Screening for new cosmetic preservatives from the French Riviera: HPTLC application to antimicrobial and antioxidant assays

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Natubaval is a project aimed at finding new natural preservatives[1] among 200 selected Mediterranean plants. The large number of plant extracts inspired us to use HPTLC to quickly obtain chemical fingerprints of the major secondary metabolites (polyphenols, terpenoids, phytosterols) and assess plant biological activities. Antimicrobial activity was determined by bioautography[2] on *Aspergillus niger*, and antioxidant potential was assessed using DPPH[3]. A preliminary work on 25 plant extracts was performed.

I. PLANT EXTRACT SCREENING

ANTIFUNGAL ACTIVITY

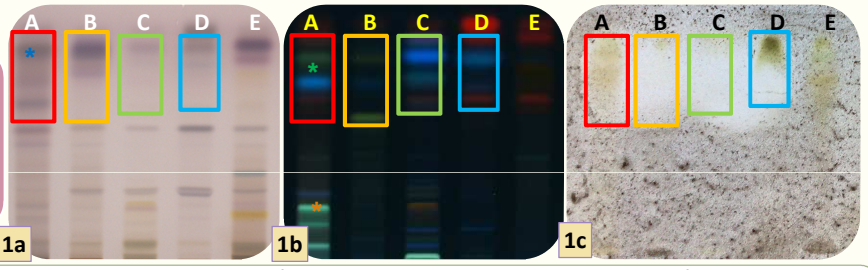

Fig. 1 : HPTLC fingerprints and antimicrobial activity of aqueous extracts A-E. MP: ethyl acetate, water, formic acid, acetic acid (100:26:11:11). **(1a)** Terpenoids and sterols. D: anisaldehyde-sulfuric acid reagent, white light. **(1b)** Flavonoids and plant acids. D: Neu's reagent (NP/PEG), UV 366 nm. **(1c)** Antimicrobial activity against *A. niger*, white light.
Standards: glycyrrhizic acid, rutin*, quercetin*.*

ANTIOXIDANT ACTIVITY

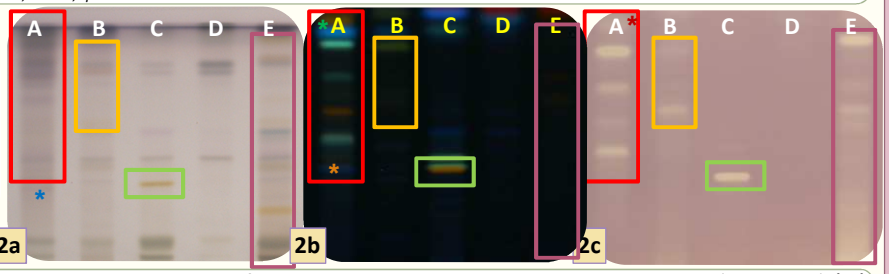

Fig. 2 : HPTLC fingerprints and antioxidant activity of aqueous extracts A-E. MP: ethyl acetate, methanol, water (100:13.5:10). **(2a)** Terpenoids and sterols. D: anisaldehyde-sulfuric acid reagent, white light. **(2b)** Flavonoids and plant acids. D: Neu's reagent (NP/PEG), UV 366 nm. **(2c)** Antioxidant activity assessed on DPPH, white light. *Additional standard: tocopherol*.*

OBJECTIVE AND APPROACH

- Comparative study of 25 plant extracts (only five are presented)
- Specific revelation of secondary metabolites, antimicrobial and antioxidant activity

RESULTS

- Quick **overview** of **bioactive secondary metabolites**
- **Plant A** active both as antimicrobial and antioxidant: selection as **target plant**

II. STUDY OF PLANT A

ANTIFUNGAL ACTIVITY

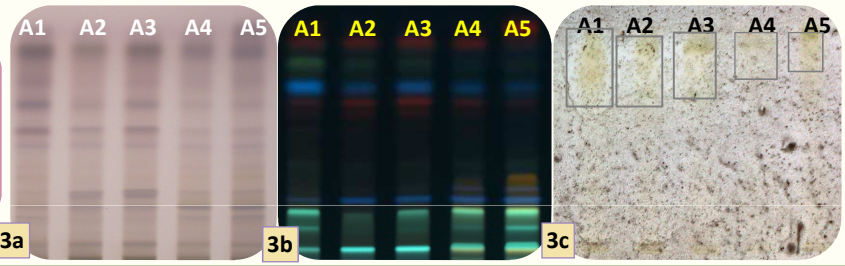

Fig. 3 : Comparative study and antifmicrobial activity of aqueous extracts A1-A5. Mobile phase and derivatization conditions are same as in fig. 1. **(3a)** Terpenoids and sterols. **(3b)** Flavonoids and plant acids. **(3c)** Antimicrobial activity against *A. niger*.

ANTIOXIDANT ACTIVITY

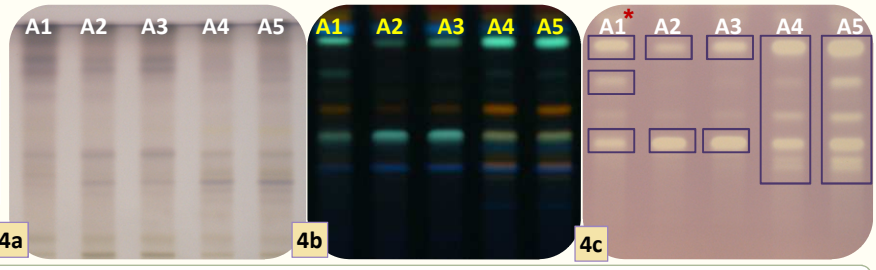

Fig. 4 : Comparative study and antioxidant activity of aqueous extracts A1-A5. Mobile phase and derivatization conditions are same as in fig. 2. **(4a)** Terpenoids and sterols. **(4b)** Flavonoids and plant acids. **(4c)** Antioxidant activity assessed on DPPH.

OBJECTIVE AND APPROACH

- Identification of bioactive compounds from plant A
- Studies on five extracts from plant A (different locations, harvest times and extraction process)

RESULTS

- Easy **highlight** of **bioactive metabolites**
- **Selection of specific plant populations** and **optimization of extraction method** according to the required activity

HPTLC is a useful tool to identify new plant extracts suitable for cosmetic preservation. Using this technique, we established correlations between phytochemical profiles and biological activities. We are currently trying to identify the bioactive metabolites of the highlighted plants using HPTLC (based on spot colours, R_f and standard compounds analyses, HPTLC-MS or –densitometry), as well as using other analytical tools (HPLC, LC-MS, NMR).

References:
[1] J.L. Rios, M.C. Recio, *Journal of Ethnopharmacology* 100, **2005**, 80–84 [2] J.L. Rios, M.C. Recio, A. Villaw, *Journal of Ethnopharmacology* 23, **1988**, 127–149 [3] Sagar B. Kedar, R.P. Singh, *Journal of Food Science Technology* 48 (4), **2011**, 412–422