysiology of four Sonaran desert woody species under a line-source sprinkler irrigation gradient system

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Successful establishment of shrub and tree legumes in the southwestern United States is dependent on rainfall amount, frequency and distribution, seedbed temperatures and available water condition affecting seed germination and seedling establishment. The line source sprinkler irrigation gradient system (LSSIGS) was used to test effects of different seedbed available water and temperature conditions on seedling emergence and establishment, and morphological and physiological characteristics of catclaw (*Acacia greggii*), jojoba (*Simmondsia chinensis*), velvet mesquite (*Prosopis juliflora* var. *velutina*) and blue paloverde (*Cercium floridum*) during the summers of 1992 and 1993 at the Tucson Plant Materials Center. Irrigation plus precipitation in July and August added 356.7, 344.6, 265.1, 209.8, 106.9 and 76.2mm of water in 1992 and 285.2, 252.6, 207.7, 186.6, 106.6 and 68.1 mm in 1993 for distance of 1.5, 4.5, 7.5, 10.5, 13.5 (lowest irrigation) and 16.5 (no irrigation) respectively, from the line-source sprinkler. Irrigation created available soil moisture differences between irrigated and unirrigated soils during rainless periods in July but generally created little difference in soil water availability within the irrigation system at different distances from the line source sprinkler. Lack of large soil water availability differences resulted from an initially wet soil profile and natural rainfall in August of both years.

Jojoba seedling emergence lagged about 2-3 weeks behind that of the other species which emerged within a week of irrigation. Seedlings emerged on unirrigated soils after August rains on both years. Although seedling establishment and plant growth was generally highest for the highest levels of irrigation, establishment was acceptable