

Texas Water Resource Institute Mills Scholarship Program
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NAME: Bhavana Viswanathan

FACULTY ADVISOR CONTACT: Dr. Astrid Volder, Assistant Professor,
Horticultural Landscape Ecology, 405 HFS Building, TAMU 2133. College Station, TX
77843. Telephone: (979) 845 9277. Email: a-volder@tamu.edu

Proposed Research

The use of impervious pavement in urban areas leads to higher surface runoff of polluted water into local watersheds. Higher rates of surface runoff also lead to soil erosion and erosion of local stream banks. Pervious pavements, such as porous concrete, can be used as a good alternative where the surface is used for light duty usage such as in parking lots, walkways and on bike trails and greatly reduce the runoff of polluted water into the watersheds. In addition, pervious pavements could benefit parking lot owners via improving existing tree health and thus providing shaded areas to their customers. Typically, in parking lot and walkway construction, mature trees are removed and small trees are planted after the parking lot is paved. These small trees have a much reduced chance of survival and provide much less shade than larger mature trees. Preserving mature trees in developing areas will have several environmental benefits, such as reduced heat load of the pavement and urban area, improved air quality and higher rates of evaporative cooling through the large canopy. Existing mature trees could be incorporated in the parking lot design, provided that the root zone is preserved and access of water, nutrients, and oxygen to the root zone is maintained. The use of pervious concrete in parking lots could aid in the preservation of mature trees via the much higher infiltration of both water and air into the root zone through this pavement compared with impervious pavement.

The purpose of this study is to test root zone health, soil water infiltration rates, runoff rates and water quality in plots planted with mature American Sweetgum (*Liquidambar styraciflua*) as affected by both pervious and impervious concrete and an unpaved control treatment. Plots have been fitted with TDR probes to measure volumetric water content, soil temperature probes, soil access tubes to measure soil respiration and soil oxygen content, minirhizotron tubes to monitor root growth, and dendrometers on the trees to measure tree diameter growth.

The data collected in this study will be used for modeling parking lot water dynamics, and be shared with industry to encourage the use of pervious pavements as an alternative to impervious ones, depending on the outcome of this study.

Proposed use of funds:

The funds from this scholarship will be used towards plot maintenance costs, oxygen analyses costs, and consumables (bags, vials etc.) as well as pay for the analyses of the soil water samples that will be collected. Some funding will also be used to pay for travel to present the results at a national meeting.

Intended career path:

After completing my masters in Horticulture, I would like to work in an industry related area where I could apply my knowledge of plant science.