*Environmental Engineering and Management Journal* xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://omicron.ch.tuiasi.ro/EEMJ/

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# CAN LIGHT INTENSITY REGULATE PHENOL OXIDASE ACTIVITY IN A BLANKET BOG; MAXIMIZING CARBON STORAGE?

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## Abstract

Vascular plants exude an array of chemicals from their roots into the surrounding soil. These root exudates, which include labile carbon compounds and oxygen, are known to affect microbial communities in the rhizosphere - with increased rhizodeposition leading to greater microbial activities. As rates of photosynthesis are often correlated to root exudation we hypothesised that photosynthesis would, in turn, be correlated to phenol oxidase activity in the rhizosphere of peatland plants, due to the enzyme being produced by a range of microorganisms and requiring oxygen to function. The same relationship was predicted to occur in peat surrounding Sphagnum moss, which likewise releases labile carbon from its tissues. Any increase in phenol oxidase activity would open the 'enzymic latch' in pealtands leading to the release of carbon through organic matter decomposition. We investigated the potential of adjusting the intensity of light imposed upon peatland plants, to modify the activity of phenol oxidase - and thereby, provide a novel geoengineering method for maximising the ecosystem's capability to sequester carbon. However, we did not find a strong relationship between varying light levels and phenol oxidase activity for any of the plant species – suggesting light does not regulate the enzyme's activity in the rhizosphere of a blanket bog. Interestingly though, we did observe significant differences in phenol oxidase activities between the species of plants tested - suggesting we could encourage the growth of certain species over others in order to maximise the carbon storage capabilities of peatlands.

*Key words:* carbon sequestration, rhizodeposition, peatland, phenol oxidase, photon flux density

*Received: October, 2013; Revised final: July, 2015; Accepted: July, 2015*

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