Winter-planting of Black Spruce on Wetland

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A Presentation at 2016 ASSW Workshop (February 18, Grande Prairie)

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Acknowledgement

- Sponsor
  - Oil Sand Leadership Initiative (OSLI) Land Stewardship Working Group - ConocoPhillips Canada, Shell Canada, Statoil, Suncor Energy Inc., Nexen Inc., and Total E&P Canada.
- Other Major Contributors (alphabetically)
  - Dave Larsen, Global Restoration Corp.
  - Melissa Day, Langji Lin & Kayleigh Hughes, Grande Prairie Regional College
  - Gordon Sheepwash and Cathy Newhook , Next Generation Reforestation Ltd.

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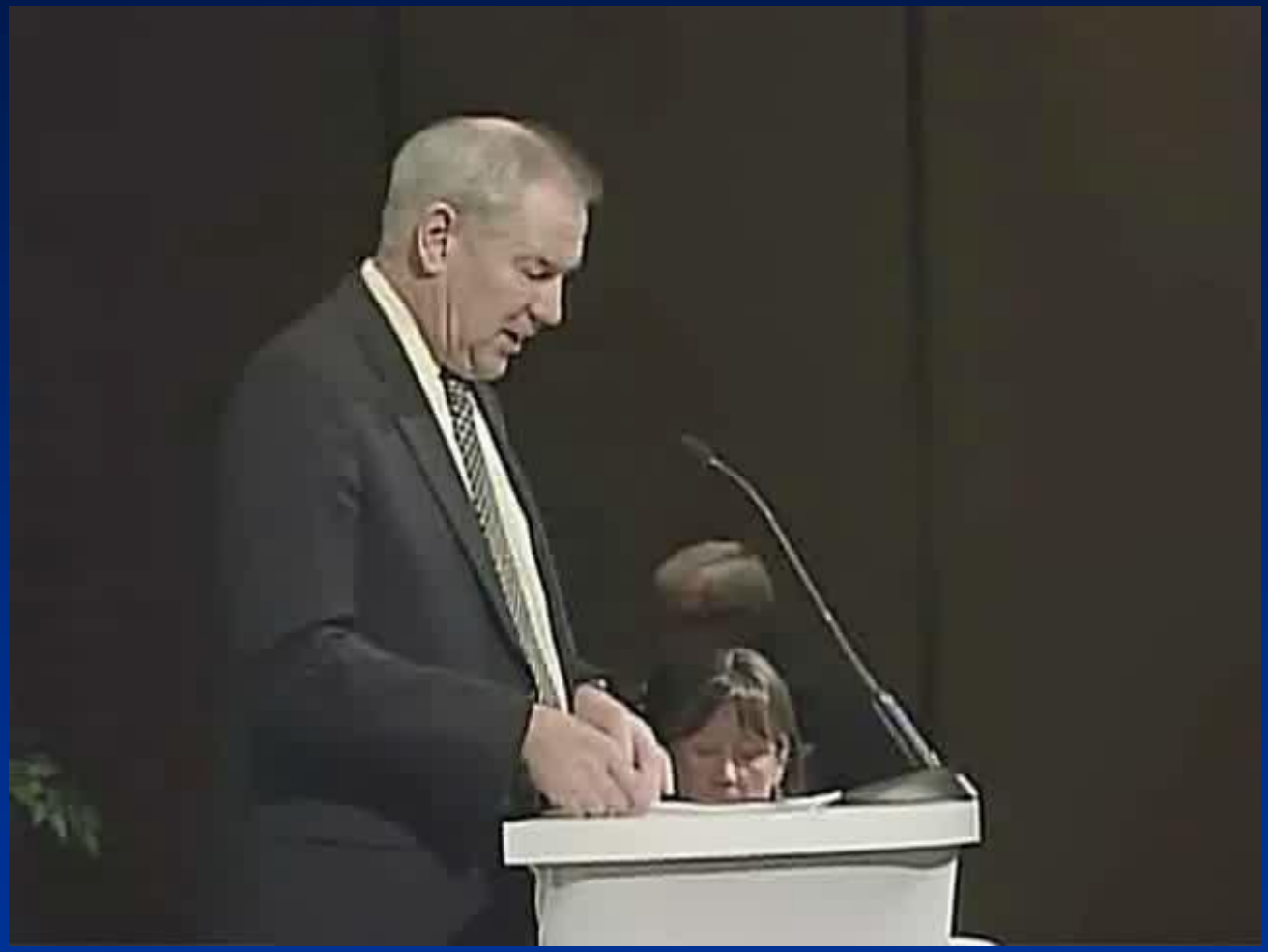
Rationale

