Managing wide-spaced young poplars by pollarding - impacts

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Plant & Food RESEARCH
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THE NEW ZEALAND POPLAR & WILLOW RESEARCH TRUST

Outline

- Wide-spaced trees and their challenges
- Management options
- Trial involving pollarded poplars
- Measurements and key results
- Conclusions

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Erosion of pastoral hill country is a key issue

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Wide-spaced trees

- **Planted on erodible hill country to enable pastoralism; usually < 100 sph**
- **Species: *Populus* (poplar), *Salix* (willow), *Acacia*, *Eucalyptus*….**
- **Millions of poplars and willows planted on hill country (50+ yrs)**
- **Many advantages of poplar and willow**
- **<u>Rarely managed</u>**

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Greater Wellington Regional Council


Greater Wellington Regional Council

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Large trees: problems

- **Up to 50% reduction in annual pasture production**
- **Liability to infrastructure, livestock**
- **Potential mess, clean up?**

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Options for large trees

Existing trees

- **Kill**

- **Partial or complete canopy removal (pollarding)**

New plantings

- **Plan to manage over lifetime**

- **Use trees with narrow crown** →

OR

Increase tree spacing to reduce shading (but stabilisation & liability??)

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Pollarding poplar (and willow)

- **Purpose: 1) address problem of large trees**
  2) supplementary fodder (Summer/Autumn)

- **Height 1.8-2.0 m above ground**
- **First pollard when DBH 20-30 cm?**

- **Impact on roots??**

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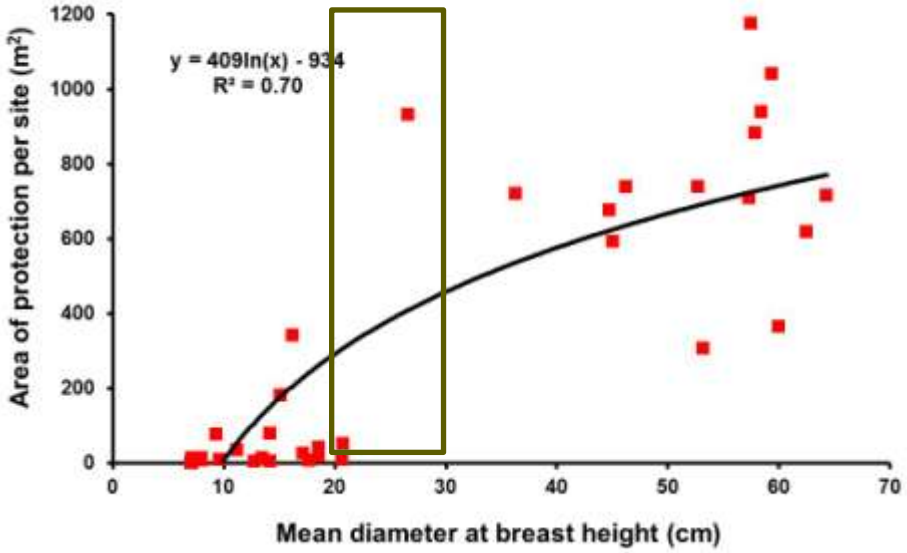
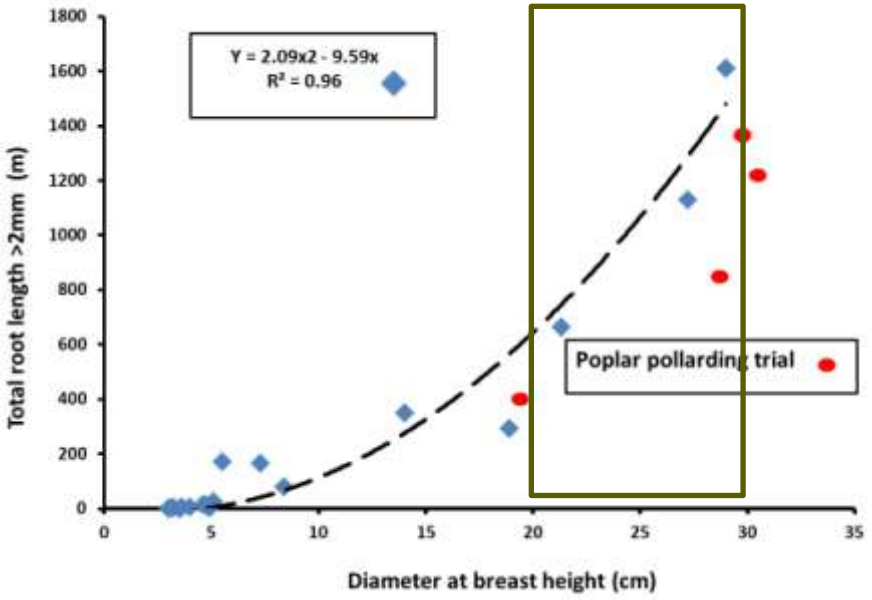
Area of protection and root length – link?

