Forest regeneration mechanization in Latvia

(history, innovations and projects of technology transfer)

Dr.silv.Dagnija Lazdiņa

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First experiments of mechanized forest planting in Latvia - 20th century

Planting machine "Quickwood" (Austria) adapted to replant container seedlings "Brika" in simultaneously with soil preparation, 80-ties.

First research of mechanized forest planting in Latvia - 20th century

Discrete planting machine "SBS-50" (Latvia) with trailer for transportation of seedlings. Experiments in Scientific forest station at Kalsnava, 1980.

First experiments of mechanized forest planting in Latvia - 20th century

Container seedling planting machine “KLM-1” (Russia) mounted on excavator “TB-1” able to make mound and simultaneously plant seedling on it 1983.

First experiments of mechanized forest planting in Latvia - tranfer of technologies from Finland

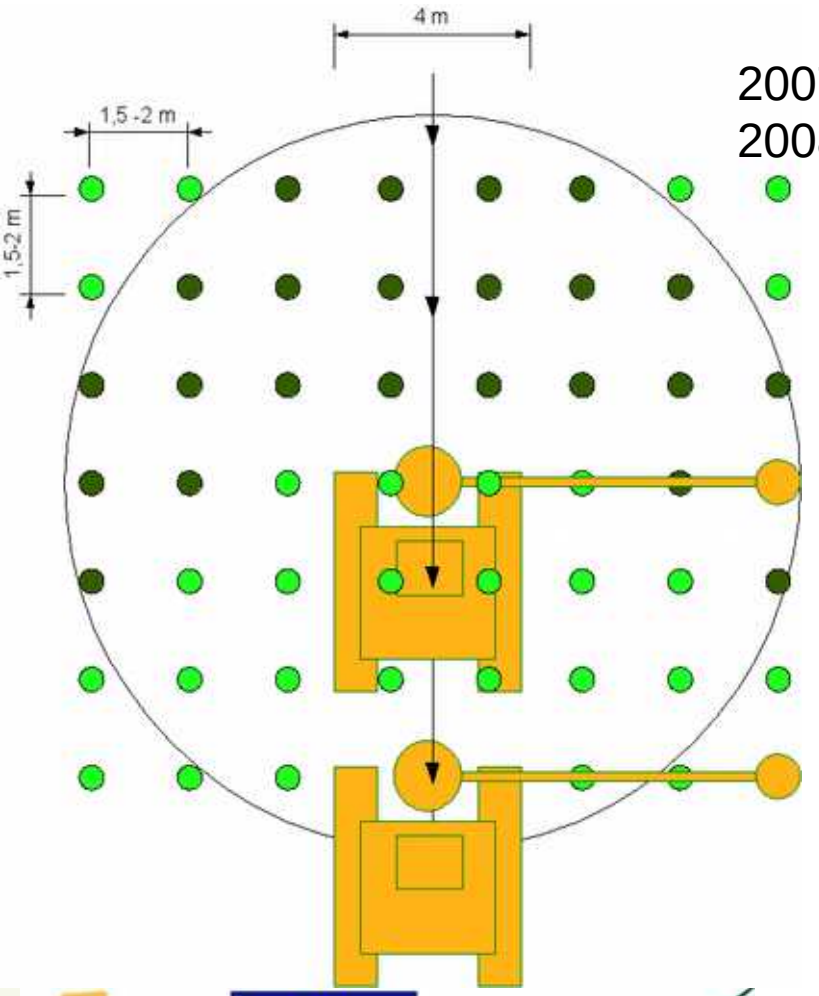
Mechanized forest planting device "SERLACHIUS" planting and simultaneously soil preparation "VALMET 886 K" (Finland), experiment at Ogres MRS 1983.

Research projects and transfer of technologies

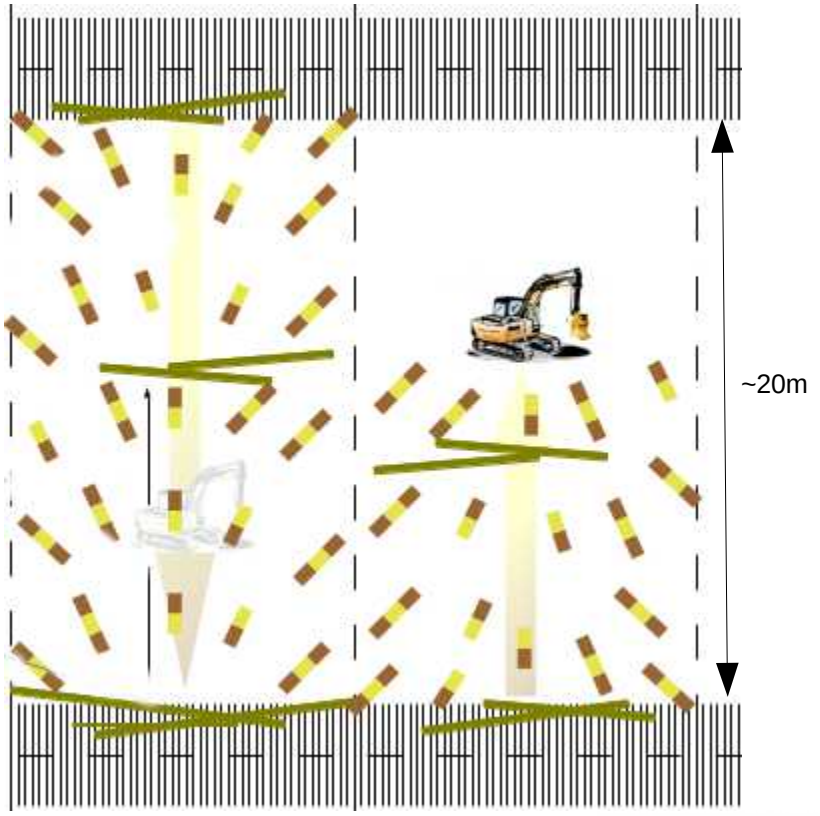
- 2007- Bracke P11a research of time studies - funded by forest development fund (spruce and pine planted in forests of Rīgas meži,Latvijas finieris, Latvijas valsts meži) ;
- 2008 – M-planter-funded by forest development fund and SIA Rigas meži (spruce and pine planted in SIA Rīgas meži) ;
- 2009 – target oriented projects – remeasurements of sites and sowing ;
- 2011-2013 - ERDF project Stump lifting and soil preparation - (planted spruce in Rīgas meži).
- 2012 "mounding "pilot project at As "Latvijas valsts meži" planted spruce and pine.
- ESF project Ecological and technical aspects of cultivating vital spruce stands (No. 2013/0022/1DP/1.1.1.2.0/13/APIA/VIAA/052) -remeasurements of stands established at previous projects.
- Forest regeneration,establishment and tending/cleaning programm.

