

Mining Rehabilitation using OGM (Organic Growth Medium)



4.5 years after OGM application and tree seeding

Ashton Coal Case Study

What:

Using OGM with topsoil and overburden (waste rock) to rehabilitate mined land based on research trials undertaken by Ashton Coal Pty Ltd (ACOL)

Where:

Open cut mine, Ashton Coal Operations Ltd (ACOL), Camberwell NSW, Australia

Outcome:

OGM improved pasture establishment and growth of woodland plant species

Background

Soils in post-mining landscapes are generally heavily degraded with low organic content. Poor quality topsoil and high weed invasion has often hampered rehabilitation in open cut mining operations in the Hunter Valley. Soil amendments are increasingly used to improve soil quality and structure and promote the rehabilitation of open cut spoils.

In May 2007 a trial was established by ACOL to investigate the effect of Organic Growth Medium (OGM), a municipal solid waste compost, in revegetation efforts at their open cut mine site in the Hunter Valley, NSW.

OGM was added as a soil amendment to see if pasture establishment could be improved on the out-of-pit emplacement area and to investigate whether tree and shrub establishment could also be improved.

“OGM improved establishment of pasture and woodland species on mined land”

Adam Spargo
Environmental Co-ordinator ACOL

Pasture revegetation

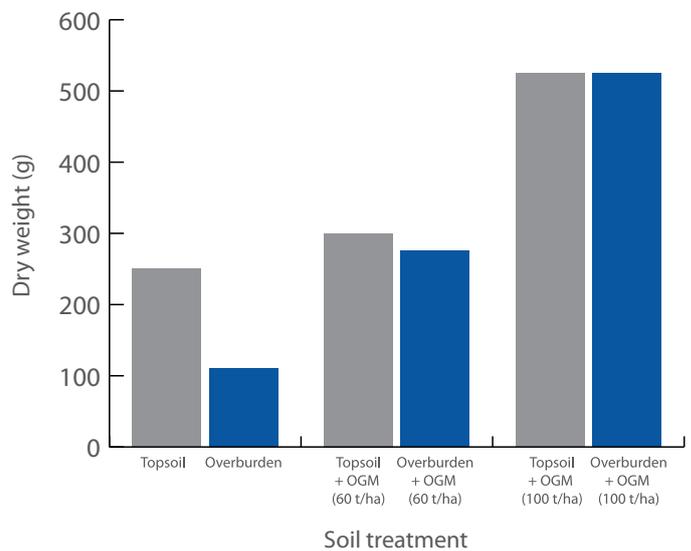
OGM increased pasture groundcover in both overburden and topsoil areas. Increased OGM application rates also showed a decrease in weeds and an increase in the proportion of desired pasture species in topsoil plots. Weed growth was reduced in the topsoil and OGM plots because the Kikuyu and Couch quickly colonised and outcompeted *Galenia* spp. sometimes known as carpet weed, mat weed or Galenia.

The best rehabilitation results were achieved with topsoil and OGM applied at 100 t/ha. These plots had the highest percentage of ground cover, low weed growth and the greatest above-ground herbage mass.

Overburden and OGM gave similar results to topsoil and OGM treatments, although the percentage of ground covered by the desired pasture species was lower. If there is limited topsoil available for rehabilitation, OGM applied with overburden has shown to give great results in pasture rehabilitation.

OGM applied at both rates provided adequate ground cover with low weed numbers but the higher rate led to more above-ground herbage (mass) on both topsoil and overburden plots. This would support a higher stocking rate in grazing areas.

Figure 2 Average dry weight of above-ground biomass in pasture plots surfaced with overburden or topsoil and OGM (0, 60 and 100 t/ha)
 Source: Evaluating the Effects of Organic Growth Medium, a Solid Municipal Waste compost, on Tree and Pasture Growth in Open Cut Coal Mine Rehabilitation, Adam Spargo.



Woodland revegetation

Trees and groundcover

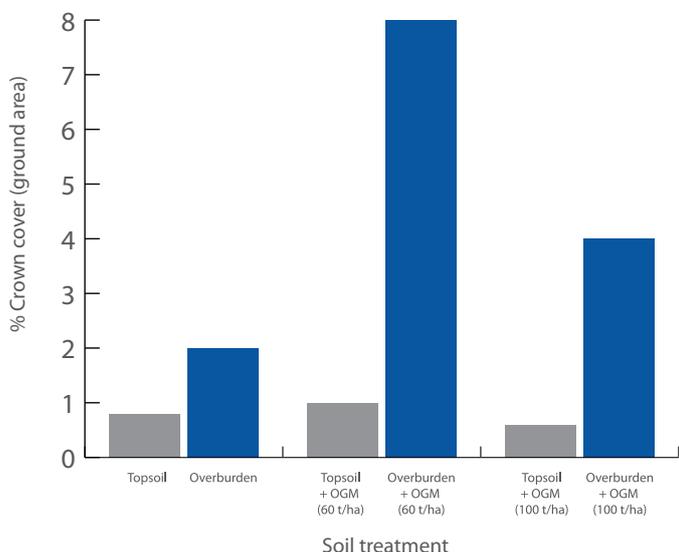
Overburden was superior to topsoil in establishing this woodland post-mining landscape and OGM significantly improved rehabilitation. OGM at both application rates increased tree growth in topsoil and overburden areas. Tree dimensions were significantly greater in treatments with overburden and OGM than in treatments with topsoil and OGM. A higher percentage of weeds was found within all topsoil plots compared to overburden plots.

