

Effect of wood ash on the cutaway peatlands: soil properties and growth of seedlings

Katri Ots, Dr.Sci

Estonian University of Life Sciences
Institute of Forestry and Rural Engineering
Chair of Silviculture and Forest Ecology
katri.ots@emu.ee

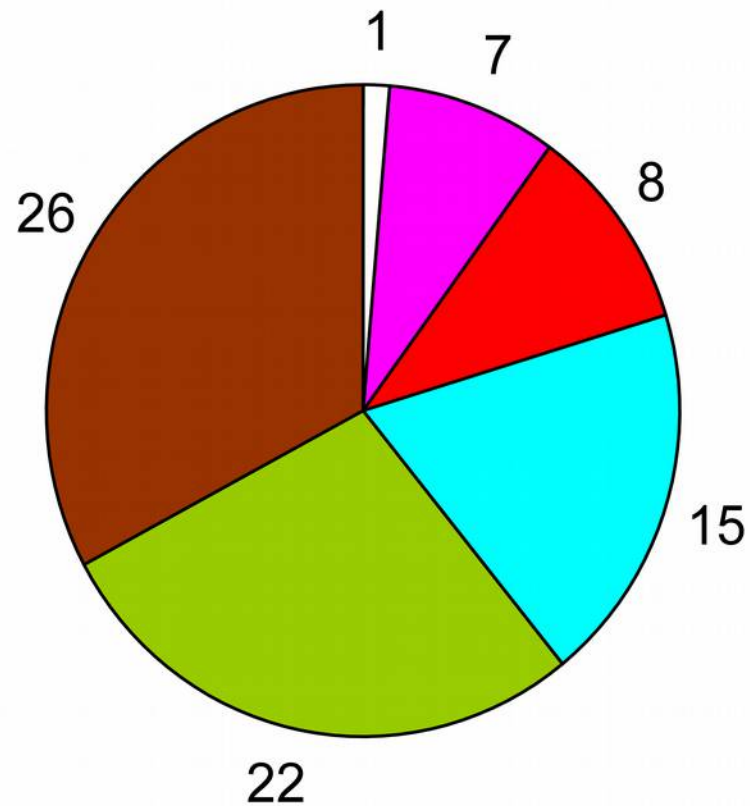
An aerial photograph of a peat bog landscape. The foreground and middle ground are dominated by dark brown, textured peat bogs with visible drainage channels. In the background, a dense line of green trees stretches across the horizon under a clear blue sky.

Ashes (wood and peat ash) from Tartu boilers are compatible for three usages:

- liming/fertilizing,
- substitute of concrete,
- substitute of road base materials.

Source: E. Seer (2009). Potential uses of ash from Tartu boilers. MSc.Thesis. Estonian University of Life Sciences.

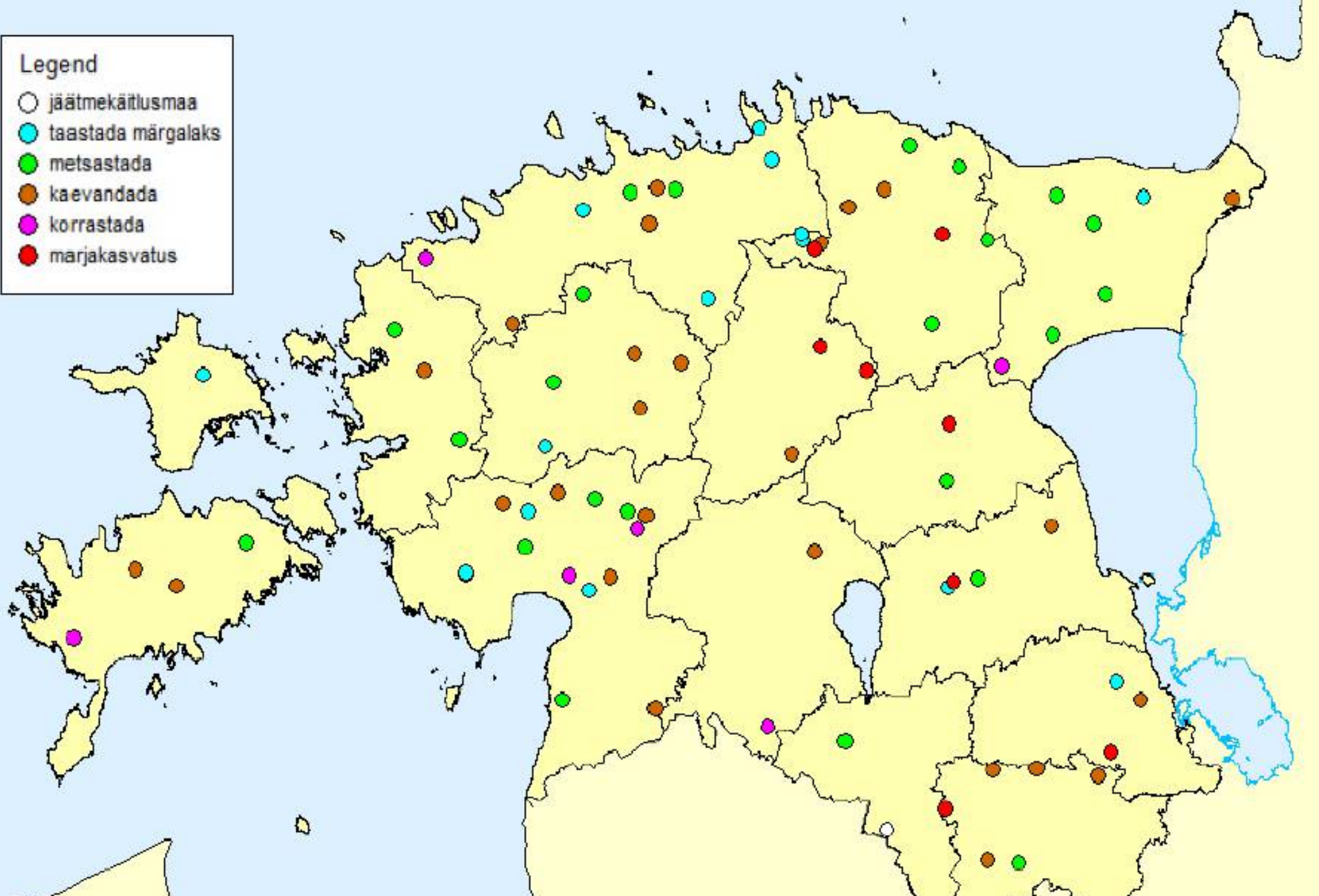
Recommendation for restoration of peatlands (Geological Survey of Estonia)



