30th Conference 27-31 October Asic 2025 | Lisbon, PORTUGAL Rectory of the University of Lisbon

BOKU UNIVERSITY | FAO IAEA Joint FAO/IAEA Centre Nuclear Techniques in Food and Agriculture | #34459

EVALUATING THE USE OF $\delta^{13}C$ STABLE ISOTOPE & CROP WATER STRESS INDEX IN MONITORING OF DROUGHT STRESS IN COFFEE VARIETIES

Janice Nakamya*, Mathilde Vantyghem, Jonas Van Laere, Roel Merckx, Rebecca Hood-Nowtny, Silas Mukune, Jeremiah Mwangi , Gerd Dercon

janice.nakamya@students.boku.ac.at

1. Introduction

- Determining the thresholds for drought stress in perennial crops, such as coffee, is a challenge
- Stable ^{13}C isotope could offer a rapid, efficient assessment using leaf punch samples
- But this requires a homogenous validated procedure

2. Methodology

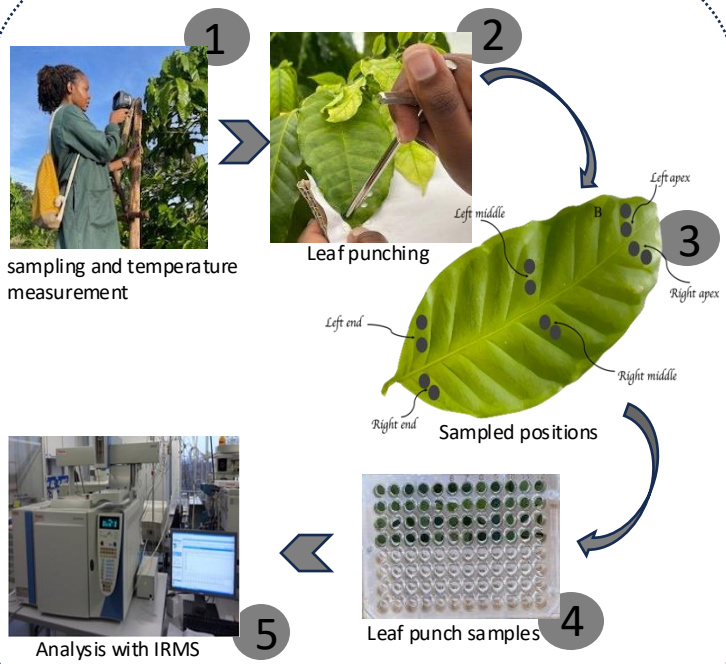

Figure 1: sampling , sample preparation and analysis

3. Research questions

i. Leaf age and spatial leaf position is the best indicator of water stress

ii. Best leaf and time to measure for CWSI

iii. Relationship between CWSI and $\delta^{13}C$

4. Results

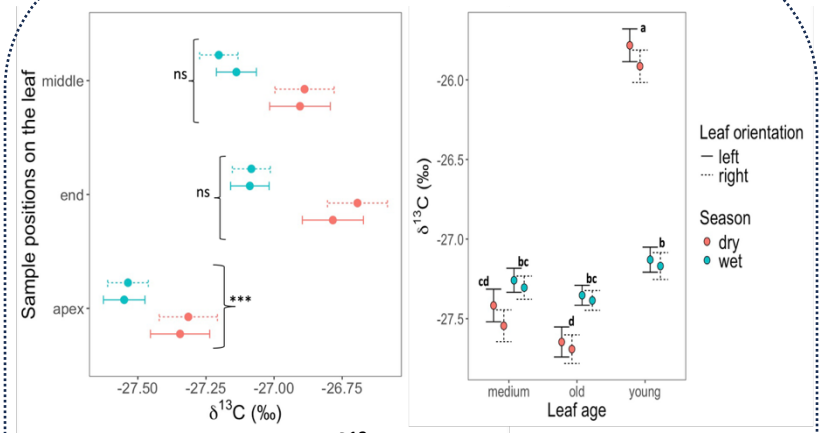

Figure 2: Variation in $\delta^{13}C$ in leaf sample positions and age

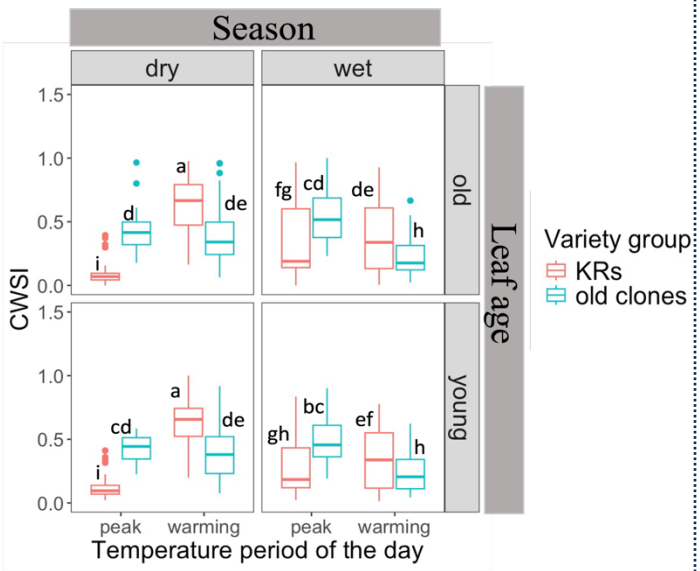

Figure 3: Crop water stress index across leaf age, time and season

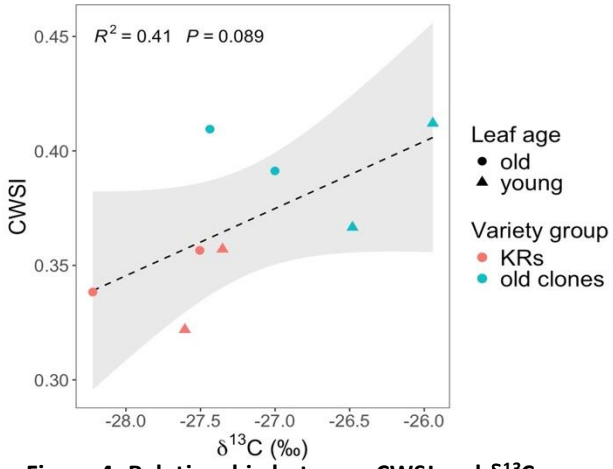

Figure 4: Relationship between CWSI and $\delta^{13}C$

5. Conclusions

1. Samples obtained at the distal postion of the leaf were more enriched and great variability in $\delta^{13}C$ between seasons
2. Young leaves were more enriched in $\delta^{13}C$ than the rest during the dry season but no difference between the rest
3. Increase in CWSI in the dry season during the warming period which was more reliable with no other environmental interferences