

Grafting Robusta coffee for performance and robustness

Aske Skovmand Bosselmann^{a*}, Nguyen Viet Tru^{b‡}, Thuyen Thi Pham^a, Benoit Duong^c

^aUniversity of Copenhagen, Frederiksberg, Denmark. ^bWASI, Buon Ma Thuot, Vietnam. ^cCIRAD, Hanoi, Vietnam.

*Presenting author: ab@ifro.ku.dk. [‡]Main author: viетtrunguyen@gmail.com

Introduction

- Grafting, which involves connecting rootstock and scion from different plant species or varieties to create a new plant with improved overall performance, has emerged as a strategy to increase coffee performance and enhance resilience to environmental and pest-related stresses.
- So far, evaluation studies have focused on Arabica or on specific traits related to yield and pests.
- We present a comprehensive assessment of farm management and coffee performance at plot and plant level of grafted and non-grafted Robusta coffee in Vietnam (Fig.1).

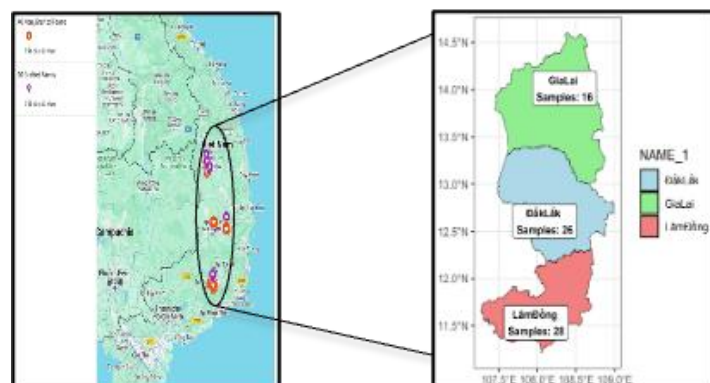


Figure 1: Central Vietnam with indication of the three provinces, where the 70 farms (30 grafted and 40 non-grafted) are located.



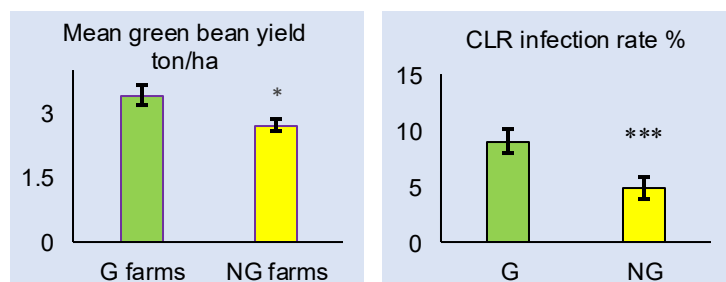
Figure 2: Renovation grafting of *C. canephora* onto unknown *C. canephora* rootstock, replanting onto *C. liberica* rootstock, and observations of individual plants in the field for flower count, yield estimation, and health.

Materials/Methods

- The study is based on the first full year of data collection from an ongoing multi-year study, of 30 grafted and 40 non-grafted coffee farms in the Central Highlands in Vietnam (Fig. 2).
- Data on management, yield, pest and diseases, drought resistance, and plant growth were collected through farmer interviews and repeated observations of individual plants on the farms.
- Leaves were analysed for proline content and osmotic pressure, indicators for drought tolerance.

Results/Discussion (Fig. 3)

- Mean coffee yield (3-year survey data) was significantly higher for grafted farms (3.4 ± 1.3 tons/ha) compared to non-grafted farms (2.7 ± 0.9 tons/ha), demonstrating long-term benefits of grafting on coffee productivity.
- Farms with grafted coffee significantly less irrigated – both in volume and application times. Despite this, no differences in drought tolerance were observed.
- Observed grafted trees were significantly more affected by coffee leaf rust (CLR), necessitating more studies on rootstock-scion / management interactions. CLR had no apparent effect on per-tree coffee yield.
- Higher plant mortality, often expected on grafted farms due to rootstock-scion incompatibility, was not observed.



Irrigation practices	Grafted farms (Mean ± SD)	Non-grafted (Mean ± SD)	P (T<=t) two-tail
Applications per year	3.3 ± 0.6	4.1 ± 1.3	0.00*
Litre per tree & year	342.4 ± 75.0	428.1 ± 105.4	0.00*

Figure 3: Mean yield/ha over 3 seasons (survey), observed CLR infection rates, and irrigation practices based on survey and observations

Conclusion/Perspectives

There is a large potential for grafted coffee for large-scale application in Vietnam. The ability to deliver higher yields, coupled with reduced irrigation demands, positions grafting as a key part of strategies for boosting farmer livelihoods and addressing climate change impacts such as water scarcity.

Successful large-scale adoption necessitates a nuanced approach tailored to local contexts, e.g. with respect to the specific varieties of rootstocks and scions. It also requires traceability of plant material at nurseries, to ensure farmers have access to approved and tested rootstock-scion pairs, and dissemination of grafting-specific cultivation protocols for planting, irrigation and nutrient management.

Visit our website

