

Introduction

- Aspen is a foundational species of boreal mixedwood forests and an important component of forest restoration
- First step towards afforestation is the successful establishment of seedlings
- Older reclamation sites create significant challenges for seedling establishment
- There is need to identify seedling characteristics that improve growth and survival on competitive sites

Objectives

- Determine what seedling characteristics improve performance on competitive sites
- Assess how competition affects aspen seedling development above and belowground

Methods

- Nine stock types developed to assess morphological characteristics
- Initial height of the stock types ranged from 28-115 cm and initial root-shoot ratios ranged from 1.2-4.7
- Three plots in Edmonton at CDC (Fig. 1)
 - A) Mulch treatment using plastic mulch to exclude competition
 - B) Plowed to temporarily remove competition at planting time
 - C) Grass planting seedlings directly into the sod of a hay field
- Ten blocks in each plot with stock types replicated four times
- Ten seedlings of each stock type excavated to assess overall development

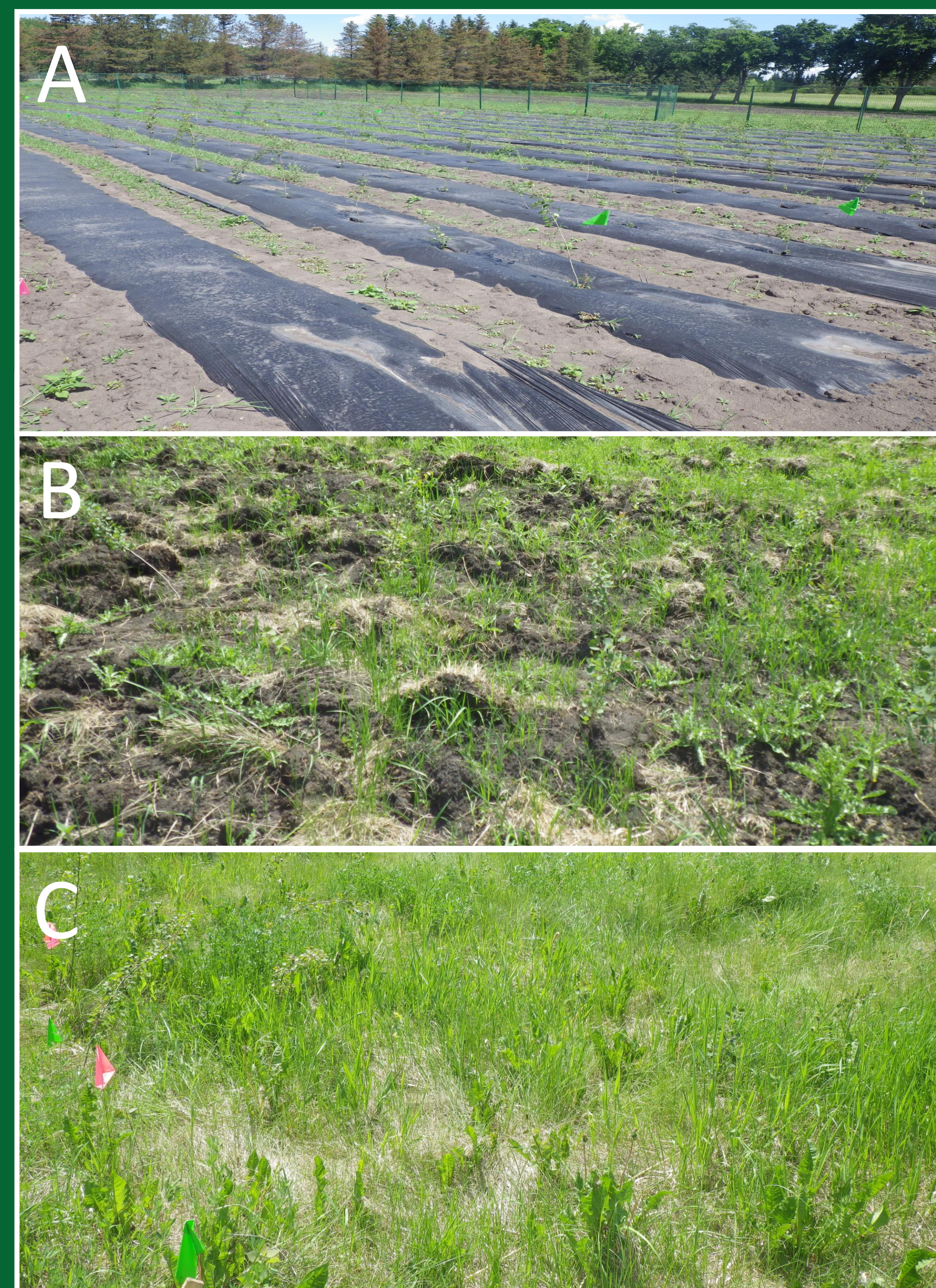


Figure 1: Plots established at the Crop Diversification Center; a) mulch, b) plowed, and c) grass treatments.

