



THE NEW ZEALAND

POPLAR & WILLOW RESEARCH TRUST

Conservation trees add value in erosion prone hill country

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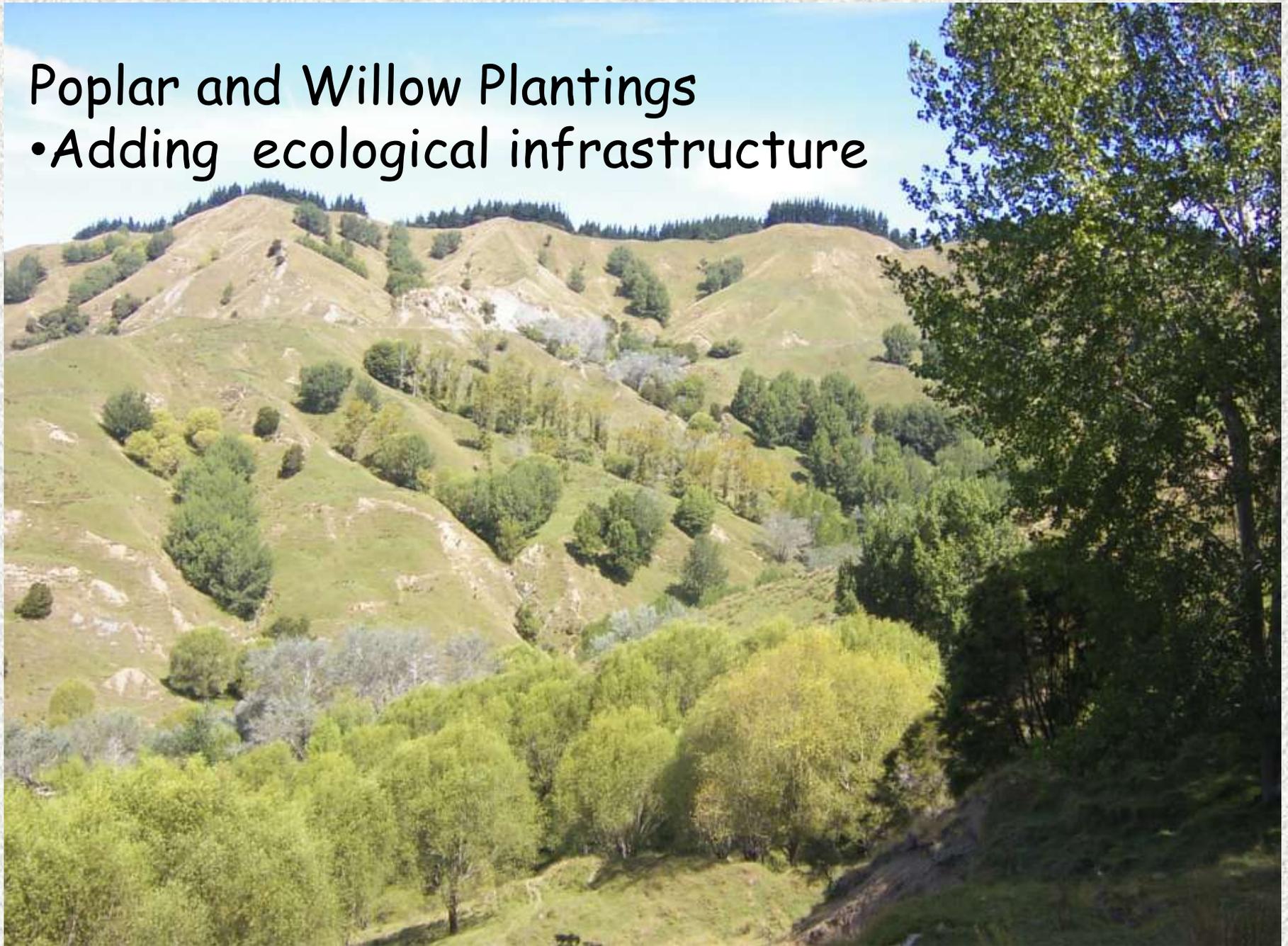
+ other contributions

www.poplarandwillow.org.nz



Poplar and Willow Plantings

- Adding ecological infrastructure



Reduce erosion, loss of natural capital

shade

Summer
moisture
retention

Wood
products

Fodder

Increased
Soil C and N

shelter

Vista
Amenity

Flood
mitigation

Protection of
streams

All add value and improve returns

Benefits of poplar

Fodder.

