

The New Zealand Institute for Plant & Food Research Limited

Plant & Food
RESEARCH

RANGAHAU AHUMĀRA KAI



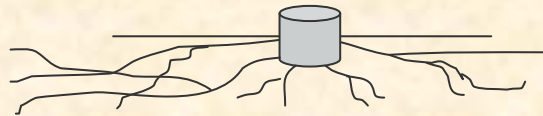
Poplars stabilising soil on slopes

Prepared by:

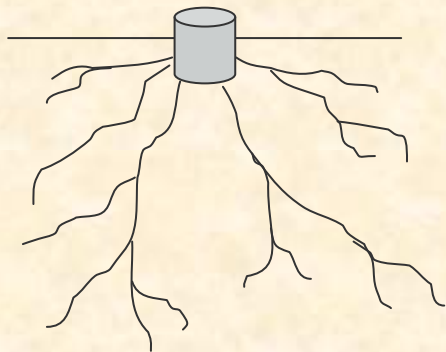
Ian McIvor

Root architecture

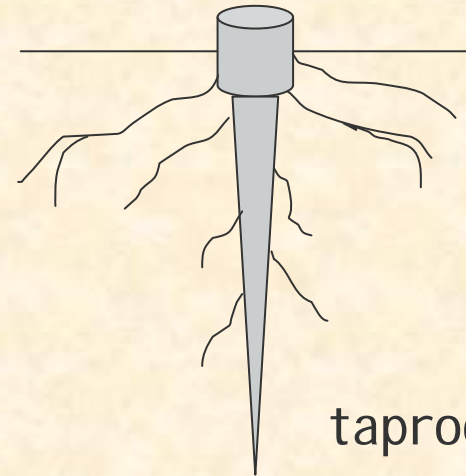
Nature of structure:



plateroot



heartroot

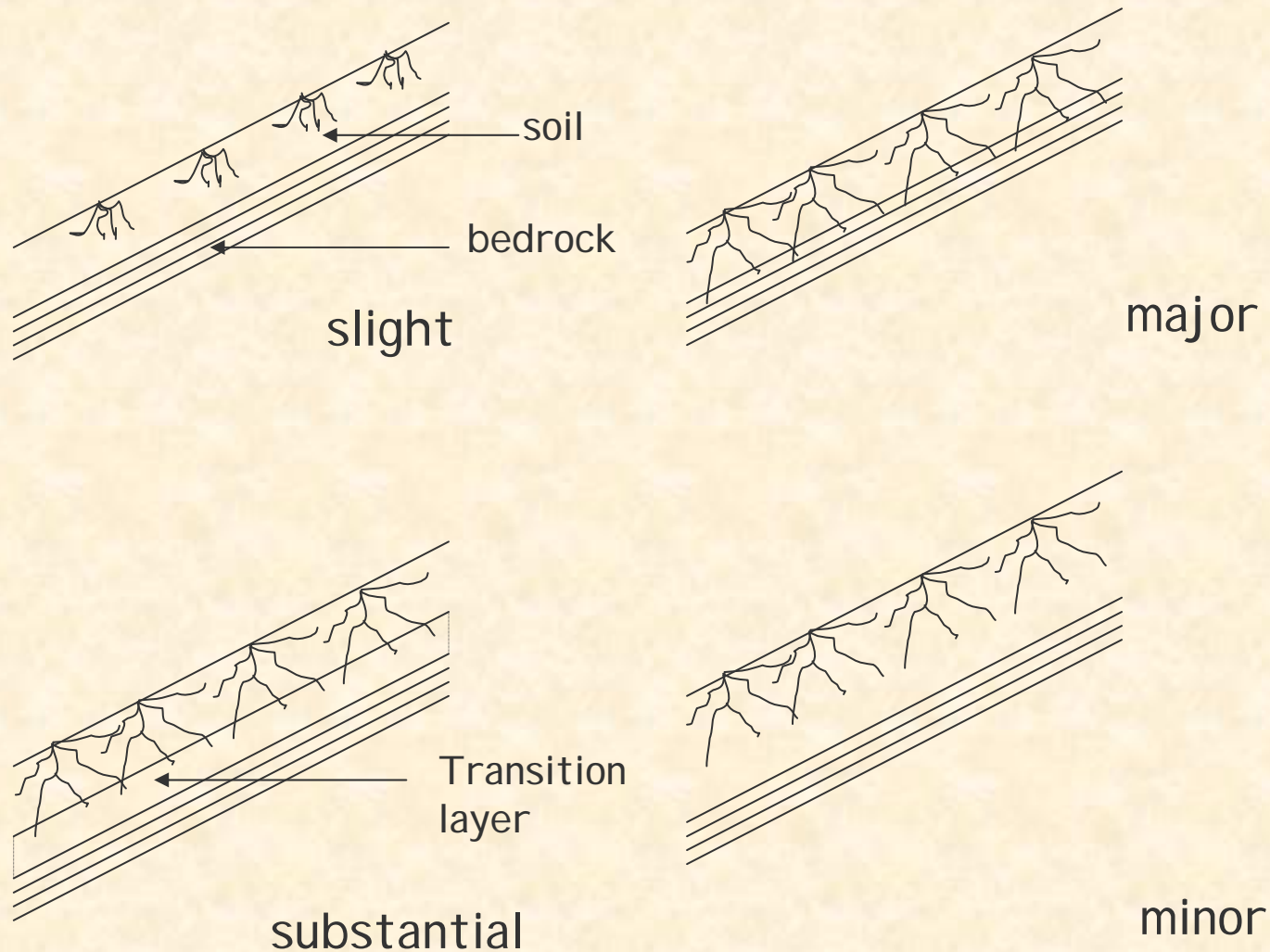


taproot

Types of roots

Lateral, vertical, sinker, coarse,
fine

How slope stratigraphy influences the stabilizing effect of roots against slope failure