Recomended designs of planting and methods asked how to do...

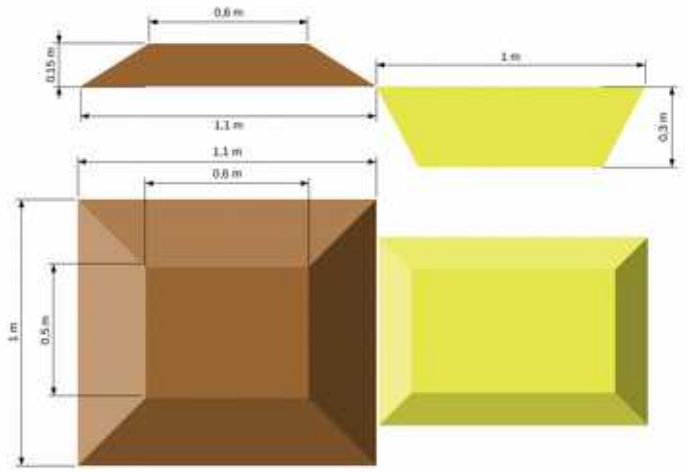
2007-2008



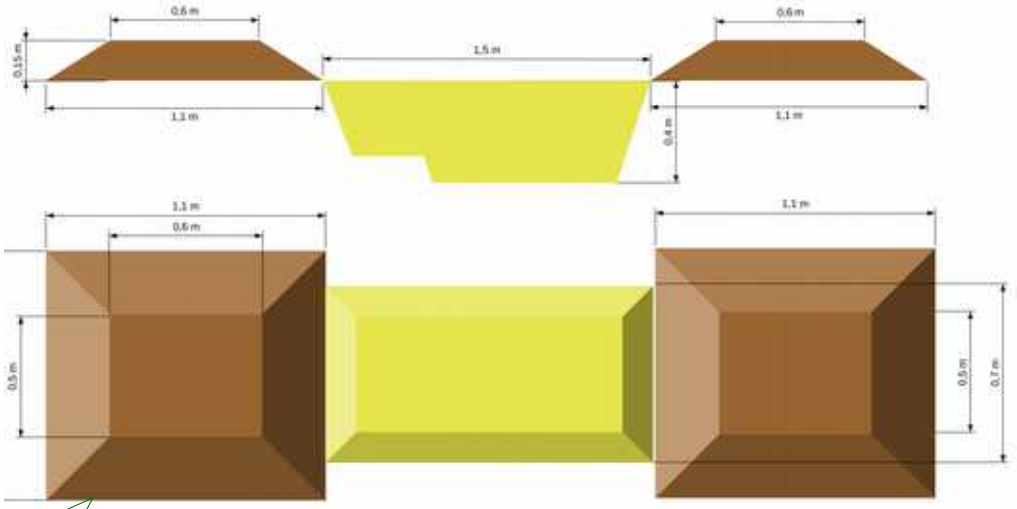
2012-...



Size and princip of mound



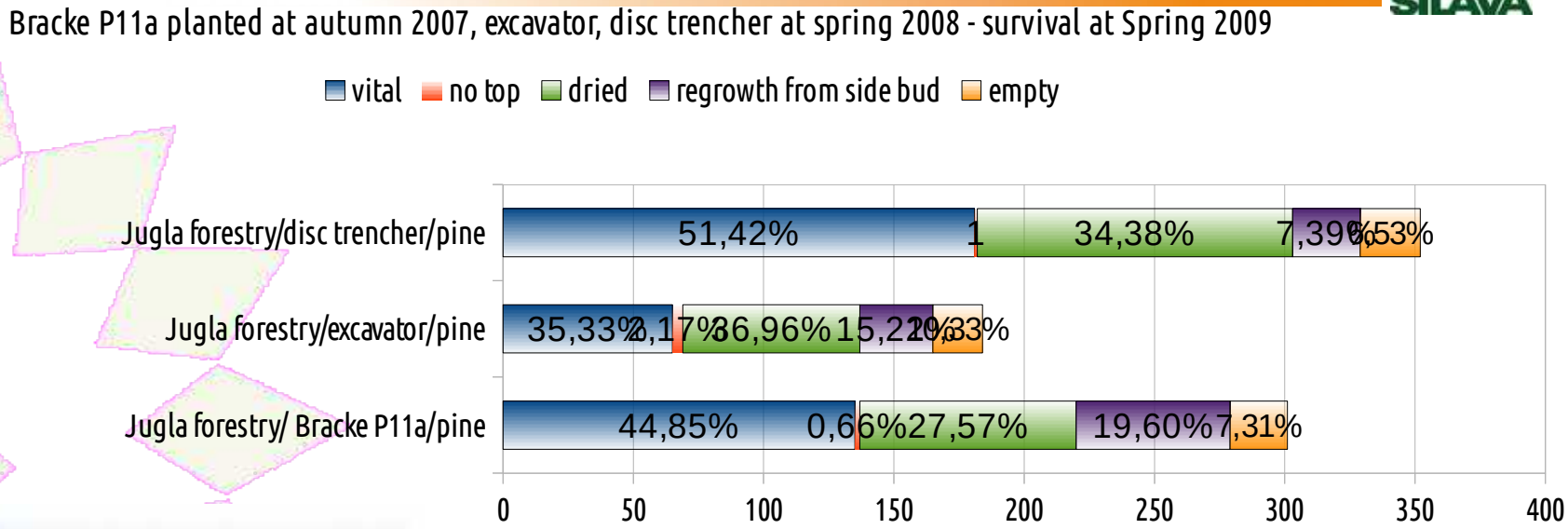
2007-2008



2012-...

More mounds per ha, less scarification of soil!