First pollard ???





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Pollarding hybrid poplar clone ‘Veronese’

- Trial in Manawatu, southern North Island
- Wide-spaced trees on N-facing slope of 15-25^{o}, 10 trees selected
- 2 trees excavated before pollarding
- Trees aged 8 years (first pollarded in winter 2008)

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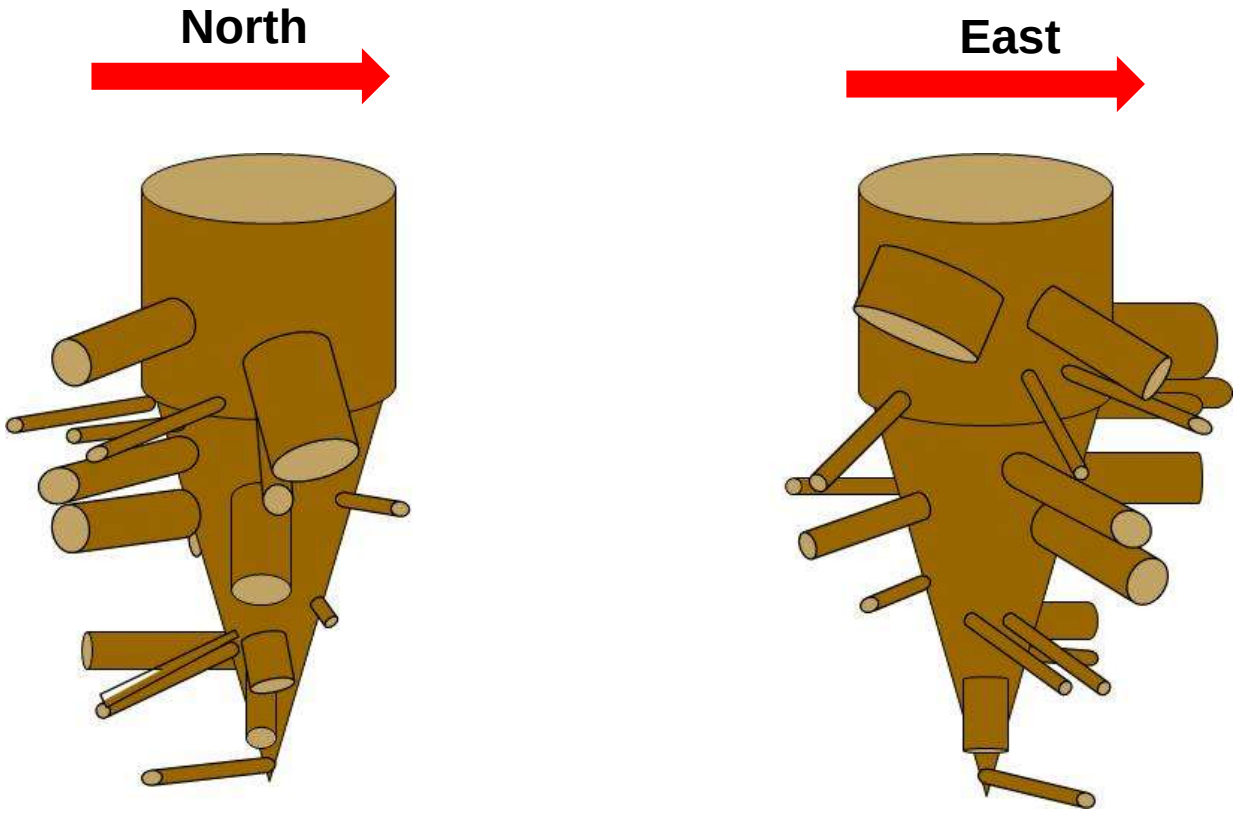
North and east orientation and relative size of roots (1 of 2 trees before pollarding in 2008)



