

Forest regeneration mechanization in Latvia

(history, innovations and projects of technology transfer)

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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 - transfer of technologies from Finland



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

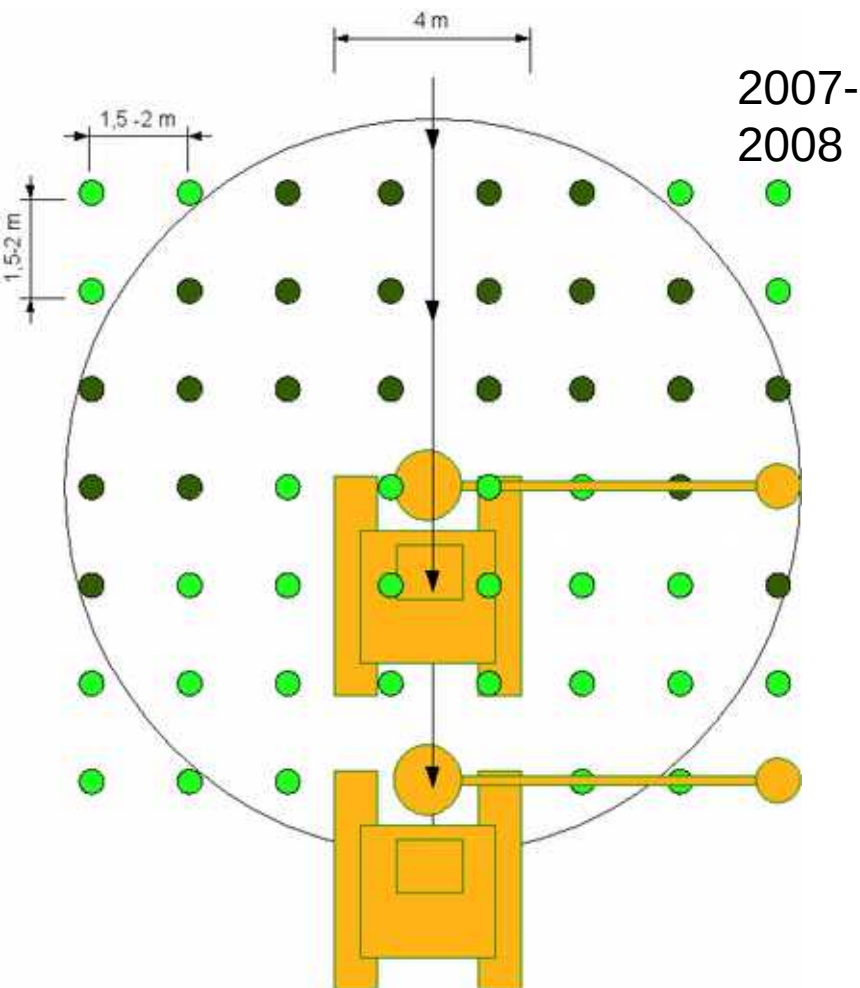


Research projects and transfer of technologies

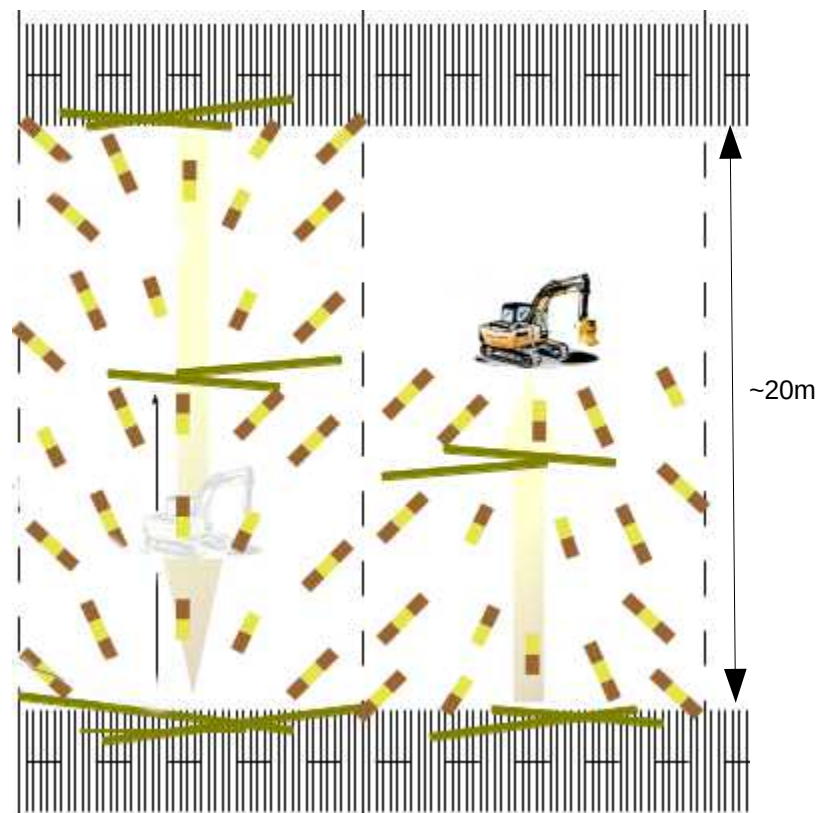


- ❁ 2007- Bracke P11a research of time studies - funded by forest development fund (spruce and pine planted in forests of Rīgas meži, Latvijas finieris, Latvijas valsts meži) ;
