Managing wide-spaced young poplars by pollarding - impacts

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Outline

• Wide-spaced trees and their challenges
• Management options
• Trial involving pollarded poplars
• Measurements and key results
• Conclusions
Erosion of pastoral hill country is a key issue
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
- Rarely managed
Large trees: problems

• Up to 50% reduction in annual pasture production

• Liability to infrastructure, livestock

• Potential mess, clean up?
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??)
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??
Area of protection and root length – link?

First pollard ???
Pollarding hybrid poplar clone ‘Veronese’

- Trial in Manawatu, southern North Island
- Wide-spaced trees on N-facing slope of 15-25°, 10 trees selected
- 2 trees excavated before pollarding
- Trees aged 8 years (first pollarded in winter 2008)
North and east orientation and relative size of roots (1 of 2 trees before pollarding in 2008)

Prevailing wind is from the west

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
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
Depths of root sampling: 0-50 cm; >50 cm

Top left
Top right
Bottom left
Bottom right
Upslope

Autumn 2012 - excavation
Above-ground responses
Mean total root mass and root length per tree

65%}

59%
Effects of management, sector and diameter on mean root mass and root length in 2012
Effects of management, depth and distance on mean root mass and root length in 2012
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
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
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...
We did it!

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