- Prunings.

- ◆ Poplar leaves 65% in vitro digestibility of DM, 10 MJME/kgDM, constitute a feed of moderate quality.

- Natural leaf fall.

- ◆ Leaf fall of 3.1 t DM/ha from widely spaced (37 stems/ha), mature (>30 years) poplars.
- ◆ Poplar leaves less acceptable to stock when shed than when removed fresh.
- ◆ Rapid removal of leaf fall by grazing in the autumn limits shading effect of leaf litter on pasture growth.



Summer prunings provide extra feed for stock.
Photo - Deric Charlton, AgResearch.

Benefits of poplar Animal Welfare.

- **Shade.**

- ◆ 'On a moderately hot cloudless day (1/3/98) temperature at 1.00 pm was reduced from 39^o C in the open to 26^o C under my poplars'.

- **Shelter.**

- ◆ Wind force reduction even through a leafless canopy of branches is likely to be significant..

- **Animal behaviour.**

- ◆ Aggressive behaviour patterns of bulls may be reduced.



Angus cow response to Heat stress in New Zealand

- KEITH BETTERIDGE ET AL.
- BRENDEN REIDY - FARMER
- AGRESEARCH GRASSLANDS
- PALMERSTON NORTH
- NEW ZEALAND

This behavioural trial of beef cows during summer with / without shade was on a farm under a normal grazing regime.