- ❁ 2008 – M-planter-funded by forest development fund and SIA Rigas meži (spruce and pine planted in SIA Rīgas meži) ;
- ❁ 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.

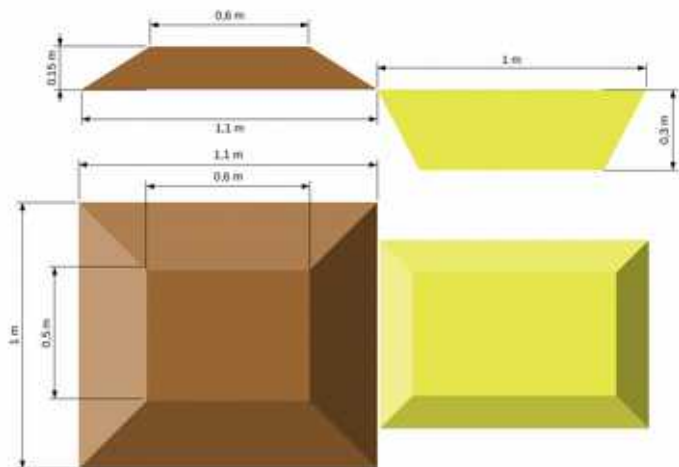
Recomended designs of planting and methods asked how to do...



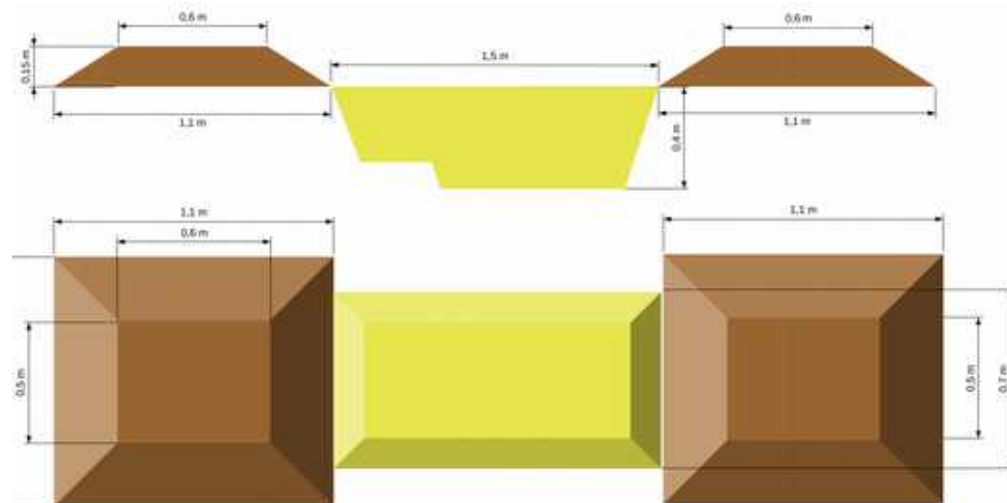
2012-...



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



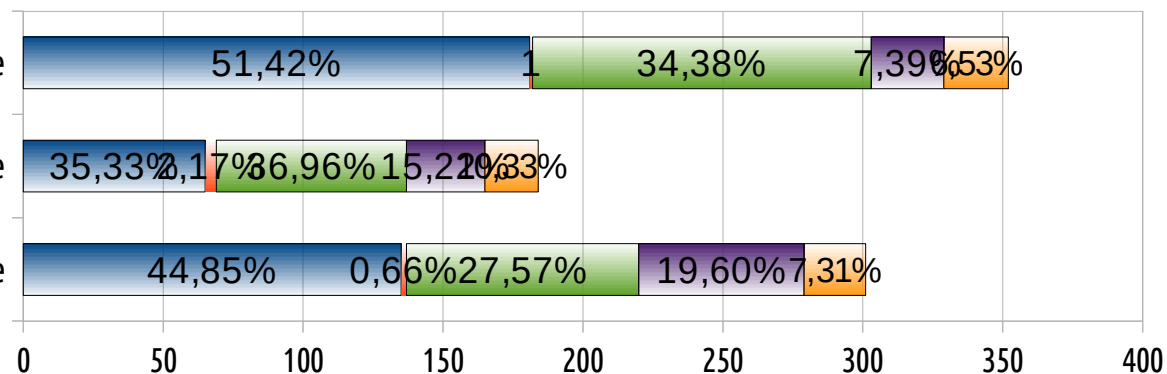
Bracke P11a planted at autumn 2007, excavator, disc trencher at spring 2008 - survival at Spring 2009