- Scale of wetland disturbance
- Excessive moisture after forest clearing
- Unsatisfactory reclamation due mostly to:
  - Poor access
  - Inadequate natural regeneration – need planting
- Good access in winter
- Winter planting?
  - A question not operationally tested for wetland

(conservationbiology.net)

Rationale (continued)



(Video clip – Part of the speech by Steve Williams at COSIA Launch about our winter planting)

Objectives & Experimental Treatments

- Objectives
  - Survivability and growth of winter-planting black spruce seedlings versus spring planting
  - Effectiveness of two planting depths
- 3 Treatments
  - Winter planting to 4 cm deep
  - Winter planting to 8 cm
  - Spring planting

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Materials & Methods (M&M) -Test Site & Preparation

- ~1 ha wetland area at Evergreen Centre for Resource Excellence and Innovation in Grande Prairie
- Dominantly black spruce (6 m) with minor tamarack and willow
- Peat moss soil of >1.5 m deep
- Water table close to surface in summer
- The site was mulched and cleared before planting

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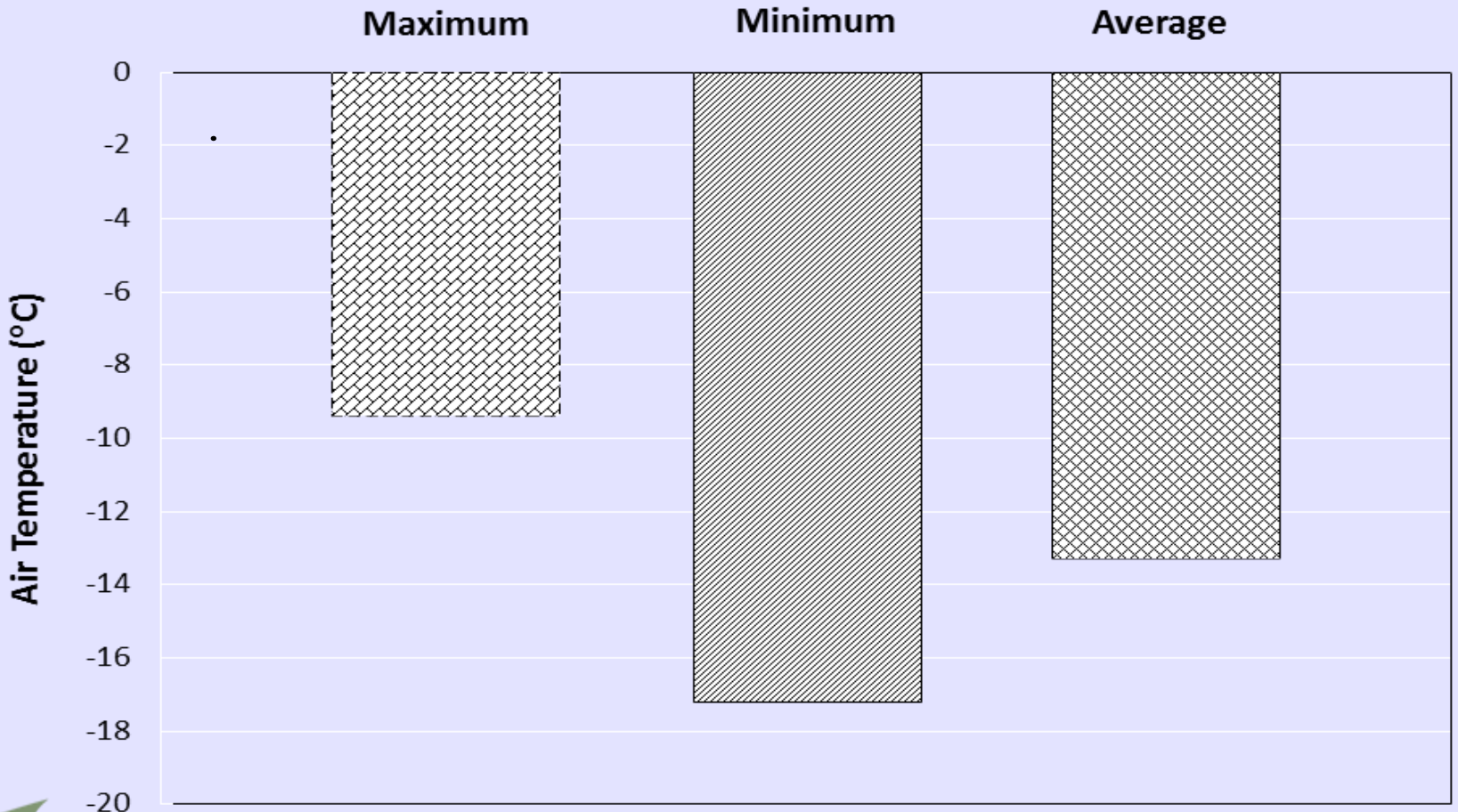
M&M - Seedling Production & Handling