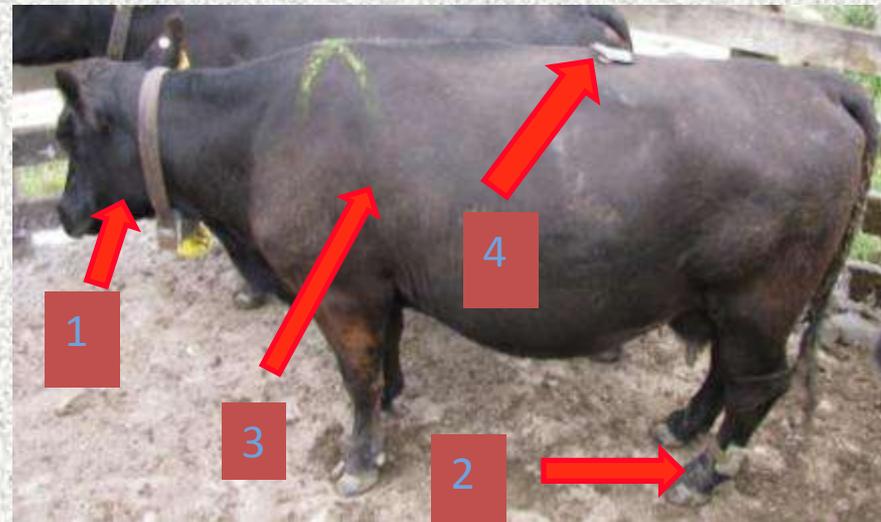
Shade



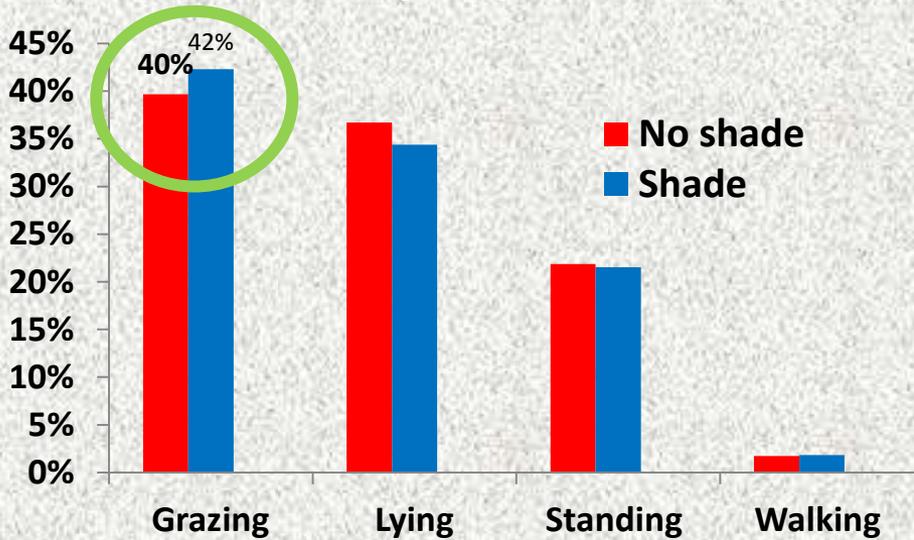
No shade

Measurements

GPS	15 min. on 15 min. off; log position @>3 m or after 5 min	1
Motion sensor	grazing, standing, lying, walking	2
Rumen sensor	pH, temperature (drinking)	3
Skin temperature	stress	4
Surveillance camera	- sensor validation - group behaviours	