“OGM applied to both topsoil and overburden areas significantly improved tree height, tree diameter and canopy cover.” Adam Spargo

Galenia spp. was the dominant weed species found

Figure 1 Crown cover of woodland plots surfaced with overburden or topsoil and OGM (0, 60 and 100 t/ha).

Source: *Evaluating the Effects of Organic Growth Medium, a Solid Municipal Waste compost, on Tree and Pasture Growth in Open Cut Coal Mine Rehabilitation*, Adam Spargo.



throughout all treatments and this appeared to affect tree growth in the topsoil treatments.

This early weed establishment, most likely from the topsoil residual seed bank, poor quality topsoil and compaction are the likely causes for reduced tree growth in the topsoil plots.

OGM applied at 60 t/ha with overburden had a similar, if not greater, effect on tree growth rates than the higher rate of 100 t/ha, which could lead to reduced rehabilitation costs. Although the addition of OGM to overburden improved tree height and diameter, it had little effect on tree density and diversity. Similar tree and shrub species were identified across all treatments.



Trial design

The OGM trial covered six hectares of the eastern emplacement area of ACOL's north-east open cut pit. Waste rock (overburden) mined from the site was dumped in the area over a three year period. The overburden was shaped at a 14° battered slope with contour drains at approximately 50 m intervals down the slope. The overburden was ripped to about 300 mm to break up compacted soil and remove any large rocks in the sub-surface area. The surface was then rock raked with a D7 dozer to remove any large rocks.



The trial was designed to highlight any differences in rehabilitation/ revegetation between overburden or topsoil as well as the effect of OGM on both of these substrates. OGM was applied to a portion of the overburden at either 60 t/ha or 100 t/ha using a tractor and spreader. Another area was treated with topsoil (at a depth of 100 mm) as well as OGM at 60 t/ha and 100 t/ha. Areas of topsoil and overburden were also left untreated for comparison. Once OGM was applied, a light rock rake was again used to incorporate the material within the substrate.

Woodland and pasture revegetation were assessed on each plot type. Tree and shrub seed was spread with a bulking agent (kitty litter) and pasture seed was spread with fertiliser (200 kg/ha of Granulock 15).

Pasture growth and tree/shrub development was assessed in each plot. Pasture revegetation was measured by percentage groundcover and mass of above-ground herbage. Woodland revegetation was measured by tree height, stem diameter, canopy cover, density and diversity. Weed presence was also recorded in all plots.

What is Organic Growth Medium (OGM)?

- A composted and pasteurised high organic matter product. Nutrients are derived from garden waste, foodwaste and other elements found in the waste stream.
- A rich source of biomass and biological activity that is produced to a strict quality standard set by the NSW EPA: "The Organic Outputs from Mixed Waste Exemption 2011".
- A composted organic product, which undergoes pasteurisation such that it meets the biosecurity requirements of the Department of Primary Industries (Phylloxera Certification). The pasteurisation process destroys weed seeds, plant propagules and pathogenic microorganisms.
- A product developed to a system based on Australian Standards AS4454:2003 and audited by an independent body (SAI Global).



Reference

The information in this case study is based on the following report; *Evaluating the Effects of Organic Growth Medium, a solid municipal waste compost, on tree and pasture growth in open cut coal mine rehabilitation*. Adam Spargo, Uni QLD, 2009.

This rehabilitation project was funded by Ashton Coal. Ashton Coal would like to acknowledge Adam Spargo's passion and effort in completing this research project.

Global Renewables Australia

Global Renewables Australia (GRA) is a privately-owned and operated Australian company which owns and operates the Eastern Creek Alternative Waste Treatment (AWT) facility in NSW. Resources from 220,000 t/year of municipal solid waste from households in Sydney is recovered, separated and cleaned into recyclables and an organic rich fraction. The resources recovered avoids the significant environmental problems that are caused by the landfilling of waste. Over 60,000 t/year of Organic Growth Medium (OGM) is produced from the organic rich fraction and is used to rehabilitate land affected by mining and improve agricultural production.

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Ashton Coal Operations

The Ashton Coal operation is an unincorporated Joint-Venture between Yancoal Australia Ltd (90%) and Itochu Corporation of Japan (10%). The Ashton Coal Project is located approximately 14 km north-west of Singleton in the Hunter Valley, NSW.

Ashton Coal is committed to growing a successful coal mining business while acting as a responsible corporate citizen with consideration for the community. Ashton Coal is dedicated to establishing stable, productive rehabilitation effective for stock grazing and native fauna ecosystems.

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