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Biochar as a biosecurity tool for the management of invasive and/or infected plants.

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Control of invasive alien/native plants and diseased trees is often achieved using labour-intensive mechanical methods, incurring high costs and significant carbon debt. Disposal of cleared biomass may be heavily regulated. The commonly used method, burning, wastes a potentially valuable resource. Biochar may offer a safe, cost-effective solution to the problem of disposal.

Large areas of Wales are covered by bracken (Pteridium aquilinum) (37x103 ha) or invasive Rhododendron ponticum (area not yet quantified). Clearance of these plants is often necessary for agriculture or maintenance of biodiversity (bracken), or to curb the rapid dispersal of the fungus-like pathogen Phytophthora ramorum from rhododendron (the principal host) into commercial timber stands, notably Japanese larch (Larix kaempferi). In addition, ash dieback (the fungal disease Hymenoscyphus pseudoalbidus aka Chalara fraxinea) is now spreading aggressively in common ash trees (Fraxinus excelsior) in the UK.

Pilot-scale experiments are being conducted using a BiGchar 1000 mobile, fast pyrolysis –gasification unit, focussing on chipped rhododendron, Japanese larch and common ash feedstocks. Preliminary results of these experiments will be presented. The biochars produced are being subjected to a range of physical and chemical analyses. Levels of micro- and macro-nutrients retained from the original feedstocks are being evaluated. Organic and inorganic contaminants are also being compared with those in the respective feedstocks. Biochar produced from R. ponticum comprised C 63.7-85.9%, H 0.4-0.8%, N 0.4-0.8%, S 0.27-1.79% and O 4.1-27.4%, with most of the mineral nutrients being retained from the original feedstock, especially Mn. Larch biochar comprised C 84.1-91.7%, H 1.8-3.1%, N 0.3-0.8%, S 0.42-0.69% and O 4.1-10.7%. Heavy-metal concentrations were below recommended limits (International Biochar Initiative, 2012), although R. ponticum growing on highly acidified soils showed some tendency to bio-accumulate Fe, Al and Cu. Life-Cycle Analyses of the pyrolysis unit and production process will be used to estimate the amount of carbon offset achievable during the operational lifetime of the unit. In addition, both gaseous and particulate emissions are being monitored in order to determine the environmental impact of the production process and ensure compliance with emissions regulations.