Green Roof Media Selection for the Minimization of Pollutant Loadings in Roof Runoff
Brett Long, Dr. Shirley E. Clark, Dr. Katherine Baker, Dr. Robert Berghage, Dr. David Beattie
Environmental Pollution Control Program at Penn State Harrisburg, Middletown, PA 17057 and Center for Green Roof Research at University Park, PA 16802

Introduction
- Stormwater is one of the leading causes of water quality impairment and stress on estuaries like the Chesapeake Bay.
- To address this concern, stormwater best management practices (BMPs) have been developed to reduce the amount and improve the quality of stormwater runoff.
- Green roofs (vegetative roof covers) are a new BMP designed for urban areas where land for traditional stormwater practices is unavailable.
  - They are aesthetically pleasing, with excellent water retention ability. However, it is unknown how effective they, especially the extensive green roofs, are at treating stormwater runoff.
  - Extensive green roofs are thin, relatively light, low maintenance, and designed typically for limited human access.
- Media depth ranges from 2.5 to 6 inches.
- Media has a low organic and a high mineral content.
- Pollutant removal/retention must occur primarily in the mineral portion of the media with limited uptake by the plants and organic matter.

Objectives
The two primary objectives are the following:
1. To develop an effective media for green roofs that will improve roof runoff quality while maintaining the known water retention benefits of green roofs.
2. To demonstrate that green roofing will generate lesser pollutant loadings than traditional roofing materials.

Environmental Significance
First, the research will develop guidelines for manufacturers who are supplying the media mixes to green roof installation.
Second, given known pollutant loadings resulting from traditional roofing materials, green roofs may have two benefits: (1) remove traditional roofing as a pollutant source, and (2) treat airborne pollutants that wash out in the rain.

Methods
Phase I: Five mineral media are being evaluated in the laboratory for their abilities to retain the pollutants from a synthetic acid rain containing nutrients and metals. The media being tested are formulated from commonly used expanded minerals. Once the mineral portion is selected, a variety of storm water filter sorbents, cation exchange materials, and anion exchange materials will be tested in similar manner. Once a mineral and additive combination is selected, different organic matters will be evaluated in a similar manner.

The samples will be analyzed for metals (Cu, Pb, Zn, Hg), nutrients (nitrate, phosphate, ammonia), pH, conductivity, chemical oxygen demand, and microorganisms (E. coli, coliphage, community structure).

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