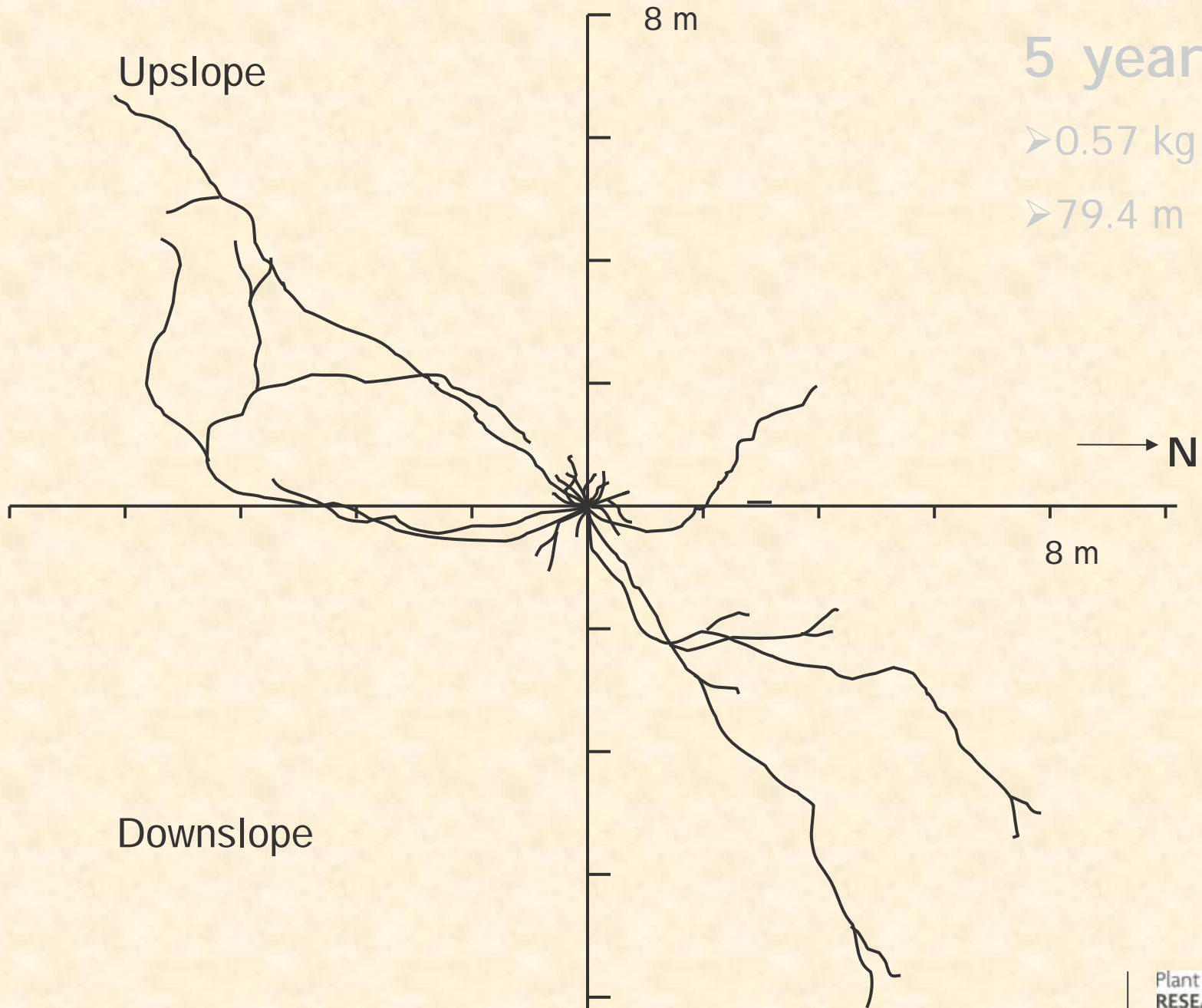


Factors affecting root development

- Plant genetics
- Competition
- Above ground stress

- Soil nutrients
- Water supply