Bracke P11.a 2007 October-Ln (*Myrtillosa*), Pine ~3000 plants ha survival and vitality after two years



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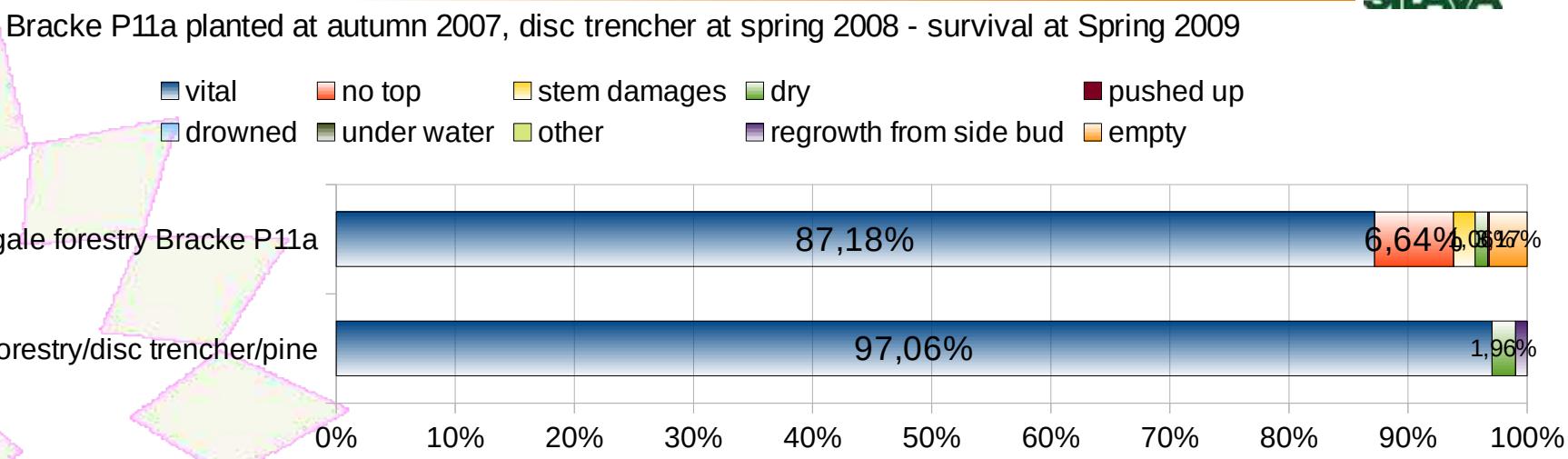
Bracke P11.a 2007 October, Dm (*Hylocomiosa*), Spruce 2500 plants ha and survival after two years



Expierence from Finland to Latvia or tecnology transfer.

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2008-06-18 Sounenjoki

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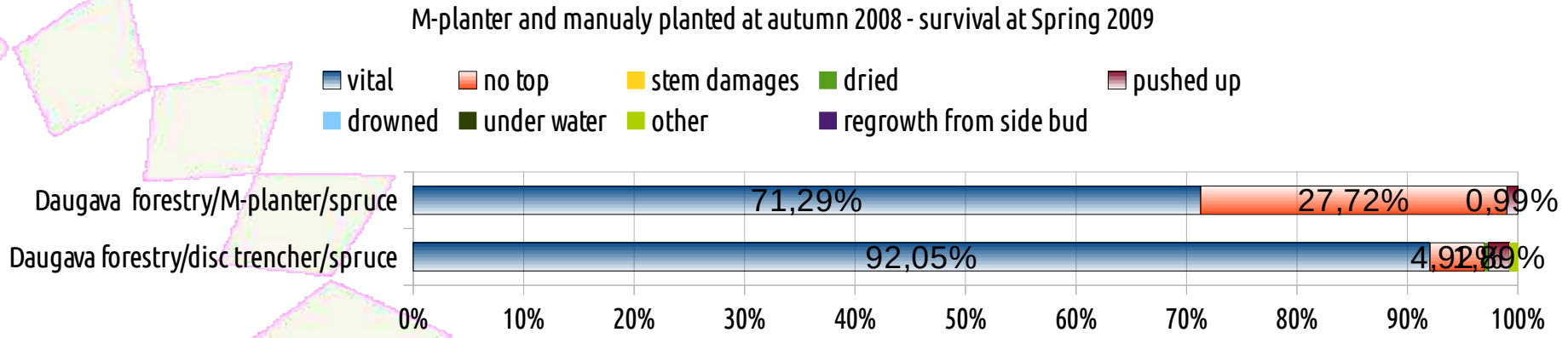
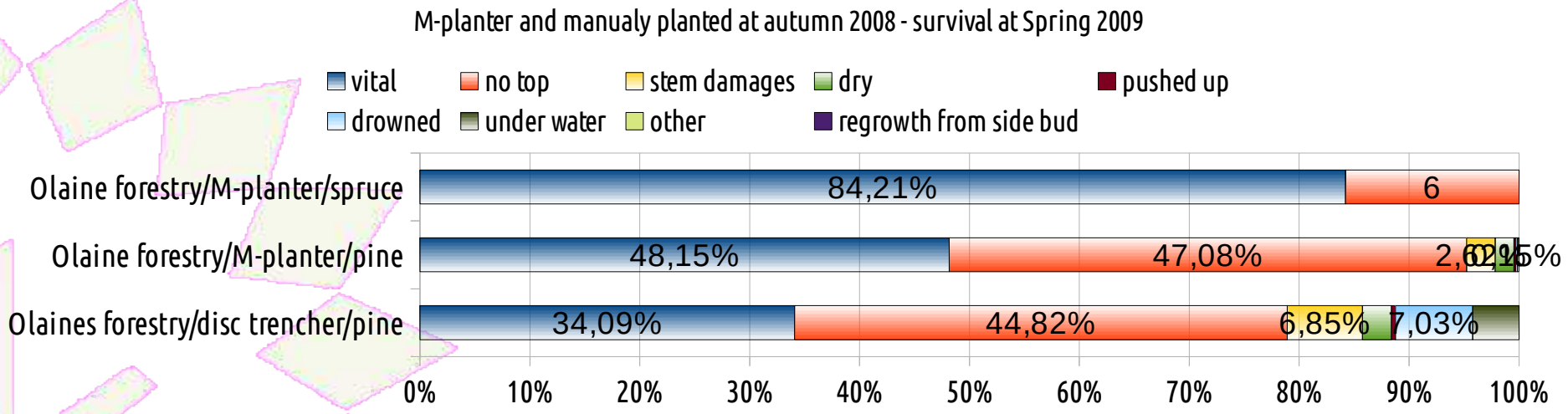
M-planter 2008 September Dm (*Hylocomiosa*), spruce 2500 plants ha - survival after one year



M-planter 2008 September, As (*Myrtillosa mel.*) Spruce just for demo, pine ~ 3000 plants ha - survival after one year



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Main benefit - root system should to have optimal conditions for development, plant get + 10-15 cm of height

Ln, priede ¶

Dm, egle ¶

Costs at that time (2007/2008)

- Bracke P11a – 368 (for spruce) – 710 (pine) EUR
- M-planter – 388 EUR
- Manualy –212 (soil preparation disc trenching) +136 (planting) EUR


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Jaunāko meža mehanizētās atjaunošanas tehnoloģiju izmēģinājumi Latvijā

