

Analysis of green wall remediation efficiency



a literature review
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Background

- Inhalation of air pollutants can induce respiratory and vascular diseases as well as other health complications
- Volatile organic compounds (VOCs) are especially concentrated in indoor environments.
- Green walls are vertical structures that exploit natural pollutant filtration by plants.
- Phytoremediation by green walls occurs primarily in the rhizosphere.

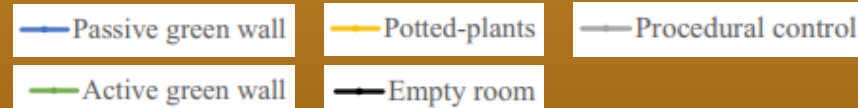
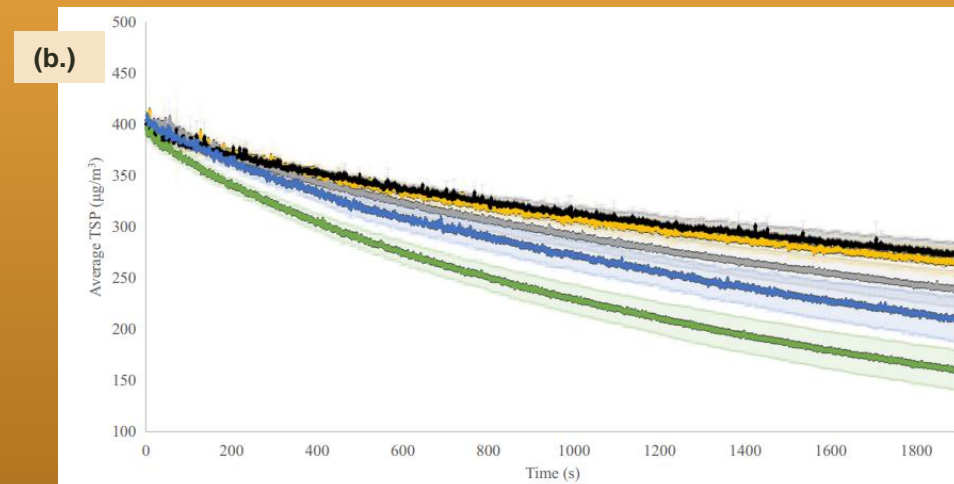
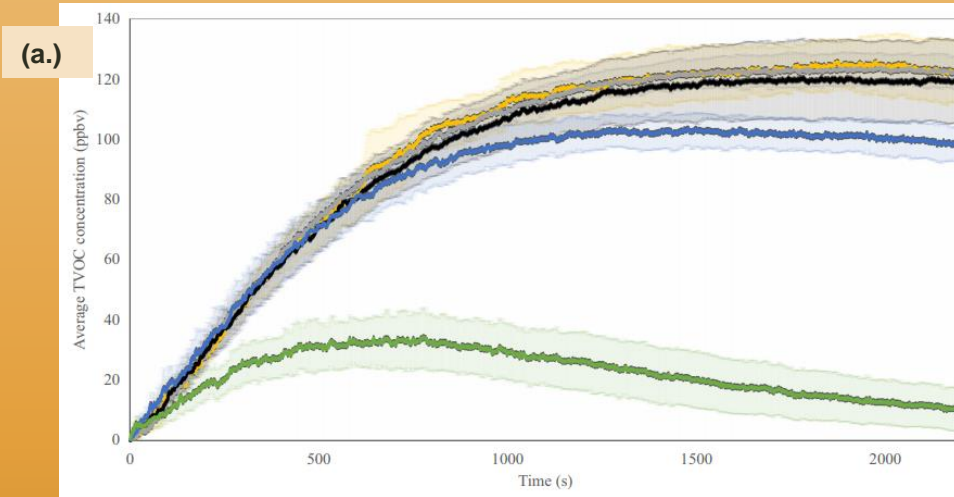
Active Green Wall Design



Figure 1. Diagram of active green wall (AGW) functionality (Pettit et al. 2018a).

Active vs. Passive Ventilation

Figure 2. Comparison of (a.) average TVOC and (b.) average TSP removal by treatments in a study by Pettit et al. (2018a).



Factors Influencing Filtration

- Using a substrate mixture of coir and active carbon yielded greater VOC removal but increased PM concentration (Pettit et al., 2018b)
- Maintaining a **saturated substrate** increases airflow rate through the module, creating optimal airflow for filtration (Abdo et al., 2019).
- Plant selection should focus on species with **fine, fibrous roots** to provide maximal surface area for remediation in rhizosphere (Pettit et al., 2017).

Areas for Future Study

- AGW performance for ambient air remediation
- Optimizing substrate composition for filtration

References

- Abdo, P., Phuoc Huynh, B., Irga, P.J., & Torpy, F.R. (2019). Evaluation of air flow through an active green wall biofilter. *Urban Forestry & Urban Greening*, (41), 75-84.
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- Pettit, P., Irga, P.J., & Torpy, F.R. (2018b). Functional green wall development for increasing air pollutant phytoremediation: Substrate development with coconut coir and activated carbon. *Journal of Hazardous Materials*, 360, 594-603.
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