Plant & Food Research
Rangahau Ahumāra Kai

RESEARCH BRIEF 15

Pollarding wide-spaced poplar trees on pastoral hillslopes alters root development

Pollarding removes the canopy and temporarily reduces food supply to the roots

Pollarding is a management tool for controlling tree height with potential to enhance understorey pasture growth without severely compromising erosion control functions. However, if pollarding reduces the rate and extent of root development then pollarding could reduce tree effectiveness for soil conservation. We hypothesised that 1) pollarding will reduce the mass, length and extension of the root system and 2) that pollarding at the younger age of 8 years will be more detrimental to the root system than pollarding at 12 years when the root system is more developed.

Three treatments, unpollarded (UP), pollarded at ages 8 years (P08), and 12 years (P12) were imposed on wide-spaced *Populus x euramericana* 'Veronese' trees growing on a pastoral hillslope. Tree root systems were excavated at 8 (2 trees), 12 (4 trees) and 16 (4 trees) years and root length (RL), root mass (RM) and root spread of coarse roots determined. A model was developed to predict the effect of pollarding of *Populus x euramericana* 'Veronese' on coarse root production. Pollarding at ~20 cm diameter at breast height (DBH) when the trees were aged eight years reduced DBH growth in the following

Several different poplar clones in Spring on a rural property

four years by 24 percent, RL by 60 percent and RM by 66 percent (Figure 1). Trees in the PO8 treatment had significantly less RL and RM below 0.5 m depth within 2 m of the trunk than trees in the UP12 and P12 treatments. At 16 years, P08 trees had reached a comparable DBH with P12 trees, and while RM was 28 percent less for P08 trees, RL was 13 percent greater and specific root length was 58 percent greater. Trees pollarded either at DBH ~ 20 cm (8 years) or at a DBH of ~28 cm (12 years) did not differ significantly in RL or RM at age 16 years. At four years, and eight years, following pollarding, RL and RM for the pollarded trees were 35 percent and 53 percent less respectively, and 32 percent and 68 percent respectively, than RL and RM modelled for UP trees of the same DBH. The model suggests pollarding trees may promote RL at the expense of RM thereby enhancing soil-root contact.

Pasture cages were used to determine pasture production in open pasture and in pasture under the pollarded tree canopy. In high herbage production years, pasture production was higher in the open than under the canopy, while in low production years pasture production was not significantly different among the treatments.