■ vital ■ no top ■ dried ■ regrowth from side bud ■ empty

Jugla forestry/disc trencher/pine

Jugla forestry/excavator/pine

Jugla forestry/ Bracke P11a/pine

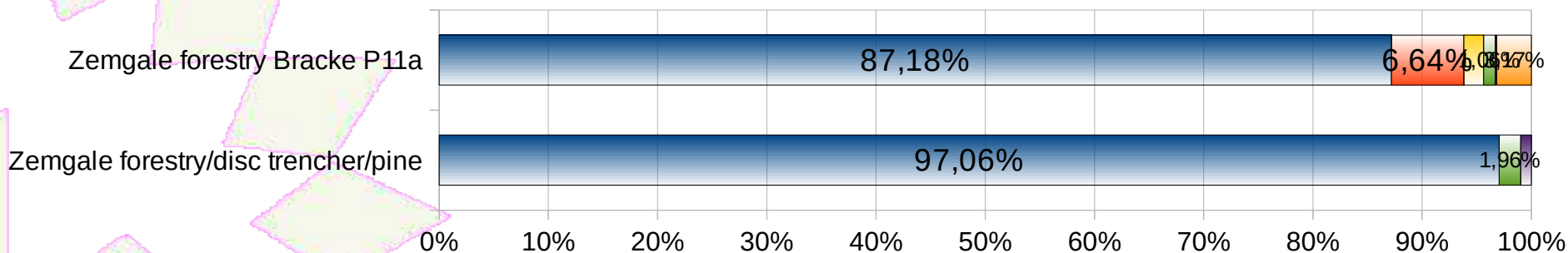


Bracke P11.a 2007 October, Dm (*Hylocomiosa*), Spruce 2500 plants ha and survival after two years



Bracke P11a planted at autumn 2007, disc trencher at spring 2008 - survival at Spring 2009

■ vital ■ no top ■ stem damages ■ dry ■ pushed up
■ drowned ■ under water ■ other ■ regrowth from side bud ■ empty



Expierence from Finland to Latvia or tecnology transfer.



2008-06-18 Sounenjoki

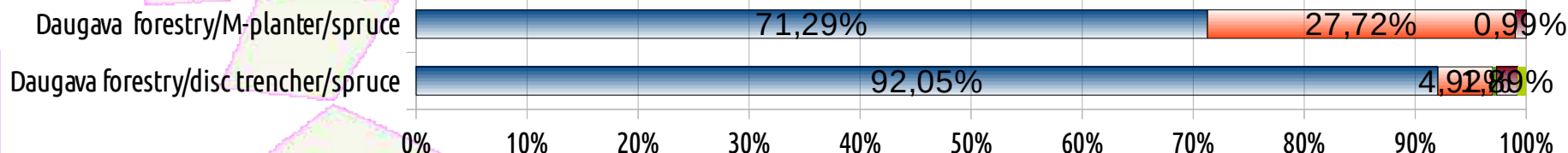


M-planter 2008 September Dm (*Hylocomiosa*), spruce 2500 plants ha - survival after one year



M-planter and manually planted at autumn 2008 - survival at Spring 2009

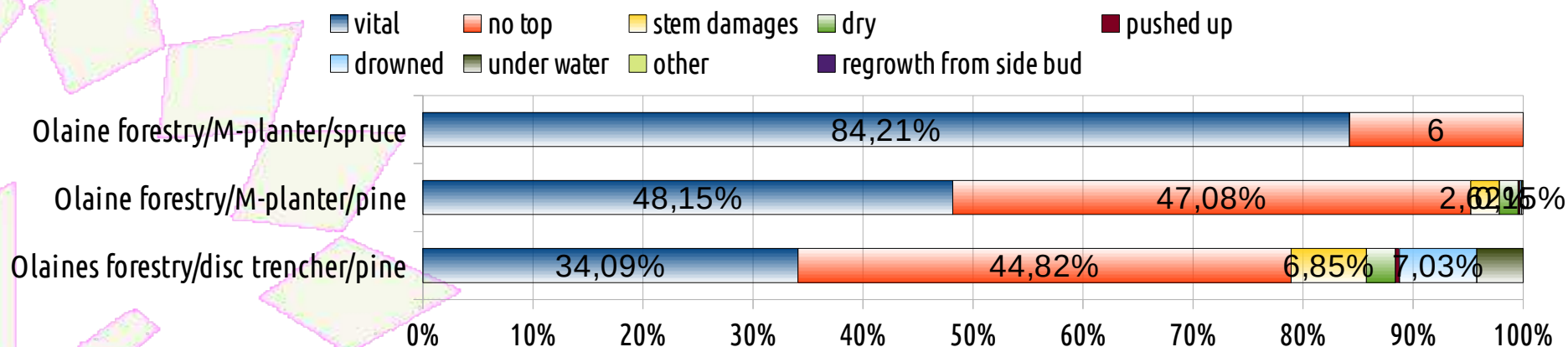
■ vital ■ no top ■ stem damages ■ dried ■ pushed up
■ drowned ■ under water ■ other ■ regrowth from side bud