Prevailing wind is from the west

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Diagrams by Ian McIvor

Measurements

- **Tree attributes e.g. DBH, canopy dimensions**
- **Tree biomass: above- and below-ground**
  - 4 trees (2 x unpollarded, 2 x pollarded) excavated 2012
  - Low replication!
- **Soil water content**
- **Pasture production and composition**

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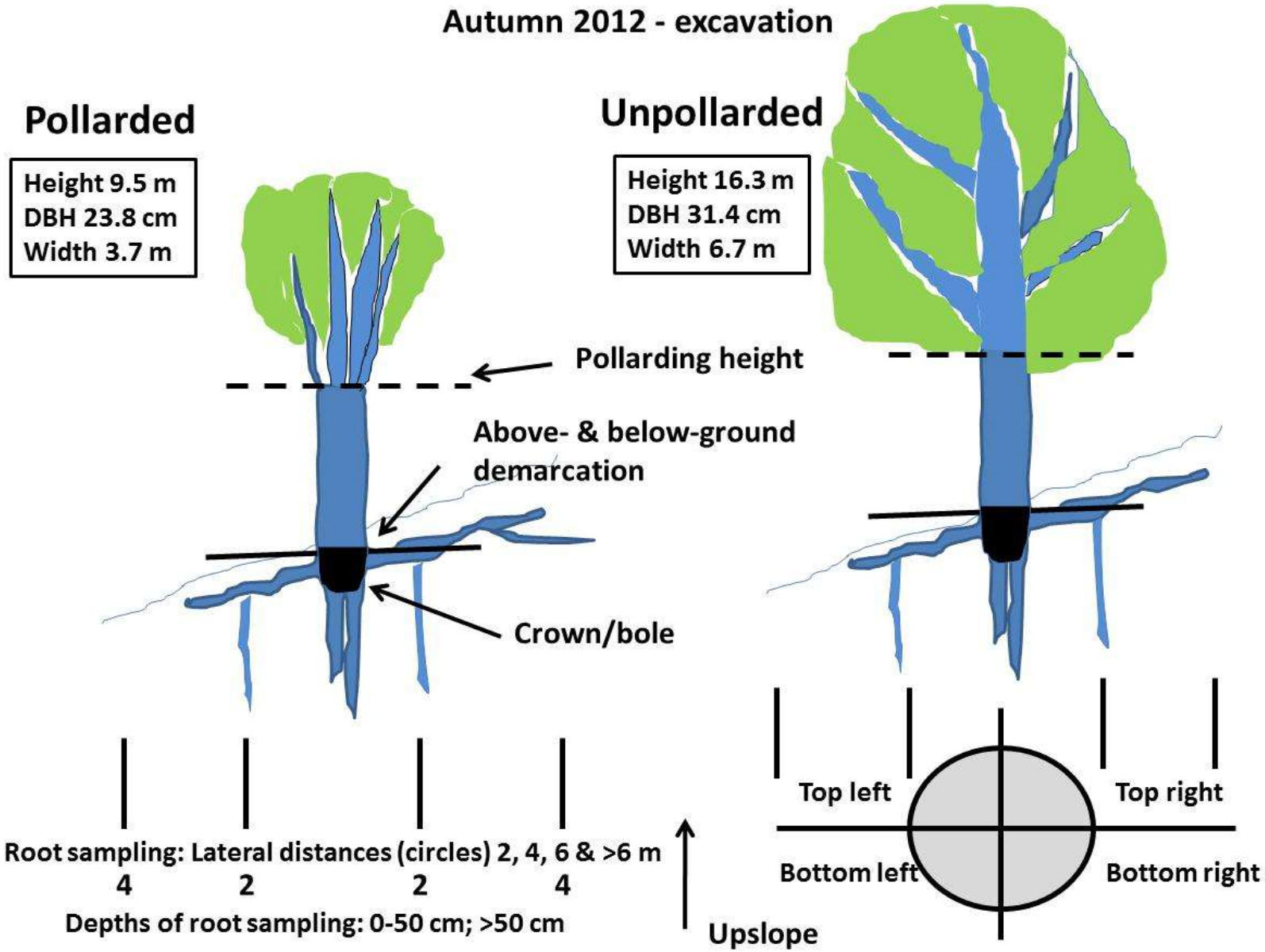
Autumn 2012 - excavation
Pollarded
Height 9.5 m
DBH 23.8 cm
Width 3.7 m
Unpollarded
Height 16.3 m
DBH 31.4 cm
Width 6.7 m
Pollarding height
Above- & below-ground demarcation
Crown/bole
Root sampling: Lateral distances (circles) 2, 4, 6 & >6 m
4
2
2
4
Depths of root sampling: 0-50 cm; >50 cm
Upslope
Top left
Top right
Bottom left
Bottom right

