28th Conference Asic 2021
From 28 June to 1 July 2021

Shade tree canopy cover affects coffee plant traits across elevations in Ethiopian smallholder coffee farms

Merkebu Getachew, Kris Verheyen, Kassaye Tolessa, Kristoffer Hylander, Ayco Tack, Marijn Bauters, Pascal Boeckx, Pieter De Frenne

GHENT UNIVERSITY

Department of Environment, Forest & Nature Lab

S5-P-10

Introduction:

The ongoing changes in the climate system reinforce the need to quantify coffee plants' ecological and eco-physiological traits to assure coffee production in the future. One way to assess how environmental changes affect coffee performance is via leaf traits, most notably leaf C and N concentrations (to reflect the nutrient status), leaf stable carbon isotope composition ($\delta^{13}C$) to determine intrinsic water use efficiency (WUEi), and specific leaf area (SLA) to describe carbon gain relative to water loss within a plant canopy.

Materials & Methods:

We sampled coffee plants growing at contrasting elevations using a space-for-time substitution approach for warming and studied a gradient of canopy cover to assess whether increasing canopy cover modulates responses to temperatures. Three coffee trees were sampled in 59 coffee farms in southwest Ethiopia across elevations (1500 m - 2160m) & along canopy cover gradients (open to deep shade). Soil nutrient concentrations, light availability, soil temperatures and moisture were quantified for each coffee tree.

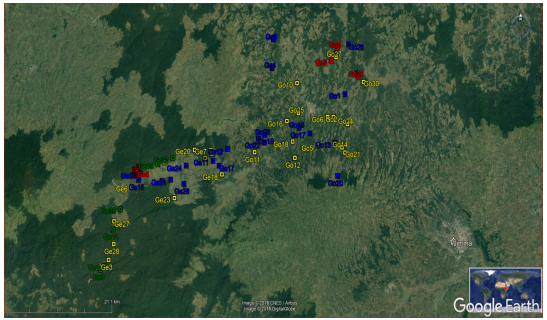
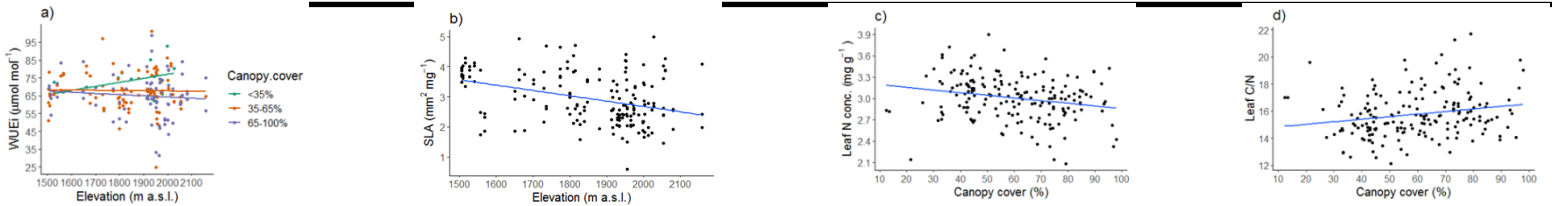


Figure 1: Study area, Southwest Ethiopia

Objectives:

To explore the effect of local shade tree canopy cover and climatic gradients induced by elevation on coffee plant traits in smallholders' coffee farming systems in Ethiopia.

Results:



Conclusion: The information generated in this study will help smallholder coffee growers to improve their coffee production for the future at their existing farm lands without moving coffee cultivation areas to higher elevations.