



# The Influence of Tree and Stand Age on Soil Water Movement in *Theobroma cacao* plantations

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# Rationale

Cocoa (*Theobroma cacao*) is one of the most important cash crops in the tropics

With global demand expected to increase, new plantations are likely to be developed

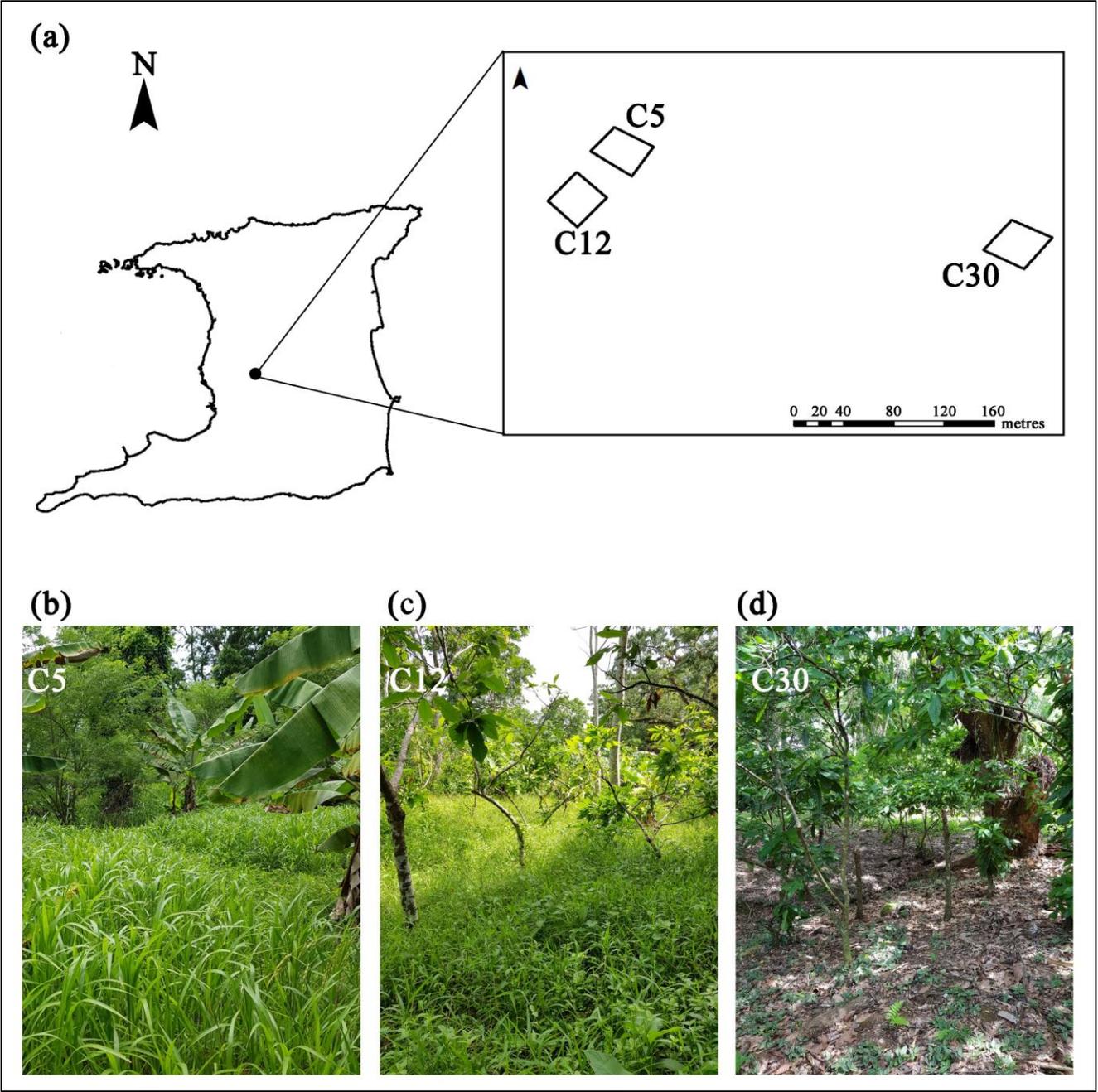
The soil properties in young plantations may differ from older ones and impact surface hydrology

**The study assessed the influence of plantation age on soil properties and water movement**



# Location

- Trinidad and Tobago
- Three plots of different ages
  - b) C5 = five year old
  - c) C12 = 12 year old
  - d) C30 = > 30 year old