- Land for waste management
- Bring into order
- Cultivation of wild berries
- Wetland restoration
- Afforestation
- Mining

Legend

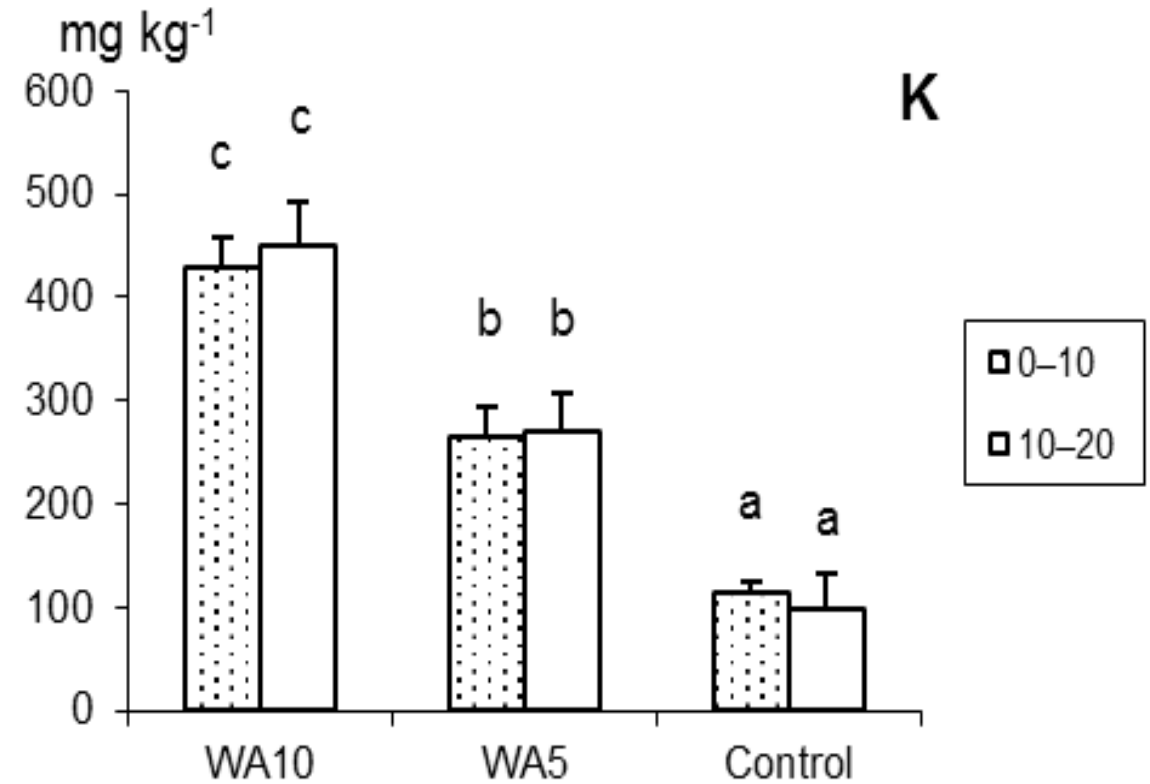
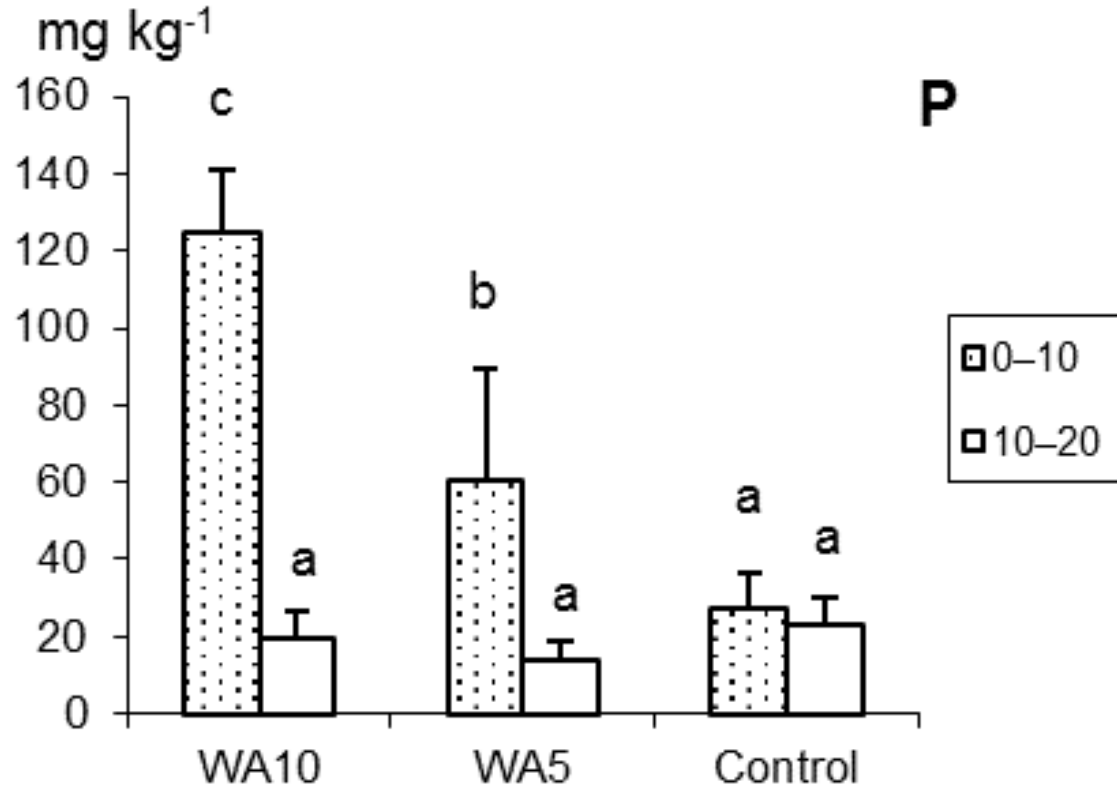
- jäätmekäitusmaa
- taastada märgalaks
- metsastada
- kaevandada
- korrastada
- marjakasvatus