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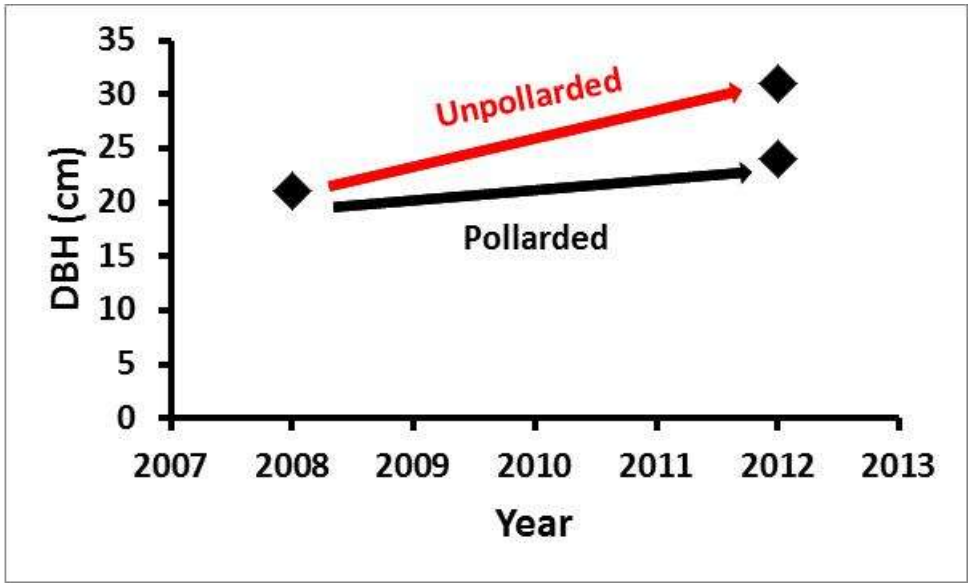
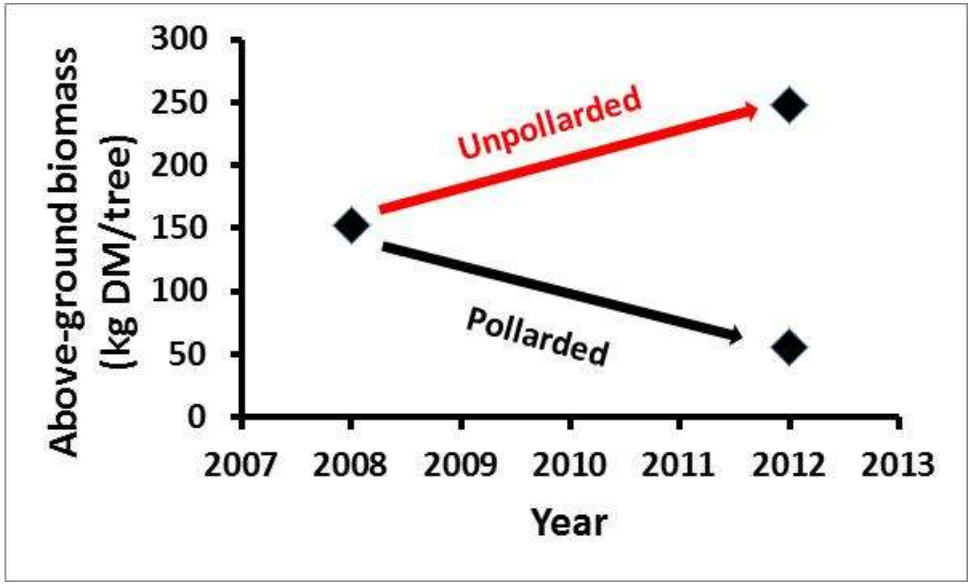
Above-ground responses





