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Water-use efficiency of new *Coffea arabica* F1 hybrids undergoing different water availability in an agroforestry system

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BREEDCAFS

Introduction

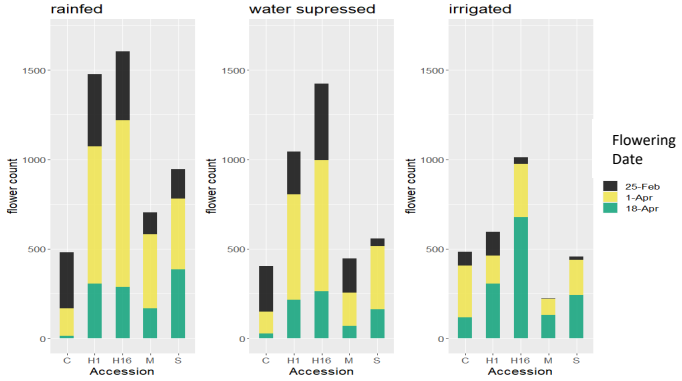
H2020 BREEDCAFS (1), a project funded by the EU, assesses the performance of new F1 hybrids of *Coffea arabica* in the context of climate change. In 2018, 3 F1 hybrids and 2 pure lines were planted together in an agroforestry trial in the North West of Vietnam. The first results on coffee water use are presented here.

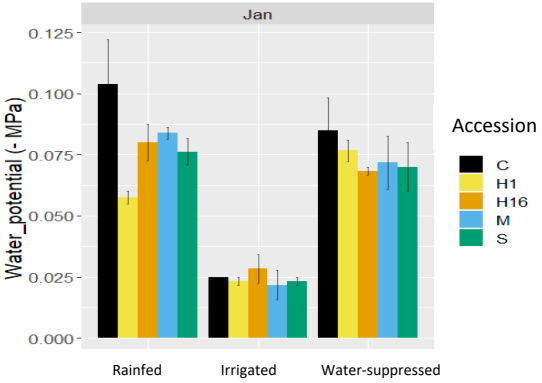
Materials/Methods

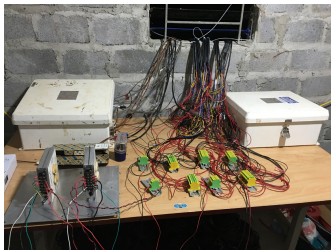
Accessions: 3 F1 hybrids – Starmaya, Centroamericano H1, Mundo Maya H16 (2-4) – were tested against two pure lines – Marsellesa (father of Starmaya) and a local Catimor (used as control).

Trials: The experiment, set up in August 2018 in a *Leucaena leucocephala* agroforestry system, in a split plot design with 3 water conditions; namely rain-fed, irrigated (no drought stress), water suppressed (-50% of rainfall intercepted), which were set up in April 2020.

Measurements: Growth (height, trunk diameter, plagiotropic branches…) was measured every year. Flowering and yield were evaluated starting in 2020. Sap-flow, photosynthesis, stomatal conductance, water potential, specific leaf area and leaf dry matter content were measured monthly during the dry season.







Results/Discussion

Tree growth: There was a significant growth difference among cultivars ($p<0.05$), with Catimor having the lowest height and diameter and Starmaya the highest ones.

Flowering and Yield: In 2020, Catimor and Marsellesa had the lowest yield, and Starmaya the highest one ($p<0.05$).
In 2021, H1, H16 had more flowers than the other cultivars ($p<0.05$). Coffee trees in rainfed condition had more flower than in the other 2 conditions ($p<0.05$).

Physiology: Sapflow and photosynthesis were the lowest in December and January. The lowest water potential was registered in January. Coffee water potential in irrigated condition was significantly higher than in other 2 conditions ($p<0.05$).

Conclusion/Perspectives

According to these preliminary results, we can observe differences in terms of growth, production and physiological responses among accessions as well as an irrigation effect. The trial will be monitored until June 2022 in order to gather more results with increasing coffee trees age and contrasting water conditions. The agronomic and physiological description of those accessions will be completed with a transcriptomic study of these accessions under each water condition.

References:

(1) http://www.breedcafs.eu
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(3) Marie *et al.* (2020). Euphytica 216: 78. https://doi.org/10.1007/s10681-020-02608-8
(4) more information available at: https://varieties.worldcoffeeresearch.org/