



# Use of Genetic Resources of *Coffea arabica*. Adaptation of F1 hybrids to various environmental conditions

The evaluation of Ethiopian wild accessions and coffee varieties for their diversity and adaptation to various conditions, namely Cerrados and Northern Parana in Brazil, French Guiana, and Cameroon is going on, together with analyzes of biochemical contents related to cup quality. Global warming especially affects *Coffea arabica*; we give thus special attention to tolerance to drought and to high temperatures.

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## Materials and methods

From 2013 onwards, we crossed chosen plants from 16 Ethiopian accessions with 7 dwarf cultivars including 3 pure arabica lines. We established hybrid trials at CPAC (Brazil, Cerrados), IAPAR (Parana), IRAD (Cameroon), and Cirad (French Guiana). Depending on the site, we used various designs, with or without blocks. Evaluation started from the nursery. Stem diameter and height are the main criteria for vigor and compactness. We analyzed data using XLSTAT® by Addinsoft.



Cross pollination

Mother/Father	DC 1	DC 2	DC 3	DC 4	DC 5	DC 6	DC 7	Selfing
E01	3	1,2,3	3,4	2,1	3	2,1	2,1	1,2
E02	3	2,3	3,4	2,1	3	2,1	2,1	1,2
E03	3	3	3					
E04	3		3		3,4			
E05	3		3		3,4			
E06	3	3	3,4		3,4			
E07	3,4	1,2	3,4	1,2	3,4	1,2	1,2	2
E08	3		3		3			
E09	3,4	3	3,4		3,4			
E10		1,2		2		1,2	2	1,2
E11		1		1		1	1	1,2
E12	3		3,4		3			
E13	3,4		3,4		3,4			
E14	3	3	3,4		3,4			
E15			3		3			
E16		1,2		1,2		1,2	1,2	1,2
CM1		1,2		1,2		1,2	1,2	1,2
Selfing	3,4	1,2,3,4	3,4	1,2	3,4	1,2	1,2	

E = Ethiopian accession CM = variety from Cameroon DC = Dwarf Cultivar  
 1=CPAC 2=IRAD 3=IAPAR 4 = Cirad

List and location of hybrid trials

## Results and discussion

The genetic gain of F1 hybrids is generally – but not always – positive over dwarf cultivars for vigor and height and over Ethiopian mothers for vigor only, with a significant effect of the mother factor on both criteria.

Hence, there is a possibility to select Ethiopian female parents for their General Combining Ability.

At this young stage the differences between sites may be due to the plants' history more than to GxE interactions. Therefore, and because yield and quality of the product are also important criteria, the plants will be observed until they bear at least three crops.

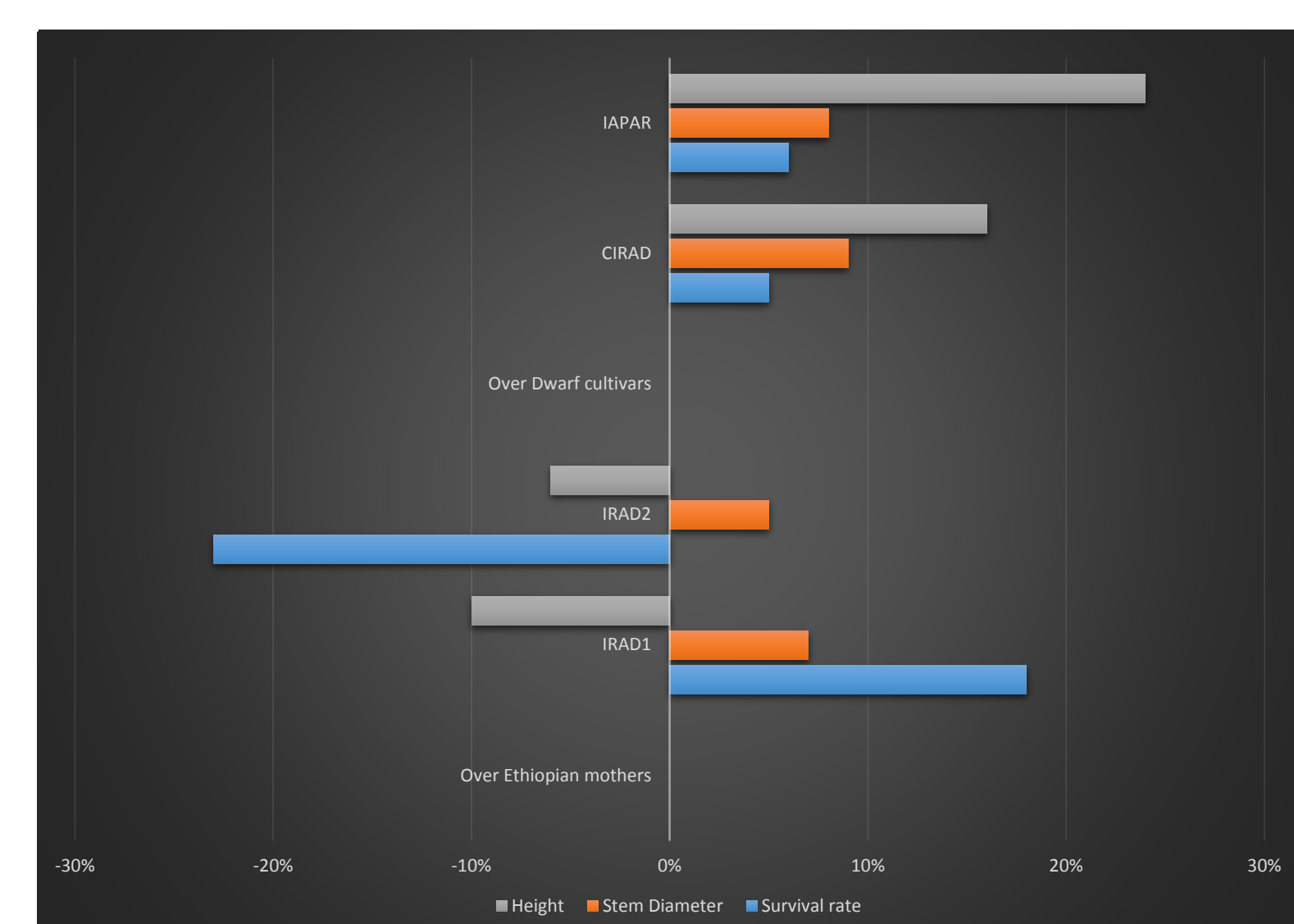
The same type of F1 hybrids developed earlier in Central America showed heterosis and a good adaptation to various environmental conditions, as compared with traditional varieties, whilst maintaining good cup quality.



Seedling transplantation



Plant measurement



Mean genetic gain of hybrids vs. genitors

## REFERENCES

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## CONCLUSION

This study confirms the interest of *Coffea arabica* genetic resources to improve current cultivars for vigor. In the coming years, adaptation and cup quality will be evaluated. GWAS studies are ongoing, which may speed up the breeding process.