- Soil bulk density
- Slope
- Soil depth
- Nature of the bedrock



5 years

➤ 0.57 kg

➤ 79.4 m

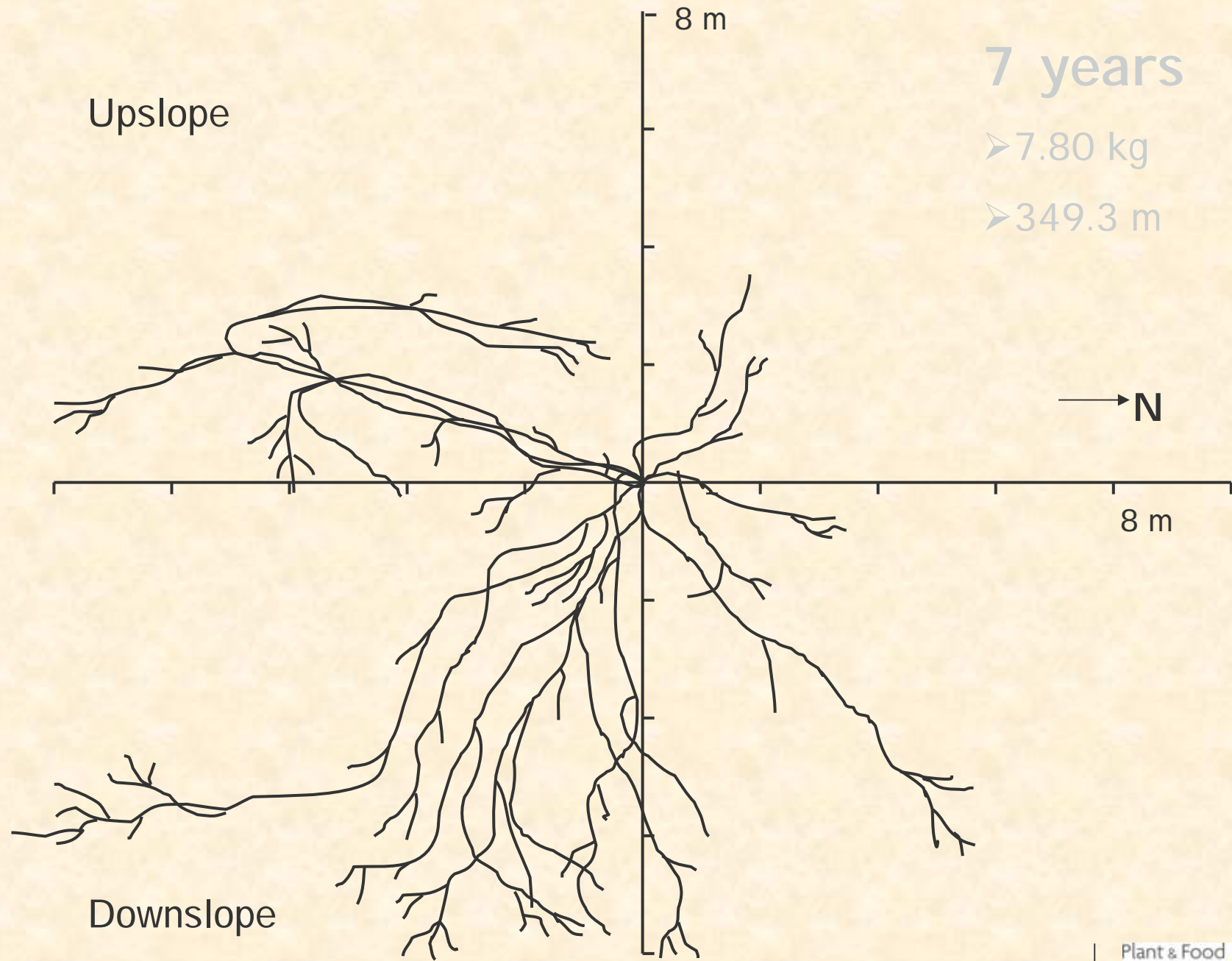
→ N

8 m

8 m

Upslope

