

# Special Interest Article – the phytomanagement of biowastes

By Brett Robinson

Phytomanagement describes the use of plants to improve environmental outcomes while producing valuable biomass. Obed Lense is starting his PhD on the phytomanagement of biowastes under the supervision of Jürgen Esperschütz, Nick Dickinson, Jacqui Horswell and Brett Robinson. Potentially, mānuka (*Leptospermum scoparium*) could be grown on biosolids-amended soils to produce valuable honey. Other economically important plants in the trial are kānuka (*Kunzea ericoides*) for the production of firewood and essential oils, and pine (*Pinus radiata*) for timber production. Sorghum (*Sorghum bicolor*) and oilseed rape (*Brassica napus*) may find a role in bioenergy production on biosolids-amended soils. A feature common to these species is that they are all Biological Nitrification Inhibitors (BNI), which means that they inhibit the transformation of the ammonium, an immobile plant nutrient, into nitrate which can leach into groundwater.

While overseas studies have shown that pine, sorghum, and brassica may be BNI, pioneering work by Lincoln University Honours student Rachel Downward has shown that some New Zealand native species also have this property. Planting BNI in biosolids-amended soils may thus reduce nitrate leaching, which is the factor that limits the application of biosolids to land in many jurisdictions.

While BNI may reduce nitrate leaching from biosolids over the long-term, the initial load of nitrate present in biosolids may cause a large pulse of this contaminant to leach shortly after application. Dharini Paramashivam has found that mixing biosolids with wood-waste and charcoal (i.e. other biowaste streams) can mitigate this nitrate leaching and further promote plant growth. The phytomanagement of biowastes is most appropriate on degraded soils, where

contaminants that are often associated with biowastes, such as heavy metals, are less important. This technology could be used in New Zealand and worldwide to rebuild degraded soils, provide a beneficial use for the biosolids and produce an economic return off the land.



*Mini-lysimeters at Lincoln University with mānuka, kānuka, pine, sorghum, oilseed rape and pasture. From left to right: Jürgen Esperschütz, Dharini Paramashivam and Obed Lense*