



The use of sustainable biochar compost for remediation of contaminated land

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South Wales (UK) has a long industrial history which, since the collapse of the coal-mining industry, has left a large number of contaminated former colliery sites. Bio-remediation of these areas by re-vegetation with native grasses aims to prevent erosion and leaching of pollutants into drainage waters. However, acid pH, low organic-matter content and unsuitable soil structure have limited the success of re-vegetation and prompted research into the development of artificial soils.

This study aims to assess the value of creating an artificial soil cover by adding “biochar compost” to the top 10cm of a large volume of contaminated colliery spoil (high in As and Cu) to be moved during construction of a flood-alleviation barrage in Cwm Dulais (Swansea). It is proposed to use biochar, manufactured from chipped biomass sourced from a local stand of invasive *Rhododendron ponticum* using a BiGchar 1000 fast pyrolysis-gasification unit, in combination with locally produced BSI PAS100-certified *Pteridium aquilinum* (bracken) compost, to remediate a large area (2.3ha) of landscaped colliery waste and re-establish a cover of native grasses suitable for sheep grazing. Pot and field trials are being used to determine the most appropriate biochar:compost mix.

In a 90-day outdoor pot trial, a commercial acid-grassland seed mix was grown in screened (< 20mm) colliery spoil, to which 25%v/v bracken compost (with/without composted manure) was added as a source of organic matter. This application rate of compost (equivalent to 250m³ha⁻¹) was based on a successful coal-tip remediation trial at Ffos-y-Frân (Jarvis & Walton, WRAP Report, 2011). Varying application rates of biochar (0%, 2%, 5%, 10% or 20%v/v) were employed. Additional benefits of adding mycorrhizal inoculant or *Trifolium repens* (white clover) seed were also tested. Six-fold replication was used, with appropriate controls. The performance of each treatment was assessed from its maximum sward height and final above-ground dry phytomass. To evaluate the quality of the resulting grassland for sheep grazing, grass samples are being analysed for nutrients, heavy metals and metalloids by elemental analysis (EA) and X-ray fluorescence spectroscopy (XRF). These results will be compared with grass samples collected from Cwm Dulais.

Initial findings suggest that addition of biochar compost improved grass growth compared with unamended colliery spoil.