CASE STUDY - AGROFORESTRY

6. Trees reduce paddock water loss (evaporation)

Formosa, Cressy - The establishment of trees can bring multiple benefits including a reduction in windspeed across the paddock which translates to reduced potential evapotranspiration.

AT A GLANCE

Owner	**Family owned**
Property name	**Formosa**
Location	**Cressy, Northern Tasmania**
Property size	**25 hectare paddock**
Enterprise	**Dryland and irrigated mixed farming**
Rainfall	**592mm**
Soil type	**Brown chromosol**
Forested area	**1ha**

KEY POINTS

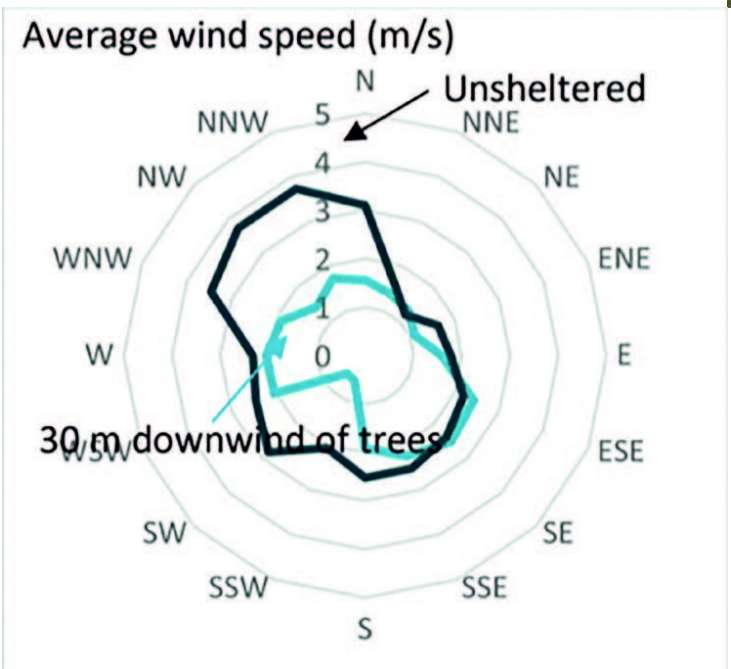
- While trees compete for water directly adjacent to them, the sheltered zone extends for at least 20 tree heights into the paddock (300m in the case of 15m tall trees).
- A belt of trees every 500m can reduce average windspeed by 30% across the land surface.
- Reduced windspeed can reduce potential evapotranspiration by 15-20% across the full 300m sheltered zone.
- Potential water saved over a year at Formosa was equivalent to 240mm or 35.9ML of saved potential ET across the paddock.

Trees reduce paddock water loss (evaporation)

Introduction

Agroforestry is the integration of trees into agricultural enterprises. The establishment of trees can bring multiple benefits including a reduction in windspeed across the paddock which translates to reduced potential evapotranspiration.

- A 5-row belt of Pinus radiata occupies 1ha along the western paddock edge. The remainder of the paddock has 24ha of pasture.
- The trees are 15m tall with the shelter effect extending to around 300m into the paddock.
- Wind speed monitors and evaporimeters were established along a transect away from the trees to assess the impact of the trees on the entire area of the sheltered zone.



Windspeed is reduced by the trees

Windspeed reduced by 20-30% across the full 300m transect to the eastern (leeward) side of the belt.

50-80% windspeed reduction between 30 and 100m from the trees where windspeed was reduced the most.

Shelter and irrigation

- Establishment of shelter markedly reduces windspeed especially in the zone equivalent to 2-8 tree heights (30-120m at our site).
- Wind reduction improves sprinkler evenness and efficiency, particularly for the vulnerable end-gun of a centre-pivot irrigator.

Formosa case study paddock. The pasture in the sheltered zone remains green.

How much water can be saved?

- Potential evapotranspiration at Formosa (with no shelter) was measured to be 1,778mm over the study period.
- The sheltered 300m (15ha of the 25ha) experienced 240mm less potential evaporation.
- This equates to 35.9ml of saved potential evapotranspiration across the entire paddock.
- Note that potential evaporation is going to be much higher than actual evaporation because evaporation can only occur at potential rates when water is freely available at the soil surface.

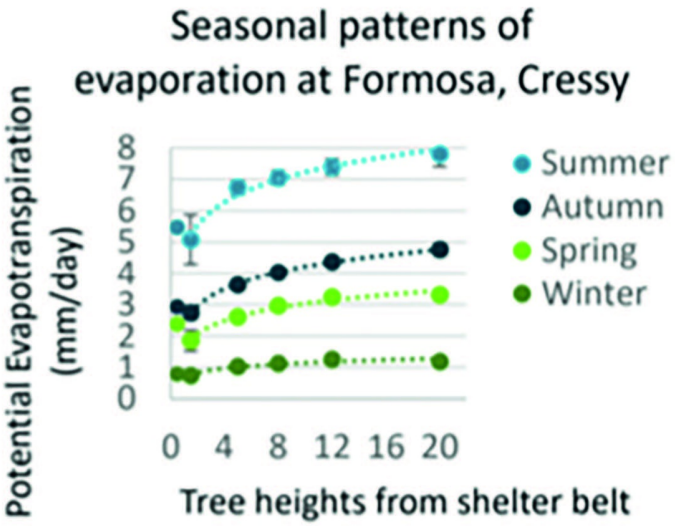
Impact of shelter on evapotranspiration

Shelter reduced evapotranspiration by 25-20% over the full 300m sheltered zone irrespective of season.

Potential verses actual evapotranspiration

Potential evapotranspiration is the evaporation that would occur if sufficient water is available at all times. Pan evaporation is a measure of potential evapotranspiration.

Actual evapotranspiration is the water that is actually evaporated/transpired and is lower than potential because water is not always available. Evapotranspiration will typically occur at potential until the soil surface (to rooting depth) starts to dry out.



Conclusions

Trees reduced water loss through evaporation. 1ha of 15m tall trees on the windward edge of a 25ha paddock provided shelter from the prevailing wind. This resulted in:

- Shelter for more than half of the paddock.
- Measured wind velocity reductions of 15-20%
- Commensurate reductions in potential evapotranspiration equating to 35.9ml.

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