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

G. Le Diouрон1, N. Poupart1, L. Della Patrona2, V. Stiger-Pouvreau1, C. Poulain3, P. Brun2 & F. Guérard1

(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) 301, Promenade Roger Laroque, Centre IRD, BP 2059 – 98846 Nouméa Cedex, Nouvelle Caledonie.
(3) Institut de Chimie des Substances Naturelles, Centre National de la Recherche Scientifique, 3, 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, Suada 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 might 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.

Material and Methods

Plants were sampled in a salt marsh at Saint Vincent (Boulouparis, New Caledonia, GPS: 21°55.632, 166°4.966) 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 vacuum 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 hydroxytoluene (BHT) were used as positive controls.

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

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 Fimbristylis 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 halophytic plants as a source of natural antioxidant product and could represent new marine resources for New Caledonia.

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 Fimbristylis 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 halophytic plants as a source of natural antioxidant product and could represent new marine resources for New Caledonia.

References: