Temperate and tropical halophytes: an interesting source of semi-purified polyphenolic extracts with high biological activities

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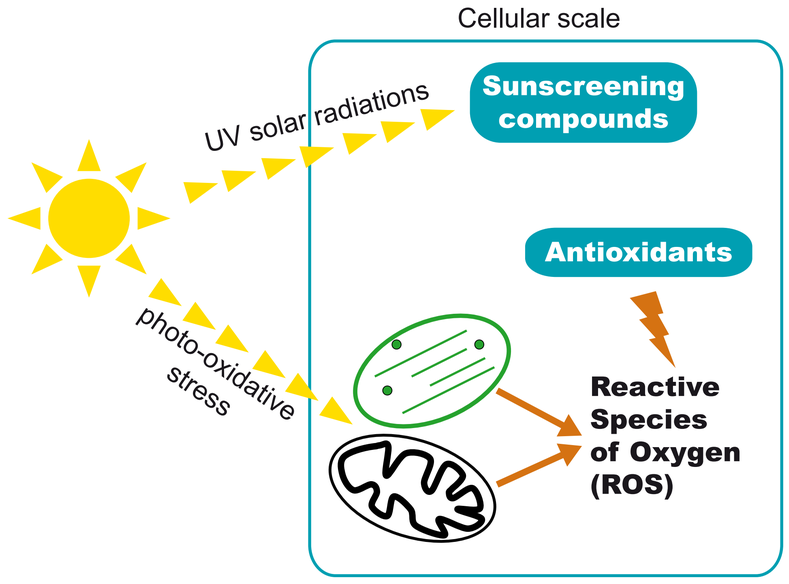
CONTEXT OF THE STUDY

Herbaceous halophytic plants develop adaptative responses face to interactive abiotic stresses such as UV solar radiations. Polyphenols, which are secondary metabolites, could be synthesized to overcome this environmental stress.



PHOTOPROTECTION
Polyphenols roles ?

Adapted of Solovchenko (2010) and Fernanda Pessoa (2012)

► Objectives:

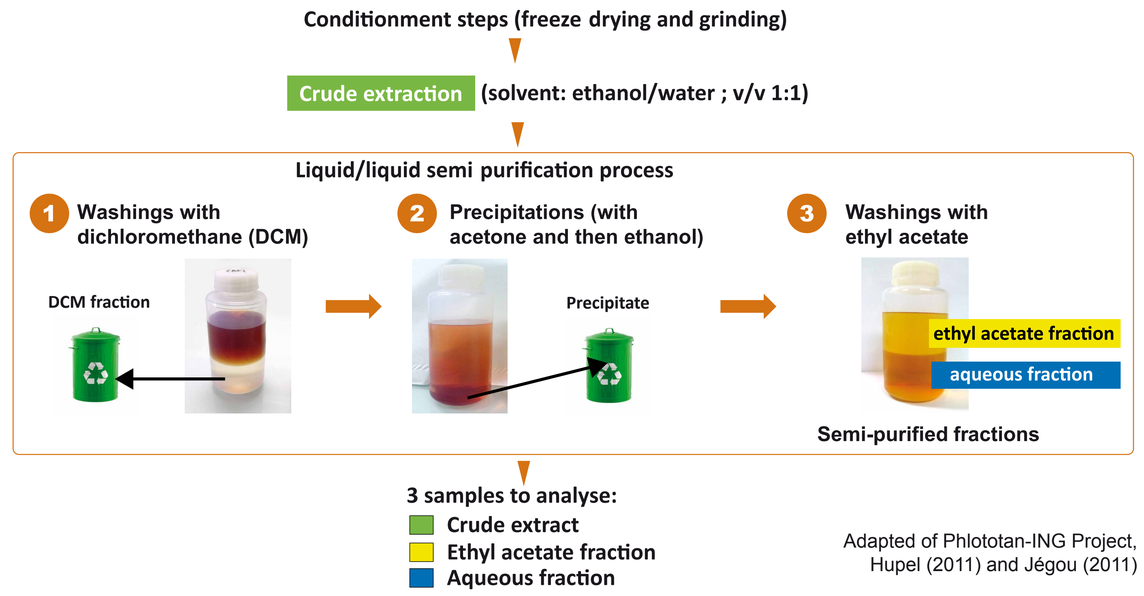
Testing original biological activities to promote the valorisation of halophytic plants as available source of antioxidants and photoprotective compounds within the framework of the MARMED project (European Union ERDF – Atlantic Area Program) and the HALOSUBNAT project (French Overseas Territories Program).

MATERIAL AND METHODS

► Species:

- 2 temperate species: *Spartina alterniflora* and *Salicornia ramossissima*
- 2 tropical species: *Aster squamatus* and *Sarcocornia quinqueflora*

► Obtaining of extracts and semi-purified fractions:

