

Jensen, AM, F Götmark, M Löf (2012) Shrubs protect oak seedlings against ungulate browsing in temperate broadleaved forests of conservation interest: A field experiment. Forest Ecology and Management, 266 (2012): 187-193

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Abstract

In many oak-rich temperate broadleaved forests of conservation value, high ungulate browsing pressure restricts oak regeneration. We examined the protection of oak (*Quercus* sp.) seedlings from browsing provided by naturally occurring shrubs in 10 forests across southern Sweden over 3 years. We planted oak seedlings in four plots in each forest; two with naturally regenerated shrubs and two with no shrubs. Ungulate browsers were excluded from two plots at each site, one with and one without shrubs. Fencing provided the best protection against ungulate browsers for the seedlings. The probability of a seedling being browsed (browsing frequency) was approximately 20% units lower for individuals growing among shrubs than for individuals growing in the absence of shrubs. When browsing did occur, the intensity (measured as a reduction in height growth) was significantly lower for seedlings in shrubs. Regression analyses showed that browsing frequency increased on seedlings in tall shrubs, and decreased on seedlings that had been browsed previously. Browsing intensity decreased if the seedling grew in tall and dense shrubs. Browsing frequency and intensity increased on oak seedlings that over topped the shrub canopy. Increased abundance of the prickled *Rubus idaeus* and *Rubus fruticosus* coll. in plots with shrubs did not affect browsing frequency and intensity. Two and a half years after planting, oak seedling mortality increased by the presence of shrubs. Although shrubs restricted oak seedling growth, we conclude that shrubs initially

facilitated oak regeneration by concealment, and subsequently by numeric dilution. Shrubs may be used to reduce browsing damages if long-term evaluation indicates a net positive outcome for oak survival and growth.

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