Kaspars Liepiņš, Dagnija Lazdiņa, Andis Lazdiņš

LVMI „Silava" Meža atjaunošanas un ieaudzēšanas darba grupa

Mehanizētās stādīšanas agregāti un to darbības principi

Priedes mehanizētā sēšana

Mehanizētās meža atjaunošanas izmaksas

Informatīvais materiāls sagatavots pamatojoties SIA Rīgas Meži un Latvijas Republikas izglītības un zinātnes ministrijas (TOP-07-23) finansējumam

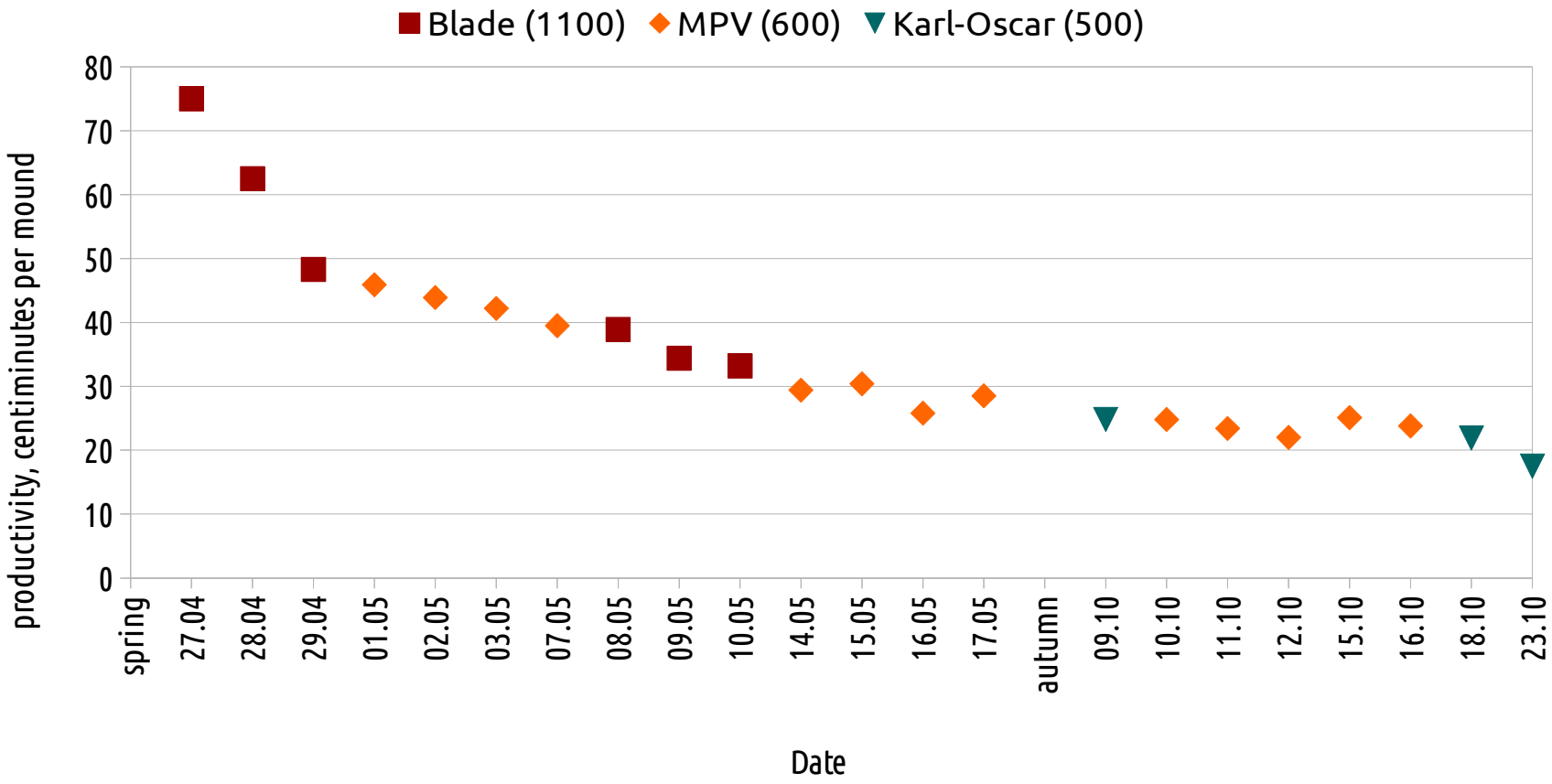
RĪGAS MEŽI

Salaspils, 2010

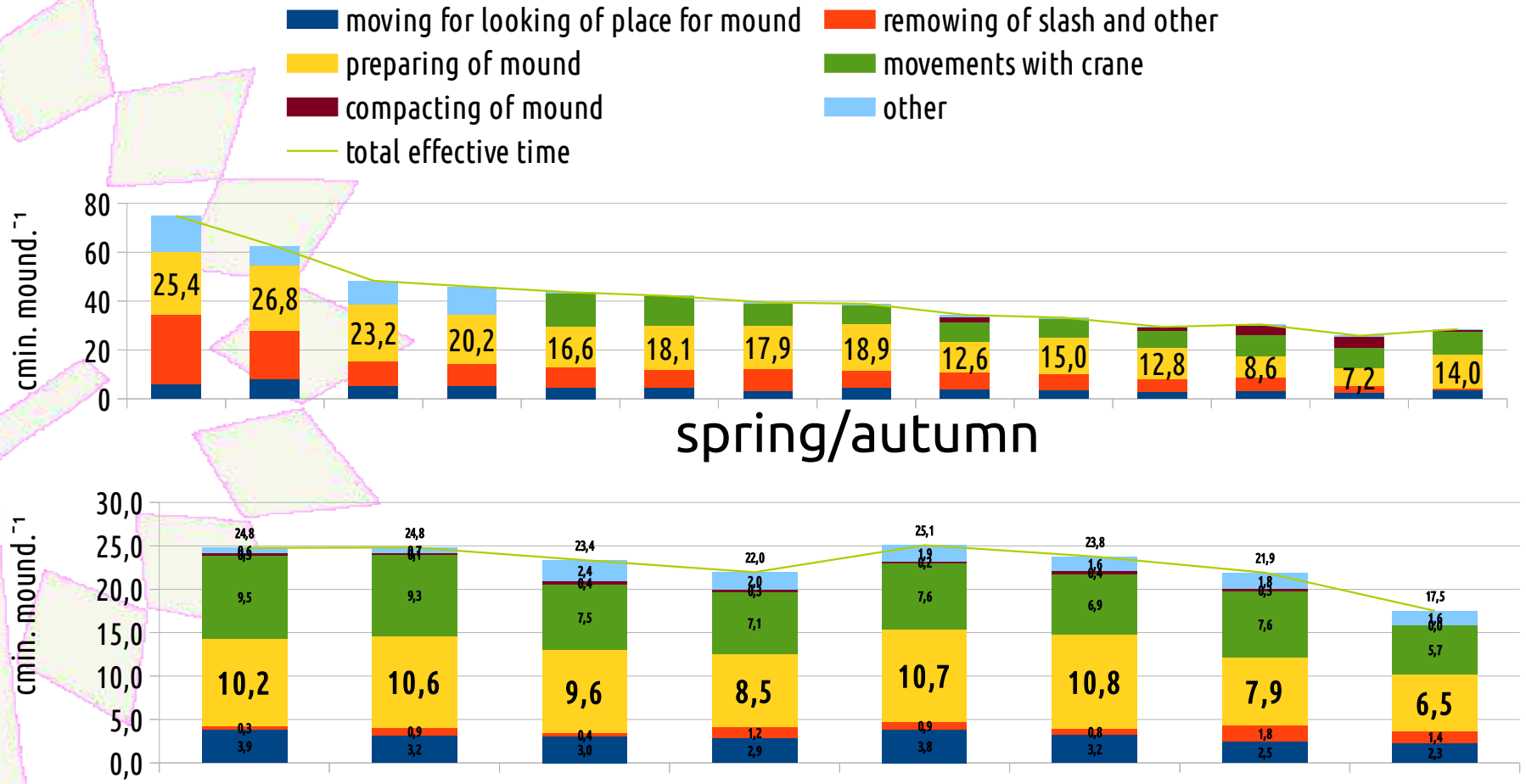

2012 April

2012 - Evaluation of our own devices and pilot time studies for mounding with excavator and different blades

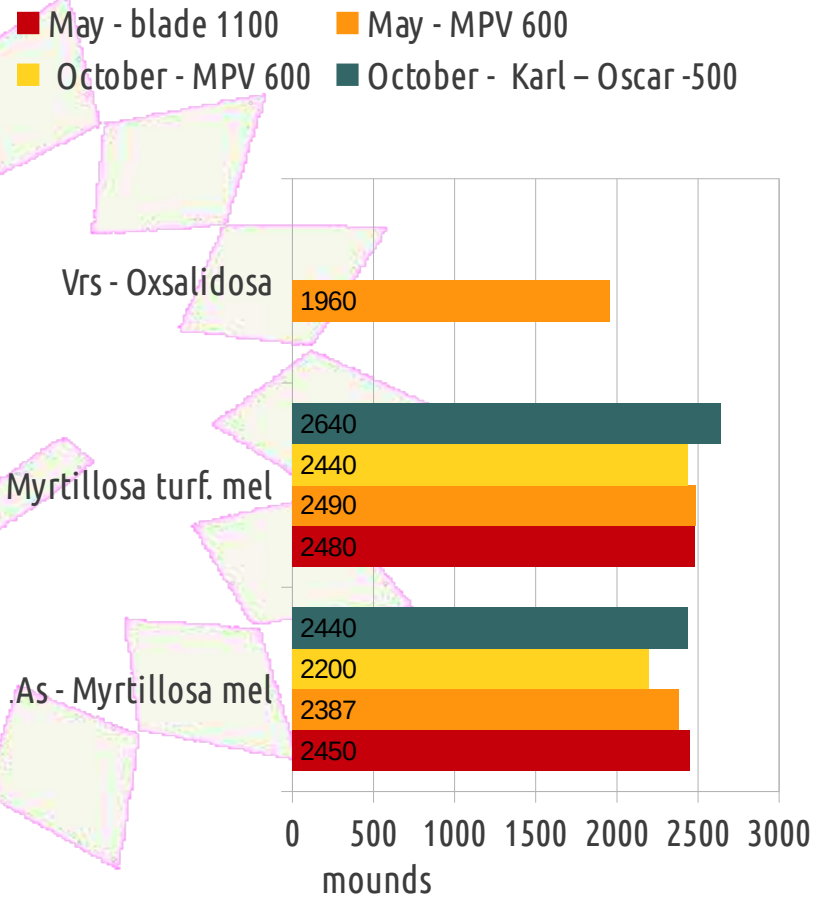