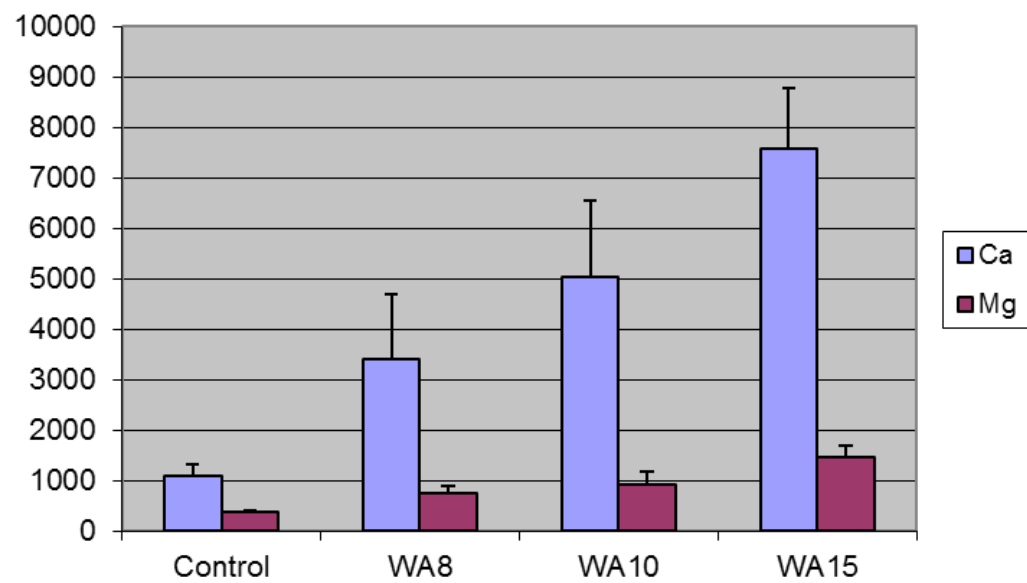
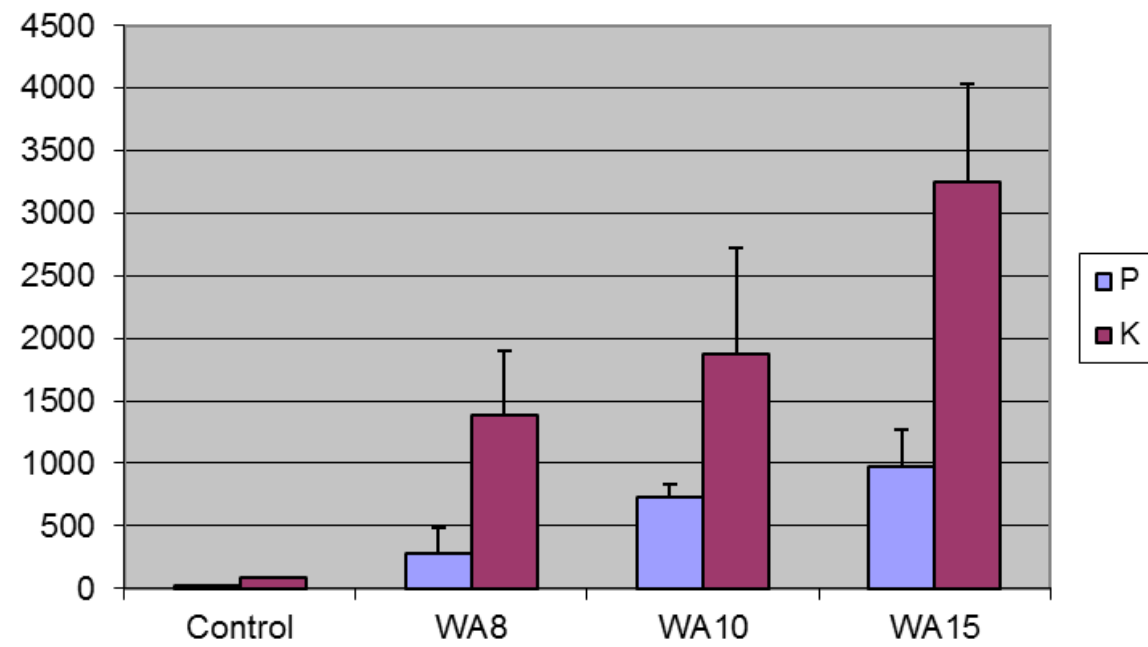
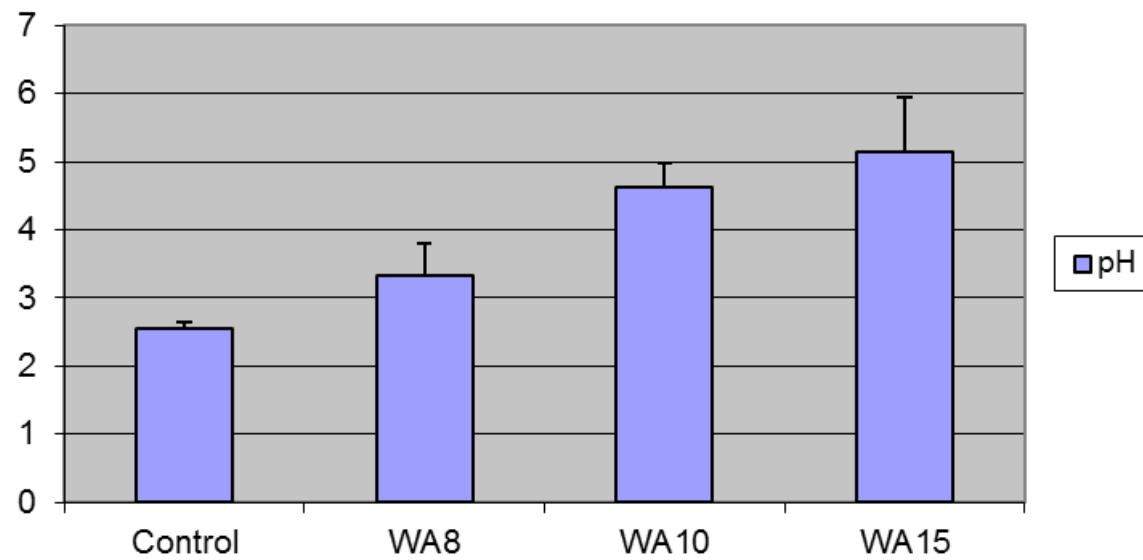
Different amounts of **loose wood ash** have been used for afforestation of the cut-away peatlands in Estonia

