# Best Trees for Parking Lots

It is no mystery to anyone who has tried to walk across a large asphalt parking lot in July and August in the desert southwest that the summer heat can be detrimental to your health. Now imagine standing in that same parking lot, 24 hours a day, 365 days a year. It is obvious to anyone involved in desert horticulture that plants, even desert adapted plants, suffer in the hottest parts of the summer. Many professionals and hobbyists have speculated about the physiological basis of these stresses and their impact on growth and metabolism but until recently there was surprisingly little research.

One study looked at the impact of surface materials, asphalt, de-composted granite, organic mulch and turf grass, on soil temperatures. Perhaps not surprising, the asphalt accumulated and transmitted to most heat into the tree root zones. Beneath asphalt, root zone temperatures reached or exceeded 105 F, temperatures known to be damaging to root tissues. Such temperatures could be recorded as deep as three feet below the surface of the asphalt. This is of particular concern considering that the majority of physiologically active roots are most likely between 18 inches and 2 feet below the surface of the soil. This transmitted heat then would impact nearly the entirety of the active root zone. There was an 8 hour lag between the peak air temperature and the peak soil temperature, meaning that the above ground tissues were impacted during the day and the root impacted 8 hours later.

A second study compared the growth and vigor of four common tree species and their response to the stress of being planted in narrow parking lot median planters or small "cut-outs." Growth was evaluated by measuring overall height, DBH (trunk diameter at breast high), canopy, leaf chlorophyll and CO 2 content. Growth perimeters for trees growing in parking medians were compared to those of the same species planted in landscape plantings surrounding the same parking lots. The species studied included Bottle Tree, Evergreen Elm, Arizona Ash and Mesquite. The most severely affected was the Elm with significant decreases in all growth characteristics measured, when compared to Elms growing in surrounding landscapes. Height, DBH and canopy were reduced by 60%, 52% and 57%, respectively. Bottle trees and Arizona Ashes were similarly but not as severely affected with substantial reductions in all growth measurements. Mesquites show no significant differences between trees growing in parking lot medians and those growing in landscapes surrounding the lots. While not a surprising result in itself, the fact that Mesquites remain largely unaffected by the conditions presented by parking lot plantings shows remarkable adaptability.

We can only speculate as to the actual physiological basis of these results. Very high temperature and very low humidity adversely impact a number of physiological processes in plants. In order to conduct photosynthesis plants must be able to exchange gasses, primarily through the leaves. They must take in carbon dioxide (that is used to build sugar molecules) and release oxygen. This gas exchange occurs through openings in the leaf surface, called stomata that open and closes in response to the outside environment and the internal demand for gas exchange. As trees that have evolved in a high temperature, low humidity environment, Mesquites likely have a genetic advantage when faced with these severe conditions. Similarly, most other physiological processes (photosynthesis, moderating moisture lose, leaf shape and function) have adapted to the severe conditions found throughout the desert southwest.

With a continuing or increasing emphasis on mitigating the impact of asphalt parking lots on the urban heat island, these studies offer excellent insights. They go a long way in explaining the results we have

casually observed in the desert southwest over the last several decades and explain, scientifically, why desert adapted species are so successful in these difficult conditions. Perhaps follow up studies might attempt to identify median size and conditions that would more fully optimize the growth and development of desert species planted in parking lot settings.