Weather	- full weather stations - top and bottom of hill - temperature in and out of shade	



Average time doing activities when max. daily temp =>25°C, All day

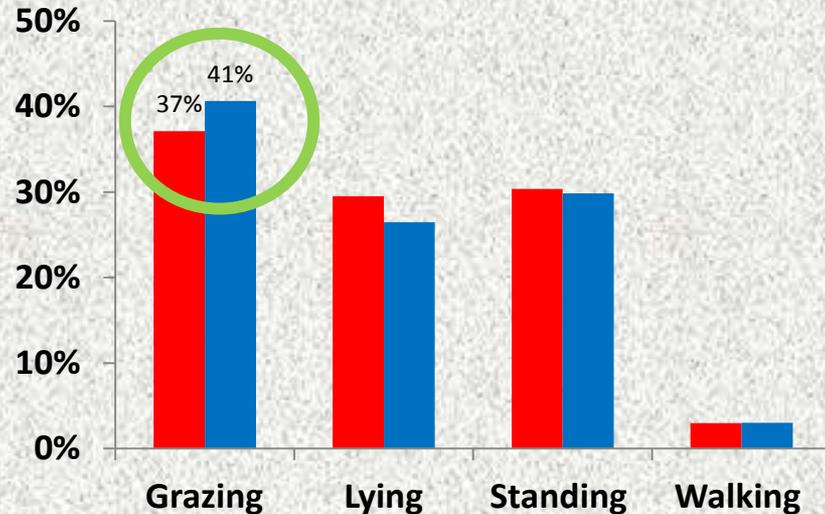


Cows with shade grazed longer mainly in afternoon

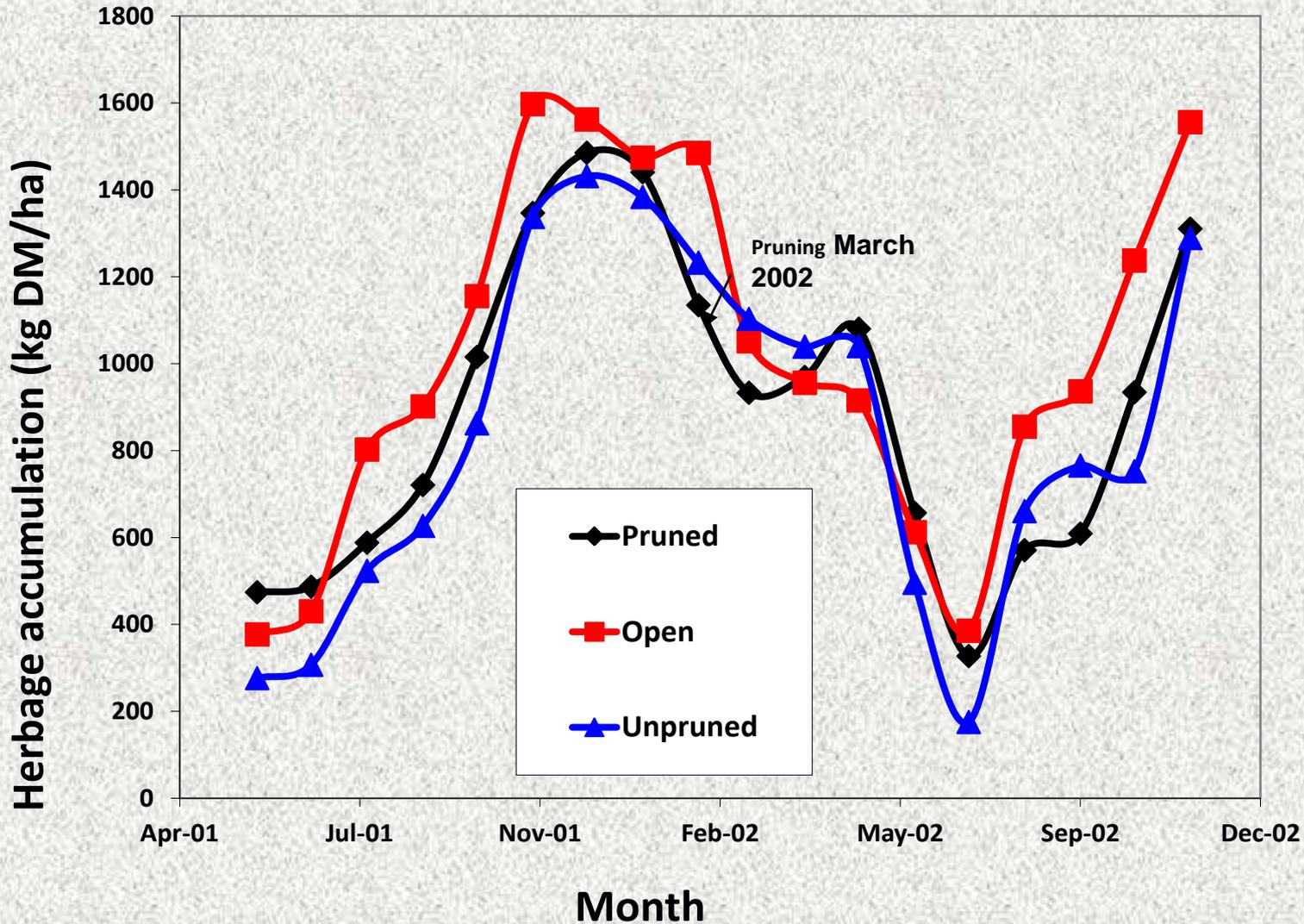
Shade cows were on average 2.4°C cooler than non-shade cows between 10.00 and 16.00 hrs

