The Effect of Green Infrastructure (GI) on Mesquite Trees

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Research Questions and Methods

1) How does GI affect the physical growth of Mesquite trees in a desert environment over a 28-year time span? Tape measurements were used to compare growth of GI and non-GI Mesquite diameter at breast height (DBH) and crown diameter (CD). A spherical densimeter was used to determine the leaf area index (LAI).

2) How does GI affect Mesquite physiology in a hot, arid climate? A LI-COR 6400 was used to measure the rates of photosynthesis and transpiration, which were used to calculate average water use efficiency.

Results

The average crown diameter of GI Mesquites grew .597 m more and was 1.400 m greater. This means that the GI Mesquites, on average, provide more canopy coverage than the non-GI Mesquites.

The average LAI of GI grew 13.96 LAI units (leaf area index m²/ground area m²) more and was 19.81 LAI units higher. This means that the average crown area of the GI Mesquites is fuller than that of the non-GI Mesquites.

The overall Mesquite DBH growth is exponential. While the non-GI DBH grew faster initially, over time, the GI DBH started growing more than the non-GI trees. Still, the average non-GI DBH grew to 15.97 cm greater than the GI Mesquites.

Discussion

The CD and LAI data indicate that the GI trees provide better shade coverage and the GI trees were more actively transpiring than the non-GI Mesquites. Since shade and transpiration have a cooling effect in warm climates, GI Mesquites exhibit a greater-than-normal potential to provide relief from increasing temperatures caused by climate change and the urban heat island effect. The GI trees also act as better carbon sinks because they assimilated more carbon. It can be inferred from the higher carbon assimilation and stomatal conductance rates that the GI trees are functioning better than the non-GI trees. It has been demonstrated that GI reduces stormwater runoff. This study reveals that the use of GI helps humans while also benefiting tree physiology. (Pataki et al., 2011).