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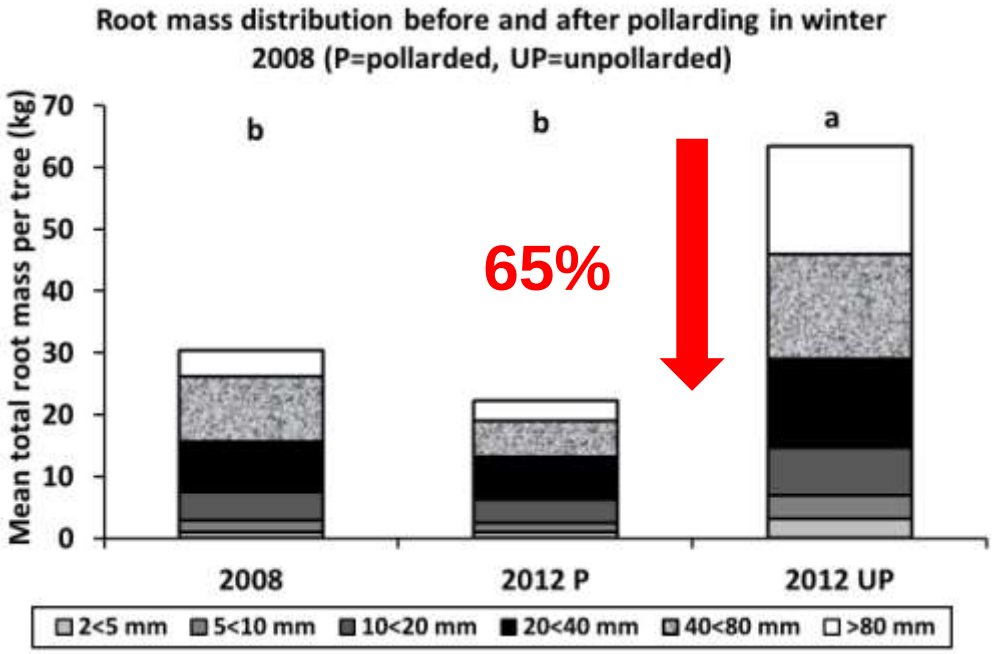
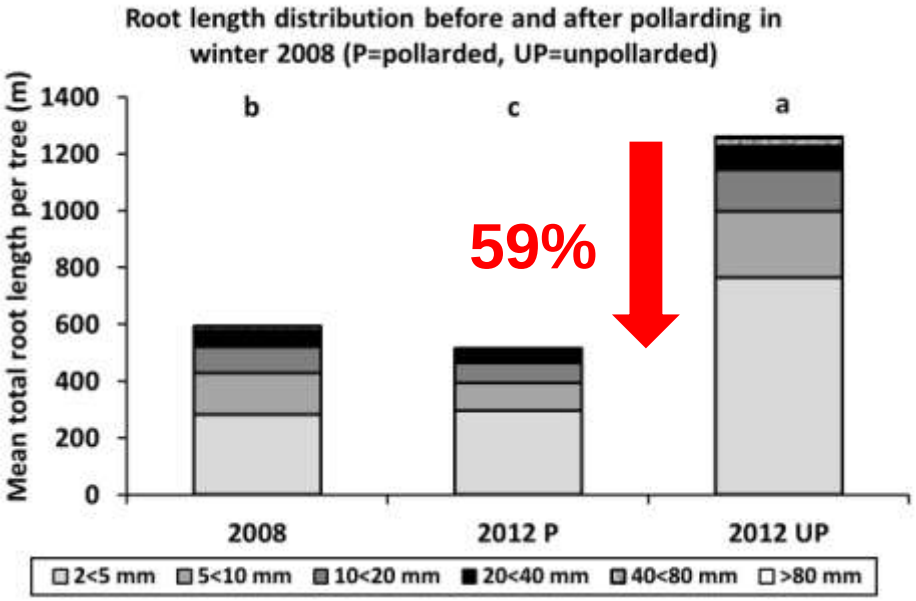