- 5 t ha⁻¹
- 8 t ha⁻¹
- 10 t ha⁻¹
- 15 t ha⁻¹
- 20 t ha⁻¹

Content of P and K in different layers of peat



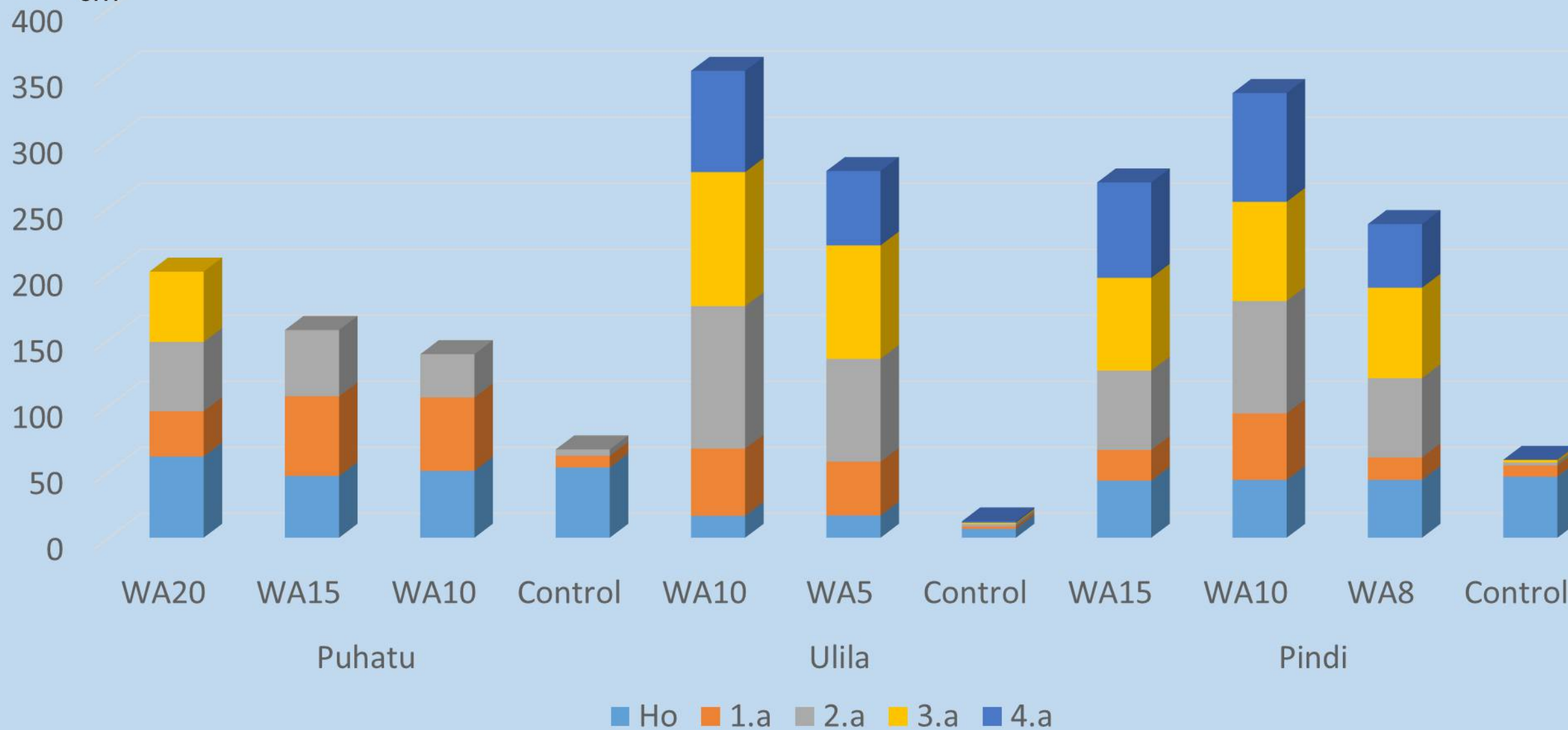
pH



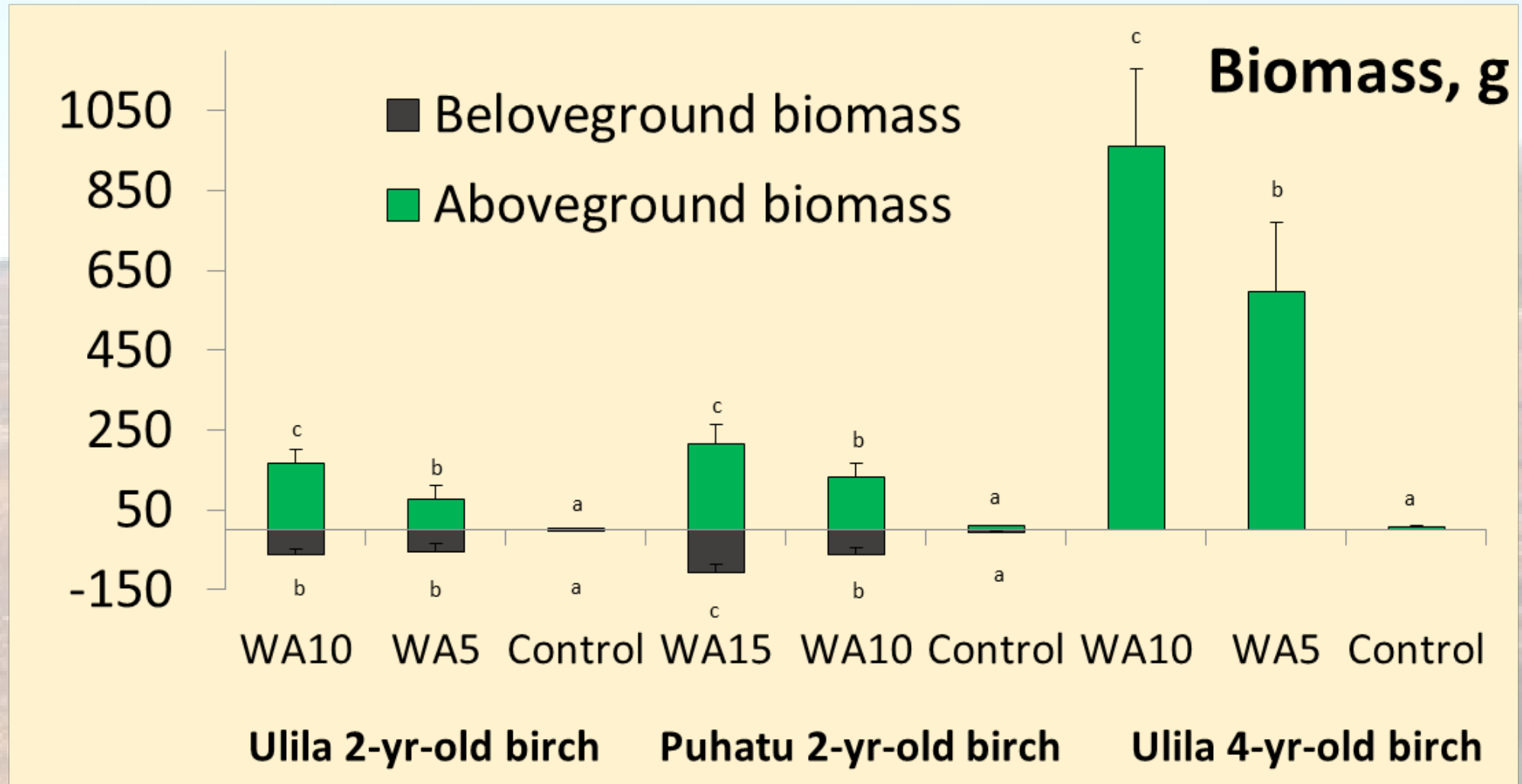


Betula pendula

cm