# Methods



Soil water repellency



Soil moisture & temperature



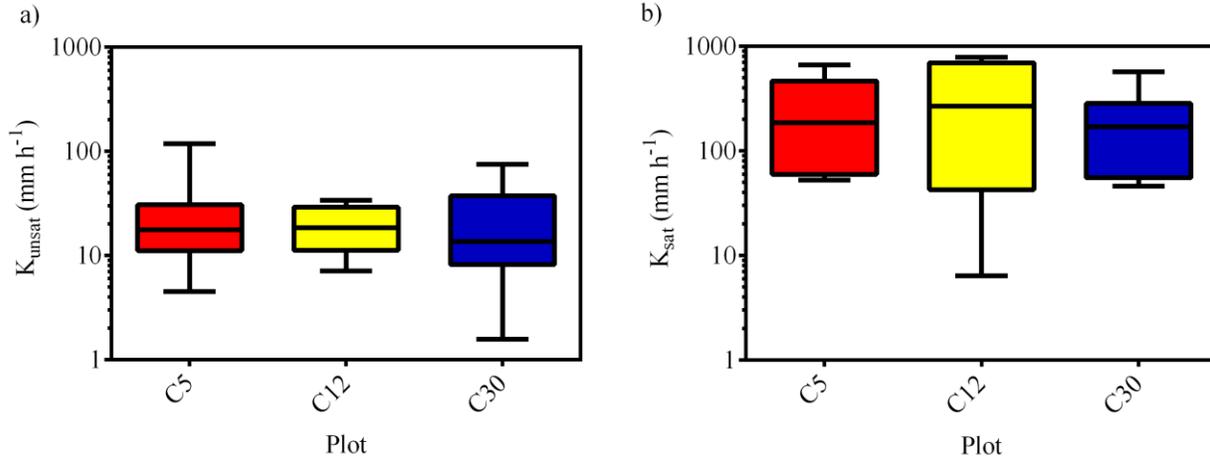
Infiltration and Field Ksat



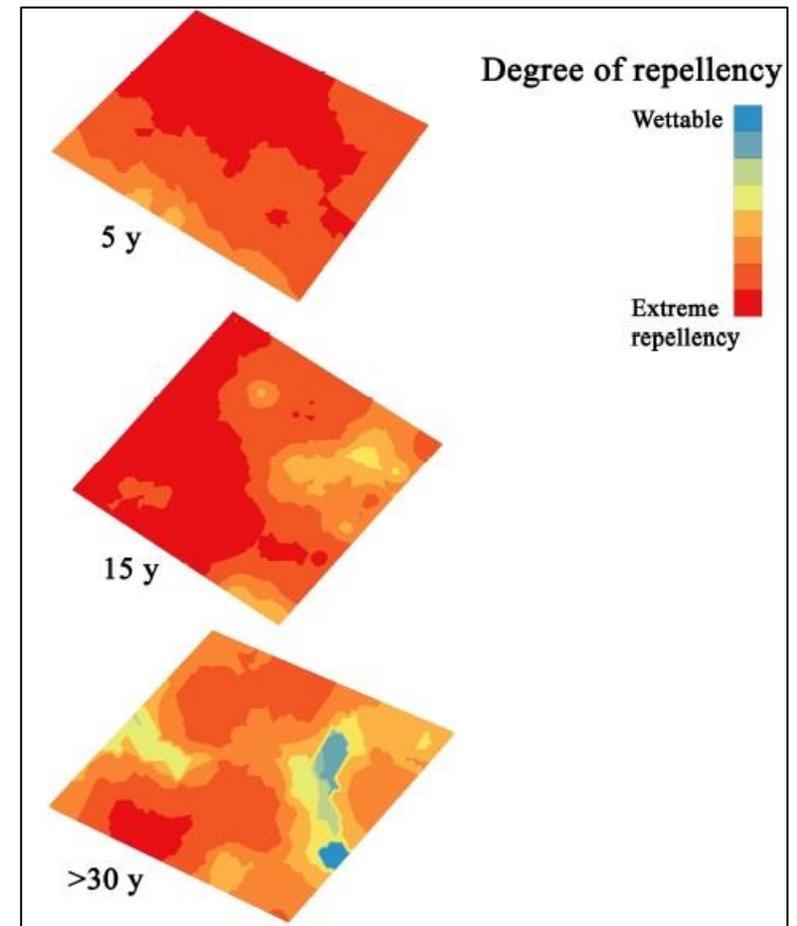
Unsaturated K

**Measured in the Wet and Dry Seasons**

# Main findings

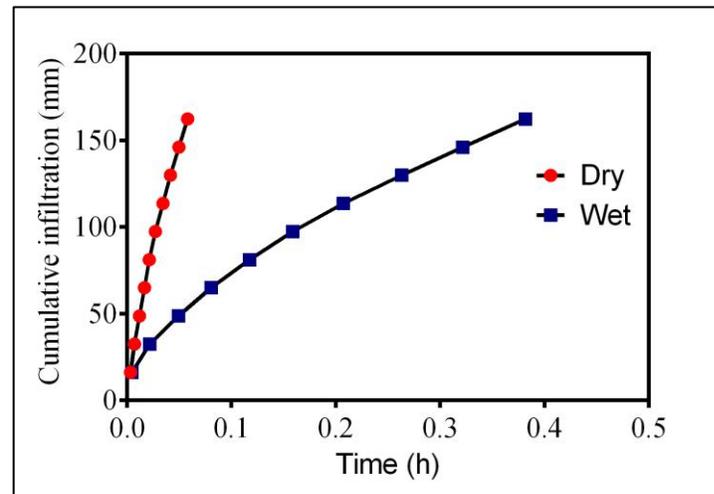


a)  $K_{\text{unsat}}$  and b)  $K_{\text{sat}}$  were similar among the three plantation ages during the wet season. Soil water repellency was absent in wet season



In the dry season, extreme levels of repellency observed throughout the 5 and 12 year old sites. The >30 year old site had the greatest variability and lowest mean penetration time (2.1 h)

Infiltration was expected to be lower in the dry season, however rates were higher: due to soil crack development



# Conclusions

Plantation age **did not** have an effect on soil water movement during the wet season

During dry season **large cracks** developed in the 5 and 12 year old sites

Although **extreme levels of repellency** were observed in the young sites, infiltration rates **remained high** due to the presence of the cracks

Recommend that shade trees be allowed to develop fully before planting young cocoa: Reduced grass cover, lower temperatures, lower cracks