- Production & storage
  - 1+0 black spruce in 412A Styrofoam container from one seed source
  - 26 cm in height and 3.9 mm in diameter
  - Produced under standard regimes in 2010
  - Winter-conditioned and frozen-stored at -2°C
- Handling and Transport
  - Individually bundled
  - Transported to planting site in a pickup on snow cache & cover at -2 to -13^{0}C

M&M - Planting Operation

- Site mounded by an excavator at 4x4 m spacing with a mound size of 90x60x60 cm
- Planted almost immediately after mounding in winter
- ~250 seedlings for each of 3 treatments
  - Winter planting 4 cm or 8 cm on Feb. 22, 2011
  - Spring planting to 4 cm on May 25, 2011
- Snow-caching seedlings on site

M&M – Temp. on the Winter Planting Date



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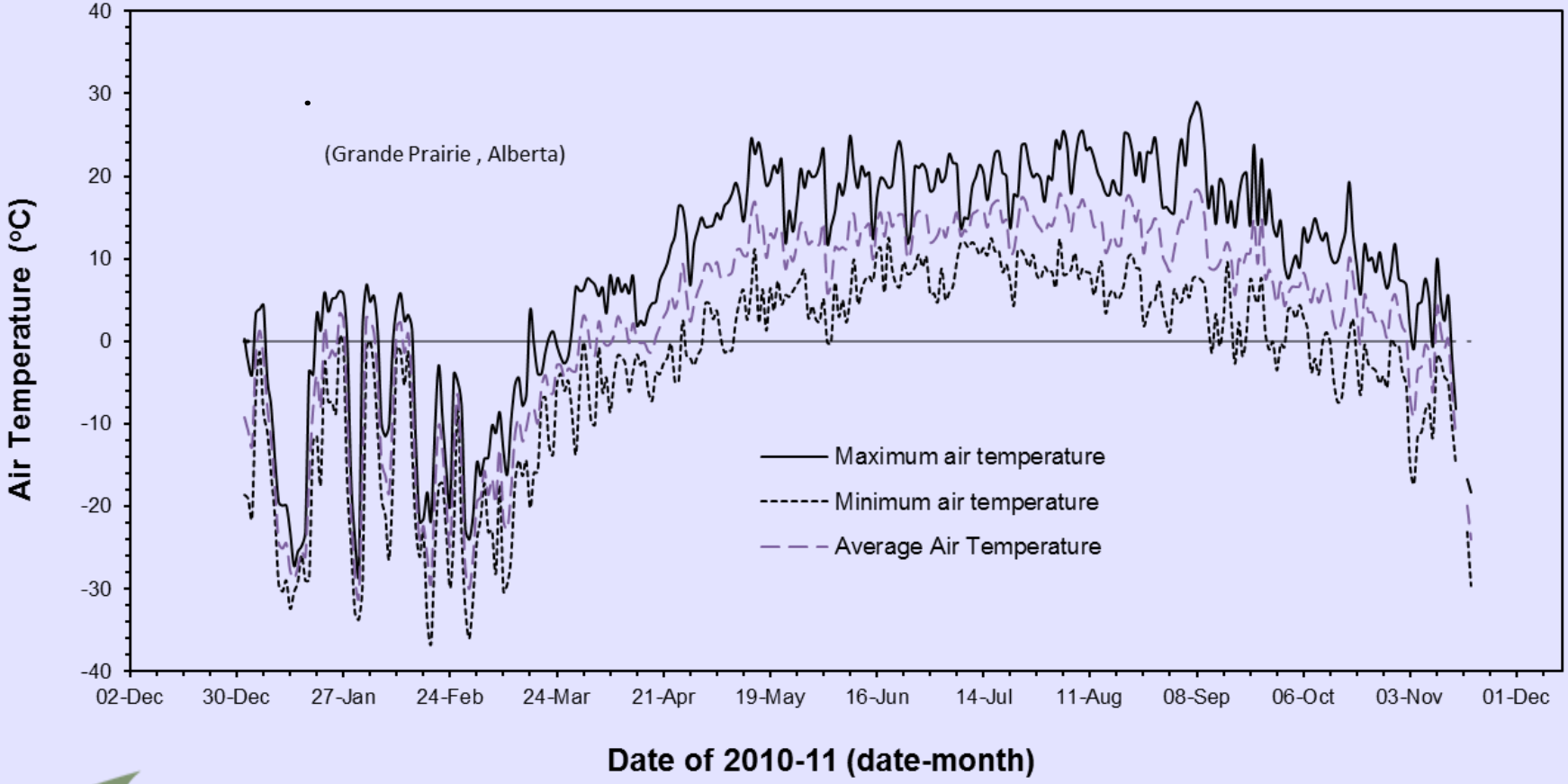
M&M - Temperature in 2010-11



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M&M - Measurements and Analysis

- Parameters measured after one growing season (fall 2011)
  - Survival
  - New height growth
  - Damage to terminal bud
  - Dead branches
- ANOVA analysis and mean comparison at P=0.05

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Results – Mortality/Survival

