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QUANTIFYING THE BENEFICIAL EFFECT OF DIFFERENT PLANT SPECIES ON AIR QUALITY IMPROVEMENT

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Abstract

The beneficial effect of urban plants in improving air quality is often mentioned in literature but is seldom quantified and valuated. Quantification and valuation of the benefits provided by urban plants allow direct comparison between plant species and help make more informed urban planning decisions. Based on fieldwork study and data processing, carbon dioxide (CO_2) sequestration, oxygen (O_2) generation, transpiration cooling, sulfur dioxide (SO_2) removal and dust interception are quantified and valuated among sixteen plant species frequently planted in an industrial area. Results showed that estimated benefits were significantly different between plant species. The plant species with relatively high leaf area index (LAI) value and photosynthetic rate were more effective at regulating the atmospheric carbon and oxygen content. Those with high LAI value and transpiration rate should be used to enhance transpiration cooling. Such plant species with rough leaf surfaces and dense pubescent leaves were found to efficiently capture dust and those with thick sclerophyllous leaves remove SO_2. By integrating species-specific benefits into the process of urban design, urban planners and greening designers can select appropriate plant species to maximize specific ecosystem services for a given greening area, improving local air quality and human health correspondingly.

Key words: CO_2 sequestration, dust interception, O_2 generation, SO_2 removal, transpiration cooling

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