Mean total root mass and root length per tree



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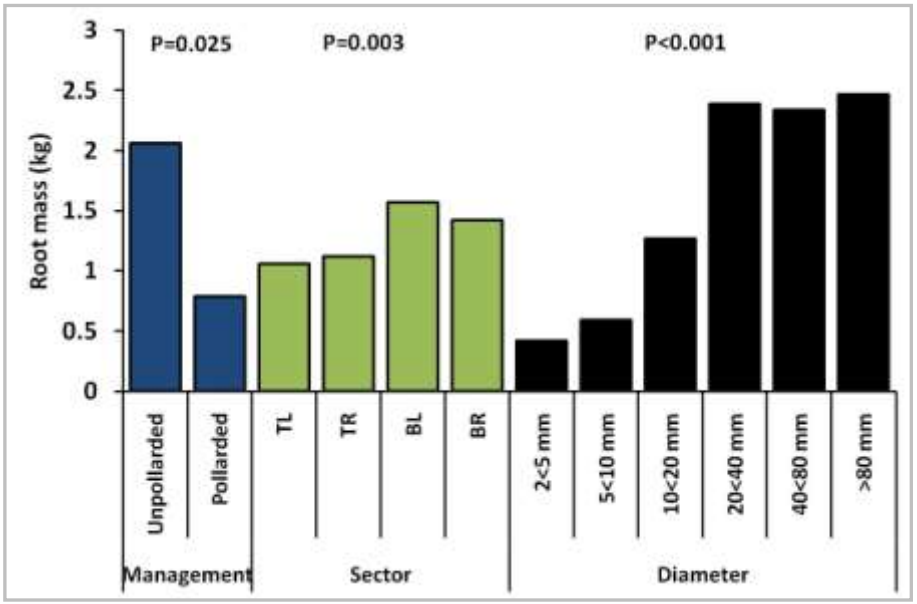
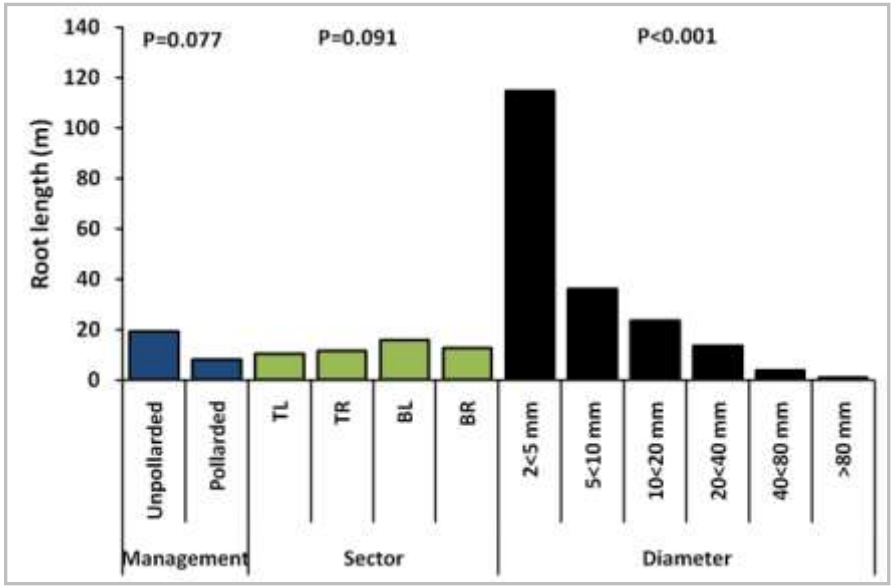
Effects of management, sector and diameter on mean root mass and root length in 2012





