



FACT SHEET 6: SLUDGE AS A GROWTH MEDIUM

THERE IS NUTRIENT VALUE IN SLUDGE

Biosolids and sludges are carbon-rich and contain high concentrations of valuable nutrients (N, P, trace elements) that can have high fertiliser value to plants¹. In addition, biosolids can improve moisture retention and organic matter content of soils.

It should be noted that depending on various parameters sludge can also be a vehicle for contaminants such as trace metals, organic contaminants and human pathogens, however, through stabilisation processes it is possible to yield products (biosolids) that are considered safe for beneficial use^{2,3,4}.

GROWING PLANTS WITH SLUDGE

Current policy and community expectations focus on the development of sustainable reuse options for biosolids. One potential use for biosolids is as part of seedling growth media in nurseries⁵. Many Councils have their own nurseries that produce plants for amenity plantings in their district, making this option for sludge use appealing. There is also a current drive to plant trees through government initiatives such as '1 billion trees' which will require the increase in output of seedlings.

The growth of shrubs and trees in nursery situations are well suited to using biosolids because:

- They are not directly linked to the human food chain;
- They commonly use growing media which requires frequent replacement;
- These types of plants, especially native trees and shrubs, are often slow growing and may benefit from a slow release fertiliser such as biosolids; and

- The time between potting up the seedlings and planting out would allow for some further stabilisation (and attenuation of microbial contaminants) of the product.

POTENTIAL ISSUES

Factors that should be considered before determining the potential use of biosolids products for seedlings include:

- This end-use would not be viable for biosolids containing high levels of trace metals such as Chromium (Cr) which may disrupt plant growth;
- In most cases, biosolids will need to be mixed with bulking agents such as mulched bark to aid in aeration and moisture retention; and
- Depending on the existing stabilisation grade of the product (pathogen content), care will need to be taken to ensure the health and safety of people that come into contact with it.

TECHNICAL APPLICATION

Nurseries use a variety of products and containers for growing seedlings. Plant growth mediums can contain a combination of peat moss, compost, mulched bark, sand, pumice, coconut coir and/or perlite amongst other things. The mixture needs to balance moisture retention with free draining properties as well as provide adequate nutrients for plant growth, often supplemented by inorganic fertilisers.



Sludge and biosolids can be an efficient replacement for the nutrient containing portion of growth mediums, where both slow and fast releasing N is beneficial to plant growth.

Sludge/biosolids and mulched bark mixtures ranging from 10-50% sludge has been shown to improve plant growth, with optimum ratios varying depending on sludge properties such as:

- Nutrient properties of the sludge i.e. N, P, K and trace element concentrations, and the subsequent availability of these;
- The pH of the sludge, most plants thrive in the 6.0 to 6.5 (slightly acidic) range, a low pH may require the addition of lime; and
- The concentrations of trace metal contaminants such as Chromium (Cr).



When investigating using sludge in this way other consideration must be given to:

- Sludge testing – the quality of the sludge must be determined prior to use to establish nutrient and contaminant concentrations;
- Growth testing – to ensure suitability of sludge for plant growth small scale trials may be required to prove efficiency;
- Effective health and safety – a nursery wishing to investigate use must be able to practice adequate health and safety measures as a precaution against potentially pathogenic microbes, unless a ‘Grade Aa’ biosolids product is being used⁴;
- Transport – significant costs are involved in transport of sludge from WWTP to the nursery site depending on the distance³; and
- Consenting – operations for using sludge in this way may require an application for council consent depending on Regional or District Plans⁶.

BACKGROUND

The Regional Biosolids Strategy – Lower North Island is a collaborative project funded by the Waste Minimisation Fund. Ten lower North Island Councils have worked in partnership with Lowe Environmental Impact and research partners to develop a biosolids strategy that includes the potential collective management of sludge, focussing on beneficial use.



This project was undertaken with the support of the Ministry for the Environment waste minimisation fund, however, the Ministry does not necessarily endorse or support the content of this publication in any way.

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1. Fact Sheet 1 of the Regional Biosolids Strategy: What are Biosolids?
2. Report 9 of the Regional Biosolids Strategy: Biosolids Processing Trials; Biosolids composting trial final report.
3. Report 13 of the Regional Biosolids Strategy: Potential End-Use Options for the Lower North Island
4. NZWWA. (2003). Guidelines for the safe application of biosolids to land in New Zealand. Ministry for the Environment (New Zealand Water and Wastes Association)
5. Report 6 of the Regional Biosolids Strategy: Seedling trial Report
6. Fact Sheet 7 of the Regional Biosolids Strategy: Regulation and Consenting