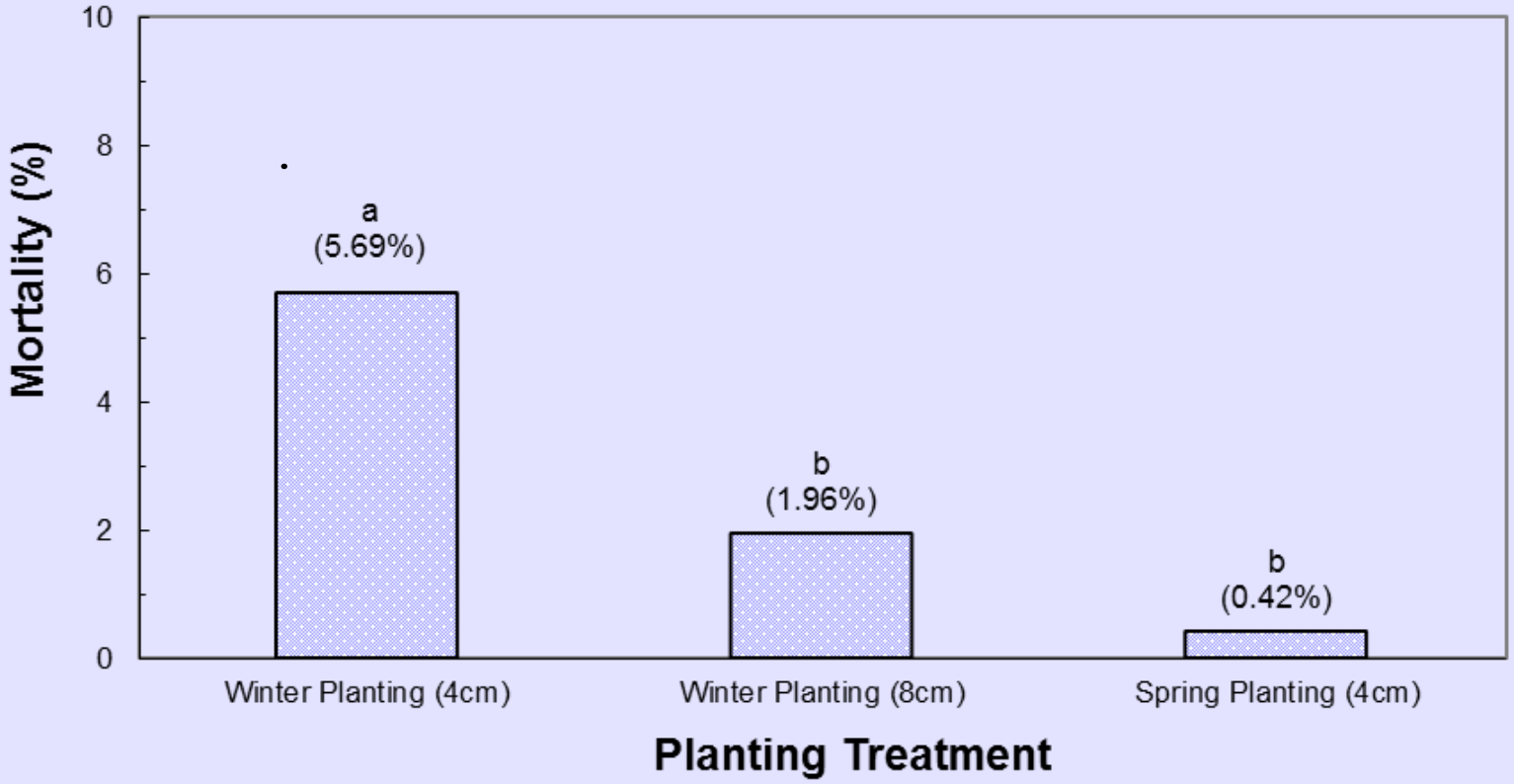

Figure 5. Percent mortality (%) of black spruce seedlings one growing season after different planting treatments. The percentage values with the same letter above do not differ significantly (P=0.05) as determined by a z-test..