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



M-planter and manually planted at autumn 2008 - survival at Spring 2009



Main benefit - root system should 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



Jaunāko meža mehanizētās atjaunošanas tehnoloģiju izmēģinājumi Latvijā

Kaspars Liepiņš, Dagnija Lazdiņa, Andis Lazdiņš
LVM „SilaVA” Meža atjaunošanas un iedzīvniecības darbu grupa



Mehānizētās stādīšanas agregāti un to darbības principi
Priedes mehanizētā sēšana
Mehānizētās meža atjaunošanas izmaksas

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



Salaspils, 2010



2012 April



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



**Blade
110 cm**



MPV-600

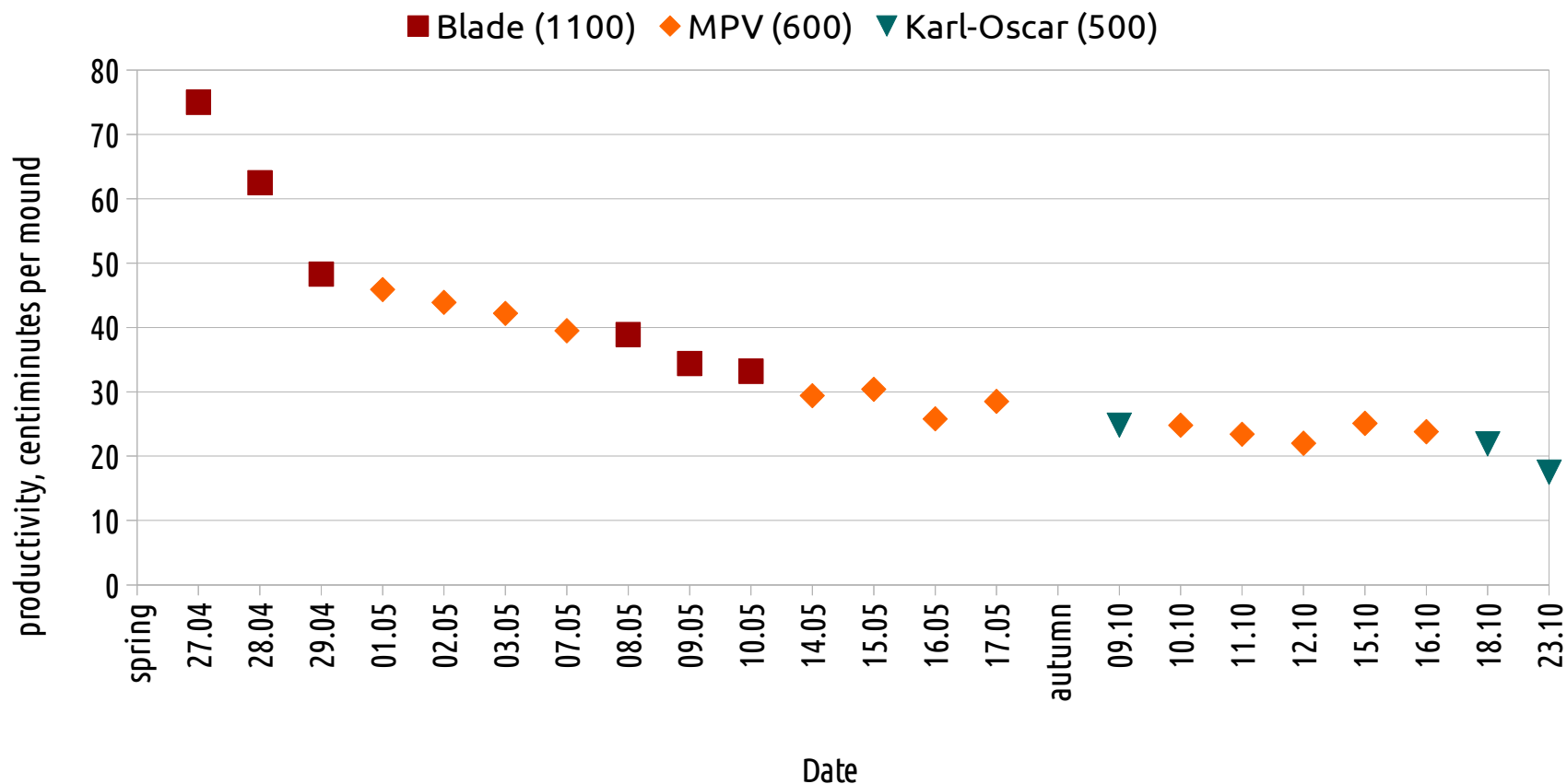


Patented



Carl-Oskar

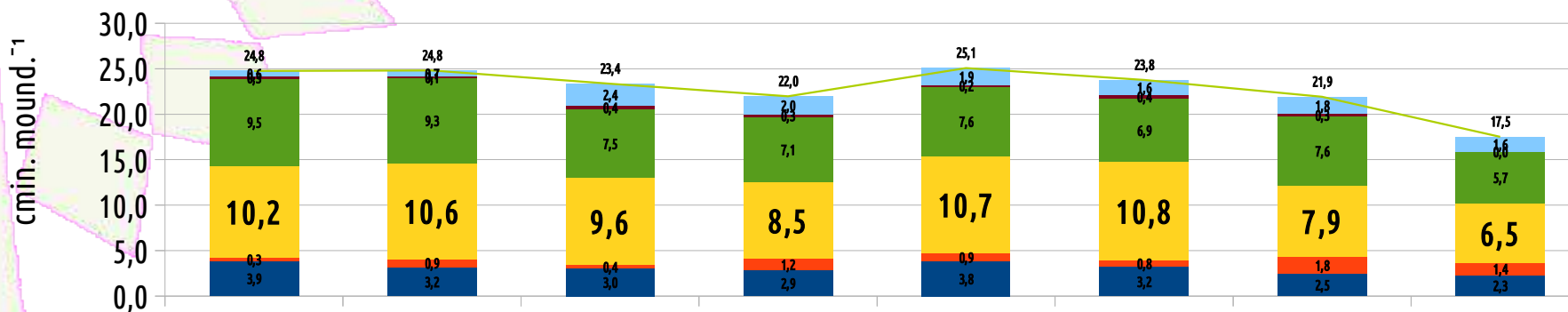
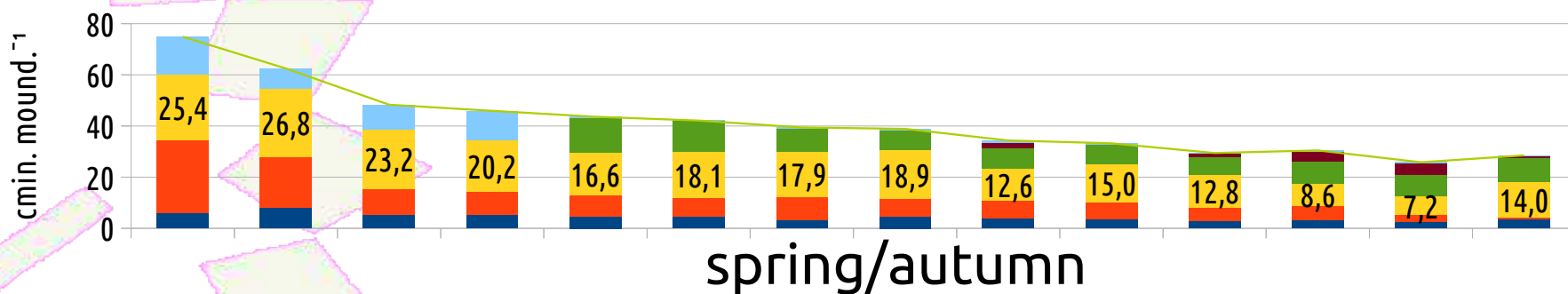
Productivity



Time studies – effective cmin per one mound



- moving for looking of place for mound
- preparing of mound
- compacting of mound
- removing of slash and other
- movements with crane
- other
- total effective time

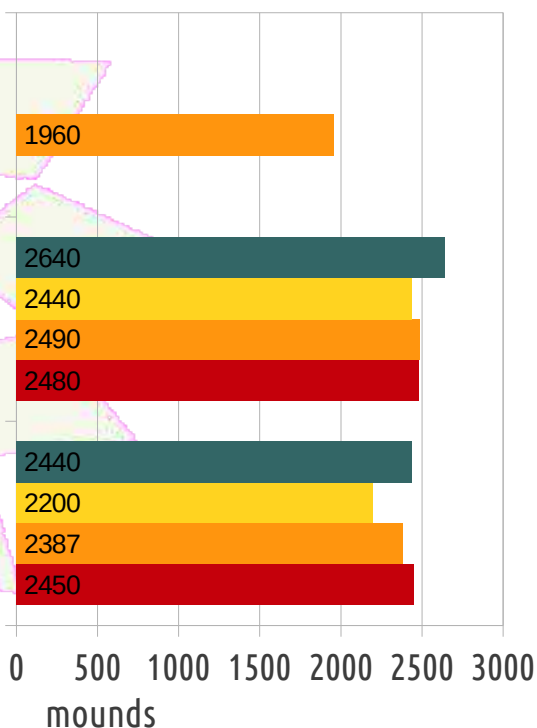


Number of mounds and size differences at different forest sites



■ May - blade 1100 ■ May - MPV 600
■ October - MPV 600 ■ October - Karl - Oscar -500