Productivity

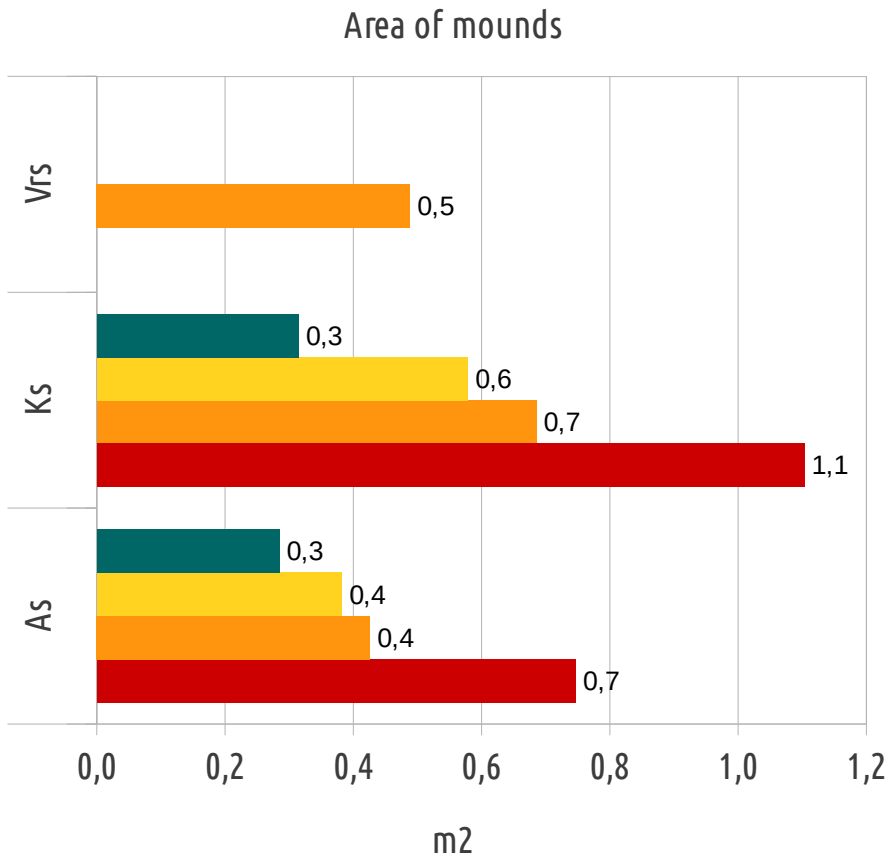


Time studies – efective cmin per one mound



Number of mounds and size diferences at different forest sites





Calculated costs at spring and autumn per operating hours at site

MPV-600 – after harvesting

- 9 operating hours ha^{-1}
- 169 ha season
- 388 EUR ha^{-1}

MPV-600 – one year after harvesting

- 6,17 operating hours ha^{-1}
- 248 ha per season
- 266 EUR ha^{-1}

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MPV-600-2012

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2012-Carl-Oscar

Mounding is expensive treatment suited to problem sites, do not over-prescribe! (1999)