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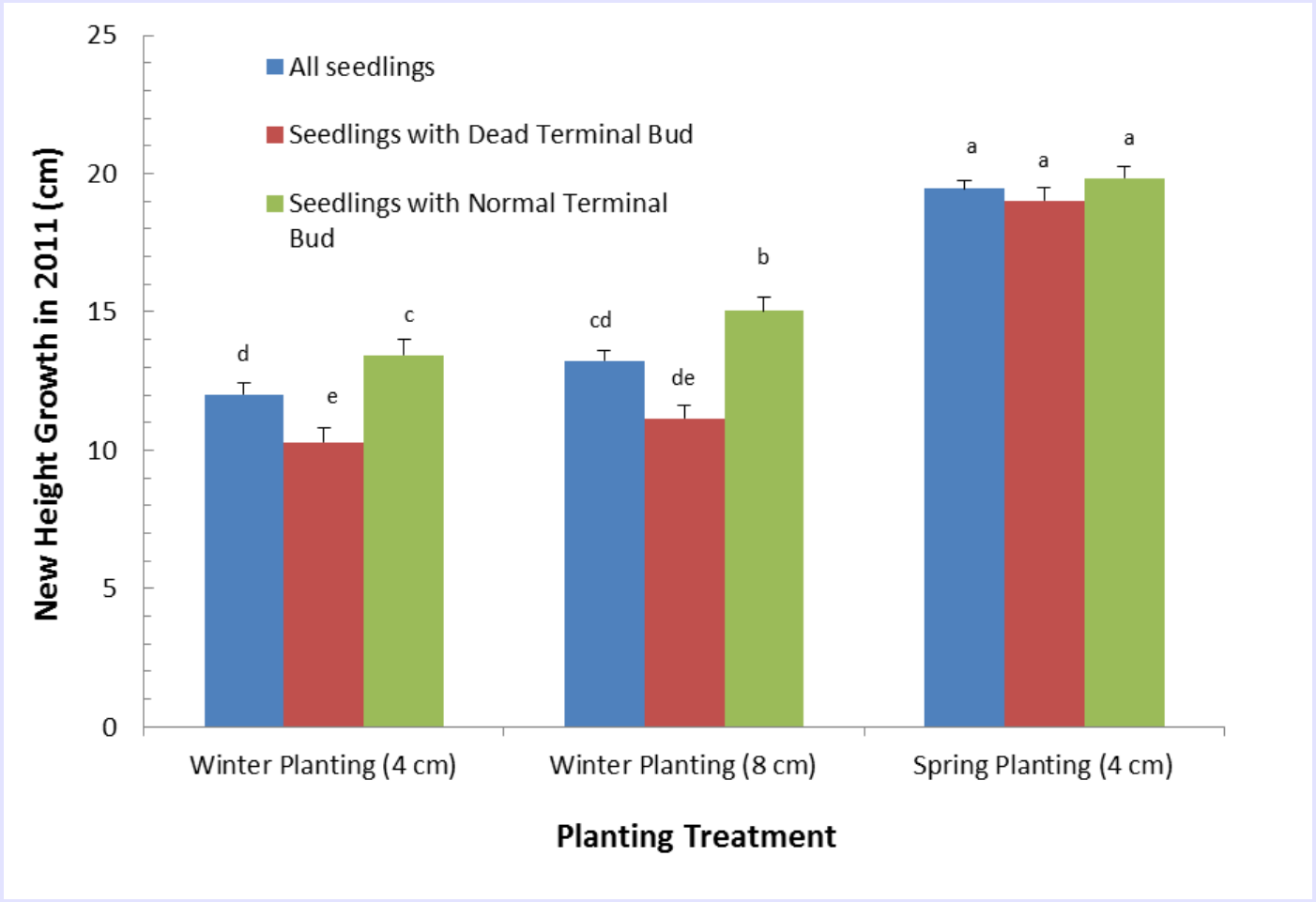
Results – New Height Growth



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Results – Dead Terminal Bud or Branch

