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P56 - Nuclear microprobe analysis of leaves from tropical nickel hyperaccumulators growing in Sabah, Malaysia

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Understanding the ways in which hyperaccumulator plants take up and store metals is critical to optimizing their use for/in phytoremediation and phytomining. However, to date very little work has focussed on tropical nickel hyperaccumulators, which have the greatest potential for application in future phytomining operations. Three plant species with high phytomining potential (because of their high growth rate and high nickel accumulation) are *Phyllanthus balgooyi*, *P. securinegoides* (Phyllanthaceae) and *Rinorea bengalensis* (Violaceae) that occur in Sabah, Malaysia on ultramafic soils. *Phyllanthus balgooyi* has been found to have 17% (dry weight) of nickel in the phloem sap, and 8,600 mg/kg in leaves, while *P. securinegoides* has 23,250 mg/kg of nickel in leaves and 10,800 mg/kg in phloem tissue, and *Rinorea bengalensis* 12,800 mg/kg in leaves and 22,600 mg/kg in phloem tissue. Plant material was cryo-fixed in the field using specially designed procedure. Micro-PIXE quantitative elemental mapping of leaves and stems of these species was performed using the nuclear microprobe at the Materials Research Department, iThemba LABS (South Africa). Analysis of stem sections of *Phyllanthus balgooyi* shows that nickel is very high in the major vascular bundles, whereas calcium is high in cortex and collenchyma, but low in the vascular bundles. In *P. balgooyi* leaves nickel is located mainly in the lower epidermis extending into the spongy mesophyll, and extremely high in central vascular bundles. Calcium is also high in the lower epidermis and spongy mesophyll, but lower in the vascular bundles. Similar elemental distribution patterns in the leaves apply to *P. securinegoides*, except that nickel is higher in the upper epidermis. In *Rinorea bengalensis* leaves nickel is highest in both the lower epidermis and upper epidermises. Calcium is located mainly in leaf vascular bundles (xylem and phloem) in the mid-vein as well as in spongy mesophyll tissue.

Primary author: Dr MESJASZ-PRZYBYLOWICZ, Jolanta (Materials Research Department, iThemba LABS, National Research Foundation (NRF), South Africa)

Co-authors: Dr BARNABAS, Alban (Materials Research Department, iThemba LABS, National Research Foundation (NRF), South Africa); Mr VAN DER ENT, Antony (Centre for Mined Land Rehabilitation, Sustainable Minerals Institute, The University of Queensland, Australia); Dr PRZYBYLOWICZ, Wojciech (Materials Research Department, iThemba LABS, National Research Foundation (NRF), South Africa)

Presenter: Dr MESJASZ-PRZYBYLOWICZ, Jolanta (Materials Research Department, iThemba LABS, National Research Foundation (NRF), South Africa)

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