There was greater weight gain in shaded cows though the trial was short

Average time doing activities when max. daily temp. =>25°C, from 10am to 4 pm



Poplars and pasture production



7 yr old 'Veronese' poplar at 8 m x 8 m spacing.

- Pruning poplar to 40% leaf area increased radiation to the pasture under the trees from 66% to 77% of radiation available to open pasture
- Wider spacing will increase these % radiation values and enhance pasture production.
- Assuming 30% canopy cover (Emissions Trading Scheme requirement) overall annual pasture production would decrease from 100% (open pasture) to 93-89% in a poplar-pasture system (less reduction with pruned trees).
- These figures are based on poplar trees in full leaf which is reached in midsummer. Most hybrid poplars do not come into leaf till mid-October.
- Surplus trees should be removed to improve pasture production.

Benefits of poplar

Soils and pastures

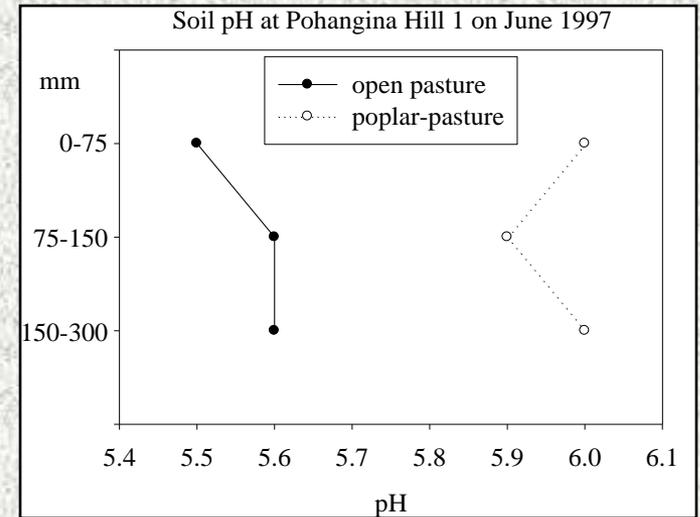
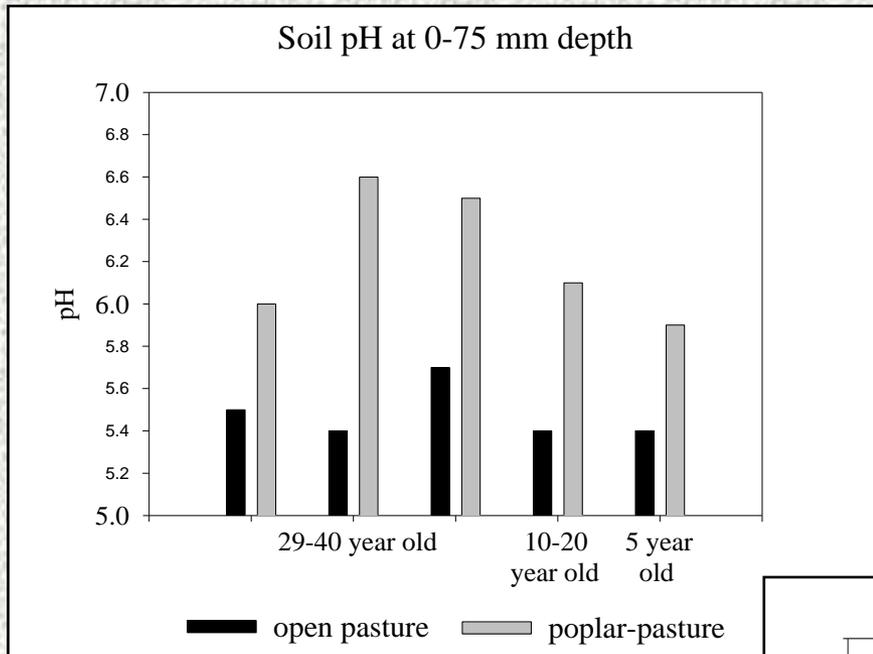
Trees entice animals to new camp areas

Trees distribute the critical source areas for faecal nutrients and bacterial contaminants away from riparian margins

Faecal nutrients distributed across hill slopes will reduce the amount of rank pasture and improve slope grazing

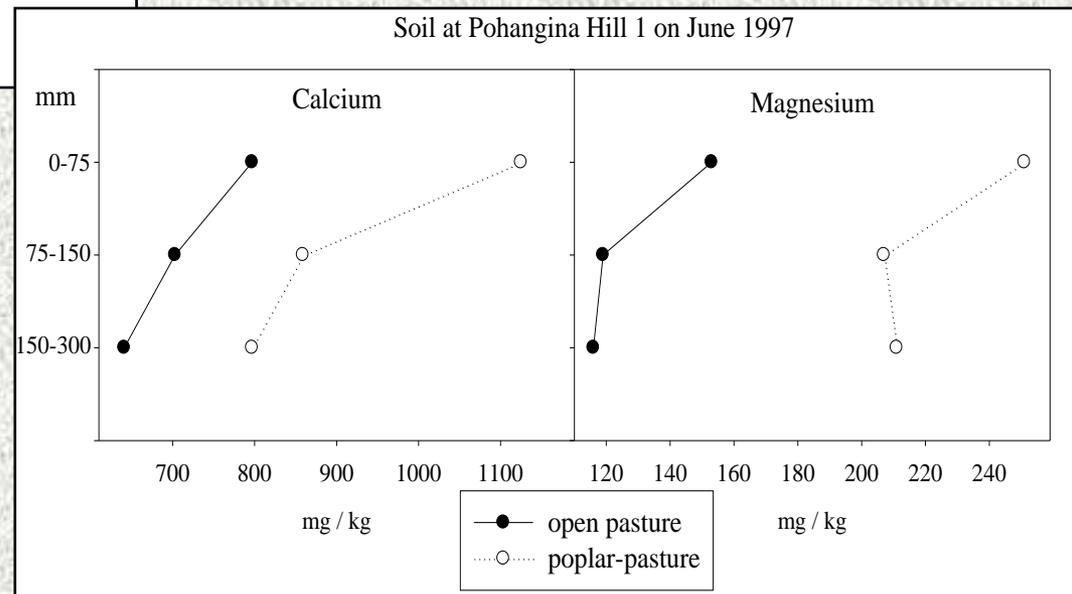
How this redistribution influences stock health (worm counts) is uncertain

