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## Roadside revegetation with native plants: Experimental seeding and transplanting of stem cuttings

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### Abstract

**Questions:** Can we use local native plants for roadside revegetation? What cultural methods help enhance the process?

**Location:** Trans Canada Highway, Terra Nova National Park, Newfoundland.

**Objectives:** To (1) test stratification requirements for seed germination, (2) determine if germination, survival and growth of seedlings and stem cuttings of selected plants can be increased by mulching treatments and (3) identify native plants and cultural treatments useful for revegetation.

**Methods:** We tested seed germination of *Kalmia angustifolia*, *Iris versicolor*, *Juncus effusus*, *Eriophorum vaginatum*, *Clintonia borealis* and *Cornus canadensis* in a greenhouse experiment. We conducted field experiments of roadside revegetation using seeds of *K. angustifolia*, *I. versicolor*, *J. effusus* and *E. vaginatum*, as well as seedlings of *I. versicolor* and rooted stem cuttings of *Empetrum nigrum* and *Juniperus communis* after hay-mat mulch and organic matter mulch application.

**Results:** Stratified seeds of *K. angustifolia*, *I. versicolor*, *J. effusus* and *E. vaginatum* germinated successfully in the greenhouse, whereas *C. borealis* and *C. canadensis* seeds did not. Along roadsides, only *I. versicolor* seeds germinated. *Iris versicolor* cover increased significantly in organic matter mulch compared to hay-mat mulch and control. Transplanted *I. versicolor* seedlings had high survival in all treatments but growth was reduced in organic matter mulch. Survival and growth of stem cuttings of *E. nigrum* and *J. communis* were significantly increased on hay-mat mulch.

**Application:** Rooted stem cuttings of *E. nigrum* and *J. communis* planted on hay-mat mulch can be used as a practical method of roadside revegetation. These shrubs have low structure, are evergreen, and exhibit stress-tolerance properties, which make them ideal species for roadside revegetation. They are also non-palatable to wildlife. Roadside ditches can be revegetated by seeds or seedlings of *I. versicolor*. Robust roots and rhizomes of this plant may provide soil stability and dark green leaves and attractive flowers create aesthetically pleasing vegetation cover.

**Keywords:** *Empetrum nigrum*; *Juniperus communis*; *Iris versicolor*; Mulching; Roadside restoration; Roadside microhabitat; Seeding; Stem-cutting; Transplanting.

### Introduction

Roads and highways are conspicuous and necessary structures in natural landscapes proving vital functions of transportation of goods and people. However, many studies have highlighted various adverse road effects (Forman & Alexander 1998; Parendes & Jones 2000; Gelbard & Belnap 2003). Adverse road effects are of particular concern when large highways pass through conservation areas such as national parks and ecological reserves and interfere directly with their conservation objectives (Forman & Alexander 1998; Mallik 2000; Karim & Mallik 2008). Ecologists, conservationists and road engineers recognize the need for rapid development of vegetation cover along roadsides to minimize the detrimental effects of roads on surrounding ecosystems (Hobbs & Harris 2001). Highway engineers often provide a grass cover by hydro-seeding immediately after road construction to reduce soil erosion (Andres & Jorba 2000). However, it is more desirable to revegetate roadsides with appropriate local plants than hydro-seeding with non-native species (Tormo et al. 2007).

Several authors have reported problems associated with establishing native plants in disturbed habitats (Paschke et al. 2000; Fattorini 2001). Natural colonization of native plants is unpredictable due to biological limitations such as seed dispersal, dormancy and viability and due to inhospitable properties of roadsides such as compacted soil, low soil moisture and nutrient content, high substrate temperature and chemical toxicity (Walker & Powell 1999; Karim & Mallik 2008). Revegetation of disturbed habitats with native plants is gaining support from restoration ecologists (Grantz et al. 1998; Kirmer & Mahn 2001; Motalvo et al. 2002; Tormo et al. 2007). However, this approach is rarely used by road engineers (but see Cotts et al. 1991; Petersen et al. 2004; Tyser et al. 1998).

Failure of roadside revegetation by native plants is often due to inappropriate selection of planting material and their propagation methods. Transplanted seedlings