How fertilization and thinning may impact tree defense and mountain pine beetle overwintering

enterine



Overview

1. Fertilization and thinning and tree carbohydrate reserves

2. Mountain pine beetle overwinter survival in bolts from fertilized lodgepole pines

Carbohydrates in trees



Sugars: mobile

Starches: Immobile, reserves

Objectives: How does growth, stem size impact carbohydrate reserves?



Experimental Design



Fertilization Increased Growth Increment but decreased starch reserves



Length of branchless stem impacts carbohydrate reserves in the roots



Height to live crown (m)

Study 2: What if beetles kill and colonize fertilized lodgepole pines?



630ched.com

Description of experiment







Description of experiment



Description of experiment



More beetles survived in fertilized bolts







No impact of N on fungal growth (G. clavigera, L. longiclavatum, O. montium)





Fungi amplify nitrogen more effectively in fertilized bolts



Study 2: Implications



- 1. Fertilization increases phloem Nitrogen
- 2. Further amplified by fungal associates
- increased survival and development rates in our beetles

Overall management implications



 Fertilization reduces carbohydrate reserves in pine trees (For Ecol Manage (260): 1914-1920)

 In fertilized trees, brood productivity will be higher (Upcoming issue of Environmental Entomology)

Thank you

University of Alberta:

Candace Serben Caroline Lecourtois Christine Dahl Eckehart Marenholtz Evan Esch Kim Stang Lucas Veldhoen Ryan Sherrit Pak Chow

Alberta SRD:

Adrianne Rice Anina Hundsdoerfer Barry White Brooks Horne Darryl Gilday Dave Morgan Devin Letourneau Jeffrey Mallete