Results

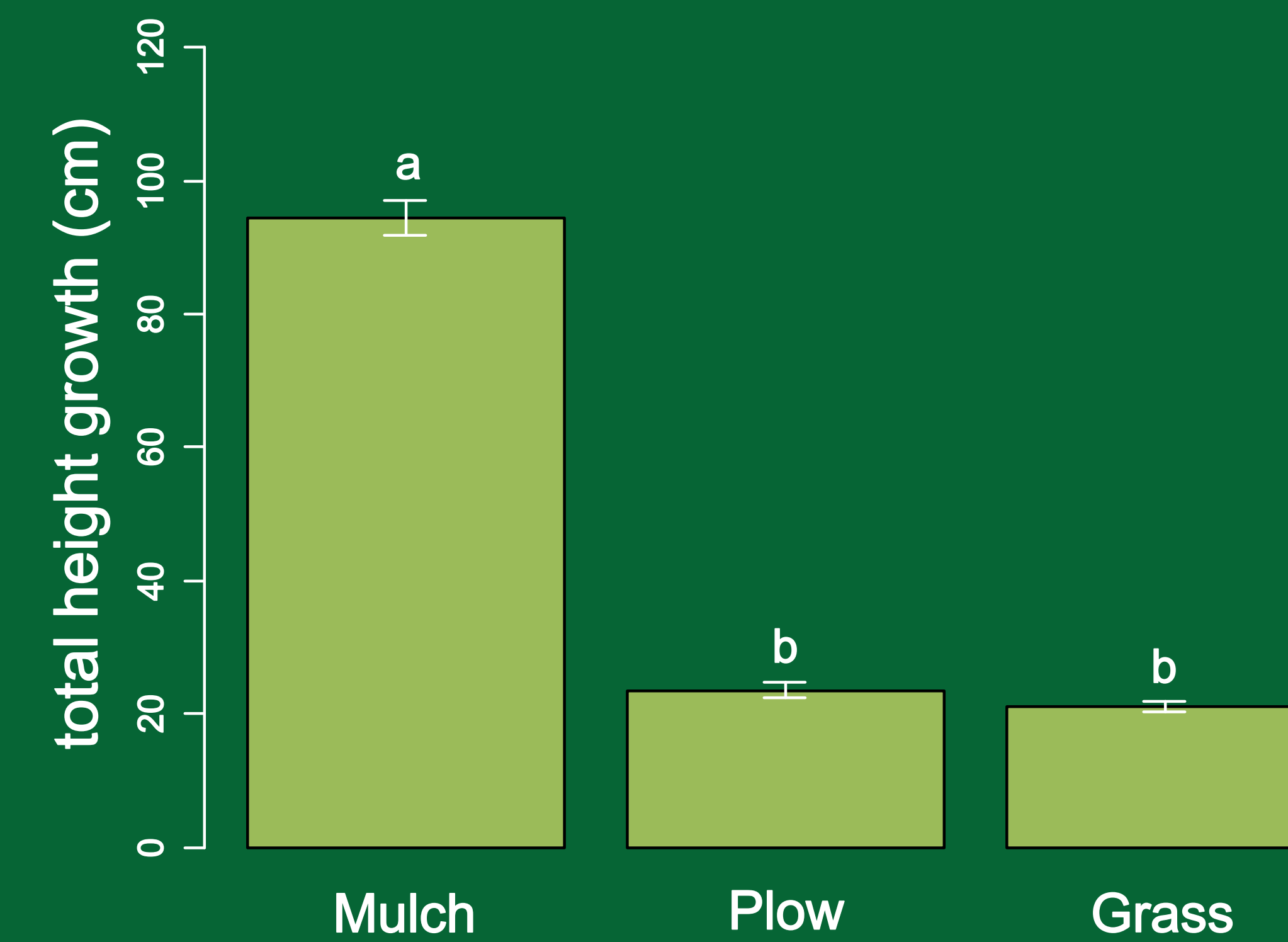


Figure 2: Average total height increment of aspen seedlings after two growing seasons in CDC plots.