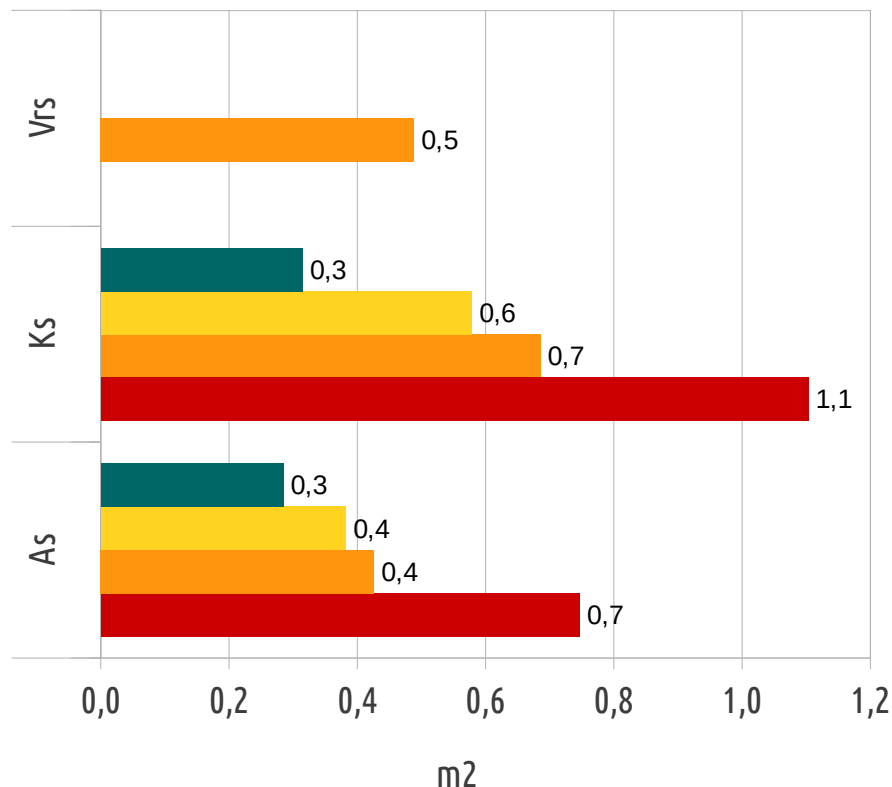
Vrs - Oxsalidosa



.Ks - Myrttilosa turf. mel

.As - Myrttilosa mel

Area of mounds



m2

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

MPV-600-2012



2012-Carl-Oscar



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

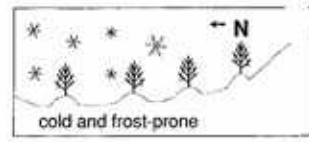
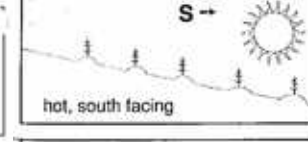
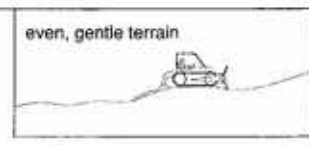
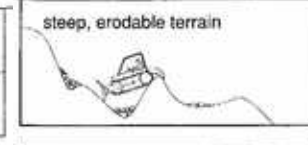
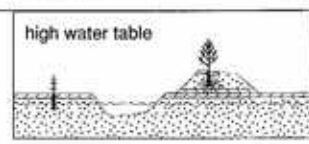
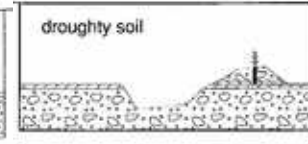
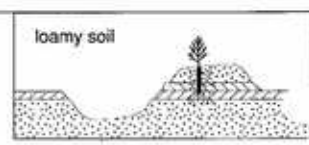
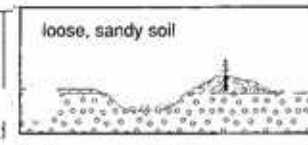
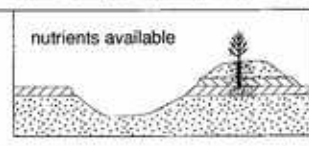
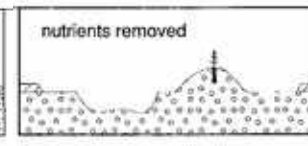
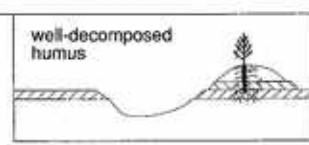
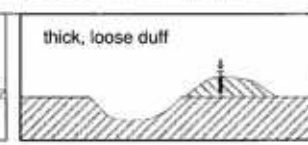
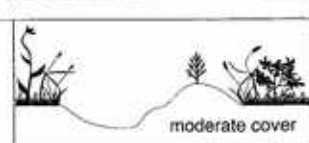
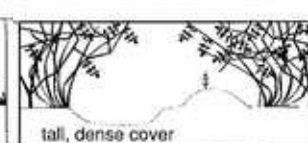
FOREST RESOURCE DEVELOPMENT AGREEMENT