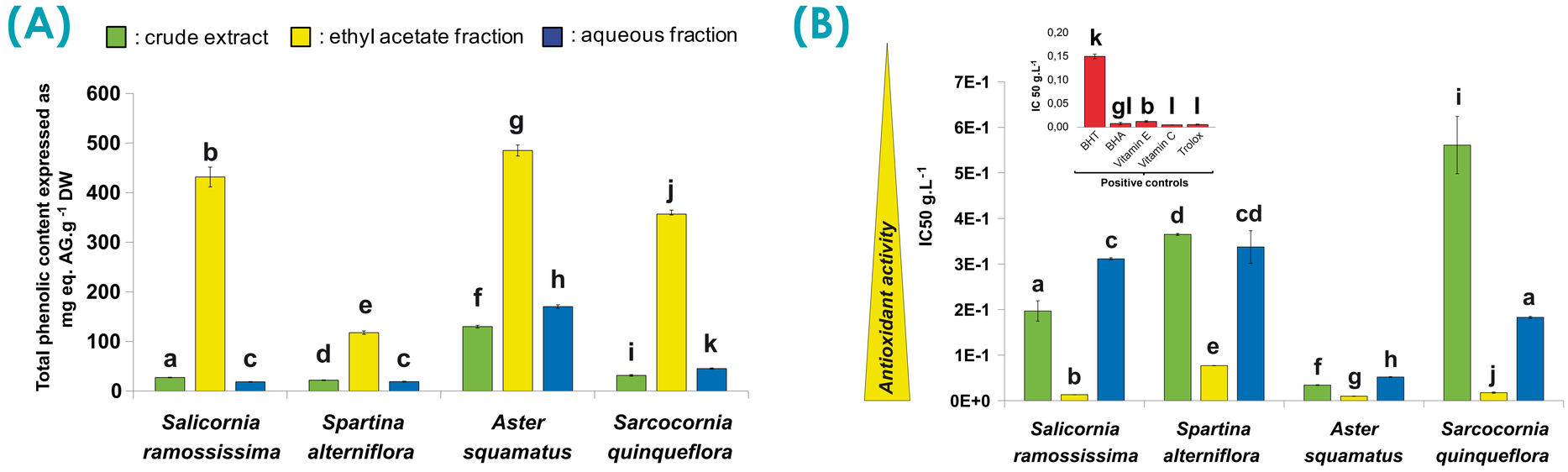


Adapted of Phlototan-ING Project, Hupel (2011) and Jégou (2011)

►Biological activities assays:

- Quantification of phenolic compounds by Folin Ciocalteu test (Van alstyne, 1995)
- Estimation of radical scavenging activity with DPPH assay (Molyneux, 2004)
- Photoprotection efficacity: Sun Protection Factor (SPF), Protection Factor-UVA (FP-UVA) and critical wavelength (λc), from O/W emulsion at 10% w/w, determined by *in vitro* method (Couteau *et al.*, 2008)

TOTAL PHENOLIC CONTENT (A) AND DPPH RADICAL SCAVENGING (B) OF FOUR HALOPHYTES



►The two highest TPC and radical scavenging activity are observed for ethyl acetate fractions of *Salicornia ramossissima* and *Aster squamatus*. Ethyl acetate fraction of *Salicornia ramossissma* showed the same activity as vitamin E. Furthermore, ethyl acetate fraction of *Aster squamatus* presented a higher activity than vitamin E and was active as BHA.

Figs A & B: Values are mean ± SD (n = 3). The letters indicates if there is significant difference between extracts and fractions of several species (same letters not significant)

PHOTOPROTECTION EFFICACITY OF THE TWO MOST ACTIVE ETHYL ACETATE FRACTIONS

Samples	SPF ± SD	FP-UVA ± SD	λc (nm)
Aster squamatus	*15.17 ± 1.64*	*9.38 ± 0.79*	371
Salicornia ramossissima	*9.33 ± 0.79*	*9.27 ± 0.74*	383

Table 1: Values are mean ± SD, n=3

► Photoprotective efficacity of ethyl acetate fractions from 2 halophytes in UVA and UVB

DISCUSSION

►The results show that the semi-purification process is effective to concentrate phenolic compounds in ethyl acetate fraction. Ethyl acetate fractions of halophytes present high levels of phenolic compounds associated to high radical scavenging activity. This study supports the hypothesis by which synthesis of phenolic compounds could be a physiological response faced with oxidative stress in halophytes (Ksouri et al., 2008). Moreover, these results show a photoprotective efficacity of ethyl acetate fractions of *Salicornia ramossissima* and *Aster squamatus*. This confirms results obtained by Hupel (2011), for the first specie, with methanol as the extractive solvent. These results are promising in valorising these halophytic plants as a source of natural antioxidant and photoprotective products, knowing that we used non toxic solvents (ethanol and water) for the powder maceration in respect to REACH norm.

References: • Couteau, C., *et al.* 2008. J*ournal of Dermatology Sciences* 50, 159–161 • Fernanda Pessoa, M., 2012. *Emirates Journal of Food and Agriculture* 24, 527-545 • Hupel, M., 2011. Thèse de doctorat en biologie marine, Université de Bretagne Occidentale, Plouzané, pp. 255 • Jégou, C., 2011. Thèse de doctorat en biologie marine, Université de Bretagne Occidentale, Plouzané IUEM, pp. 228 • Ksouri R., *et al.* 2008. *Comptes Rendus Biologies* 331, 865-873 • Molyneux, P., 2004. *Songlanakarin Journal of Science and Technology* 26, 211–219 • Phlorotan-ING project (GIS Europôle Mer 2009-12) • Solovchenko, D.A., 2010. *Springer Series in Biophysics*. Springer Berlin Heidelberg, pp. 143–163 • Van Alstyne, K., 1995. *Journal of Chemical Ecology* 21, 45-58.