

Polyphenols characterization and antioxidant capacities of concentrated extracts of *Carapa procera* D.C. and *Hibiscus sabdariffa* L. obtained at pilot plant scale

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INTRODUCTION

Carapa procera and *Hibiscus sabdariffa* are 2 tropical plants traditionally used in Ivory Coast to prepare at home level medicinal and food complement products.

A pilot plant coupled-process was developed mimicking the traditional recipes using plant leaves and flowers to prepare functional and active polyphenol extracts with colorant and antioxidant properties. These natural extracts are on high demand locally in the South or for industrial niche markets in the North, as medicinal products and as food or cosmetic ingredients to replace synthetic compounds usually used in such industrial sectors

Concentrated water-extract of plant polyphenols, were prepared at pilot plant in pilot plant. Extracted anthocyanins, phenolic acids and flavonols were characterized and their antioxidant capacities measured and compared.

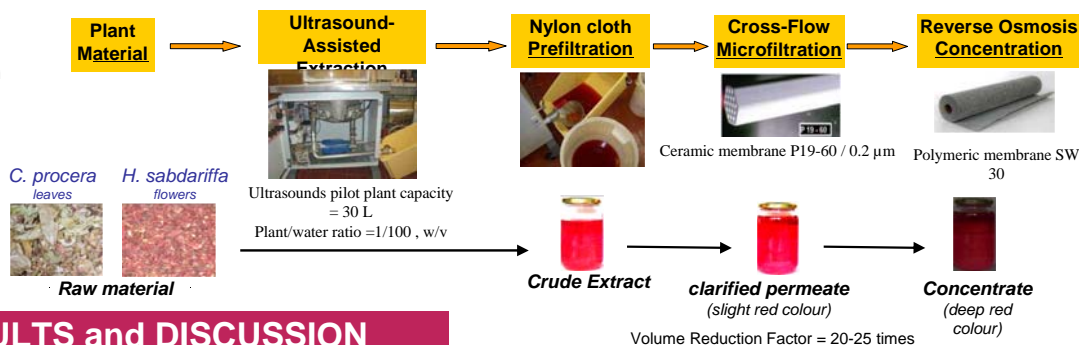


PROCESSING AND ANALYSES

Calyx of *H. sabdariffa* and leaves of *C. procera* were harvested in the centre part of Ivory Coast, around the Yamoussoukro area. The harvested samples were locally dried at 40°C and sent to CIRAD-Fr. A pilot plant multi-step process was applied to non-crushed plant samples to obtain concentrated water-extracts.

Polyphenol extracts were analyzed by HPLC-DAD (Agilent 1100 model equipped with a RP 18 column: 250x4.6 mm, 5 µm) and their chemical structures were determined by LC-MS²-ESI. AntiOxidant Capacities (AOC) of the plant extracts obtained during the process were measured as Trolox eq. by 2 different methods: DPPH and ABTS.

Process Flow diagram



RESULTS and DISCUSSION

Polyphenol contents of process end-products

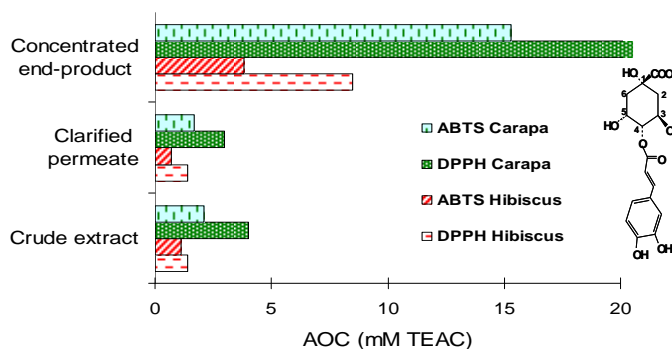
Processing plant samples of *C. procera* and *H. sabdariffa* lead to deep-red concentrated polyphenolic extracts that contained anthocyanins and phenolic-acids for both plant extracts, and flavonol glycosides, for *C. procera* only. The process clarified and concentrated crude extracts 10-20 times for anthocyanin, 10 times for phenolic acid, and 7 times for flavonol compounds.

Anthocyanin contents of *H. sabdariffa* concentrated end-products were 17 times more concentrated than those of *C. procera*, which showed higher concentrations in phenolic acids (5 times) and in flavonols.

Material	Plant Extracts	Anthocyanins (µmol/L, Cya eq.)	Phenolic ac. (µmol/L, GA eq.)	Flavonols (µmol/L, Quer eq.)
<i>C. procera</i>	Clarified permeate	1.6 ± 0.3	361 ± 2	226 ± 6
	Concentrate end-product	28.4 ± 0.3	3650 ± 10	1587 ± 1
	Concentration Factor	18	10	7
<i>H. sabdariffa</i>	Clarified permeate	54 ± 2	77 ± 13	not detected
	Concentrate end-product	503	743 ± 1	not detected
	Concentration Factor	9	10	not calculated

AntiOxidant Capacities (AOC) of plant extracts

Anthocyanins generally showed lower AOC than other polyphenolic families. *C. procera* extracts showed the strongest AOC due to flavonol and phenolic acid contents, that were found higher than in *H. sabdariffa* extracts.



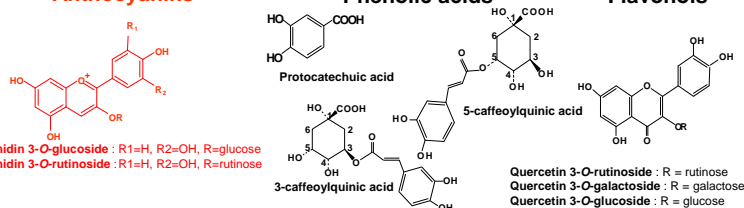
Major polyphenolic compounds identified in concentrated extracts

C. procera processed extracts

Anthocyanins

Phenolic acids

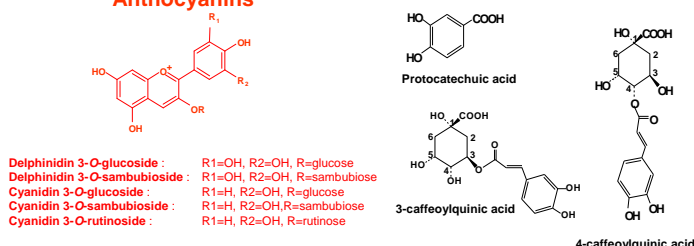
Flavonols



H. sabdariffa processed extracts

Anthocyanins

Phenolic acids



CONCLUSION

The Process used to eco-friendly extract and concentrate bioactive water-soluble molecules, such as polyphenolics, from 2 tropical plants, traditionally used by village people in Ivory Coast, allowed producing natural concentrates. Mixtures of these 2 plant extracts give natural deep-red concentrates with high AOC.

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