LITHUANIAN RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY

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Sharing of nutrient medium with spruce seeds leads to the increased quality of *in vitro* cloned aspen microplants

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- **TA visit :**

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Project name: **"*In vitro* research of mutual impacts between spruce and aspen microplants"**

- **Dissemination of results:**

Poster presentation at the international conference **"Eco-Bio 2016: Challenges in Building a Sustainable Biobased Economy" (6-9 March, 2016; Rotterdam, The Netherlands),** titled **"Exploitation of spruce seeds for the increased effectiveness of aspen micropropagation"** (J. Žiauka, I Szyp-Borowska, K. Szczygieł, M. Vaičiukynė, S. Kuusienė)

Introduction

- In nature, Norway spruce (*Picea abies*) and European aspen (*Populus tremula*) are closely interconnected species, often sharing the same ecological habitats.

- For the start of developing a biotechnological approach to possible interactions between these two species, the present *in vitro* study was designed to test the ability of spruce seeds to promote aspen development through a shared nutrient medium.

Materials and Methods

- Norway spruce seeds were collected from the provenances of **Ustroń** and **Świeradów-Zdrój** (in southern and south-western Poland, respectively).
- The study involved shoot cultures of a high-quality European aspen tree (No. 18DPL037) selected in Lithuania.
- Surface-disinfected spruce seeds were put in culture tubes (one seed per tube) on 6 mL hormone-free Woody Plant nutrient medium (WPM) and, after one week, aspen explants (shoot tips of *in vitro* propagated clones) were planted alongside the spruce seeds.
- For control, aspen explants prepared in the same way were planted on seed-free nutrient medium.

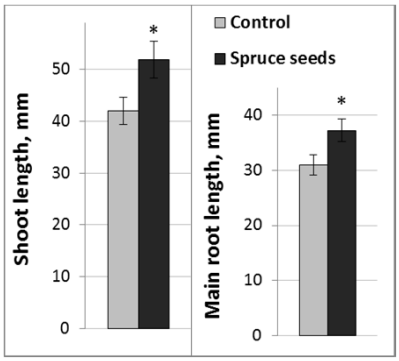
Materials and Methods (contd.)

- The data were collected after eight weeks of culturing spruce seeds and apical aspen explants on the shared nutrient medium.

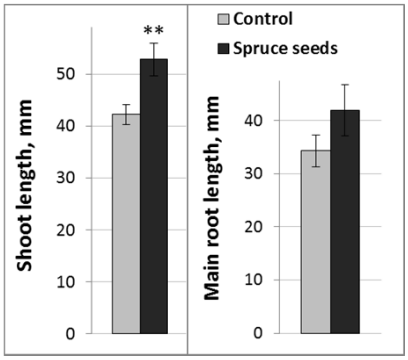
Results

Spruce seeds promoted aspen shoot growth

1. Influence of spruce seeds (prov. Świeradów-Zdrój) on the shoot and root growth of aspen explants



2. Influence of spruce seeds (prov. Ustroń) on the shoot and root growth of aspen explants

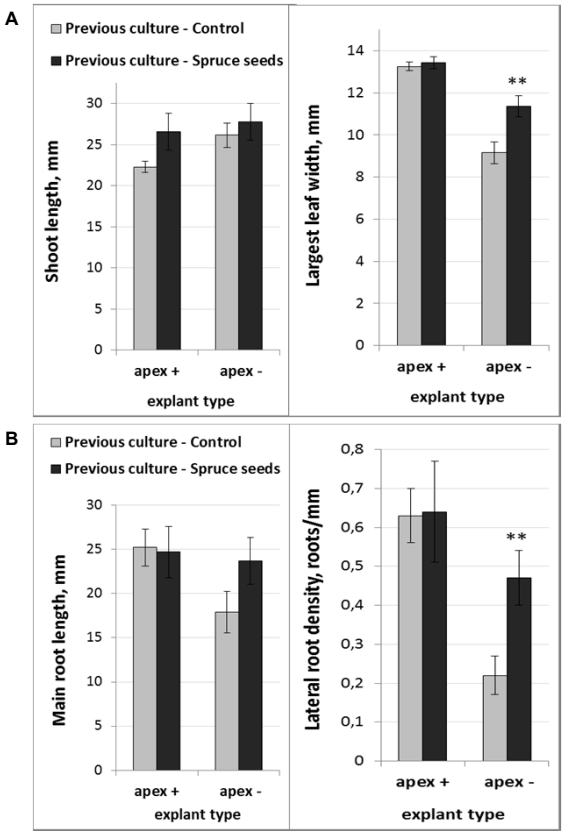


Statistically significant differences between two explant groups (control and cultured with spruce seeds) in all the graphs are indicated: * P < 0.05; ** P < 0.01

Results (contd.)

Spruce seeds increased shoot and root quality of the plants regenerated from non-apical aspen explants in subsequent culture

3. Influence of spruce seeds (prov. Ustroń) on the shoot (A) and root (B) parameters of aspen plants regenerated during the subsequent culture



Previously developed shoots were cut into apical and non-apical explants and cultured under uniform conditions – on hormone-free WPM. Statistically significant differences between two explant groups (control and pre-cultured with spruce seeds) are indicated: ** P < 0.01

Conclusions

- European aspen explants that shared nutrient medium with Norway spruce seeds developed longer (by approx. 25 %) shoots than control explants.
- Non-apical aspen explants prepared for subsequent culture from the shoots developed on the medium shared with spruce seeds had better shoot (increased leaf width) and root (increased lateral root density) quality than non-apical explants from the control group (not treated with spruce seeds).
- Exploitation of spruce seeds during certain stages of aspen cloning *in vitro* may be helpful for obtaining a higher number of aspen microplants suitable for *ex vitro* adaptation.