Downslope



7 years

➤ 7.80 kg

➤ 349.3 m

Upslope

Downslope

8 m

8 m

N

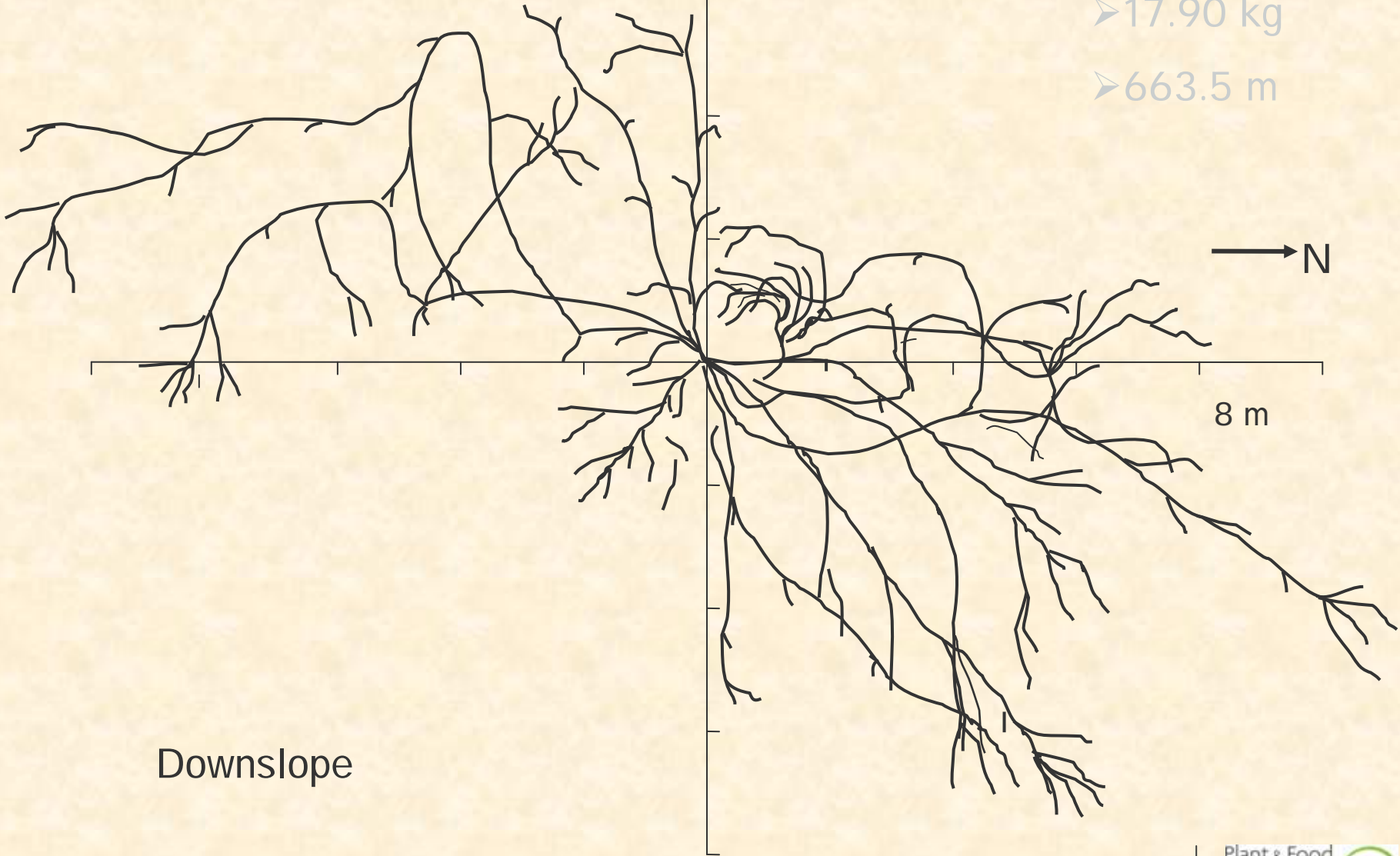
Upslope

8 m

9.5 years

▶ 17.90 kg

▶ 663.5 m

