

Coffee cultivation at Mt. Elgon: perspectives and challenges in a changing climate

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INTRODUCTION

Coffee is crucial for the livelihood of millions of people and plays a central role in the economy of several developing countries. Many authors warn about the adverse effects of climate variability and extreme events (linked to climate change) upon coffee production. Effective strategies which increase climate resilience and sustainability of the coffee sector are urgently needed. However, such strategies have to be tailored to the local conditions (both socio-economic and biophysical) and available resources.

METHODS

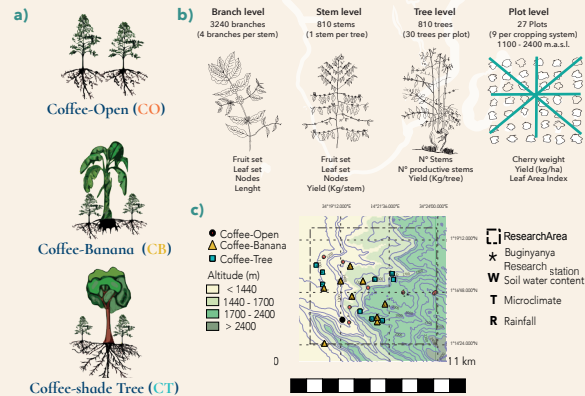


Figure 1: a) Local cropping systems, b) Sampling design and monitored variables, and c) Research area

RESULTS

How do local coffee cropping systems affect microclimate?

- Shaded systems buffered temperature extremes, temperature amplitude
- Lower SWC in shaded systems did not correlate with lower yields, neither with fruit drop.
- At low altitude, maximum temperature and daily VPD exceeded optimal coffee thresholds

How do coffee performance vary across local cropping systems and along an altitudinal gradient?

- Coffee yields were optimal at 30 % shade (LAI = 0.5-1 m²/m²)
- More than three stems per coffee tree had a negative effect on coffee yields
- Fruit drop (%) did not vary across cropping systems and was mostly determined by fruit set
- Altitude did not have any significant effect on coffee yields

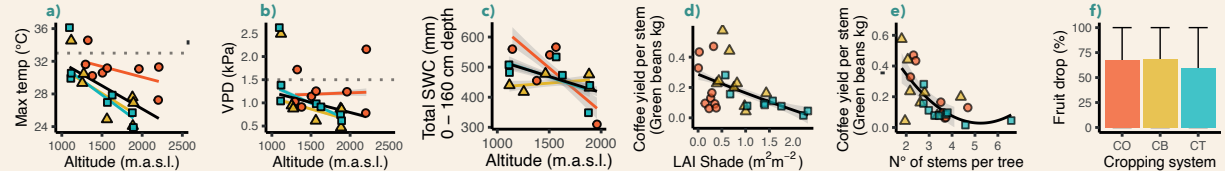


Figure 2: a) Daily Maximum temperature along altitude (m.a.s.l.), b) Daily pressure deficit along altitude (m.a.s.l.), c) Soil water content (mm) (From 0 to 160 cm depth) along altitude (m.a.s.l.), Coffee yield per stem (Green Beans Kg/Stem) along N° of stems and f) Fruit drop (%) (Average 2015 and 2016). Colour and symbol indicate coffee cropping system (Coffee-Open = CO (Red circle), Coffee - Banana = CB (Yellow triangle), Coffee - shade tree = CT (Blue square).

CONCLUSIONS

1. Shade should be maintained to protect coffee underneath but managed (below 30 %) to reduce negative effects on coffee yields.
2. Coffee yields could increase if better coffee pruning practices are implemented.
3. Coffee-Banana systems showed an optimal balance between microclimate buffering and coffee yields, in addition to increasing food security

References

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