

Defoliation Effects on Herbage Production and Root Growth of Wet Meadow Forage Species

Author(s): Jerry D. Volesky, Walter H. Schacht, Ann E. Koehler, Erin Blankenship, and Patrick E. Reece

Source: Rangeland Ecology & Management, 64(5):506-513. 2011.

Published By: Society for Range Management

DOI: <http://dx.doi.org/10.2111/REM-D-10-00010.1>

URL: <http://www.bioone.org/doi/full/10.2111/REM-D-10-00010.1>

BioOne (www.bioone.org) is a nonprofit, online aggregation of core research in the biological, ecological, and environmental sciences. BioOne provides a sustainable online platform for over 170 journals and books published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Web site, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/page/terms_of_use.

Usage of BioOne content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

Defoliation Effects on Herbage Production and Root Growth of Wet Meadow Forage Species

Jerry D. Volesky,¹ Walter H. Schacht,² Ann E. Koehler,³ Erin Blankenship,⁴ and Patrick E. Reece⁵

Authors are ¹Professor, University of Nebraska–Lincoln, West Central Research and Extension Center, North Platte, NE 69101, USA; ²Professor, Department of Agronomy and Horticulture, University of Nebraska–Lincoln, Lincoln, NE 68583, USA; ³Research Analyst, University of Nebraska–Lincoln, Panhandle Research and Extension Center, Scottsbluff, NE 69361, USA; ⁴Associate Professor, Department of Statistics, University of Nebraska–Lincoln, Lincoln, NE 68583, USA; and ⁵Former Professor, University of Nebraska–Lincoln, Panhandle Research and Extension Center, Scottsbluff, NE 69361, USA.

Abstract

Root growth is important to the competitive ability of plants, and understanding how herbage defoliation affects root growth has implications for development of management strategies. Objectives were to determine the effects of defoliation intensity and frequency on root characteristics and herbage production of slender wheatgrass (*Elymus trachycaulus* [Link.] Shinners), Nebraska sedge (*Carex nebrascensis* C. Dewey), and “Steadfast” birdsfoot trefoil (*Lotus corniculatus* L.). Plants of each species were transplanted into containers that had been placed in the ground at wet meadow field sites the prior year. There were eight replications of a control and five defoliation treatments, which were combinations of different frequencies (two or five times) and intensities (light or heavy) and haying. Treatments were applied for a single growing season, and aboveground biomass was collected. Containers were extracted in October, and plant crowns, rhizomes, and roots were separated from the soil. Defoliation treatment did not affect total root weight, length, and surface area of Nebraska sedge or birdsfoot trefoil ($P > 0.10$). Slender wheatgrass total root weight was less when defoliated five times ($4.46 \text{ g} \cdot \text{container}^{-1}$) than when defoliated twice ($6.62 \text{ g} \cdot \text{container}^{-1}$) during the growing season. More frequent defoliation of slender wheatgrass also reduced length (20%) and surface area (21%) compared to less frequent defoliation. However, defoliation frequency did not affect aboveground biomass. Defoliation intensity did not affect aboveground production or root characteristics of the three species. Abundant soil moisture in meadows likely buffers negative effects of defoliation. For all species, two defoliation events (e.g., haying followed by grazing) does not appear to negatively affect root growth and herbage production.

Resumen

El crecimiento radicular es importante en la habilidad de las plantas para competir y, entender como el efecto de defoliación afecta el crecimiento radicular y las implicaciones en implementar de estrategias de manejo. Los objetivos de este estudio fueron determinar el efecto de la intensidad y frecuencia de defoliación en las características y producción herbácea del triguillo delgado (*Elymustrachycaulus* [Link.] Shinners), junco de Nebraska (*Carex nebrascensis* C. Dewey), y trébol pata de pájaro (*Lotus corniculatus* L.). Plantas de cada especie fueron trasplantadas en contenedores que se pusieron con un año de anticipación en el suelo en sitios de praderas húmedas. Hubo ocho repeticiones, un control y cinco tratamientos de defoliación que se combinaron con diferentes frecuencias (de dos a cinco veces) e intensidades (leve e intensa) y henificación. Los tratamientos se realizaron una sola temporada de crecimiento y se colectó la biomasa aérea. Los contenedores se retiraron en octubre y la corona, rizomas y raíces de las plantas se separaron del suelo. El tratamiento de defoliación no afectó el peso total, extensión y superficie de la raíz del junco de Nebraska y trébol pata de pájaro ($P > 0.10$). El peso total de la raíz del triguillo delgado fue menor cuando se defolio cinco veces ($4.46 \text{ g} \cdot \text{contenedor}^{-1}$) que cuando se defolio dos veces ($6.62 \text{ g} \cdot \text{contenedor}^{-1}$) durante la época de crecimiento. También, la frecuencia de defoliación del triguillo delgado reduce la extensión (20%) y superficie (21%) de la raíz comparado con defoliaciones menos frecuentes. Sin embargo, la frecuencia de defoliación no afectó la producción de biomasa aérea. La intensidad de defoliación no afectó la producción aérea ni las características de la raíz de las tres especies. La abundancia de humedad en el suelo en las praderas probablemente amortigua el efecto negativo de la defoliación. Para todas las especies, dos eventos de defoliación (ej. henificación seguida del pastoreo) aparentemente no afecta negativamente el crecimiento de la raíz y la producción herbácea.

Key Words: birdsfoot trefoil, defoliation frequency, defoliation intensity, Nebraska sedge, root distribution, root length, root surface area, root weight, slender wheatgrass

INTRODUCTION

Understanding defoliation and plant growth interactions has direct application in the development of sustainable management strategies for grasslands. Plant response to defoliation has been the objective of numerous research studies (Jameson 1963; Belesky 1986; Jones and Nielson 1993). While many of these studies have concentrated on aboveground plant or plant

A contribution of the University of Nebraska Agricultural Research Division, supported in part by funds provided through the Hatch Act. Additional support was provided by University of Nebraska Foundation Sampson Range and Pasture Endowment.

Correspondence: Jerry D. Volesky, West Central Research and Extension Center, 402 West State Farm Rd, North Platte, NE 69101. Email: jvolesky1@unl.edu

Manuscript received 12 January 2010; manuscript accepted 18 April 2011.

Download English Version:

<https://daneshyari.com/en/article/4404652>

Download Persian Version:

<https://daneshyari.com/article/4404652>

[Daneshyari.com](https://daneshyari.com)