

Effect of cellulose wastes upon the growth of *Phragmites australis*

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Growth responses of *Phragmites australis* (Cav.) Trin. Ex Steud, (reed grass), a helophyte species, were examined under in vitro and greenhouse conditions in the presence of various residues from a Kraft pulp mill. Plant tolerance to solid residues (ashes, dregs, flyashes, grits, primary sludge, and brown stock rejects) was tested in vitro. Solid residues were added separately up to 30% (w/v), as well a liquid residue up to 30% (v/v), to a Murashige and Skoog (1962) sucrose-free nutrient media with (5 mg l⁻¹) 6-benzylaminopurine. After 2 mo in vitro, plantlets developed well in the presence of up to 10% solid or liquid wastes, but higher concentrations of either limited growth. This effect was mainly attributed to the plant's uptake and accumulation of various elements such as sodium, iron, copper, manganese, and boron, which are common to these waste types, thus showing an efficient phytoremediation potential. When added to MS media, the concentration of these elements generally decrea