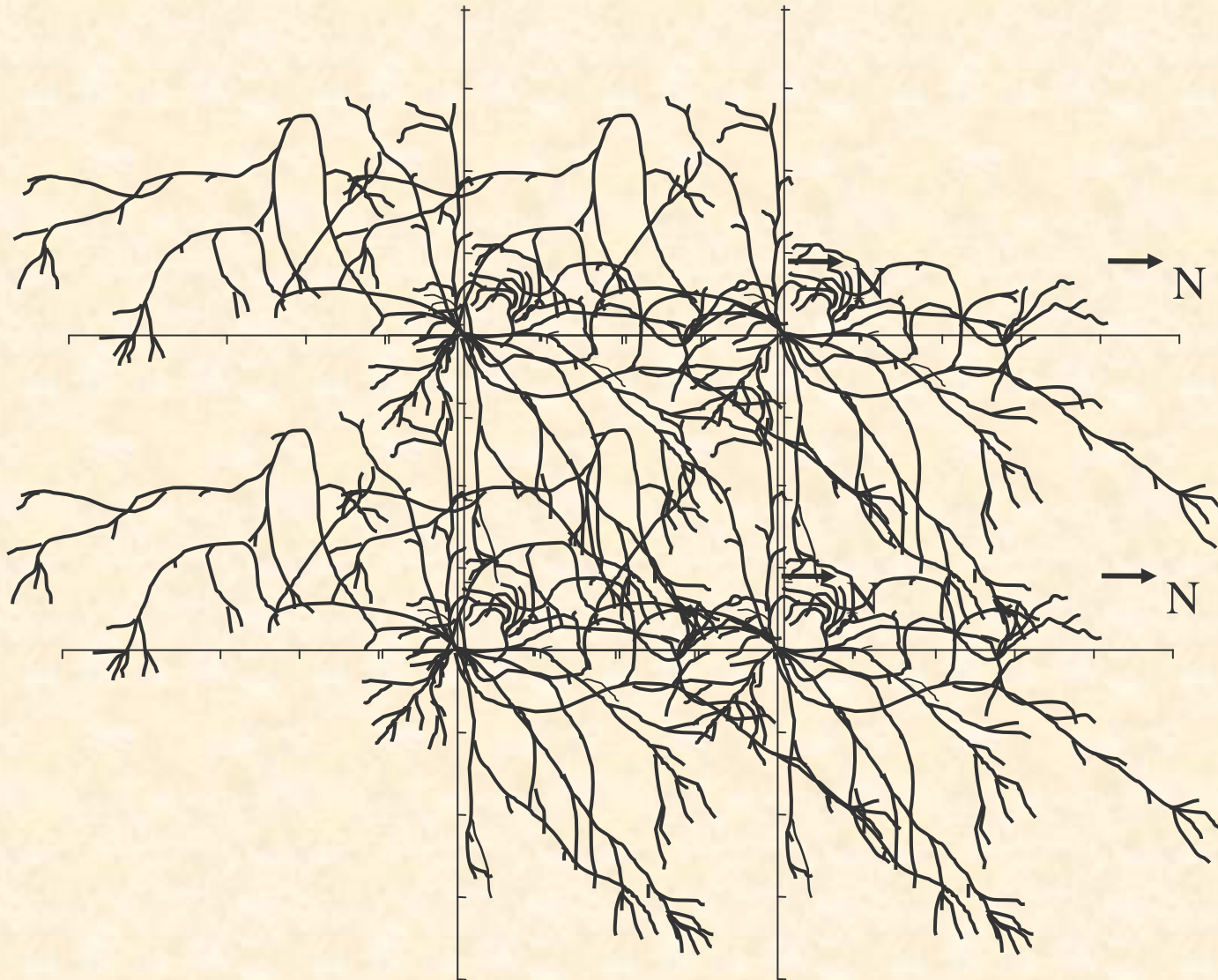


Downslope

8 m

→ N

8 m x 8 m



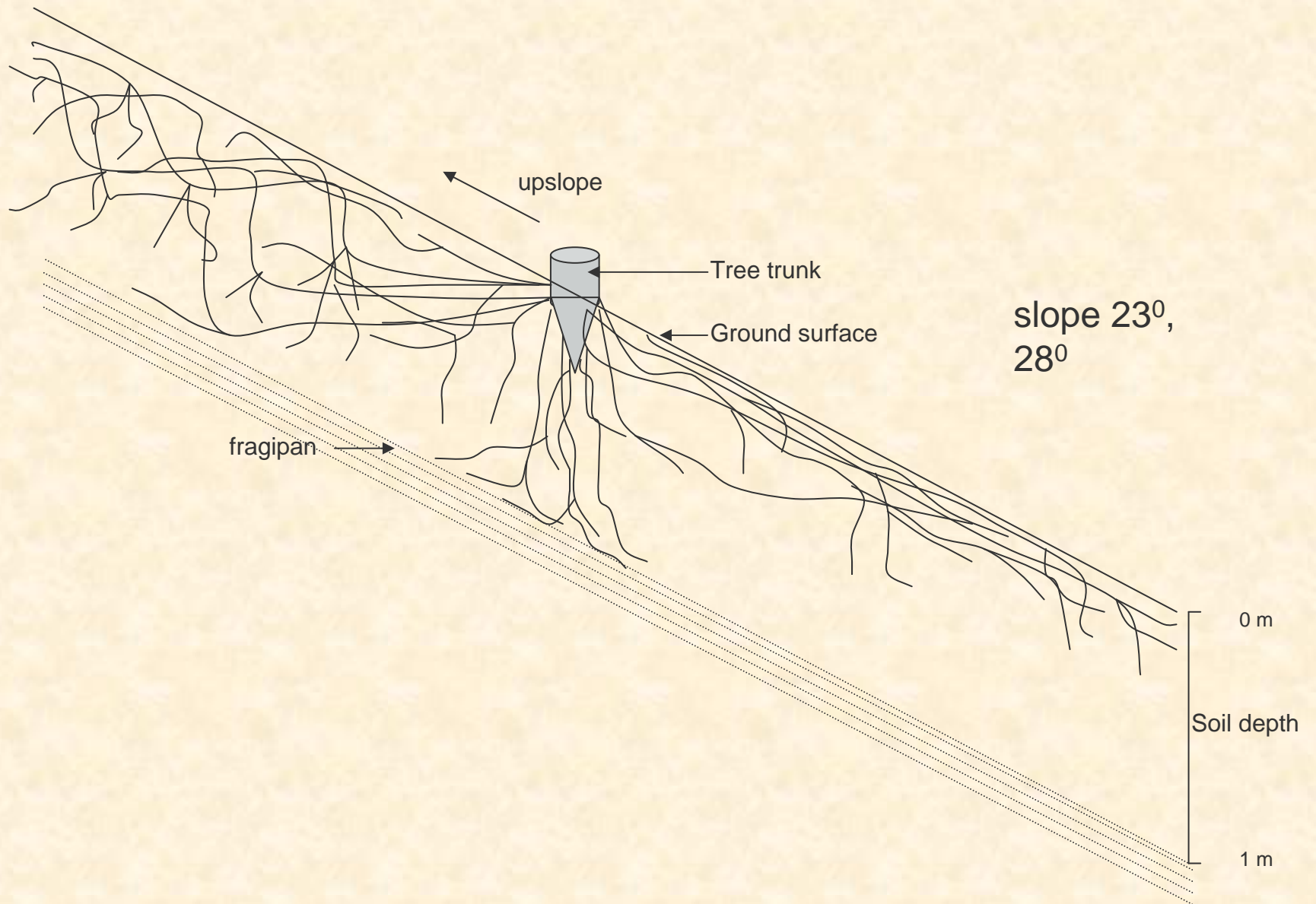
10 m x 10 m



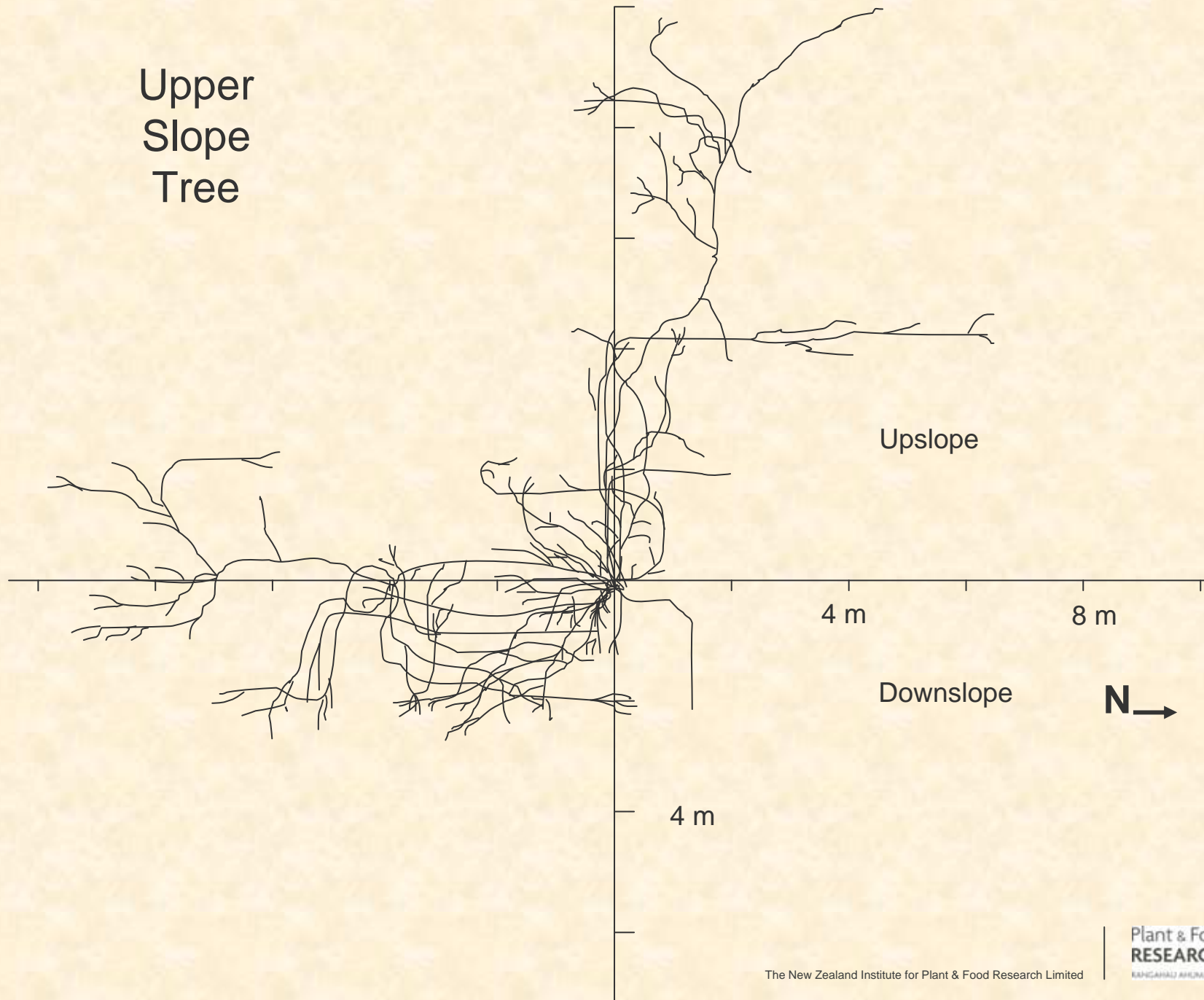