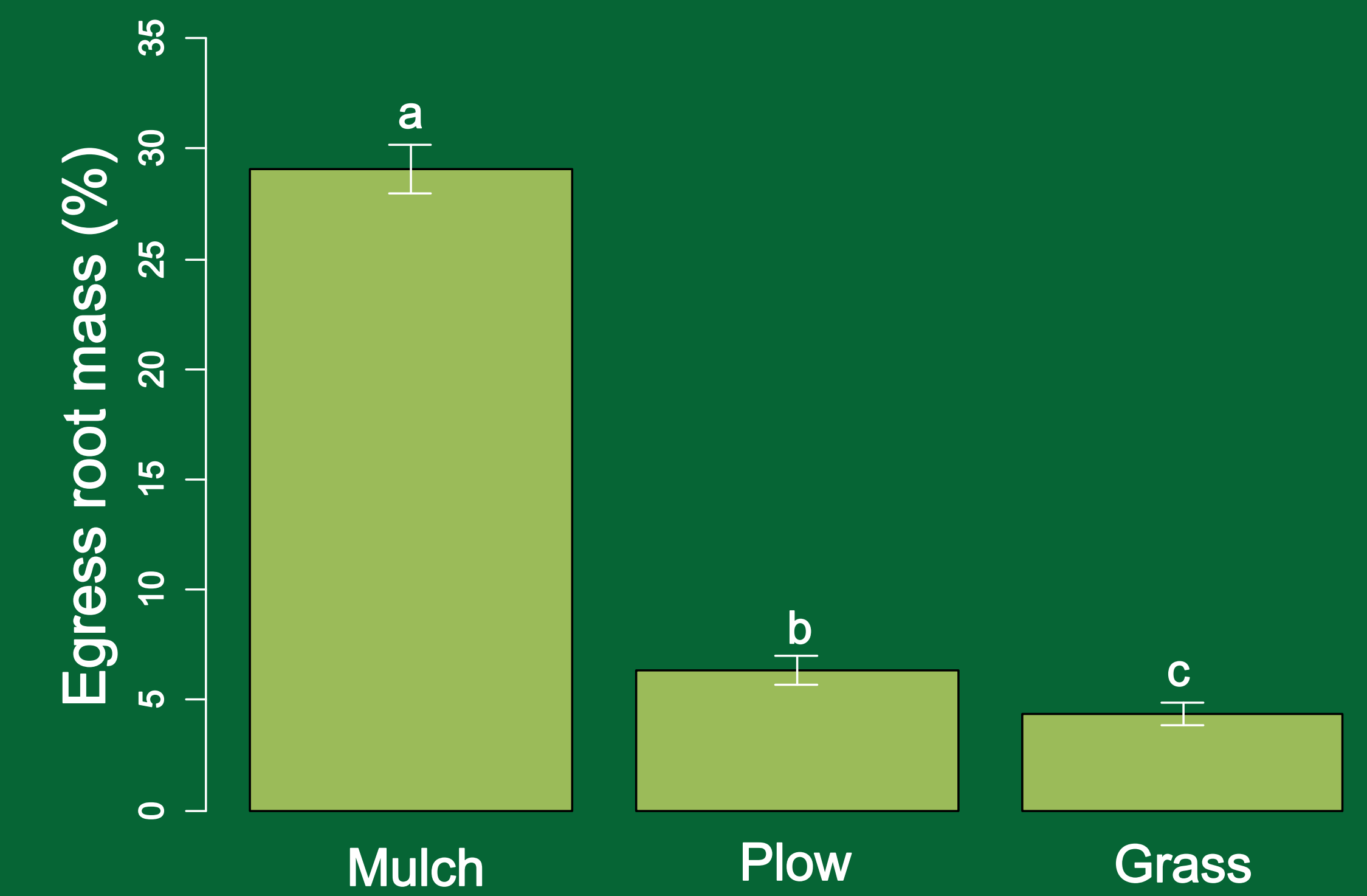


Figure 3: Average percentage of root mass developing outside of seedling plug in CDC plots.

