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## **Fruits of the Forest: Exploring Australia's Tropical Rainforests for New Pharmaceuticals and Industrial Chemicals<sup>®</sup>**

**Paul Reddell**

CSIRO Tropical Forest Research Centre, PO Box 780, ATHERTON QLD 4883

**Victoria Gordon**

Primary Source Phytochemicals Pty Ltd, PO Box 148, YUNGABURRA QLD 4872

Many of the chemicals on which our healthcare and agriculture rely originate from "leads" provided by nature. For example, approximately one in four prescription drugs used in the developed world are derived from tropical plants. However, a major limitation to the discovery of new chemicals from nature is the enormity of the tasking using current approaches which are largely random, time consuming, and costly. Recently we have developed a powerful new approach to discovery of "bioactive" chemicals based on our knowledge of the ecology of Australia's tropical rainforests. This approach very effectively targets sources of bioactive chemicals in nature and is helping us unlock the very rich, but largely untapped, chemical diversity of our tropical forests. In this presentation, we illustrate this approach with an example from our work on chemical defences in fruits and seeds of Queensland rainforest plants.

There are more than 1800 species of flowering plants in Australia's humid tropics and they exhibit a striking diversity in size, shape, colour, form, fruiting patterns, and dispersal mechanisms for their fruits and seeds. On the basis of ecology we predicted that because they are the propagules for future generations, fruits and seeds of rainforest plants would have a proportionally greater investment in defence (chemical and other) than would other plant parts. We further postulated that chemical defences would be:

- 1) Strongly developed in certain ecological groups against specific types of predators and pathogens;
- 2) Highly localised and potent within the fruit due to biological "trade-offs" inherent in packaging, protection, and dispersal of propagules.

From chemical analyses and bioassays of extracts we have confirmed much of what we predicted. Fruits and seeds of ecological groups that have significant resources invested in individual propagules and/or persist for extended periods in the warm, moist environment on the forest floor are a particularly rich source of bioactive defence chemicals. Bioassays on extracts from these groups show highly localized occurrence, and often very potent, biocidal activities within specific layers of the propagules. Many of these extracts are more effective than some antibiotics, fungicides, and insecticides currently on the market. Overall, using this approach we have found strong bioactivity in 67% of the extracts we have examined, this is much higher than current industry “hit” rates that are less than 2%.

Our “knowledge-guided” approach offers very significant opportunities to hasten the discovery from our tropical rainforest of new chemicals for medicine, agriculture, and industry that could have significant economic benefits to Australia.

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## New Plants for Tropical Landscapes®

### Anton Van de Schans

Siteplan Landscape Architects, 24 Scott Street, CAIRNS QLD 4870

**The definition of a “NEW” plant is very relative, depending upon personal perception, availability, and location. Its progression from being a “novelty” to an “old faithful” is influenced both by supply factors such as growth rate and ease of propagation and demand factors such as profile and application.**

### SOME EXAMPLES GROUPED BY TYPE OF “NEWNESS”

**Unsung Aussies in Exotic Gardens.** Species with a natural distribution extending from Australia to southeast Asia, that are in cultivation overseas, but little known or untried in Australia. The following plants illustrate this point:

- *Pogonatherum paniceum* (waterfall grass), wild species type of baby panda bamboo.
- *Tristellateia australasiae* (bagnit vine or climbing galphimia), Malpighiaceae
- *Dipteris conjugata*

### Exotic Species Not Yet Introduced.

- *Dipterocarpaceae* spp.
- *Ficus celebensis* (with *Pandanus toei*)
- *Stiffia chrysantha*, Asteraceae
- *Pereskia corrugata*, Cactaceae
- *Cordia sebestena* (variegated), Boraginaceae

**Exotic Species Introduced into Cultivation.** Here, but still in “collectors” phase. Plants not quite available or in very limited supply. Often attracting a premium price. The following plants illustrate this point:

- *Pisonia grandis* ‘Alba’ (moonlight tree), Nyctaginaceae
- *Fagraea fragrans* (tembusu), Loganiaceae
- *Mesua ferrea* (Ceylon ironwood), Clusiaceae