Canada

BC

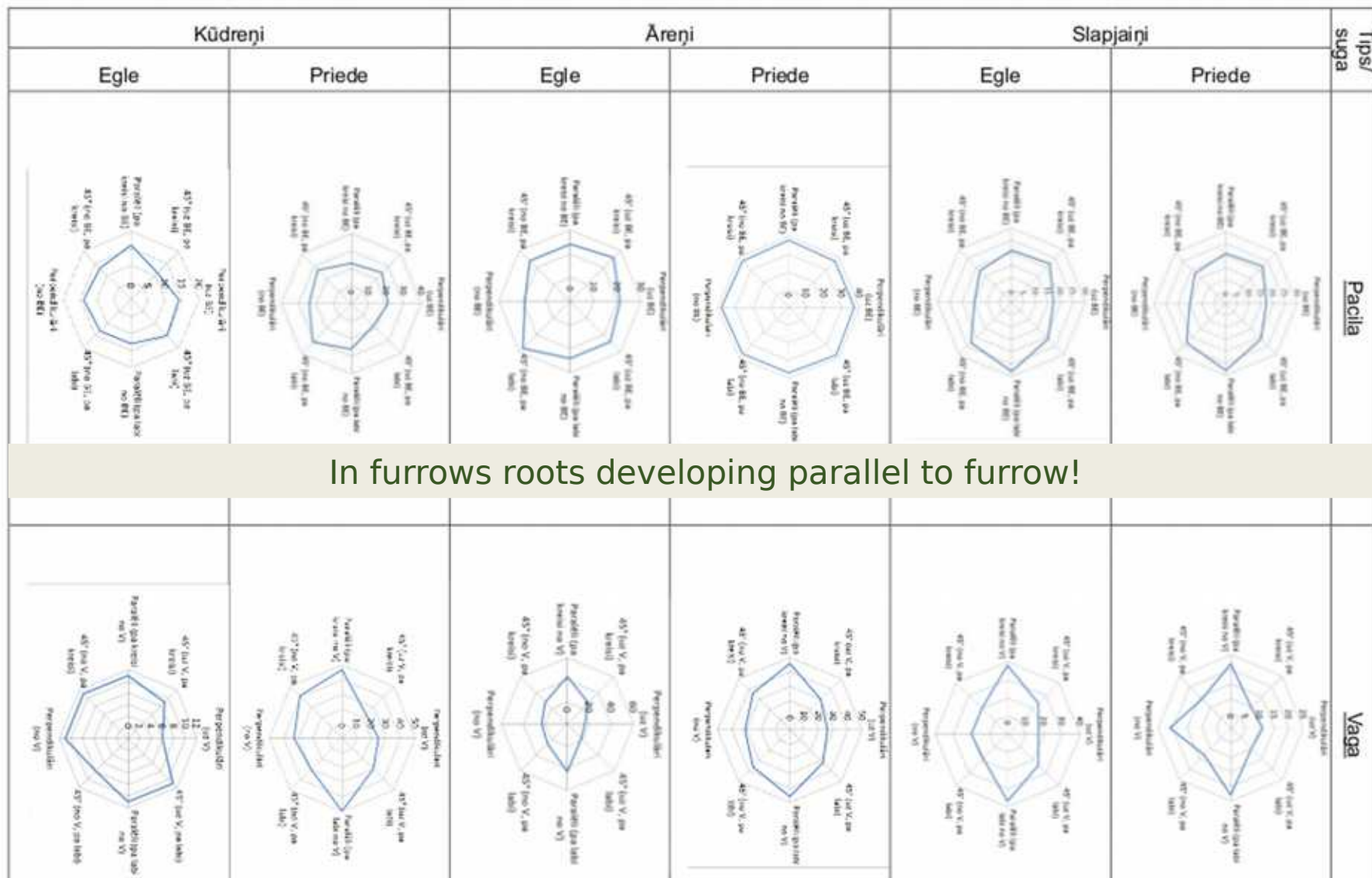
Suitable Mounding Conditions

Unsuitable 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	 cold and frost-prone	 hot, south facing	Climatic conditions - warm, dry growing seasons with significant risk of summer drought (IDF; IP; drier MS, ICHdk, dm, dw, mw, xw; SBSdh, dk, dw, mh, mw, mm) - sunny, exposed south-facing slopes and ridges.
Terrain - even or rolling terrain - slopes less than 30% (or up to 50% if excavator or flex-track prime mover available) - deep soils	 even, gentle terrain	 steep, erodible terrain	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 - 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)	 high water table	 droughty soil	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 - 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)	 loamy soil	 loose, sandy soil	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 inverted humus mounds will benefit seedlings on nitrogen-deficient, nutritionally poor sites	 nutrients available	 nutrients removed	Soil nutrients scalping with mineral mounds not recommended for nitrogen-deficient, nutritionally poor soils