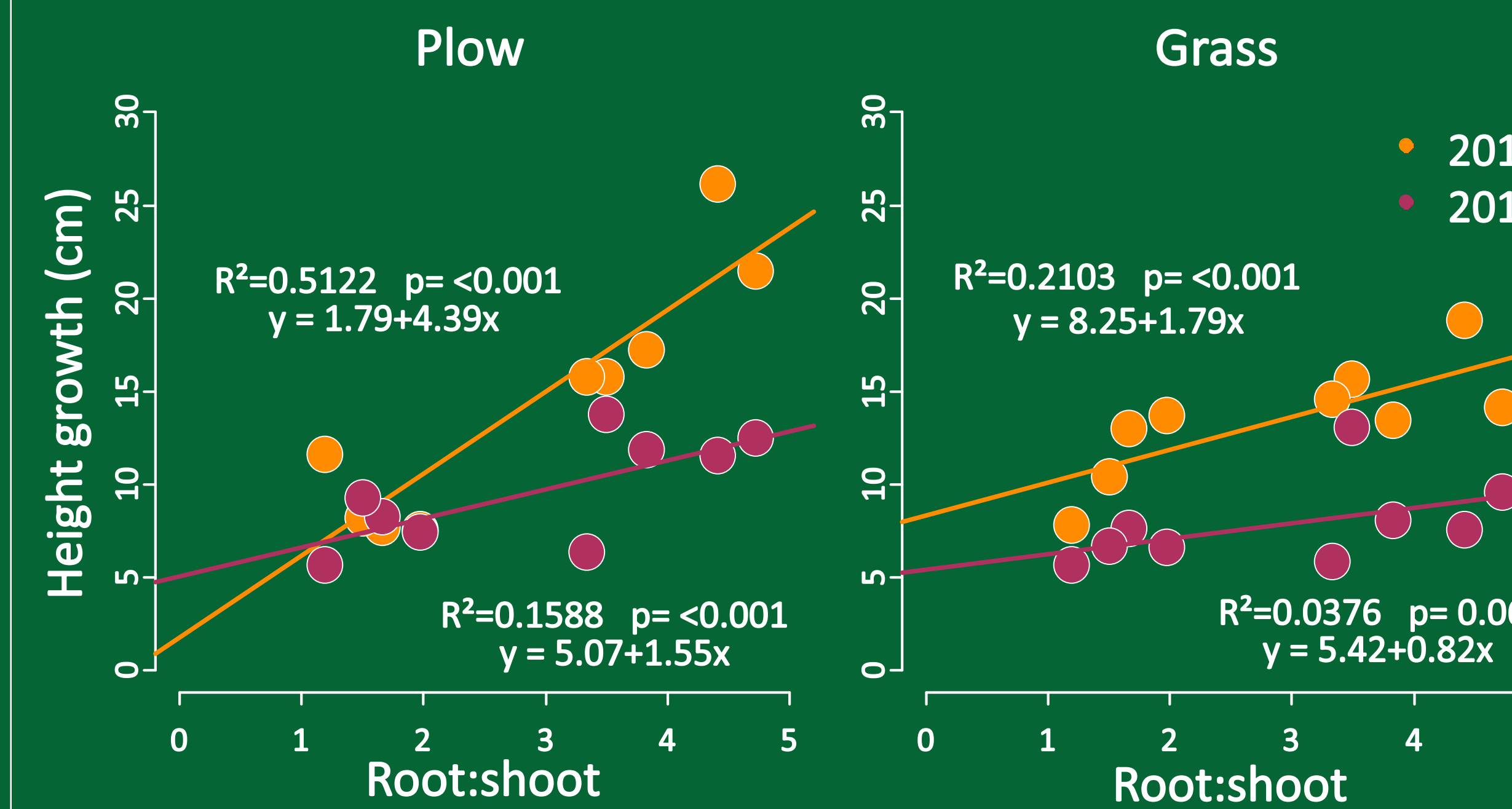


Figure 4: Relationship between initial root-shoot ratio and height growth during 2014 and 2015 in the grass plot.



Figure 5: Root development of aspen seedlings in the mulch (left) and grass (right) plots.

- Grass competition greatly reduced overall development of aspen seedlings
- After two growing seasons, height increment was greatest in the mulch (no competition) plot with no difference between plowed and grass plots (Fig. 2)
- Seedlings grown with grass had the least egress of new roots (Fig. 3)
- Initial root-shoot ratio of seedlings was correlated with first and second year growth in plow but only marginally significant in the grass (Fig. 4)

Management Implications

- Initial root-shoot ratios appear to be useful in predicting first year performance of aspen in competitive environments
- Despite drought conditions in 2015, a relationship between higher root-shoot ratio and height growth was found with seedlings planted in a highly competitive environment

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