Effect of shading on performances of new Arabica coffee varieties in Northwest Vietnam

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Introduction

Most high-yielding coffee varieties have been bred and selected for optimal performances under full sun conditions, and perform less well when intercropped with shade trees. Thus, selecting and testing new varieties adapted to shaded environment is needed to support the development of sustainable agroforestry systems. Here, we studied the performances of 4 recently developed coffee varieties under a shade gradient in the Northwest Vietnam.
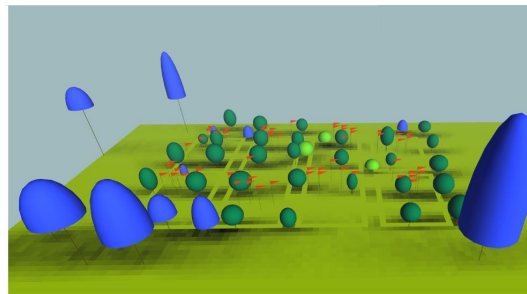

Fig 1. 3D model of a trial with ShadeMotion. Red flags represents the selected coffee trees.
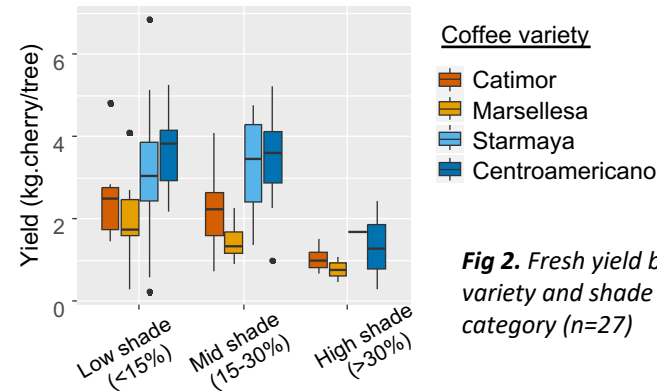

Fig 2. Fresh yield by variety and shade category (n=27)

Materials/Methods

In 2019, coffee trees belonging to 4 varieties (Catimor, Marsellesa, Starmaya and Centroamericano) were planted in 2 trials in Son La Province, Vietnam. Buds, flowers, and fruits were regularly counted from Feb to Sep 2022. Harvest was monitored between Oct 2022 and Jan 2023. Shade was modeled and estimated using ShadeMotion software (3D modeling).

Results/Discussion

Under low (<15%) and medium (15-30%) shade conditions, Starmaya and Centroamericano exhibited better performances than Catimor and Marsellesa. They had more flowers, more fruits and ultimately higher yields. Additionally, they displayed stable yields across shade levels ranging from 0 to 30%. Conversely, Marsellesa yields were negatively correlated with shade levels, even under low shade conditions. Under high shade levels (>30%), all 4 varieties experienced a sharp yield decline.

Conclusion/Perspectives

The newly introduced Starmaya and Centroamericano hybrid varieties demonstrate higher productivity compared to the widely cultivated Catimor pure line variety. More importantly, this higher agronomic performance extends up to medium shade levels (30%). Promoting these hybrid varieties could therefore facilitate the adoption of agroforestry in the study area, providing that shade levels do not exceed 30% (threshold to ensure optimal coffee yields). Conversely, Marsellesa appears to be the variety least suited to shade conditions, and should only be used in monoculture systems that are not the most suited for the Northwest Vietnam.