

Pharmacognostic, phytochemical and antioxydant studies of *Hydnophytum formicarum* L

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Abstract

The leaves of *Hydnophytum formicarum* Jack belonging to the family Rubiaceae, a tropical tree commonly found in eastern and southern Thailand, South Asia, Papua New Guinea and the Pacific Islands, were studied for these antioxidant compounds. Sterols, flavonoids and phenolic compounds appear to be good markers for this species. Chromatographic and histochemical techniques were used to analyze its secondary metabolites and to localize these molecules in the leaves of *H. formicarum* and its petiole. With histochemistry, we can locate the phenols in situ by an iron chloride reagent, which gives a black color, especially in fibers, hypodermis and xylem. Flavonoids are detected histochemically using a potassium hydroxide reagent to obtain a yellow coloration under visible light. Histochemical studies of *H. formicarum* showed a high concentration of natural antioxidants in the central cylinder, particularly in the vascular bundle, whereas condensed catechic tannins were mainly detected in collenchyma, fibers and also in xylem. The high levels of phenolic compounds and their localization in the conductive tissues allow us to explain the traditional medicinal use carried out in Thailand with this tree because, very often, compounds with antioxidant properties prove to be good anti-cancer agents.

Thanks to screening by thin layer chromatography and histolocalisation on transverse sections, we have been able to select an extremely interesting plant more easily and less costly among many tropical medicinal plants. The tests with DPPH confirmed our hypothesis as to the leaves and caudex ethanolic extract antioxidant activity of *Hydnophytum formicarum*. The work on caudex could not be developed since it requires plant destruction. So we concentrated our work on leaves, which are much simpler to obtain in our tropical greenhouse. The spectrophotometric assays of the chemical compositions corroborate the qualitative analytical results obtained by histolocalisation of metabolites of interest. Indeed, by studying Table 1, we find the presence of phenols, flavonoids and tannins essentially and a non-negligible antioxidant activity. These metabolites are none other than phenolic compounds which are therefore corroborated and attest to the therapeutic properties traditionally granted to this plant. Histochemical studies of *H. formicarum* showed a high concentration of natural antioxidants in the central cylinder, particularly in the vascular bundle, whereas condensed catechic tannins were mainly detected in collenchyma, fibers and also in xylem. The high levels of phenolic compounds and their localization in the conductive tissues allow us to explain the traditional medicinal use carried out in Thailand with this tree because, very often, compounds with antioxidant properties prove to be good anti-cancer agents.

We have been able to show the usefulness of histolocalisation screening in order to make the initial research of medicinal plants (in particular antioxidant properties, see anticancer) more effective

for a more complete phytochemical study, which can then lead to establishing the discovery of a new “structure-activity” relationship, in a further research.

Mother tincture, decoction and infusion were the commonly used form used in traditional medicine because of its ease. Indeed these traditional forms of plants medicinal consumption in the world, thus highlighting their health potential due to their high content of bioactive compounds possessing a variety of biological activities.

Antioxidants acting as radical scavengers are able to protect the human body as well as processed food from oxidative damage especially because of their wide application in food preservation. Due to their wealth of phenolic compounds (flavonoids, anthocyanins, carotenoids, etc.), numbers of plant extracts are used are usually used to add flavour and improve the shelf life of dishes and processed food products. The low cost of natural antioxidants and their beneficial properties increases the interest in polyphenol plants in order to develop their use in the food industry and preventive medicine. The antioxidant capacity

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measured by the DPPH assay is generally strongly correlated with the amount of total phenols, as shown by our results for Provence herbs, which are at the heart of a booming market. The alcoholic extract and

the decoction, traditionally used methods, will be studied in our case because we want to demonstrate the correlation between the traditional use and the validated biological properties.