FOREST RESOURCE DEVELOPMENT AGREEMENT

Canada BC

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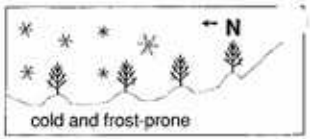
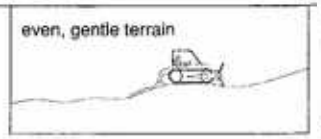
Suitable Mounding Conditions

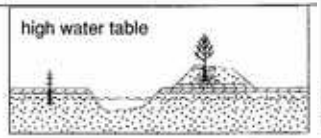
Climatic conditions
- short growing seasons and cool temperatures (most subzones of BWBS, SBS, SBPS, and ESSF; also ICHmk, mc, wk, vk, vc, and wetter MS)
- cool, shady north-facing slopes, especially at higher elevations
- frost pockets and areas of cold air drainage



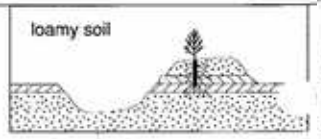
Terrain
- even or rolling terrain
- slopes less than 30% (or up to 50% if excavator or flex-track prime mover available)
- deep soils



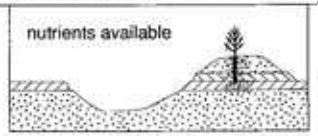
Soil moisture
- mesic and especially subhygric, hygric, and subhydric moisture regimes
- no significant risk of drought
- poorly aerated soils with seasonal or year-round high water tables (but prime mover access may be difficult)



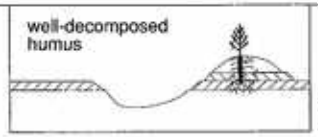
Soil texture
- sandy loam to clay loam soils best
- clayey or silty soils acceptable (if no other treatment option available)
- gravels or stones less than 30%
- compacted subsurface layers (hardpan) - (only if equipment with sufficient down pressure is available)



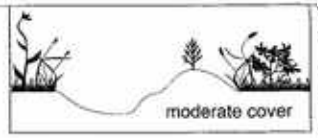
Soil nutrients
- inverted humus mounds will benefit seedlings on nitrogen-deficient, nutritionally poor sites



Soil organic layers
- duff layers less than 15-20 cm thick (unless excavator available)
- well decomposed organic matter (H layer) can be an acceptable planting medium on wet sites

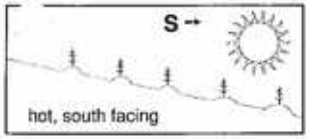


Competing vegetation
- light to moderate herbaceous or shrub cover
- dense, but short grass cover

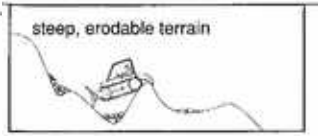


Unsuitable Mounding Conditions

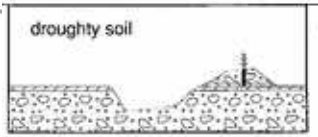
Climatic conditions
- warm, dry growing seasons with significant risk of summer drought (IDF; PP; drier MS, ICHdk, dm, dw, mw, xw; SBSdh, dk, dw, mh, mw,mm)
- sunny, exposed south-facing slopes and ridges.



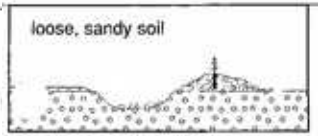
Terrain
- significant erosion hazard present
- slopes greater than 30% (or 50% if excavator available)
- irregular terrain with shallow soils and frequent rock outcrops



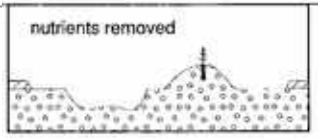
Soil moisture
- submesic, subxeric, or xeric moisture regimes
- significant risk of drought
- coarse-textured or shallow soils with low moisture-holding capacity;
- rapidly drained ridge crests or upper slopes



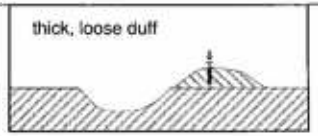
Soil texture
- loamy sand to sandy soils lacking cohesion
- use with caution on fine-textured or silty soils prone to frost-heaving
- gravels or stones greater than 30%



Soil nutrients
- scalping with mineral mounds not recommended for nitrogen-deficient, nutritionally poor soils



