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Potential for Crumb Rubber as an Amendment in Green Roof Substrates.

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Abstract:

Recently, there has been increased interest in green roofs becoming a part of American cityscapes, primarily to mitigate storm water runoff from impervious surfaces in dense urban areas. Extensive green roofs are functional, increasing stormwater retention by incorporating a thin layer of substrate (approximately 10 cm) with specific roof liners and planted with xerophytic species which are tolerant of large diurnal and seasonal temperature fluctuations. Soon, new city buildings may be required to have systems in place for greater stormwater retention, yet in some cases, city planners will be asked to retrofit extensive green roofs on older structures. The substrates presently used in extensive green roof designs consist primarily of light-weight heat expanded shales, clays and slates. Physical and chemical processes may result in the degradation of substrate particles over time, reducing aeration and increasing the potential for waterlogging, whereby causing reductions in plant health with a consequent increase in maintenance and renovation costs. We therefore seek to investigate the addition of a potentially stable, recycled tire product (crumb rubber) to these substrates, to increase their long-term performance and sustainability. At the same time, crumb rubber would decrease the weight of the substrate and potentially increase the percentage of buildings able for retrofit of extensive green roof systems. However, crumb rubber has been shown to leach quantities of zinc that affect growth of sensitive plants. Our research focuses on the characterization of green roof substrates with crumb rubber additions and the tolerance of green roof plant species to crumb rubber amendments.

Impact Statement:

Green roof systems are becoming more popular as a design strategy for urban water management. The nature of this research could provide the green roof industry more options for structure retrofits and substrate longevity. Additionally, most green roof substrates are processed using enormous amounts of energy (embodied energy) which may be considered unsustainable. The use of a recycled product may make the process more sustainable and may also improve the longevity of the substrate. A number of partnerships have been created with this project including state agencies, green roof organizations, research and academic faculty and plant nursery operators. This project team has been able to leverage nearly \$50,000 in grants, and includes a graduate student. This research is ongoing.

Category: Other Water Resource Topics
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