

# ***In vitro* radical scavenging activity of essential oils from Brazilian medicinal plants: *Croton zehntneri*, *Pterodon emarginatus* and *Schinopsis brasiliensis***

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Free radicals, as the partially reduced oxygen metabolites, are highly toxic and mutagenic; in human tissues, these can react with the neighboring molecules causing cellular damage, mainly through molecular chain reactions. Cancer, ischemia, atherosclerosis, diabetes and dementia are well known diseases related to radical damage. To counterbalance radical damage, endogenous antioxidants are available in organisms such as superoxide dismutase, catalase, glutathione peroxidase, alpha-tocopherol etc. When these defence systems fail due to increased production of reactive oxygen species (ROS), medicinal plants can represent a useful source of natural antioxidants for dietary supplementation and in the prevention or treatment of diseases. In the past, extensive use was made of plant products in the form of essential oils, known since ancient times for their biological activities. In this regard, the properties of the essential oils of a great variety of plants with anti-inflammatory, antibacterial and antioxidant properties have been long studied. Thus, in this context our research has focused on the characterization and determination of the antioxidant activity of plants of Central and South America, where the use of medicinal plants has always been significant and integral part of the popular culture. More specifically, the objective of this study was the phytochemical characterization of the essential oils of three traditionally used species, known as *Croton zehntneri* Pax et Hoffm., *Pterodon emarginatus* Vogel and *Schinopsis brasiliensis* Engl. The antioxidant activities were also determined by the use of 1,1-diphenyl-2-picrylhydrazyl (DPPH) scavenging assay<sup>1,2</sup> and oxygen radical absorbance capacity (ORAC) assay<sup>3,4</sup>. The essential oil of *Pterodon emarginatus* was extracted from the seeds, while the *Schinopsis brasiliensis* oil from the leaves and finally, the *Croton zehntneri* oils were obtained from leaves or bark. The qualitative and quantitative characterization of essential oils was carried out by gas chromatography/mass spectrometry (GC/MS); the constituents were identified by comparison of their mass spectra with those from NIST Mass Spectral Database. The essential oils contain mostly phenylpropanes and terpenes: the main compounds of *Croton zehntneri*, *Pterodon emarginatus* and *Schinopsis brasiliensis* oils were estragole,  $\beta$ -caryophyllene and myrcene, respectively. In order to have a preliminary pharmacological evaluation, antioxidant activity of the volatile oils was studied by the use of DPPH and ORAC assays. The essential oils, in a concentration range from 1.0 to 100 mg/ml, showed an appreciable antioxidant activity both in DPPH and ORAC assays. The *Pterodon emarginatus* oil exhibited the higher activity, with an EC<sub>50</sub> of 7.36 (CI: 6.25-8.65) mg/ml, in DPPH scavenging assay. The observed potency order was: *Pterodon emarginatus*>*Schinopsis brasiliensis*>*Croton zehntneri* bark>*Croton zehntneri* leaves. Moreover, the antiradical activities were confirmed also by ORAC assay, even if with some difference in the potency order. The present results show that the *Croton zehntneri*, *Pterodon emarginatus* and *Schinopsis brasiliensis* essential oils have an appreciable antioxidant activity. Generally, the essential oils are of interest in ethnopharmacology for their antimicrobial and anti-inflammatory activities which may be utilized to prevent or treat several illnesses. Moreover, these Brazilian plants are not reported in the Italian Health Ministry lists of herbal substances allowed or not allowed in food supplements, and thus could represent new useful products useful in herbal remedies. Other studies on their pharmacological activities are progressing.

## References

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