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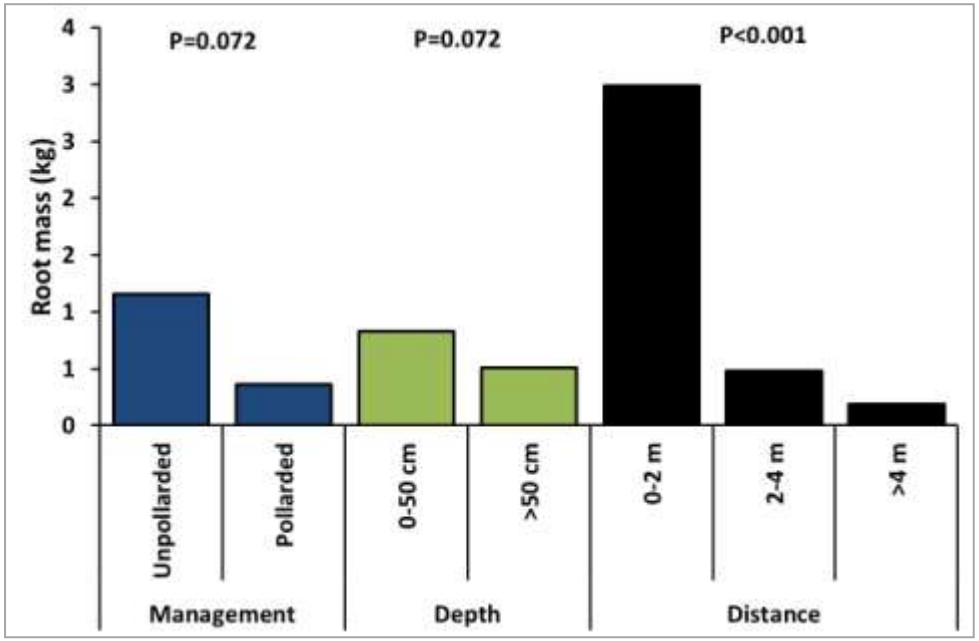
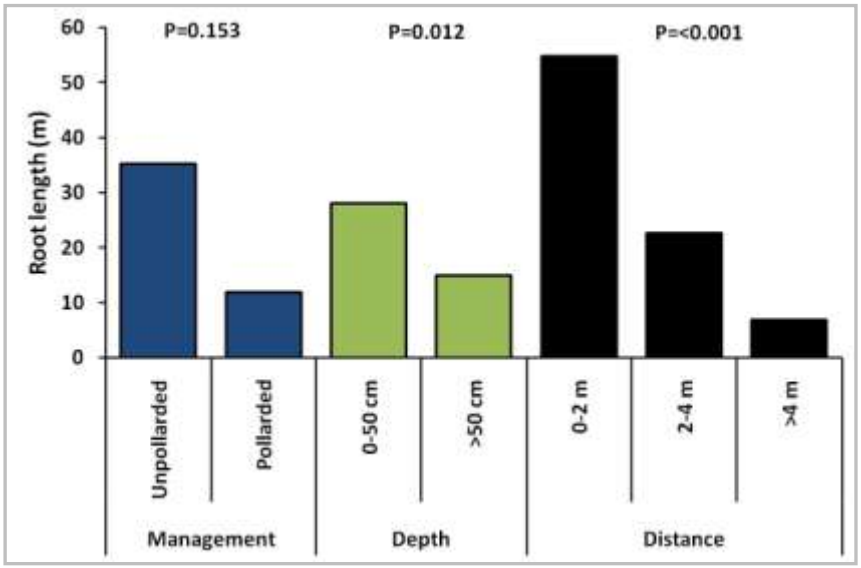
Effects of management, depth and distance on mean root mass and root length in 2012





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Conclusions

1. **Four years after pollarding, root mass and root length of young 'Veronese' poplar trees were 60% less than unpollarded trees**
2. **Root asymmetry was detected (downslope > upslope)**
3. **Roots > 20 mm diameter comprised 75% of total root mass**
4. **Roots 2<5 mm diameter contributed 60% of total root length**
5. **There was a dramatic decrease in root mass and root length with distance from trees and with depth**

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Trial: Work to completion in 2016

- **Unpollarded trees pollarded in winter 2012 (compare first pollarded 8 yr (2008) vs. 12 yr (2012))**
- **Pasture and soil water measurements**
- **Micro-topography characterisation**
- **Annual above-ground tree measurements**
- **Whole-tree excavations in autumn 2016**

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Implications

- **With pollarding, trees may need to be spaced closer together to achieve similar levels of slope stabilisation**
- **Closer spacing will increase extent of shading (w/o pollarding)**
- **Issue: Variation between species/clones…**

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We did it!

And a few of us are keen for more .....

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Sustainable Land Use Research Initiative