Soil pH and exchangeable cations

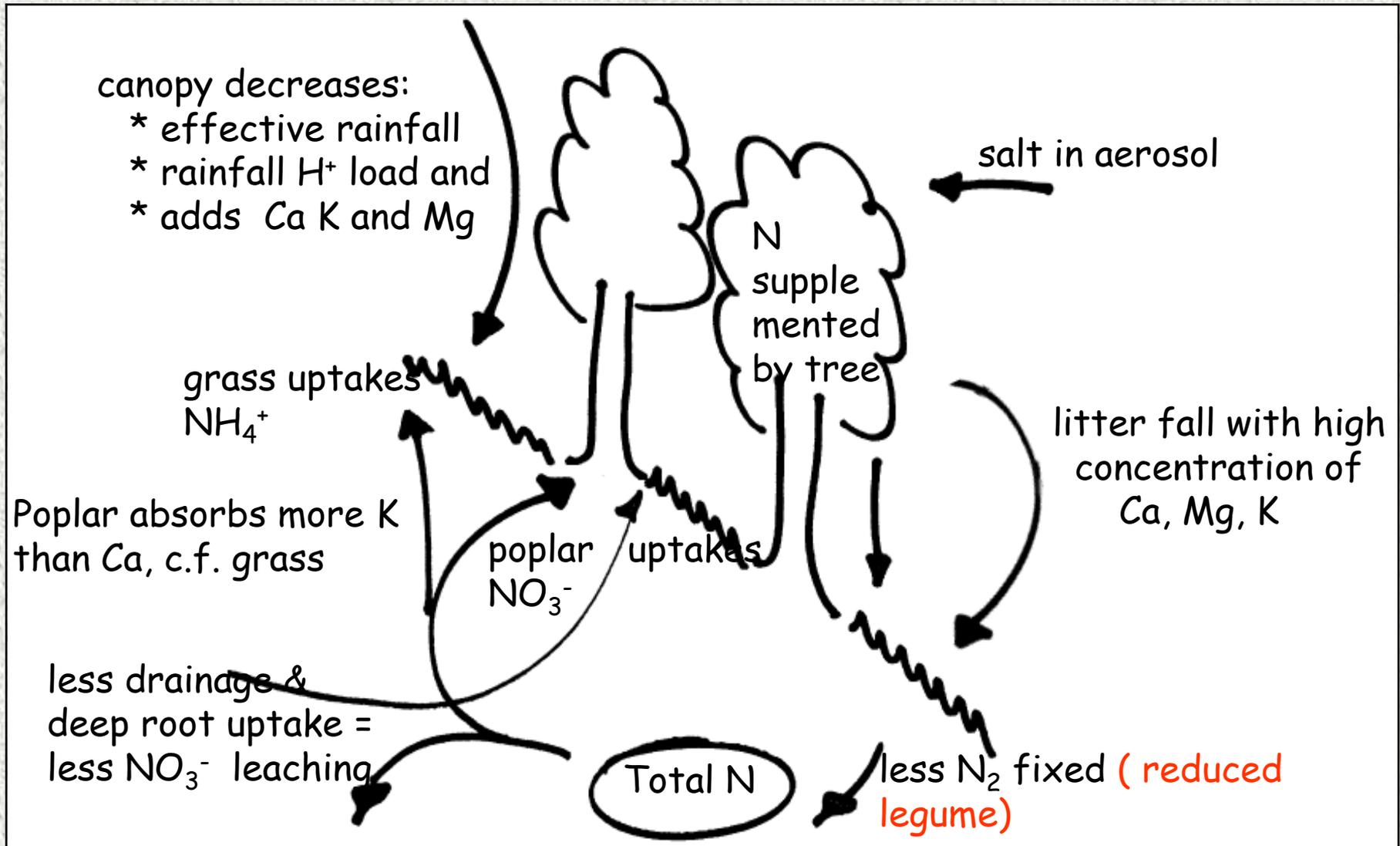


In the poplar-pasture system

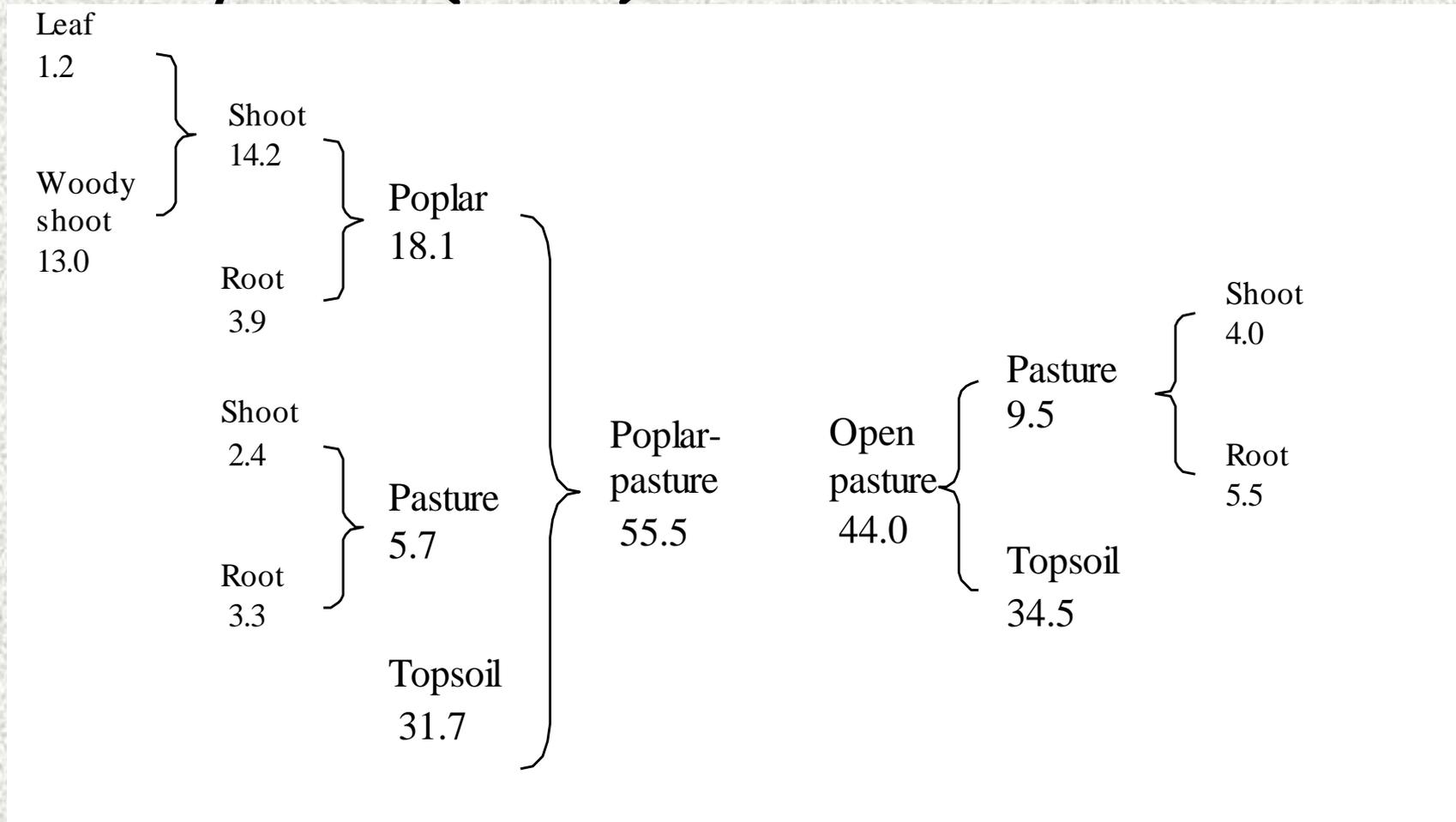
- pH increased
- Availability of exchangeable cations increased



Mechanisms for pH increase



Carbon pools in poplar pasture system (t/ha) (Guevara-Escobar et al. 2002)



Gains in the carbon pools are in the trees with reductions in the soil and pasture pools. Overall effect is a gain in the system carbon pool

Benefits of poplar

- Tree planting, even if planted for non-economic reasons, will add to capital values
- The economic gains are from erosion prevention 1. retention of topsoil on the slope and protection of soil on flats, 2. reduction in infrastructure repairs following storm damage, 3. increased summer grazing and weight gain
- Economic losses are from reduction in pasture quantity and quality, and reduced carrying capacity
- Farm income following tree planting does not necessarily decrease despite the reduction in pasture production.
- Every \$1 spent on soil conservation is worth \$68 of net present value (NPV) of avoided infrastructure costs and avoided ecosystem services loss (Dominati & Mackay 2013 - see presentation)



Does a vista confer marketing advantages?



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