Identifying appropriate methodology to diagnose aeration limitations with large peat and bark particles in growing media

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Résumé en anglais	Large-sized particles (coarse peat, bark or sawdust) are often added to growing media to improve substrate aeration properties (gas storage and exchange). Recent studies have shown that large fragments mixed with fines may create barriers that restrict gas diffusion or create competition for oxygen even if they improve air storage. An experiment was carried out to compare the growth performances of growing media containing large fragments and to assess their aeration status using different methods. Different mixes were made of a fine sphagnum peat (average size 2.4 mm) and a coarse (1-2, 2-4, 4-6, 6-10, and 10-20 mm particles) sphagnum peat or bark (2-4 and 10-20 mm). These substrates had different aeration properties and were used to grow Poinsettia and *Impatiens* 'New Guinea' in a greenhouse, resulting in differences in plant growth. The results show that air-filled porosity remained relatively unaffected by fragment size. Gas relative diffusivity differed significantly between treatments and was highest in the mix with the 2-4 mm particles and diminished rapidly as fragment size increased from 4 to 20 mm or decreased to 1-2 mm. Diffusivity was clearly lower in the bark/peat mixes but showed the same trend with coarse fragments. Root and shoot growth parameters were significantly and positively correlated to gas relative diffusivity. Moreover, the growth reduction observed in the bark/peat mixes relative to pure peat was most likely linked to limited gas exchange. Air-filled porosity assessments performed in situ (in the pot itself) or prior to potting, in cylinders, gave inconsistent results or were not significantly correlated to plant growth, indicating that aeration limitations are better diagnosed with gas diffusivity in growing media.

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