

2.10 Adaptation of *Coffea arabica* F1 hybrids to various environmental conditions

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The use of the genetic diversity of *Coffea arabica* is a source of high genetic gains for adaptation and coffee quality, especially in a context of global warming. We evaluated 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. We used data obtained from collections established in various sites. We analysed biochemical contents related to cup quality. From 2013 onwards, we crossed chosen plants with various dwarf cultivars. We established factorial hybrid trials at CPAC (Brazil, Cerrados), IAPAR (Brazil, Parana), IRAD (Cameroon), and CIRAD (French Guiana). We used randomized design by tree, or by rows of 5 to 10 trees, with or without blocks. Stem diameter, height and canopy diameter are the main criteria for vigour and compactness. The oldest hybrid progenies are now two years old. The genetic gain of F1 hybrids is generally positive over dwarf cultivars for vigour and height, with a significant effect of the mother factor. It is thus possible to select Ethiopian female parents for their General Combining Ability. We confirm the interest of *Coffea arabica* genetic resources to improve current cultivars in terms of vigour and adaptation; maintaining plant compactness is possible. Further use of F1 hybrids for breeding may use vegetative propagation or backcrosses to commercial varieties. GWAS studies are ongoing.

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