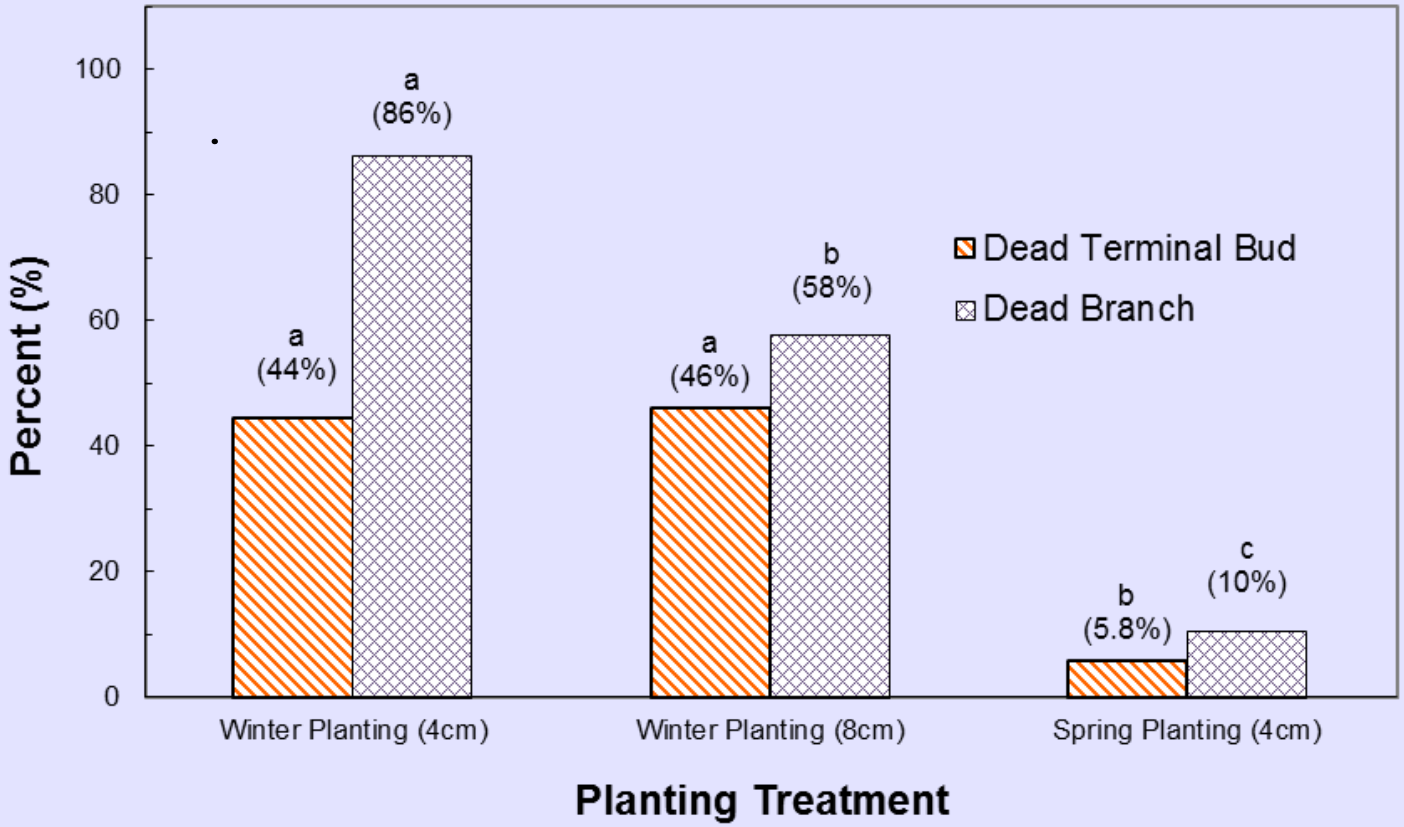

Figure 6. Percentage of black spruce seedlings with a dead terminal bud or branch(es) one growing season after different planting treatments. The values with the same letter above do not differ significantly as determined by a z-test (P=0.05).

Major Conclusions

- Winter-planting is feasible for black spruce on wetland since >94% survived.
- -15^0C is a safe threshold for both planting and transporting.
- Deep planting enhances survival and reduces bud and branch damage.
- In spite of a healthy height growth of 10-15 cm in 2011, winter-planting resulted in higher bud and branch damages and lower growth in comparison to the spring planting.

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Key Recommendations

- Larger operational trials are needed.
- Similar studies should be done before winter planting be applied to other species.
- It is helpful to study how to reduce bud/branch damage and enhance performance
  - Better seedling tolerance
  - Different seedling size
  - Optimum planting depth
  - Snow cover after planting

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Thanks!

Comments & questions

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