15 m x 15 m

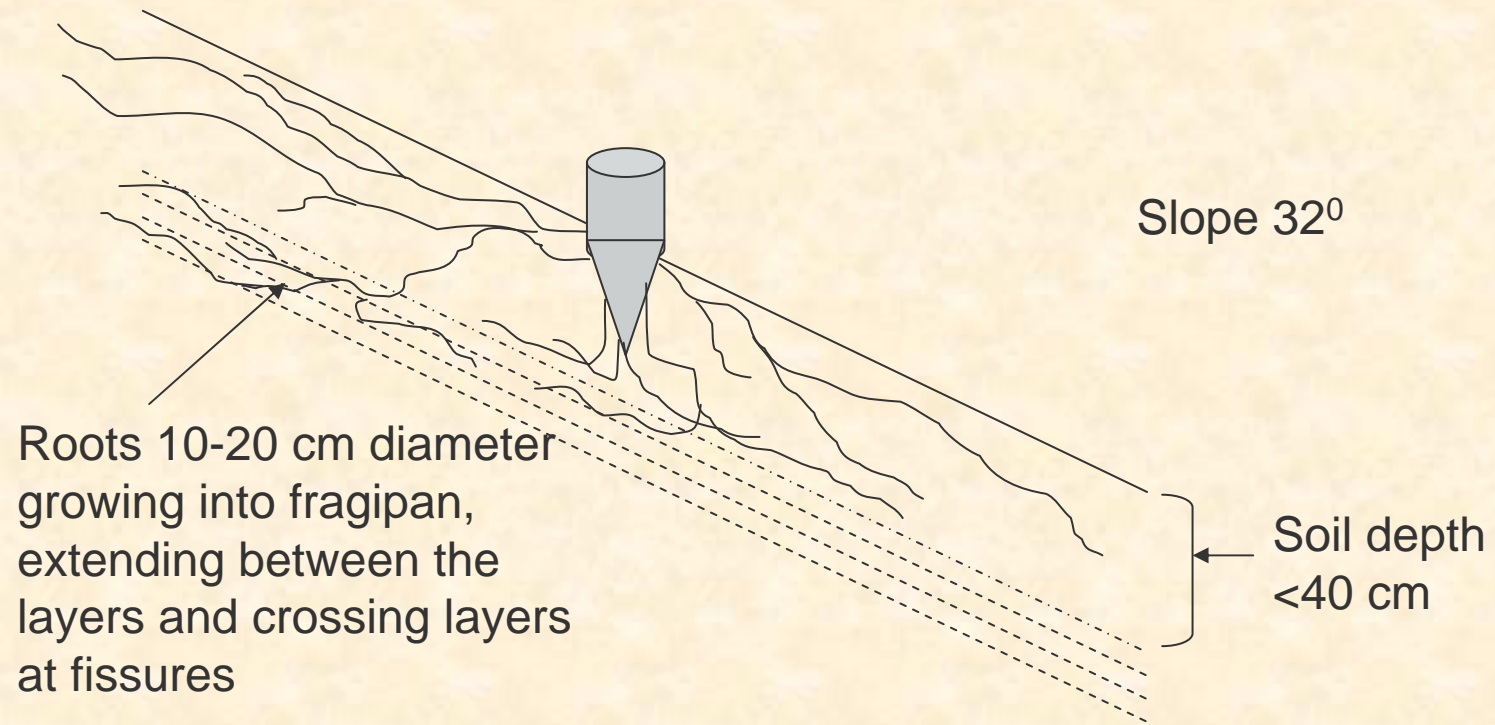






Upper Slope Tree



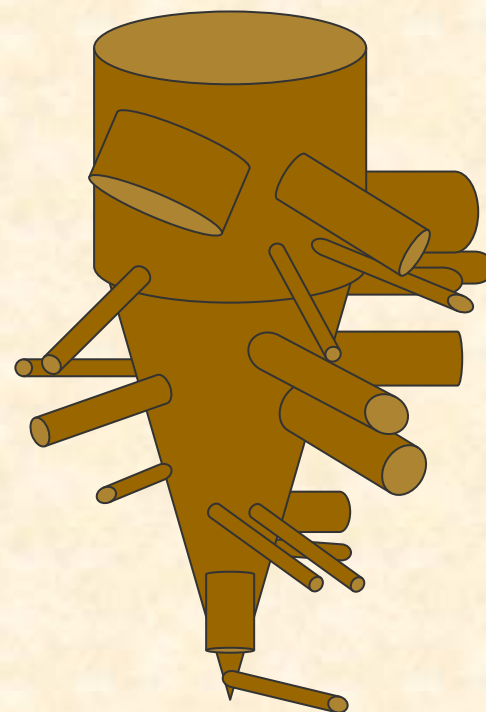
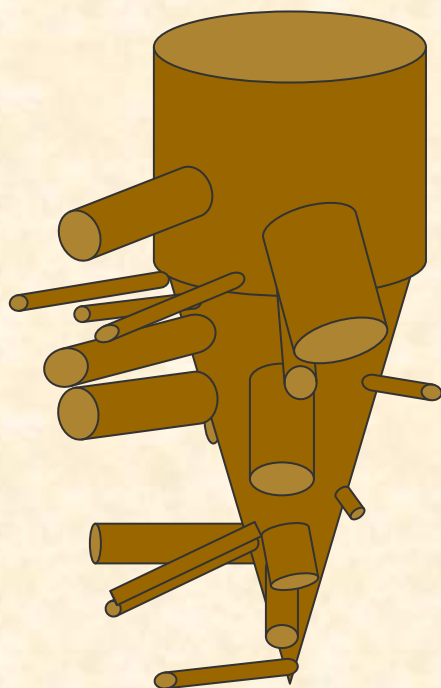




