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RESTORING FOREST IN WETLANDS DOMINATED BY REED CANARYGRASS: THE EFFECTS OF PRE-PLANTING TREATMENTS ON EARLY SURVIVAL OF PLANTED STOCK

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Abstract: Reed canarygrass (*Phalaris arundinacea* L.) is an aggressive and persistent invasive species in formerly forested wetlands of the northern United States. Heavy shading reduces the dominance of reed canarygrass, so a promising long-term approach to restoration of reed canarygrass–dominated wetlands is the establishment of woody plants that will overtop and shade the grass. The first step toward developing this long-term restoration method is to determine a combination of reed canarygrass control methods and suitable trees and shrubs to provide high early survival of the native woody plants. We tested 23 tree and shrub species in five treatments to determine: 1) the woody species that have the highest survival when planted in treated stands of reed canarygrass, and 2) the pre-planting treatments that lead to the highest rates of survival. Near-monocultures of reed canarygrass were herbicided, mowed and herbicided, herbicided and plowed, or herbicided and burned. One- to three-year-old, mostly bare-rooted trees and shrubs were hand-planted into these treatments and into untreated control plots at three sites, and over two growing seasons. Fall herbicide followed by spring plowing provided the highest survival for the majority of species planted. However, all experimental treatments (controlling reed canarygrass with a single herbicide application) provided reasonably high survival of the 10 most successful woody species. Those pre-planting treatments and study sites that developed the greatest herbaceous species diversity after treatment had the highest tree and shrub survival. The early establishment success we found using these methods is encouraging for development of a technique for restoring swamp forest in degraded reed canarygrass–dominated wetlands.

Key Words: glyphosate, herbicide, *Phalaris arundinacea*, swamp forest, wetland restoration

INTRODUCTION

Invasive species threaten native species, communities, and environments (Wilcove et al. 1998, Mack et al. 2000) and are among the primary concerns for natural area managers (Randall and Rice 2003). The worst invaders can decrease the value of wildlife habitat, alter ecosystem functions and disturbance regimes, and displace native species of plants and animals (D'Antonio and Vitousek 1992, Pimentel et al. 2000). Invasive species can displace native vegetation and suppress establishment of native flora through competitive dominance (Apfelbaum and Sams 1987, Galatowitsch et al. 1999, Mulhouse and Galatowitsch 2003, Spyreas et al. 2004, Zedler and Kercher 2004). Aggressive invasive species are particularly troublesome for restoration efforts. Adequate sites for seed germination, seedling growth, and establishment of vegetative propagules, both at the beginning of a restoration project and during subsequent aftercare, are necessary for normal community function to resume and for recruitment to occur naturally (Urbanska 1997).

Grasses in particular can limit the establishment and growth of woody species (D'Antonio and Vitousek 1992, Hess et al. 1999, Mazia et al. 2001, Spyreas et al. 2004). D'Antonio and Vitousek (1992) list nearly 40 non-native grass species that are serious problems somewhere around the world. The competitive advantages of grasses include effective competition for water and nutrients, soil-surface light reduction, changes to the historical fire regime, and a number of ecosystem-level effects (D'Antonio and Vitousek 1992). Some grass-domi-