Organic Growth Medium Good or Bad for Perennial Herbs?

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Introduction

Organic Growth Medium™ (OGM) is produced from municipal household waste which undergoes sorting, composting and pasteurisation in order to produce a material high in organic matter as well as macro and micro nutrients. Previous work in the Hunter Valley has shown that OGM leads to significant increases in cover in the canopy and shrub layer (Spargo, 2012). However, trees and shrubs make up less than 30% of the species diversity within the Central Hunter Grey Box Ironbark Woodland EEC (Endangered Ecological Community). Perennial herbs within the ground layer make up a significant portion of the remaining 70% but are often not included when performing rehabilitation works due to lack of seed availability or when included they rarely establish and survive poorly. The reasons for poor long term survival may include unsuitable conditions on the rehabilitation area for growth or reproduction, seed predation by ants or a lack of pollinators. This study focuses on whether the use of OGM can improve site conditions to increase the survival and cover of six perennial herbs from the target EEC.

Experimental Setup

An experiment was set up on the Ravensworth Open Cut coal mine in the Hunter Valley examining the effect combinations of spoil, subsoil, OGM and shredded wood mulch application have on cover and survival of native understorey plants. 6 blocks of 10x10m plots were set up with 6 perennial herb species planted into 1x1m sub-plots that were grouped by species. *Calotis lappulacea, Desmodium brachypodum, Einadia nutans* and *Swainsona galegifolia* were planted in May 2014 while *Chrysocephalum apiculatum* and *Hypericum gramineum* were planted in August 2014.

Projected Cover

In February 2015 the % projected cover on each 1x1m sub-plot was measured for the targeted species as well as for everything else on the plot, with species covering ≥25% of the plot being identified.

There was significantly (p=<0.0001) more cover from exotic species on OGM plots (Figure 1) which will lead to increased competition for native plants.

Plants on the OGM plots were generally larger (Figure 2) except for *H. gramineum* (p=0.0467).

Survival of Perennial Herbs

Five surveys were performed over 7 months. Survival curves have been developed using JMP11 to show proportional risks (Table 1).

Reference: Sprago, A., (2012). Evaluating the Effects of Organic Growth Medium, a Solid Waste compost, on Tree and Pasture Growth for Open Cut Coal Mine Rehabilitation. Hunter Valley, Australia: Ashton Coal.

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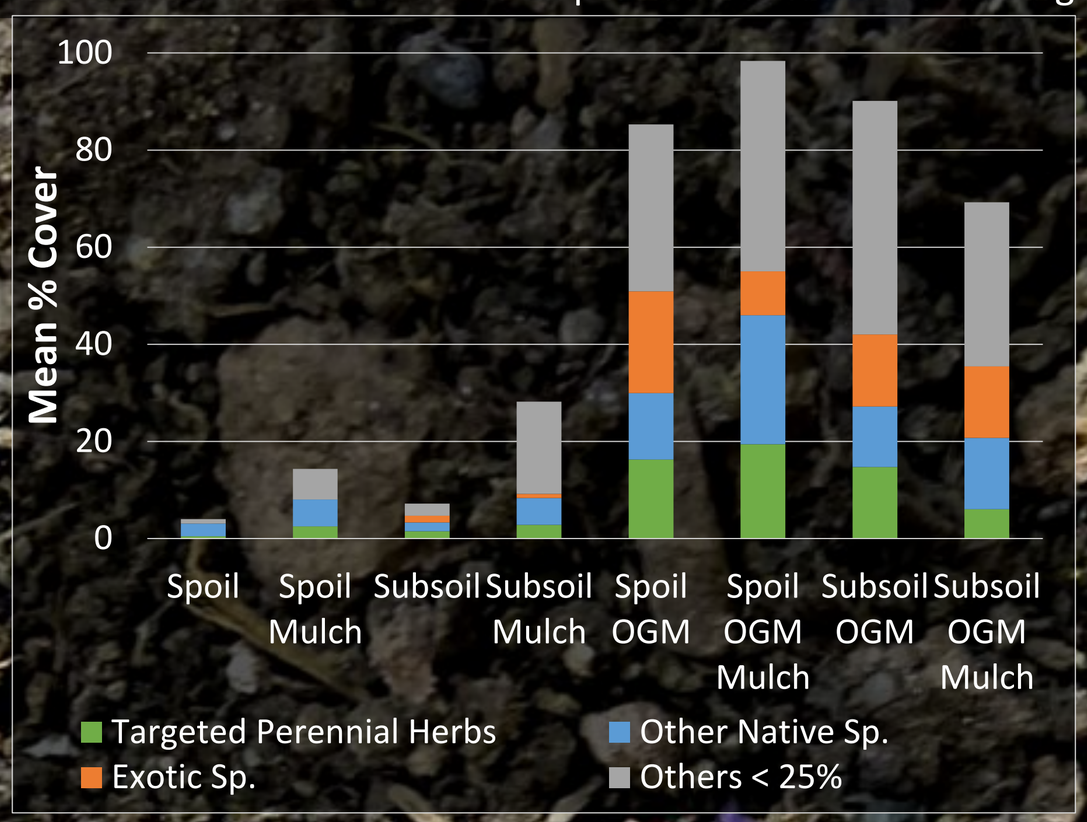

Figure 1. Projected cover of 1x1m subplots. There is significantly more targeted, native and weed cover on OGM plots (p= <0.0001). Grey bars represent other species that did not make up 25% on a plot and hence were not identified as either native or exotic