TREE 8 Carter Farm North and East orientation and relative size of roots

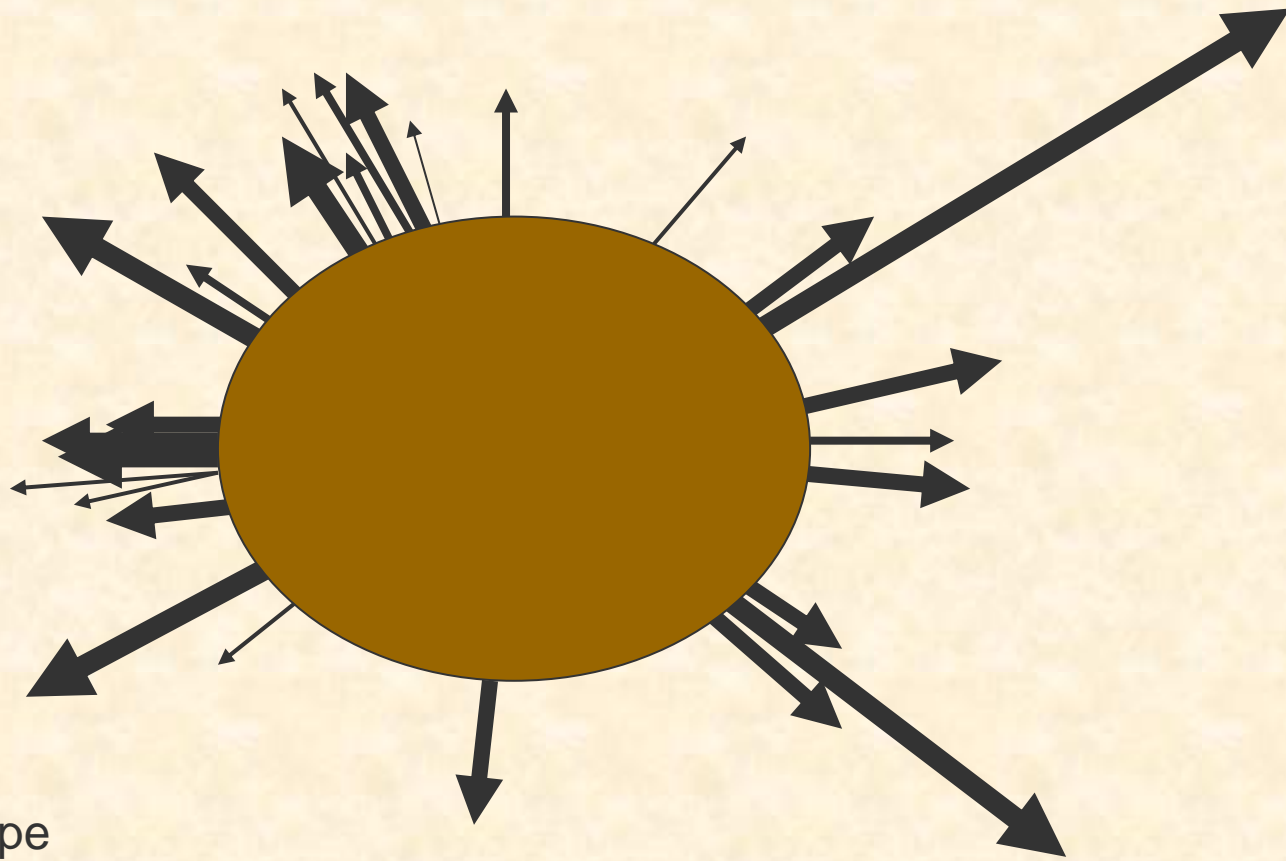
→ N

→ E






North-facing slope
Prevailing wind is from the west

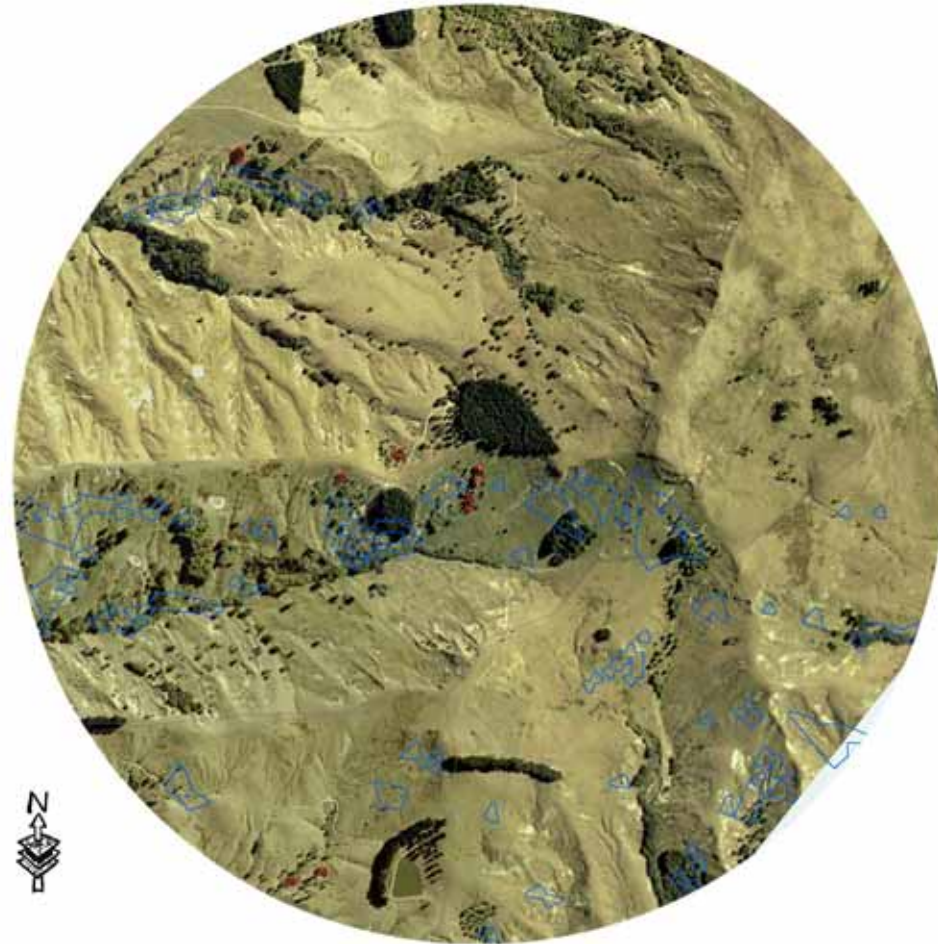
Tree 8 Root orientation off the crown



Root CS area ~ arrow font x arrow length

Site #61

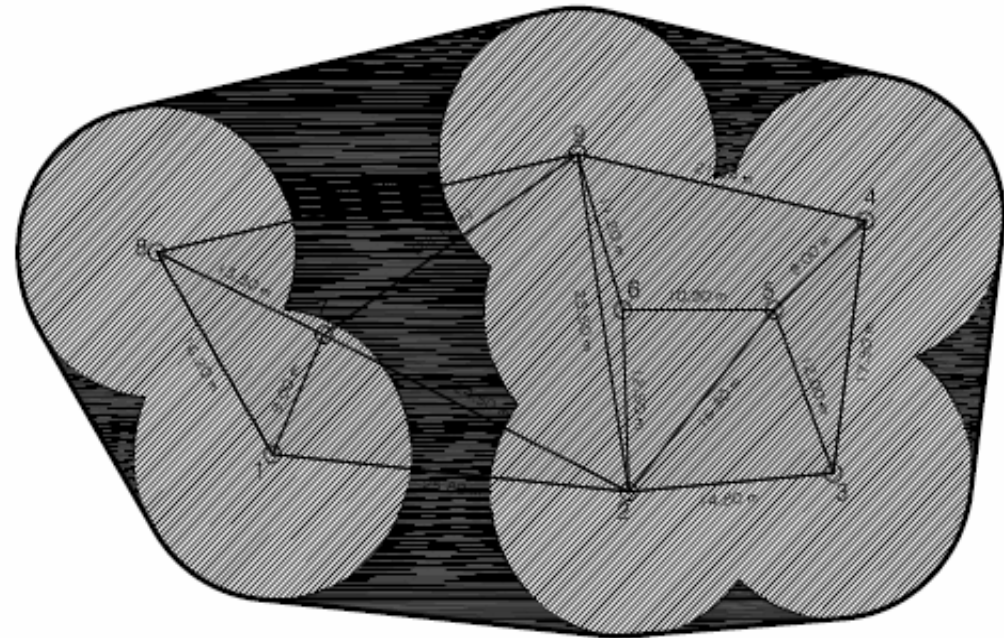
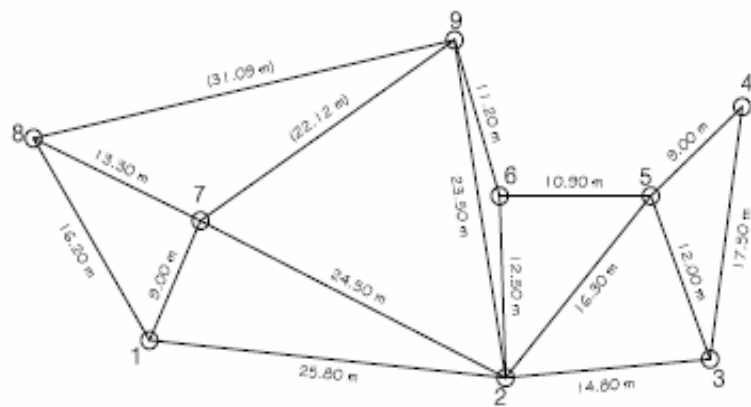
-  Areas that meet search criteria (generalised + 5m buffer)
-  Study sites
-  Farm boundaries