Biomass formation of Silver birch seedlings





PUUTUHK 10 000

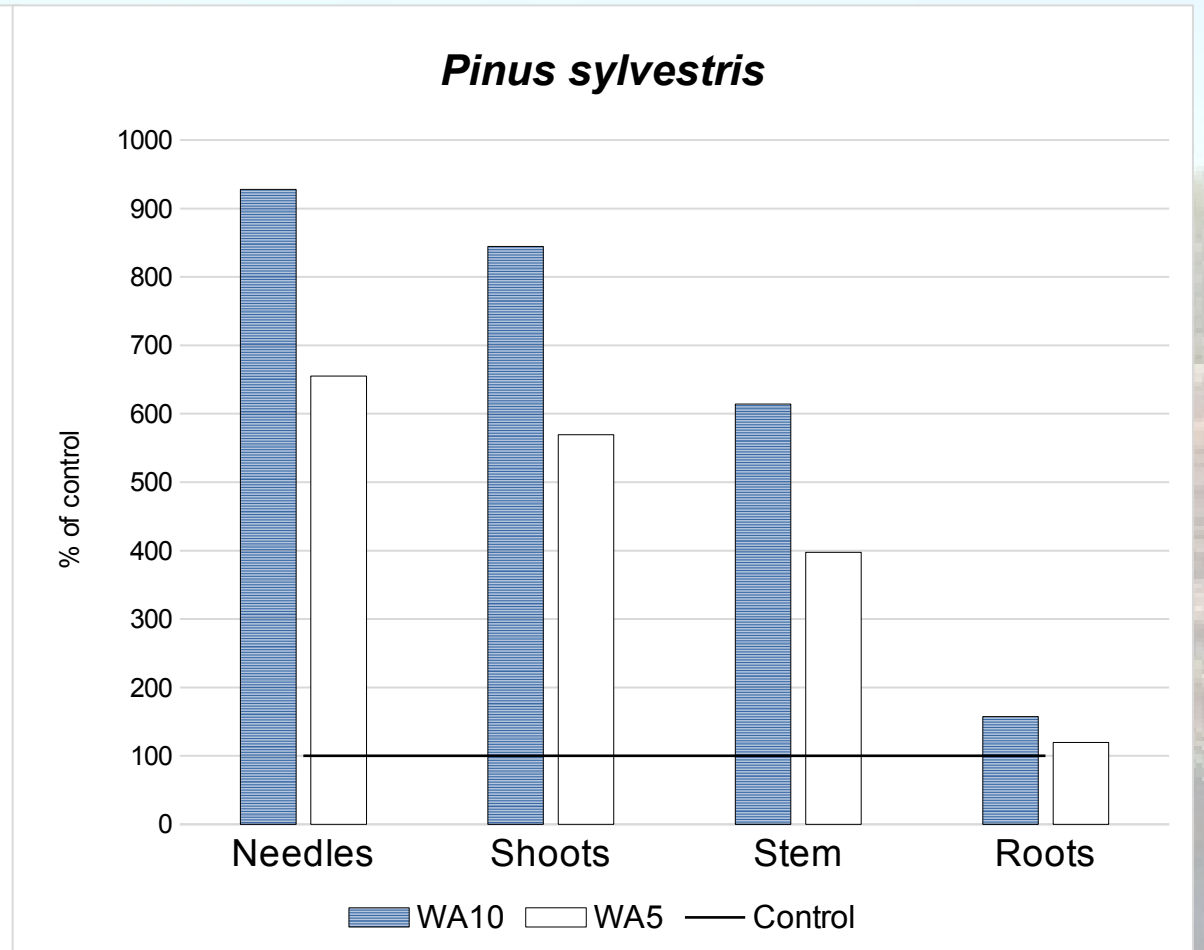
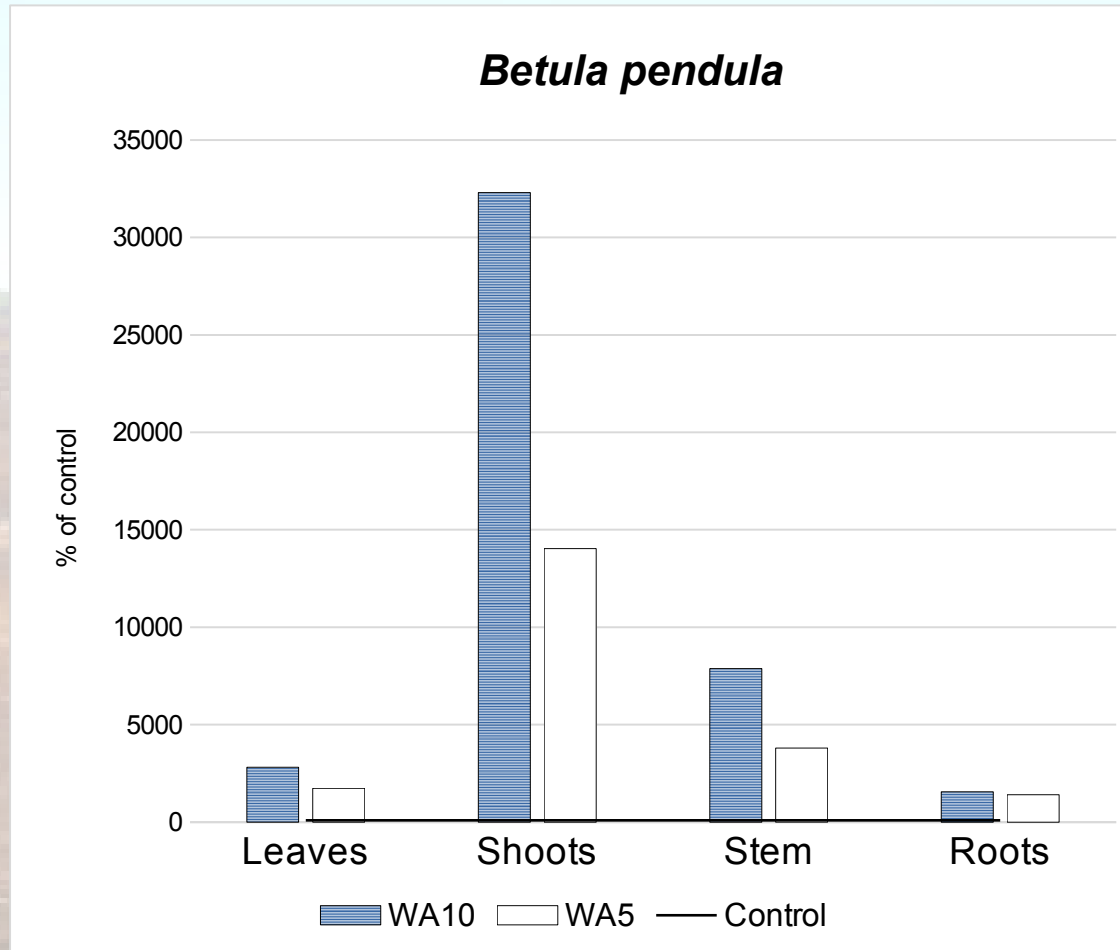


PUUTUHK 5000



KONTROLL

Biomass allocation



The greatest surprise – very good growth of Norway spruce



One-year old seedlings of silver birches and Scots pines



Opportunities of tree growth condition improvement – fertilization 11 October 2017, Jelgava

Silver birches one month later (WA10 t ha⁻¹)



Silver birches one month later (WA10 t ha⁻¹)