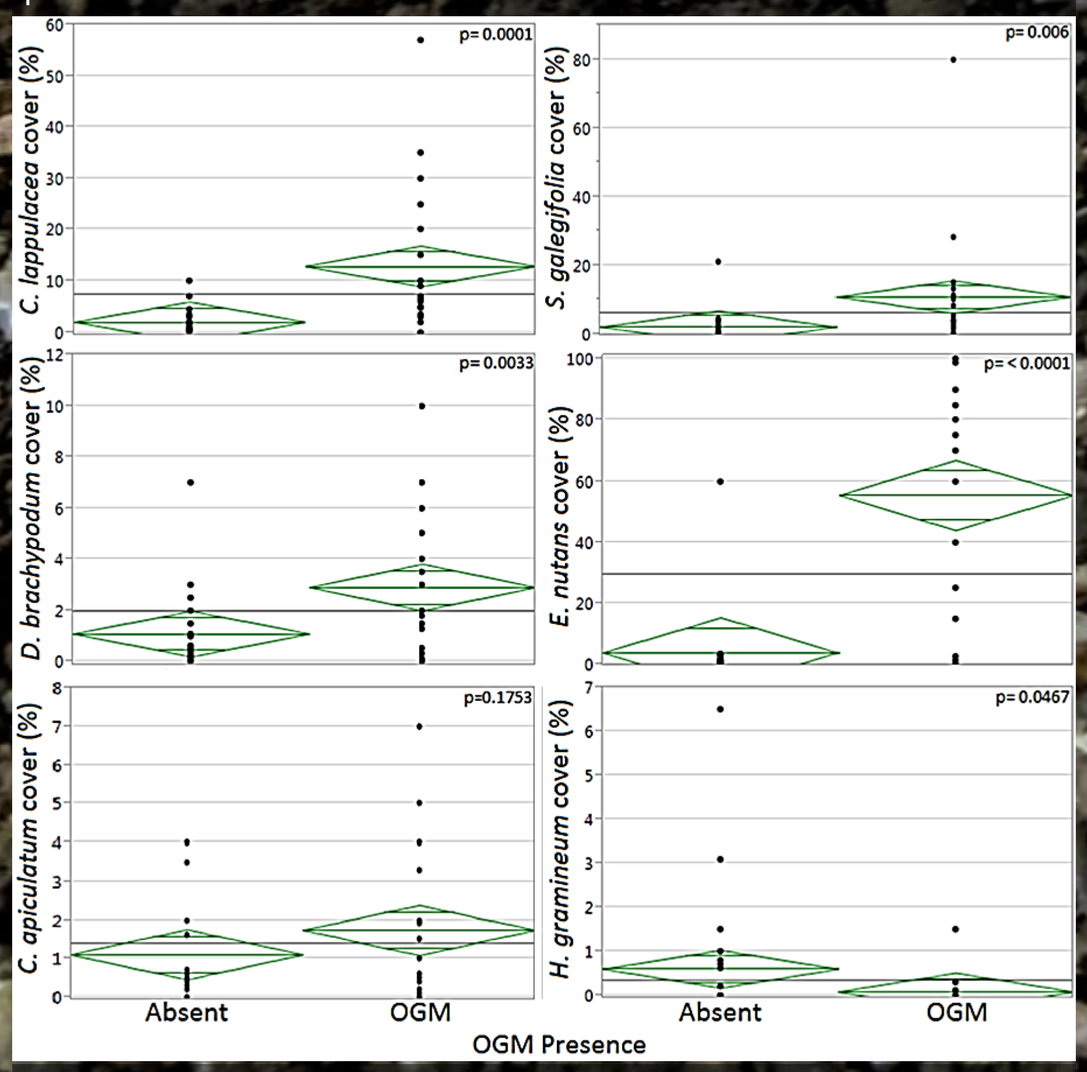

Figure 2. Percentage cover of targeted herbs.

Table 1. Risk ratios with associated probability. A significant p value (p<0.05) indicates the strength of the risk ratio. Risk approaching infinity from 1 indicates higher risk of dying (red) where as risk approaching 0 indicates higher probability of surviving (green).

Species	p value	Risk of Dying With OGM
C. lappulacea	<.0001	0.13
C. apiculatum	0.0157	2.35
D. brachypodum	0.4789	0.82
E. nutans	0.8080	0.89
H. gramineum	<0.0001	2.91
S. galegifolia	0.0001	0.37

Soil Chemistry

Four soil samples were taken from each plot then combined and sent to SWEP Analytical Laboratories for analysis. Though some elements were brought to the recommended levels for native forest given by SWEP (Ca and P), many elements (N, K, S, Cu, Zn) and electrical conductivity were taken to excessive levels.

Discussion

OGM appears to increase the cover and survival of *C. lappulacea* and *S. galegifolia*. *D. brachypodum* and *E. nutans* displayed increased cover with OGM while not having a significantly different survival rate. It could be that the species are well suited to surviving in harsh conditions but are able to make use of nutrients when supplied. *C. apiculatum* and *H. gramineum* did not display positive effects from the OGM with neither species surviving better and *H. gramineum* having lower cover. Planting these species later in the season may have influenced their interaction with OGM, nutrient levels in the OGM may be excessive or higher competition levels from exotic species early in establishment may have reduced their cover and survival on OGM.

Conclusion

At this stage indications are that while some species appear to have benefited from the OGM others have not, however, longer term monitoring will be required. So far, creating a diversity of habitats by placing patches with and without OGM could be beneficial for increasing species diversity.

Nevertheless controlling weeds is essential as they also benefit from the increased nutrient levels on OGM. OGM therefore has the potential to benefit herbaceous perennials but appropriate management is necessary.