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	 well-decomposed humus	 thick, loose duff	Soil organic layers poorly decomposed duff greater than 20 cm thick (must be removed before mounding)
Competing vegetation - light to moderate herbaceous or shrub cover - dense, but short grass cover	 moderate cover	 tall, dense cover	Competing vegetation dense, tall grass, herbs, or shrubs (must be removed before mounding)

CAUTION: Mounding is an expensive treatment suited to problem sites. Don't over-prescribe!

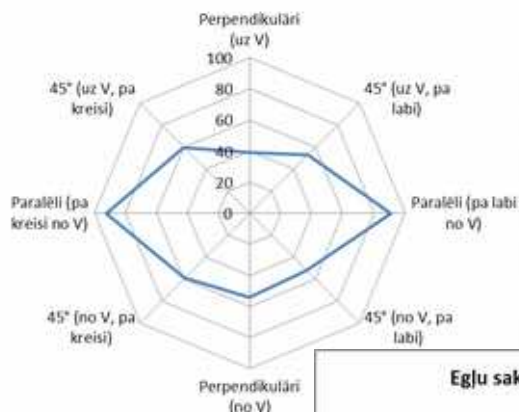
Main roots and soil preparation method used



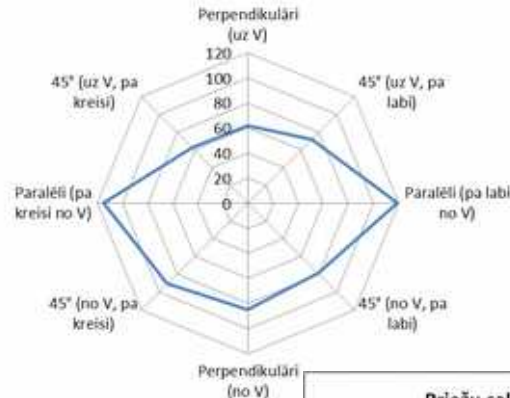
Root direction not correlated with cardinal points



Egļu sakņu virziens attiecībā pret vagu



Priežu sakņu virziens attiecībā pret vagu



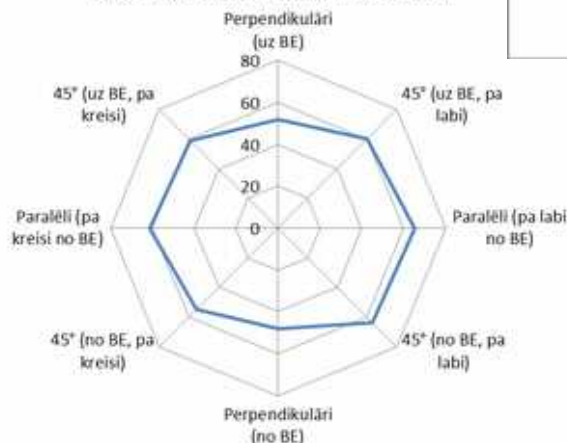
Priežu sakņu virziens attiecībā pret debespusēm (vagas)



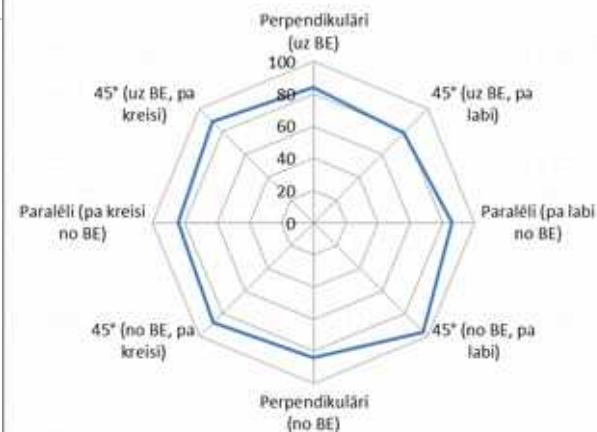
Egļu sakņu virziens attiecībā pret debespusēm (vagas)



Egļu sakņu virziens attiecībā pret bedri



Priežu sakņu virziens attiecībā pret bedri



Thanks for attention!