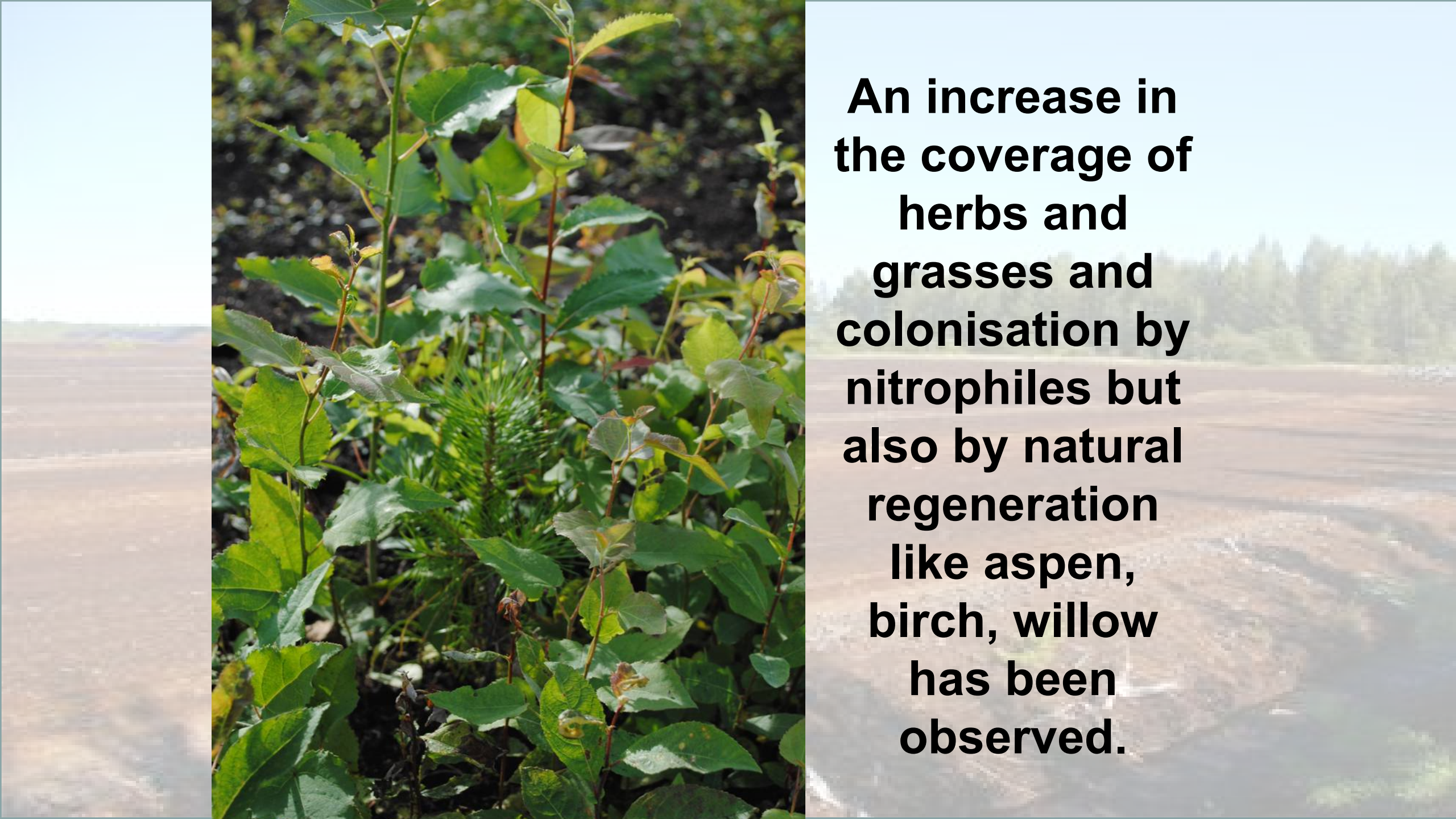
WA 15 t ha⁻¹



Control





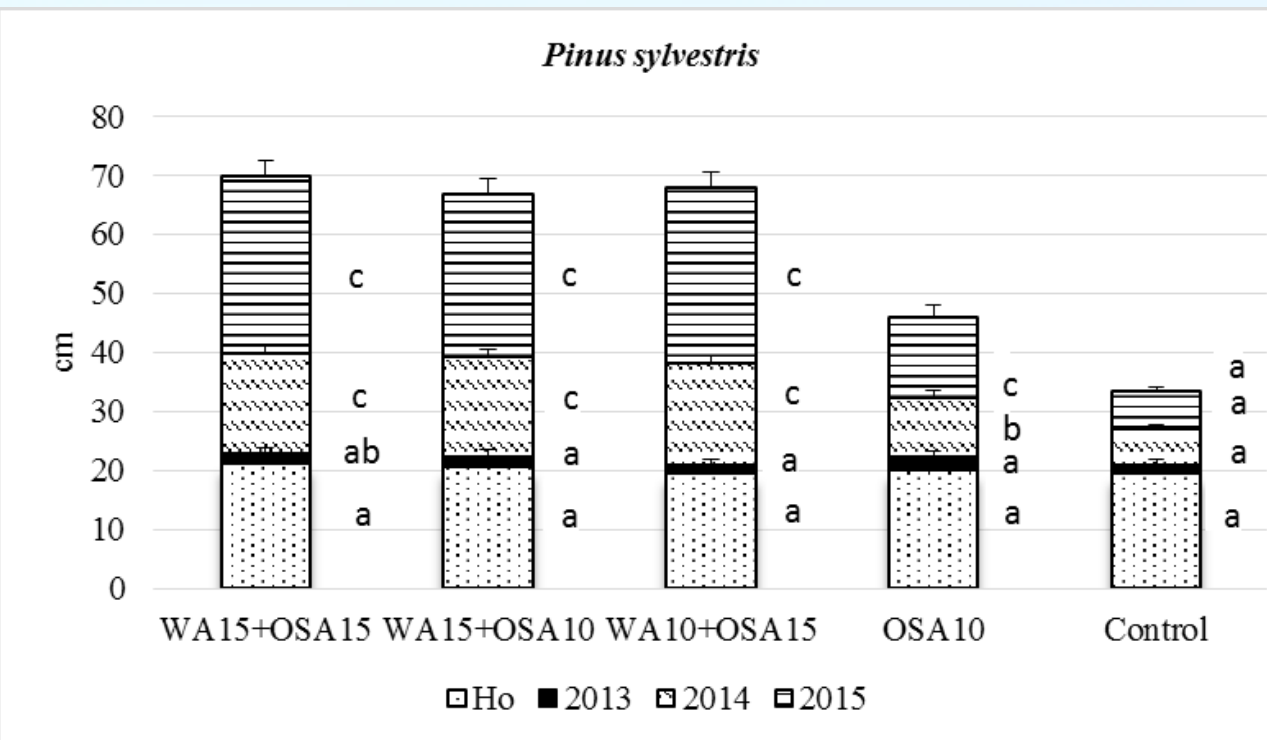
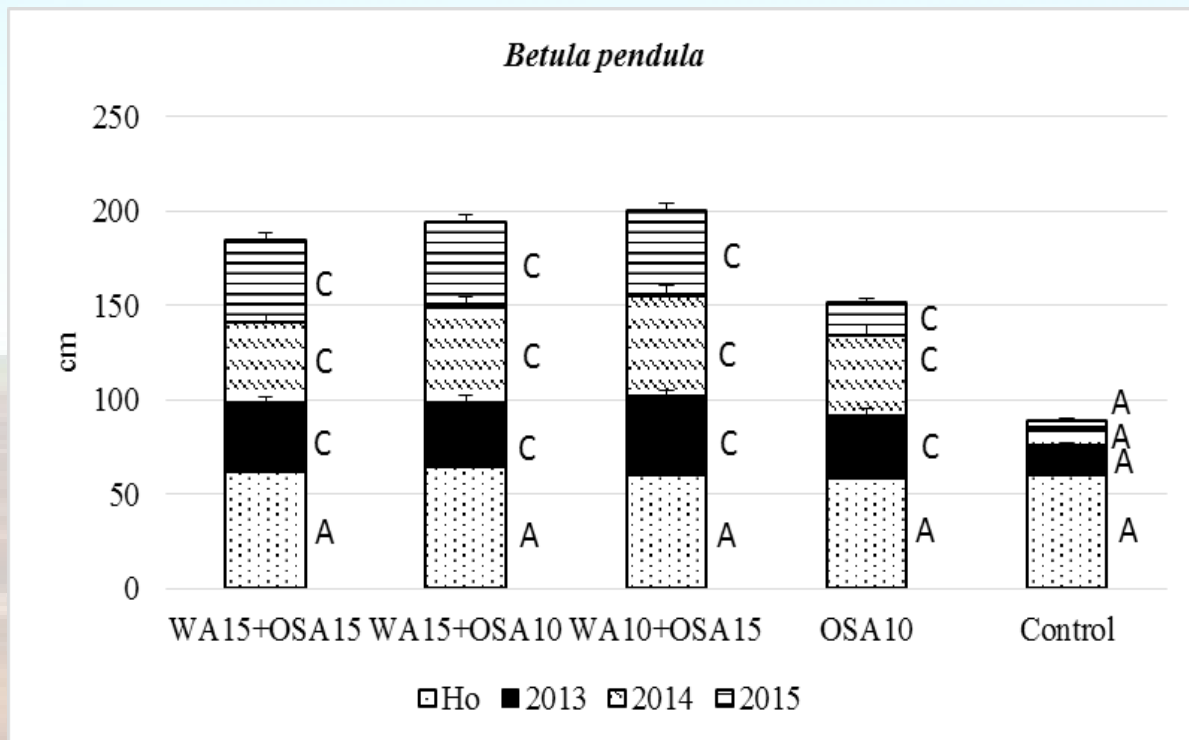


An increase in the coverage of herbs and grasses and colonisation by nitrophiles but also by natural regeneration like aspen, birch, willow has been observed.

Summary

WOOD ASH is the excellent fertilizer:

- balanced nutrition on the peat,
- increased microbial activity
- tree growth rate



WA15+OSA15 – wood ash 15 t/ha + oil shale ash 15 t/ha
 WA15+OSA10 – wood ash 15 t/ha + oil shale ash 10 t/ha
 WA10+OSA15 – wood ash 10 t/ha + oil shale ash 15 t/ha
 OSA10 – oil shale ash 10 t/ha
 Control – unfertilized plot

Publications

- Ots, K., Tilk, M., Aguraijuja, K. (2017). The effect of oil shale ash and mixtures of wood ash and oil shale ash on the above- and belowground biomass formation of Silver birch and Scots pine seedlings on a cutaway peatland. *Ecological Engineering*, 108, 296–306.
- Aguraijuja, K., Klõšeiko, J., Ots, K., Lukjanova, A. (2015). Effect of wood ash on leaf and shoot anatomy, photosynthesis and carbohydrate concentrations in birch on a cutaway peatland. *Environmental Monitoring and Assessment*, 187, 444–456 .
