

# Pine weevil research in Finland, two major lines:

- Effect of Stump Extraction to Pine Weevil
- Damage Risks Related to Deep Planting

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# Pine weevil

- The most harmful pest in forest regeneration in Europe
- Adults gnaw bark and phloem from seedlings
- Even 80% seedlings can die in 1st year after planting





Photos: Erkki Oksanen/Luke

# Stump extraction experiments

- The occurrence of pine weevils, their nutrition and breeding potential in stump extraction and conventional regeneration sites has been studied
- Annual stump harvest  $\approx 0,8$  mill. m<sup>3</sup>
- Mainly 1-2 years old Norway spruce seedlings are planted

# Pine weevil at stump extracted sites:

- Studies at 10 sites in Eastern and Central Finland
- Survey 2008-2010
- With corresponding methods in Sweden



Photos: H. Viiri



# Number of pairs of experimental sites 2008 -2010



Data U.S. Navy  
Image © 2009 TerraMetrics  
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# Root material that remains at stump extraction sites

- In preliminary experiments there were no differences in surface area of roots that remained in stump extraction area compared to traditional regeneration site (average 3 700 m<sup>2</sup>/ha in Finnish sites)
- In root samples pine weevil gnawing was on average 20 % from the total surface area of roots, feeding of *Hylastes* beetles was 17 %.
- Diameter of root did not influence to feeding
- After stump extraction remains a lot of roots, which are suitable for nutrition of pine weevil

# Summary about pine weevil and stump extraction

- According to trapping results it looks that stump extraction does not reduce the amount of pine weevils at site
- Amount of roots decreases, but it looks that this is not enough to prevent pine weevil damage to seedlings
- *Proper mounding is still important method in preventing pine weevil damage*

# Compatibility of seedlings, soil preparation and planting date

- Part of Project "Quality Chain of Forest Regeneration from Seed Production to Early Tending"
- Studying planting of container seedlings and site preparation in order to find a suitable container type for mechanized planting, early development of seedlings planted on different depths on mounds and a suitable site preparation method for fine-graded soils.
- Risks of deep-planted seedlings to be damaged by voles, large pine weevil, black spruce beetle and drought has been evaluated.

# Deep planting and increased damage risks

- Machine planting has come more common
- Need to demonstrate that seedlings can be planted without reduced field performance
- We established two experiments in Central Finland in 2006 and 2009
- On a site with medium coarse soil, planting depths were 0, 2, 5 and 8 cm
- In the experiment established on fine-textured soil, planting depths were 3, 6 and 10 cm

*Luoranen, J. & Viiri, H. 2016. Deep planting decreases risk of drought damage and increases growth of Norway spruce container seedlings. Accepted, New Forest.*

- During the first four years after planting, deeper planted seedlings grew better and at the end of the fourth season initial differences in shoot length among planting depths had disappeared.
- Incidence of insect damage was low, and no differences among planting depths were found.
- During the dry summer, there was a positive relationship between increased planting depth and improved survivability of seedlings.
- In conclusion, deep planting improved growth of Norway spruce seedlings and was an advantage in dry conditions.

# Thank you!

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