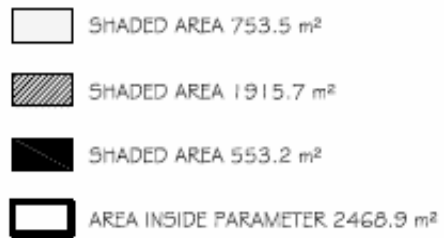
0 145 290 580 Meters

Aspect search is 45 degrees either side of the measured aspect (90 degree arc)
Slope search is one standard deviation either side of the measured slope average (average of tree slopes).

Search criteria
 $((\text{slope} \geq 23.78) \text{ AND } (\text{slope} \leq 27.28)) * ((\text{Aspect} \geq 135) \text{ AND } (\text{Aspect} \leq 225))$



SITE 9



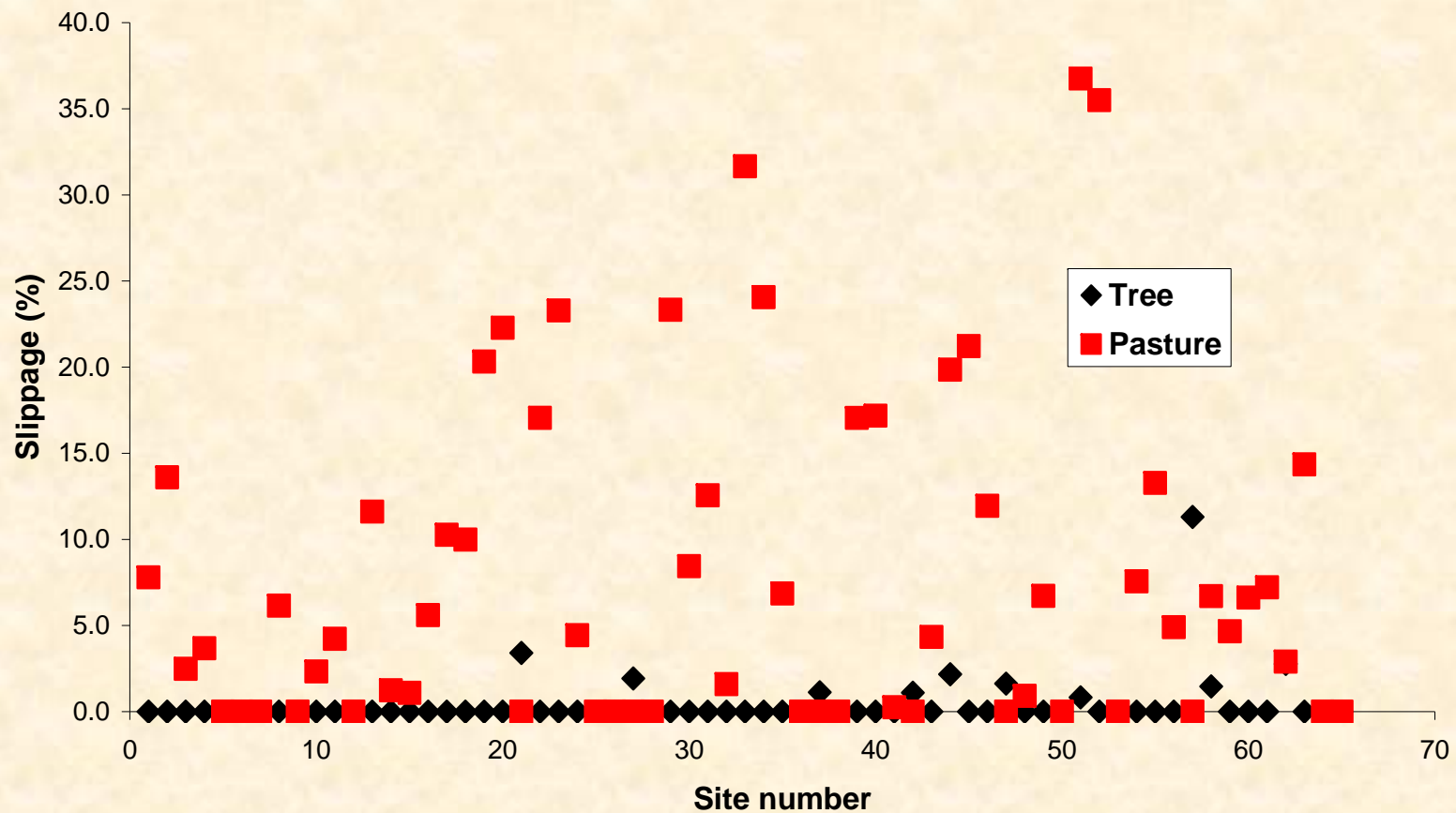
(TOTAL AREA INSIDE POLYGON BETWEEN CENTRE OF EACH TREE)

(TOTAL AREA OCCUPIED BY 10 m RADIUS OF TREES CIRCLES)

(AREA OF OUTER PARAMETER LESS THE AREA OF 10 m RADIUS TREE CIRCLES)

(AREA INSIDE OF THE MOST OUTER PARAMETER)

Extent of slippage (%) on tree and pasture sites at 65 sites in Manawatu and Wairarapa in winter 2007



Association between extent of slippage (%) and diameter at breast height (DBH; cm) for spaced trees growing at 65 sites in Manawatu and Wairarapa in winter 2007.