- Kikamägi, K., Ots, K., Kuznetsova, T., Pototski, A. (2014). The growth and nutrients status of conifers on ash-treated cutaway peatland. *Trees-Structure and Function*, 28 (1), 53–64.
- Ots, K., Kikamägi, K. (2014). The effects of wood ash on the biomass of trees at cutaway peatlands. In: *Abstracts of the 9th European Conference on Ecological Restoration: The 9th European Conference on Ecological Restoration*, Oulu, Finland, August 3-8, 2014. Ed. Tolvanen, A.; Hekkala A.-M. Oulu, Finland: Finnish Forest Research Institute, 178–178.
- Kikamägi, K., Ots, K., Kuznetsova, T. (2013). Effect of wood ash on the biomass production and nutrient status of young silver birch (*Betula pendula* Roth) trees on cutaway peatlands in Estonia. *Ecological Engineering*, 58, 17–25.
- Kikamägi, K., Ots, K., Kuznetsova, T., Klõšeiko, J., Lukjanova, A. (2011). Afforestation - one possibility of a successful restoration of cutaway peatlands in Estonia. In: *Restoring Forests: Advances in Techniques and Theory. Abstract Book: Restoring Forests: Advances in Techniques and Theory*; Madrid, Spain; 27-29 September. 108/124.
- Kikamägi, K., Ots, K. (2010). Stimulating the growth of trees with ashes of various biofuels (wood, peat) on a cutaway peatland. *Forestry Studies*, 52, 60–71.

Thank you for your attention!