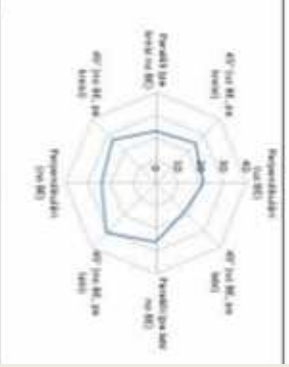
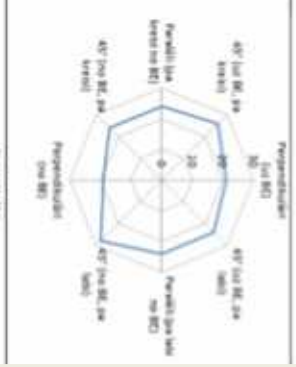
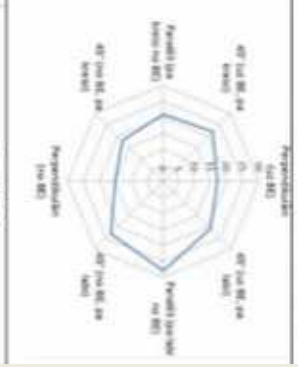
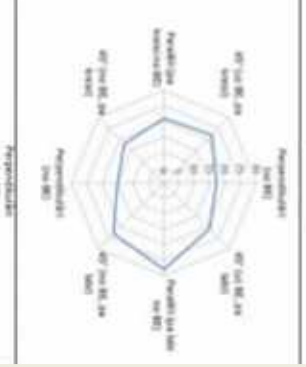
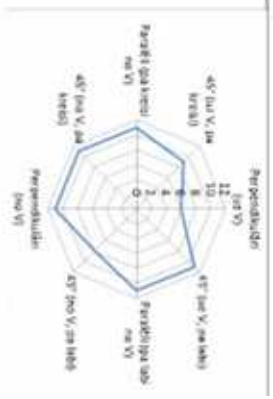
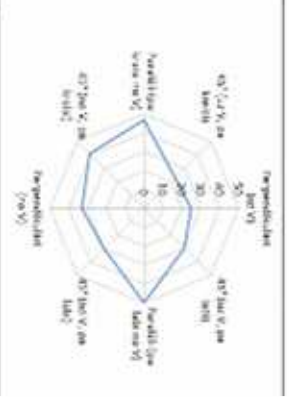
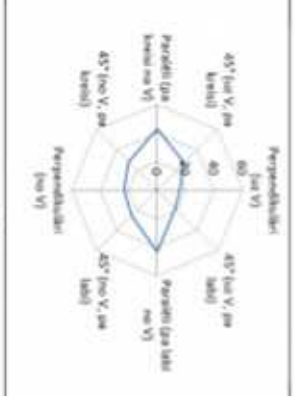
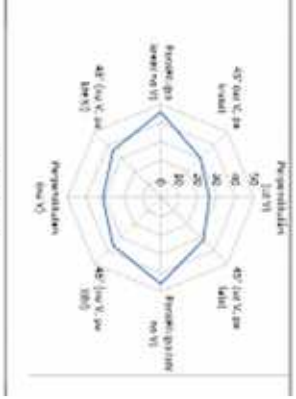
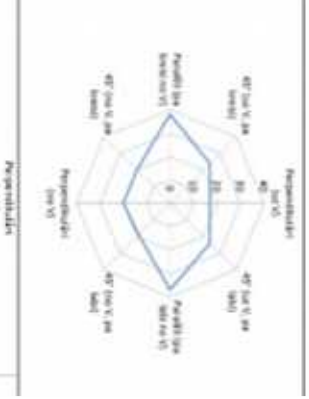
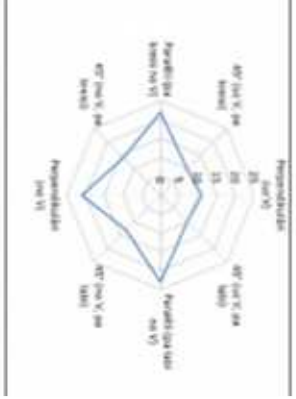
Soil organic layers
- poorly decomposed duff greater than 20 cm thick (must be removed before mounding)



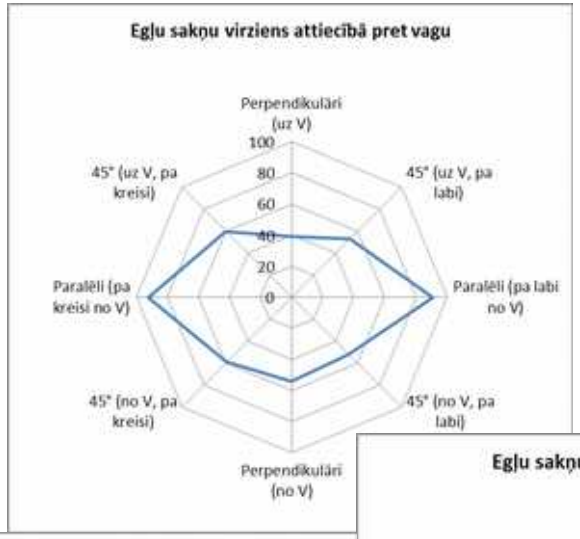
Competing vegetation
- dense, tall grass, herbs, or shrubs (must be removed before mounding)

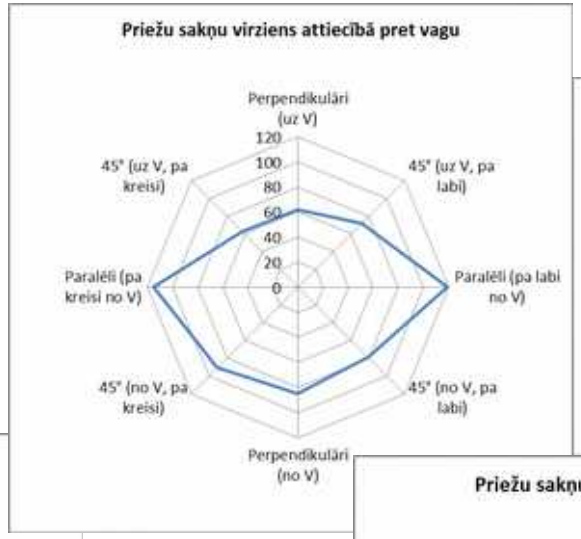
CAUTION: Mounding is an expensive treatme[nt] s[uited] to problem sites. Don't over-prescribe!

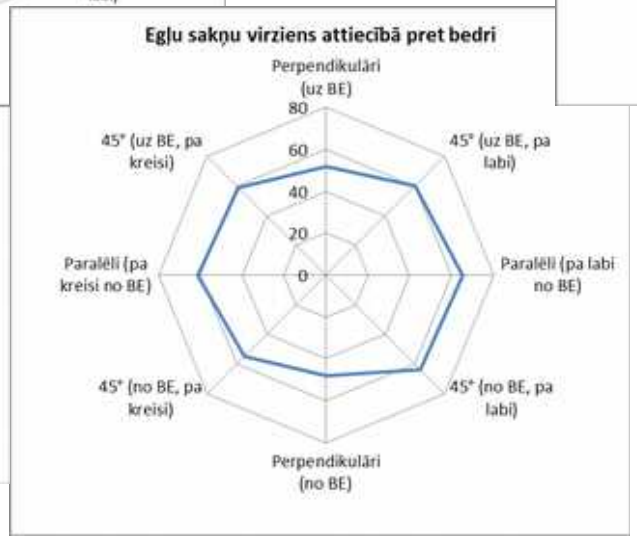
Main roots and soil preparation method used

