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Cryptic Australian *Huperzia*: the lure of biology, a promise of natural products and the challenges of conservation

Of eleven Australian *Huperzia*, ten are slow-growing epiphytes of the Queensland Wet Tropics. Four are endangered, four are vulnerable and two are rare. Members of the most basal extant vascular plants, the Lycopodiophyta, *Huperzia* tend to wide ranges over which they are rare but locally common, a phenomenon that possibly reflects the distribution of mycorrhizae upon which the long-lived, non-photosynthetic gametophytes are mycoheterotrophic. Collectors and logging have reduced populations such that some taxa may become extinct in the wild.

Of horticultural interest, *Huperzia* are also of pharmaceutical interest because they produce an acetylcholinesterase inhibitor that reportedly reduces short-term age-related memory impairment in humans. Plants are currently the only source of huperzine-A which is available in the USA as an over-the-counter supplement.

Huperzia underperform their horticultural and industrial potential because supply is restricted by slow growth, no methods of sexual propagation and limited availability of species in culture. The genetic variation of individuals in horticulture is low, with the industry based on a few species sourced from a small number of vegetatively-cloned plants. The restricted availability of *Huperzia* in nurseries, and their consequent cost, has contributed to the pressures on wild populations from poachers. Uncertainties in naming species have commercial and conservation consequences by making more difficult the registration of provenances with biotechnological and horticultural promise.

I shall discourse upon science that may assist preserving *Huperzia* biodiversity, revitalizing a traditional resource-based horticultural business and creating a new pharmaceutically-oriented industry.

Biography

A reader in Tropical Plant Sciences at James Cook University, a university in the Australian tropics, I have published extensively on the biochemistry and ecophysiology of plants with Crassulacean acid metabolism (CAM) and on the physiology of herbicide resistance in weeds. Between 2001 and 2006 I co-directed OzFACE, the only Free-Air CO_2 Enrichment (FACE) experiment yet performed in the tropics.

Current research interests include i. the feasibility of *Agave tequilana, Agave sisalana* and cassava as biofuel feedstocks in the tropics, ii. pathways of photosynthesis in Australian desert plants, iii. survival strategies of Australian desert trees such as *Acacia peuce*, iv. responses of tropical plants to rising concentrations of CO_2, and v. how hydraulic morphology and water-use adjusts during the transition from vine to hemiepiphyte.