Pollarding of poplars reduces the growth rate of roots

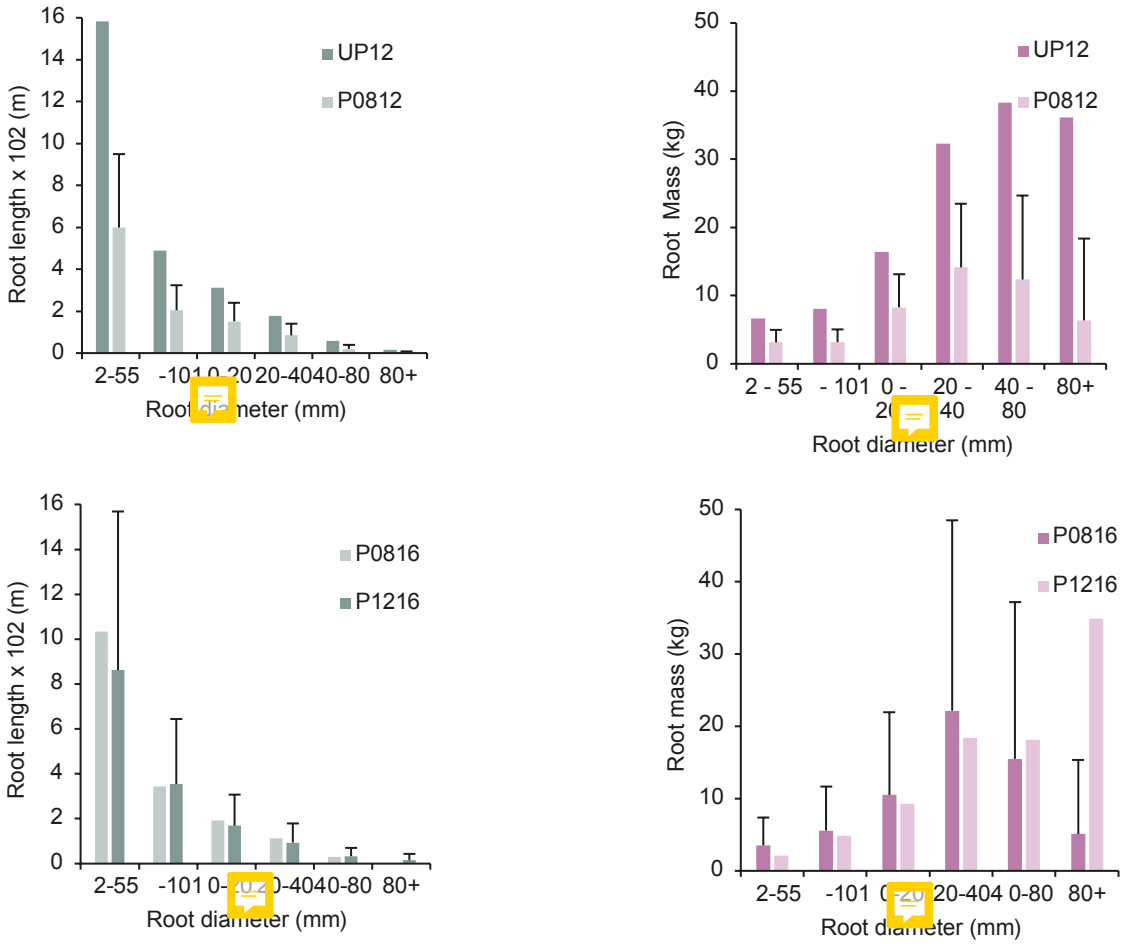

Figure 1. Mean a) root length (m) and b) root mass (kg) for 12-year-old trees unpollarded (UP12; N=2) or pollarded at 8 years (P0812; n=2); c) root length (m) and d) root mass (kg) for 16-year-old trees pollarded at 8 years (P0816; n=2) or pollarded at 12 years (P1216; n=2) for six diameter classes. Error bars are LSDs (5% level) for comparing treatments within each root diameter class.

Key messages:

- Pollarding significantly reduced coarse root length and mass in 'Veronese' poplar.
- Root growth was similar for pollarded trees aged 16 years, whether pollarded at age 8 or 12 years.
- The practice of pollarding at the earlier age is likely to carry less risk for the operator.
- Slower root growth following pollarding will reduce tree effectiveness in reducing erosion.
- Early pollarding may promote root extension, and a reduction of buttressing roots.
- If poplars are to be managed by pollarding they should be planted at closer spacing to achieve effectiveness at the same age.
- Since regular pollarding reduces canopy width, canopy width is likely to be a poor proxy for carbon sequestration in pollarded poplars.
- Shading from pollarded trees reduced pasture production in high production years only.
- Pruning to produce a timber option we consider a better management option for poplars.

Pollarded poplars or willows in wetter areas recover quicker following pollarding, dry out the soil and provide a rich fodder supply

A series of videos on tree management by pollarding and pruning can be viewed by visiting **poplarandwillow.org.nz** or by using or clicking on the links here.

bit.ly/poplars-willows-videos

For more information

This is one in a series of research briefs about Poplars and Willows that can be found at poplarandwillow.org.nz

Prepared by The New Zealand Institute for Plant and Food Research Limited.

Contact

Ian McIvor, Plant & Food Research
ian.mcivor@plantandfood.co.nz

Trevor Jones, Plant & Food Research
trevor.jones@plantandfood.co.nz

CB0-1970

Te Uru Rākau With funding support from New Zealand Forest Service

THE NEW ZEALAND POPLAR & WILLOW RESEARCH TRUST