Stormwater runoff from highways is a source of pollution to surface water bodies and groundwater. This project develops a bio-detention treatment and harvesting system that is incorporated into roadside swales. The bio-detention system uses Bold & Gold™, a type of biosorption activated media (BAM), to remove nutrients from simulated highway runoff and then store the water in underground vaults for infiltration, controlled discharge, and/or irrigation and other non-potable applications. In order to design a bio-detention system, media characteristics and media/water quality relationships are required. Media characteristics determined through testing include: specific gravity, permeability, maximum dry density, moisture content of maximum dry density, infiltration, and particle-size distribution.

One of the goals of this experiment is to compare the nitrogen and phosphorous species concentrations in the effluent of BAM to sandy soil for simulated highway runoff. Field scale experiments are done on an elevated test bed that simulates a typical roadway with a swale. The swale portion of the test bed is split into halves of BAM and sandy soil. The simulated stormwater flows over a concrete section, which simulates a roadway, and then over either sod covered sandy soil or BAM. One, one and a half, and three inch storms are each simulated three times with a duration of 30 minutes each. During the simulated storm event, initial samples of the runoff (influent) are taken. The test bed is allowed to drain for two hours after the rainfall event and then samples of each of the net effluent are taken.

In addition to the field scale bio-treatment system water quality testing, column tests are also performed on the sandy soil and Bold & Gold™ without sod present. Sod farms typically use fertilizer to increase production, thus it is reasonable to assume that the sod will leach nutrients into the soils on the test bed, especially during the initial test runs. The purpose of the column tests is to obtain a general idea of what percentage removals of total phosphorus and total nitrogen are obtained by the sandy soil and Bold & Gold™. It is shown that the Bold & Gold™ media effluent has significantly lower concentrations of total nitrogen and total phosphorus compared to the effluent of the sandy soil based on an 80% confidence interval. The Bold & Gold™ has a 41% lower average effluent concentration of total nitrogen than the sandy soil. The Bold & Gold™ media has a 78% lower average effluent concentration of total phosphorus than the sandy soil. Using both the column test data in combination with the field scale data, it is determined that the Bold & Gold™ bio-treatment system has a total phosphorus removal efficiency of 71%.

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