

# Medicinal plants from the Guinea-Bissauan flora: Anti-inflammatory properties of *Parinari excelsa* and the chemistry behind it

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## INTRODUCTION

Guinea plum, scientifically named *Parinari excelsa*, is a tree from the Chrysobalanaceae family that can reach 25 m [1, 2]. It is widespread across West Africa, where it is employed for wound healing and in the treatment of several health conditions, such as chest pain, malaria and diabetes [1,3,4]. This plant is one of the Guinean-Bissauan species studied by our research group. A hydroethanol extract from its stem bark caught our attention due to its score in an *in vitro* screening of anti-inflammatory activity performed with extracts from several species from Guinea-Bissau. In this work we investigated its effects on the expression of inflammatory mediators and we studied its chemical composition.

## METHODS

### *Parinari excelsa* stem bark hydroethanol (1:1) extract preparation

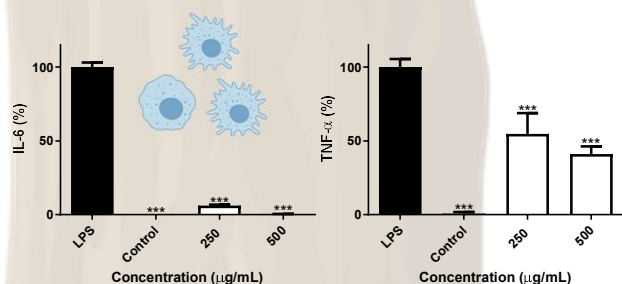
#### 1. *In vitro* cell-based assays

1.1. ELISA for the evaluation of the expression of the inflammatory mediators IL-6 and TNF- $\alpha$  in THP-1 cells;  
1.2. Luminescence-based assay for the evaluation of the NF- $\kappa$ B activity (macrophages)

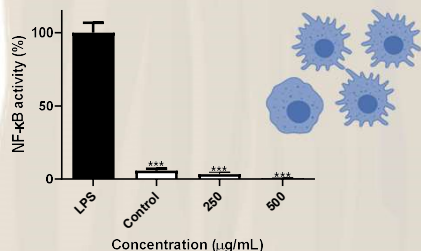
#### 2. Chemical characterization and compound isolation

2.1. HPLC  
2.2. MS  
2.3. TLC  
2.4. NMR:  
2.4.1. 1H NMR  
2.4.2. 1C NMR  
2.4.3. DEPT 135  
2.4.4. COSY  
2.4.5. HSQC  
2.4.6. HMBC

## RESULTS



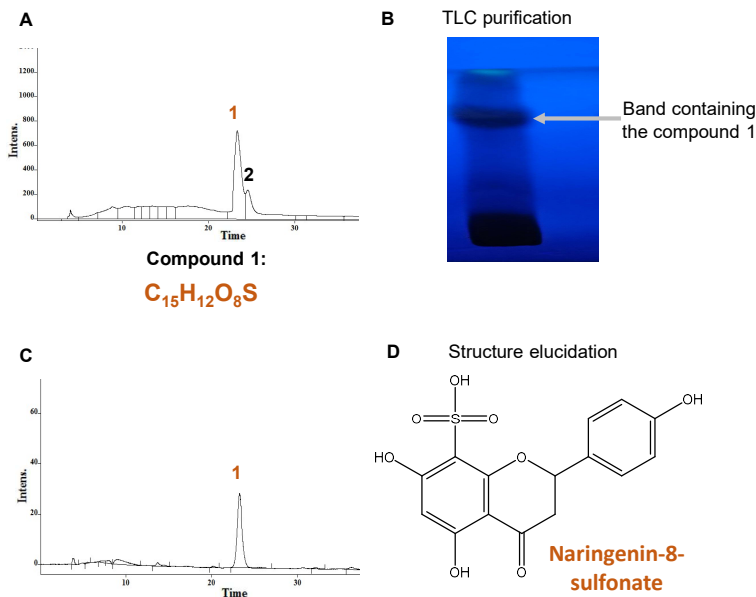
**Figure 1.** Effects of the hydroethanol extract of *P. excelsa* on the expression of IL-6 and TNF- $\alpha$  in THP-1 derived macrophages. IL-6 and TNF- $\alpha$  results are expressed as mean  $\pm$  standard error of three independent experiments, performed in duplicate. \*\*\* $p$ <0.001 compared to the LPS stimulated control.



**Figure 2.** Effects of the hydroethanol extract of *P. excelsa* on the NF- $\kappa$ B activity in THP-1 Lucia derived macrophages. Results are expressed as mean  $\pm$  standard error of three independent experiments, performed in triplicate. \*\*\* $p$ <0.001 compared to the LPS stimulated control.

## CONCLUSIONS AND FUTURE PERSPECTIVES

- The extract from the stem bark of *P. excelsa* inhibited the **NF- $\kappa$ B pathway** and reduced the levels of **IL-6** and **TNF- $\alpha$** .
- In the HPLC-DAD chromatogram a detached and major compound was noticed, with UV spectrum characteristic of a flavonoid.
- **Naringenin-8-sulfonate** was isolated for the first time from a species of *Parinari* genus.
- Our next goal will be to access the anti-inflammatory ability of the isolated compound to understand if it may be, at least partially, responsible for the anti-inflammatory activity of the extract.



**Figure 3.** Chemical characterization and compound isolation. A - HPLC-DAD chromatogram (280 nm) of the hydroethanol extract obtained from the stem bark of *P. excelsa*. B - *P. excelsa* extract's TLC at 365 nm. C - HPLC-DAD chromatogram (280 nm) of the compound obtained after TLC purification. D - Chemical structure of the isolated compound, identified as naringenin-8-sulfonate.

## REFERENCES

- [1] Ndiaye, M., Diatta, W., Sy, A.N., Dièye, A.M., Faye, B., Bassène, E., 2008. Antidiabetic properties of aqueous barks extract of *Parinari excelsa* in alloxan-induced diabetic rats. *Fitoterapia*. 79, 267-270.
- [2] Wyk, B. E., 2015. A review of commercially important African medicinal plants. *J Ethnopharmacol*. 176, 118-134.
- [3] Boer, H. J., Kool, A., Broberg, A., Mziray, W. R., Hedberg, I., Levenfors, J. J., 2005. Anti-fungal and anti-bacterial activity of some herbal remedies from Tanzania. *J Ethnopharmacol*. 96, 461-469.
- [4] Kamuhabwa, A., Nshimo, C., Witte, P., 2000. Cytotoxicity of some medicinal plant extracts used in Tanzanian traditional medicine. *J Ethnopharmacol*. 70, 143-149.

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