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### Saponins from leaves of *Quillaja brasiliensis*, a new source of immunoadjuvants with low toxicity: Biotechnological strategies for improving yields

*Quillaja brasiliensis* (Quillajaceae) is a native tree of southern Brazil, popularly known as soap tree. The barks of its congener species *Q. saponaria* are one of the main sources of saponins of industrial interest, mostly due to the immunoadjuvant properties of these secondary metabolites in vaccines. Saponins from leaves of *Q. brasiliensis* are remarkably similar to those of *Q. saponaria* barks, constituting a readily renewable source of biomass. These facts prompted investigations on the immunoadjuvant activity of *Q. brasiliensis* leaf saponins. The leaf aqueous extract and purified saponin fractions obtained from it showed strong immunoadjuvant activity with low toxicity in mouse experimental vaccines against bovine herpes virus 1 and 2, poliovirus, bovine viral diarrhoea virus and rabies. Effective propagation protocols for *Q. brasiliensis* were developed from seeds, as well as by clonal strategies such as micropropagation and minicuttings. Callus and cell suspension cultures accumulating saponins were also established. Studies on the regulation of saponin biosynthesis in leaves revealed increased production upon specific stress conditions and signaling molecule treatments. Leaf postharvest procedures were also developed, further increasing saponin yields. Among the most stimulant treatments, considering both the pre and postharvest stage, were exposure to UV-C, osmolytes, salicylic acid, jasmonic acid, ultrasound, and leaf mechanical damage. These results indicate that saponin accumulation in this species may be involved in general defense responses against biotic and abiotic stresses. The combined approaches of sustainable plant biomass generation, saponin yield elicitation, and proof of immunoadjuvant activity in vaccines against different pathogens provide a solid platform for the industrial application of *Q. brasiliensis* and its saponins.

#### Biography

Arthur Germano Fett-Neto received a PhD in Plant Physiology and Biochemistry at the University of Toronto, Canada. He spent two years as Research Associate at Dartmouth College (USA), working on Plant Molecular Genetics. After two years as Visiting Professor, he joined the faculty of UFRGS, where he has been a Full Professor of Botany since 1999. His research interests have a focus on trees, including plant secondary metabolism (mostly indole alkaloids and terpenes), and adventitious root development. He has authored over 75 papers, 19 book chapters, edited 3 books, and is inventor of 6 patents.

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