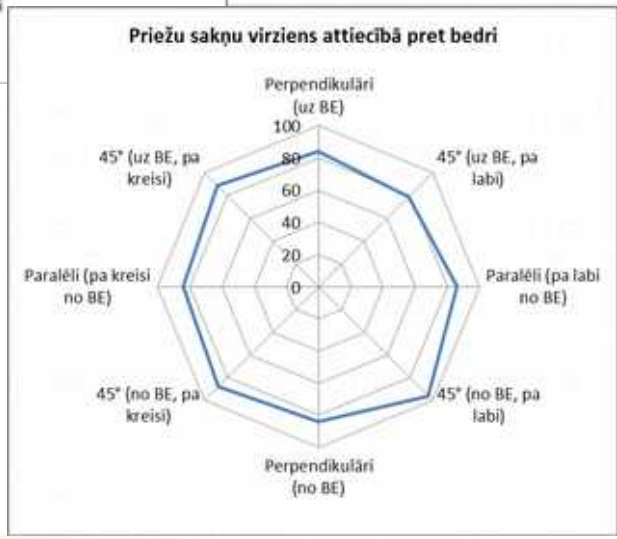
Kūdreņi		Āreņi		Slapjaiņi		Tips/ suga
Egle	Priede	Egle	Priede	Egle	Priede	
						Pacila
In furrows roots developing parallel to furrow!						
						Vaga

Root direction not correlated with cardinal points



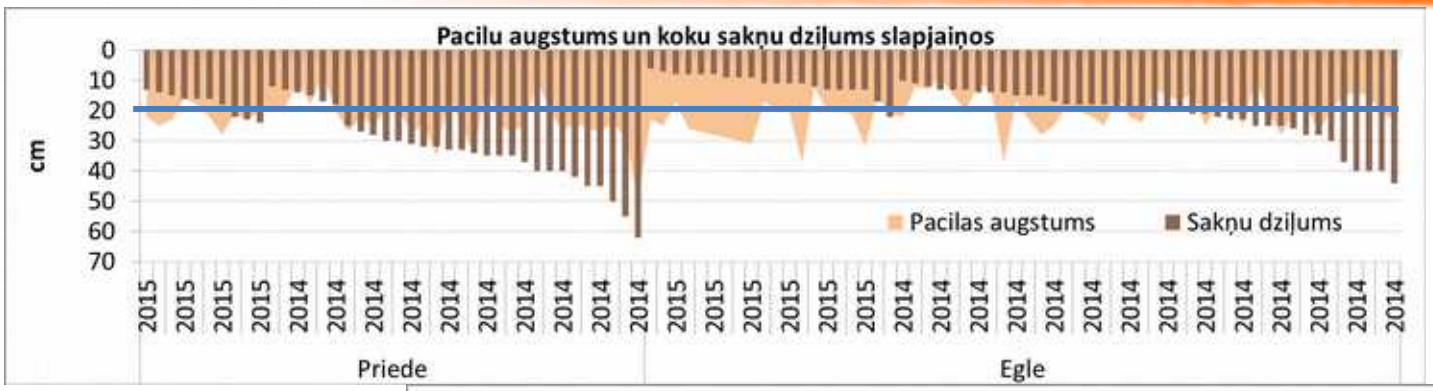


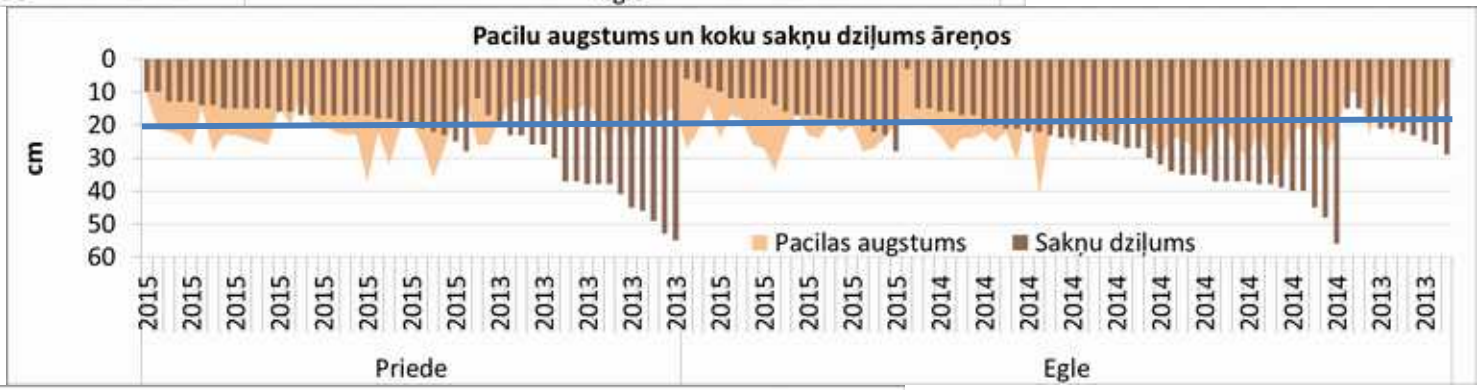


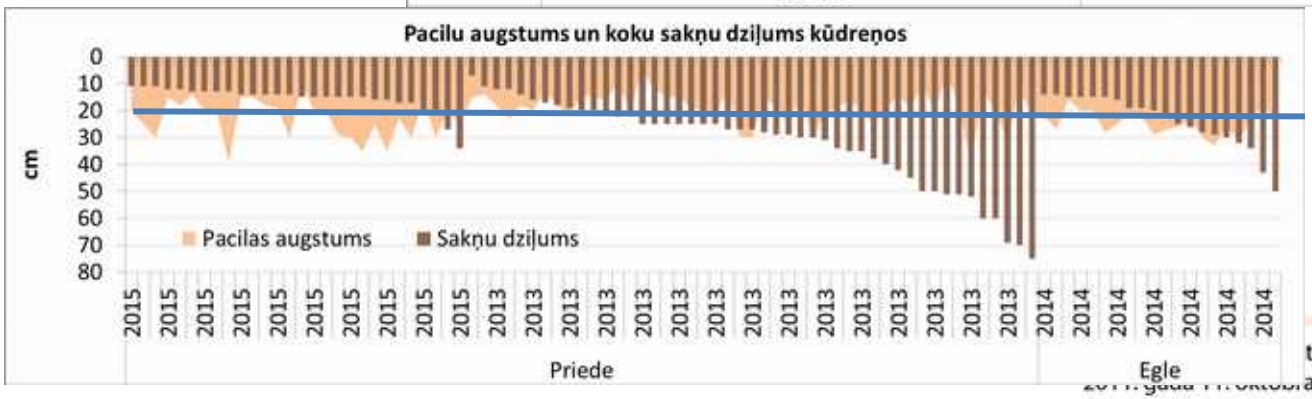


Pētījums veikts a/s "Latvijas valsts meži" un LVMI Silava
2011. gada 11. oktobra memoranda
"Par sadarbību zinātniskajā izpētē" ietvaros

Roots growth through mound in second – third year







tvijas valsts meži" un LVMI Silava
a memoranda
"Par sadarbību zinātniskajā izpētē" ietvaros

Thanks for attention!

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