

# Arabusta seed morphology: Arabica-like or Robusta-like? A morphological characterization of Arabusta coffee in comparison with parental species.



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INTRODUCTIO

Arabusta coffee is an interspecific hybrid derived from *C. arabica* x *C. canephora*, often used in coffee breeding to study both the gene transfer from Robusta and its possible use in coffee production. The plants have very different morphological characteristics, as well as different levels of fruit production when compared with the parental species. As far as we know, no investigations have been devoted to study Arabusta seed morphology and to disclose possible Arabica-like or Robusta-like traits in its cell structure and this highly stimulated the present work.



Fig.1 Robusta (a), Arabusta (b) and Arabica (c) seeds respectively (stereomicroscope).

Seeds of *C. arabica* L. (Costarica, 2019), *C. canephora* Pierre ex-Froehner (French Guyana, 2019) and F1 clones of Arabusta coffee (French Guyana, end of 2018) were harvested, processed and selected. Seeds were kept in a fixative solution then cut with a cryostat (Leica CM1520). Sections of 60 μ were observed by a SEM (Hitachi TM3030plus). Sections of 12 μ were stained in a Toluidine Blue O solution. Measurements were performed by a Leica Software.

MAT & MET

RESULTS

Arabusta (fig.1b) is characterized by an elongated seed, slightly rounded, generally with a linear furrow. An incredible intermediate between Arabica and Robusta (data not reported). Seed endosperm cells are regular, characterized by a polygonal shape, with not frequent nodes in their cell wall (white arrow), that are present in the other two species (fig.2b).

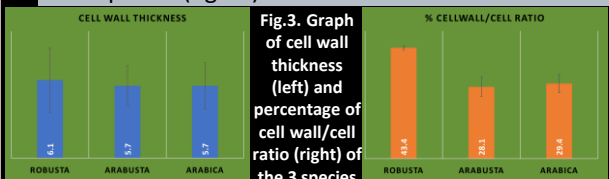


Fig.3. Graph of cell wall thickness (left) and percentage of cell wall/cell ratio (right) of the 3 species

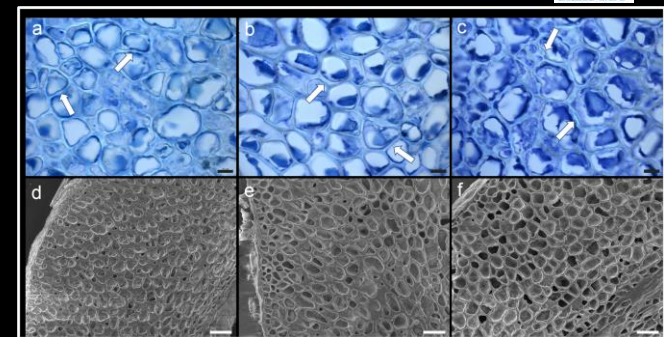


Fig.2 Robusta, Arabusta and Arabica sections observed by an optical (a, b, c, bars: 25μ) and electronic (d, e, f, bars: 50μ) microscope.

No histochemical differences in the cell content were observed among these coffee species under the chosen experimental conditions. Cell wall thickness of Arabusta coffee is not significantly different from the parental species ( $5.7 \pm 1.6 \mu$ , fig.3). However, the area occupied by the cell wall respect to the cell total area (28%) is closer to that measured in Arabica (29%) than that in Robusta (43%), meaning that the lumen cells in Robusta is smaller than that of the other species, supporting also the observation made by SEM .

CONCLUSION

The measurements performed on cell wall area and measured diameter as well as cell content area and endosperm cell size show that the morphoanatomical characteristics of Arabusta seeds corresponds more to those of Arabica than Robusta seeds. This feature is probably related to ploidy level (Arabica and Arabusta :  $2n = 4x = 44$ , Robusta  $2n = 2x = 22$ ). Further studies are necessary to confirm this preliminary view.

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