Radical scavenging activities of various tropical salt marsh plants from New Caledonia

G. Le Diouron[1], N. Poupart [1], L. Della Patrona[2],
V. Stiger-Pouvreau[1], C. Poullain[3], P. Brun[2] & F. Guérard[1]

Nathalie.Poupart@univ-brest.fr

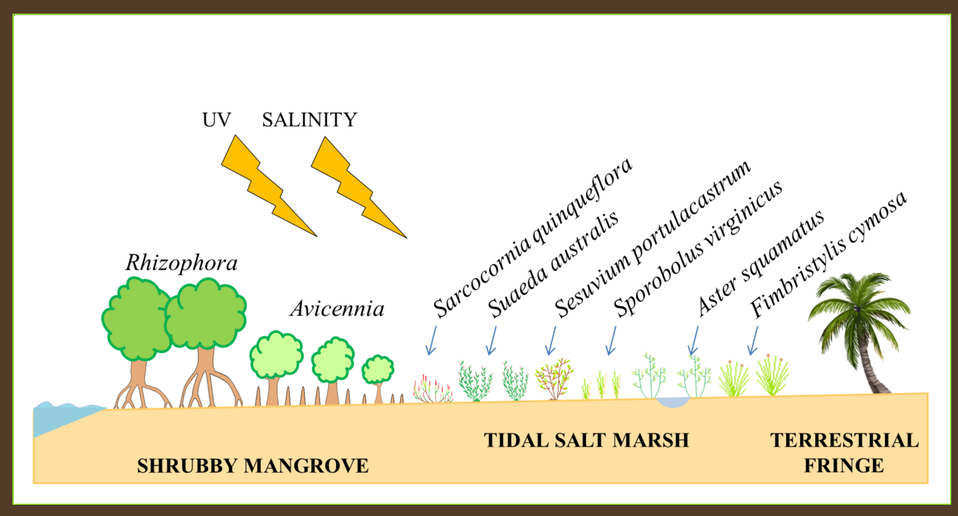
(1) Laboratoire des sciences de l'environnement marin , LEMAR - UMR 6539,
Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, Rue Dumont d'Urville, 29280 Plouzané, France.
(2) 101, Promenade Roger Laroque, Centre IRD, BP 2059 – 98846 Nouméa Cedex, Nouvelle Calédonie
(3) Institut de Chimie des Substances Naturelles, Centre National de la Recherche Scientifique, 1, avenue de la Terrasse, 91198 Gif-sur-Yvette Cedex, France

Context of the study

Few tropical tidal saltmarshes are characterized by halophytic plant populations associated to mangrove species, as observed in New Caledonia (Duke et al., 2010). Field studies showed that these halophytic communities are dominated by phanerogamic species, belonging to different families, like *Sarcocornia quinqueflora, Suaeda australis, Sesuvium portulacastrum, Sporobolus virginicus Fimbristylis cymosa* and *Aster squamatus*.

This environment undergoes strongly abiotic stresses for the plants, like UV radiation and high salt concentration, which may trigger oxidative stress generating reactive oxygen species (ROS) formation at molecular scale (Arbona et al., 2013). Plants develop several antioxidant mechanisms whose the synthesis of phenolic compounds to withstand this toxic ROS (Solovchenko et al., 2008). We investigate here the radical scavenging activities of six halophytic mangrove-associated-species of New Caledonia in the aim to potentially harvest these species as a source of antioxidant natural compounds.

Tropical saltmarsh in Kaala Gomen, New Caledonia

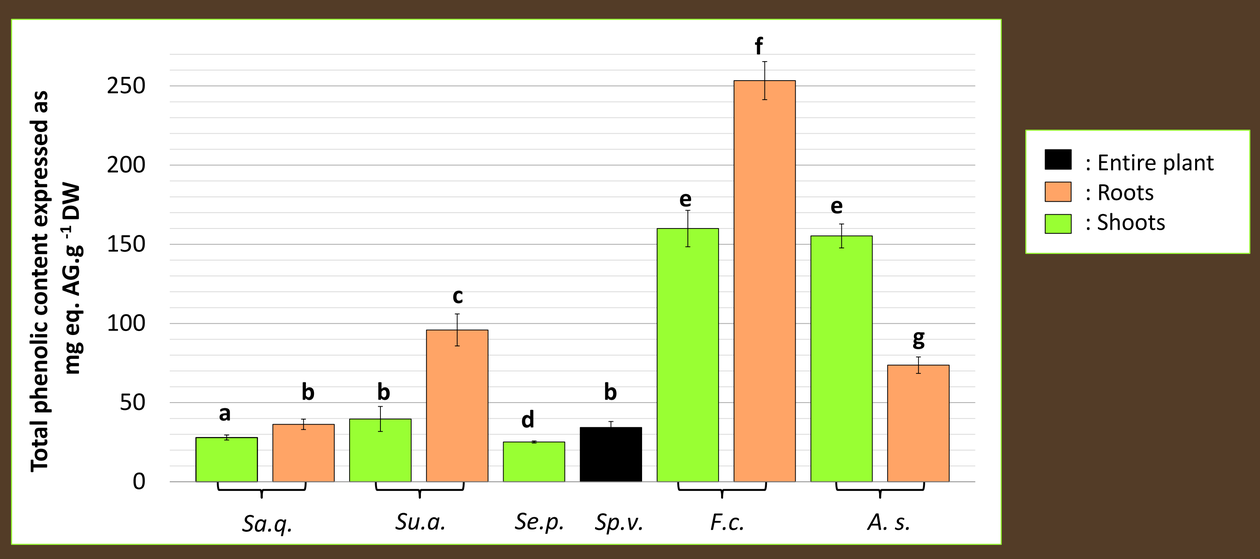


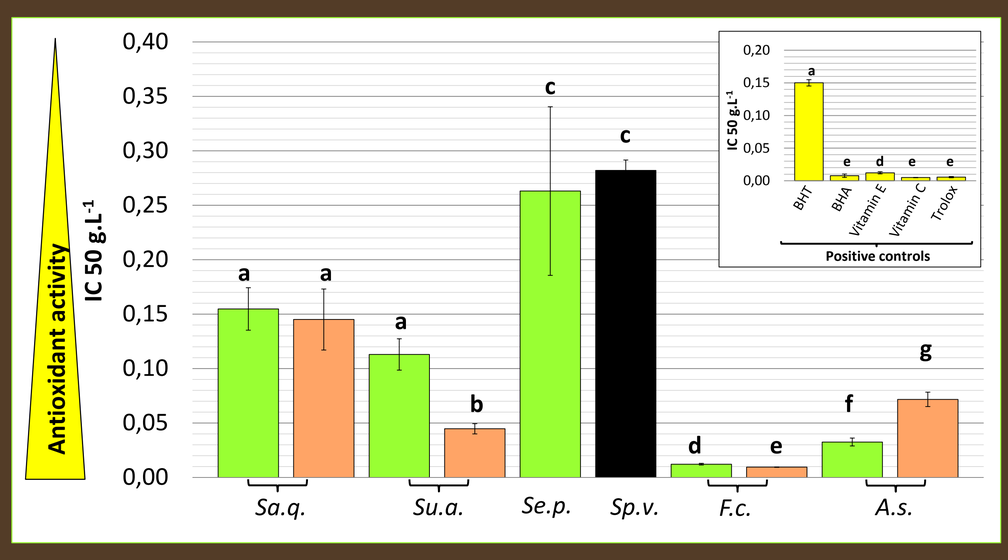
Spatial distribution pattern of halophytes along the tidal profile

Material and Methods

Plants were sampled in a salt marsh at Saint Vincent (Boulouparis, New Caledonia, GPS: S21° 55.632, E166° 04.966) in december 2011. Plant freeze-dried powder is extracted with ethanol-water (v/v 1:1) during one hour at 120 rpm and in the dark. After centrifugation, crude extracts were filtered and evaporated under vaccum at 35° C before aliquoting. Phenolic contents of the hydroethanolic extract were quantified using the Folin-Ciocalteu procedure (Van Alstyne, 1995) and the radical scavenging activities were assessed with the DPPH radical scavenging assay (Molyneux, 2004). Trolox, Vitamin C and E, butylated hydroxyanisole (BHA) and butylated hydrotoluene (BHT) were used as positive controls.

Total phenolic content (A) and DPPH radical scavenging (B) of six mangrove's halophytes





Sa.q. : *Sarcocornia quinqueflora, Su.a.* : *Suaeda australis, Se.p.* : *Sesuvium portulacastrum, Sp.v.* : *Sporobolus virginicus, F.c.* : *Fimbristylis cymosa, A.s.* : *Aster squamatus*.
Values are mean ± SD (n = 6). The letters indicates if there is significant difference between organs and species (same letters not significant).

The TPC and radical scavenging activity depend on the part of the plant. These results are in agreement with previous studies (Ksouri et al., 2008 ; Falleh et al., 2008). Furthermore, results show a high variability between species. The highest TPC and radical scavenging activity are observed for roots of *Fimbristylis cymosa* (with TPC = 246.9±8.6 mg eq. AG.g^{-1} DW and IC50 = 0.009 g.L^{-1} respectively. Conversely, *Sesuvium portulacastrum* (Aizoceae family), *Sarcocornia quinqueflora* and *Suaeda australis* (Amaranthaceae family) present low TPC and antioxidant activity. These differences could be partially explained by the fact that these species employ different strategies to overcome the oxidant stress, induced by environmental stresses. Some of them synthesize mainly polyphenols as *Fimbritylis cymosa*. In parallel, others develop morphological adaptations as for example, the succulence against saline stress (Orcutt et al., 2000) for the species belonging to Amaranthaceae and Aizoceae families. We have brought out the role of polyphenols in antioxidant activity and there is a negative correlation between the total phenolic content and the IC50 values (Kendall correlation, tau=-0.91, p-value=0.0000298).

Conclusion and perspectives

The results show variabilities according to both factors tested, organs and species. This study supports the hypothesis by which synthesis of phenolic compounds is a physiologic response faced with oxidative stress in halophytes (Ksouri et al., 2008). Otherwise, roots of *Fimbrystilis cymosa* present a strong antioxidant activity similar to positive controls. This finding is repeatable if plants are harvested from one year to another at the same period (no annual variability, data not shown). These two last informations would be promising in valorizing these halophitic plants as a source of natural antioxidant product and could represent new marine resources for New Caledonia.

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