

Put Maples in Their Place

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A foundation of Integrated Pest Management (IPM) in urban landscapes is to put the right plant in the right place. A plant in its "right place" will have the appropriate water, sun and soil it needs to thrive. This reduces plant stress and, in many cases, reduces pest abundance, too.

For example, azaleas are understory shrubs. They're stressed if planted in too much sun (wrong place) and get many more azalea lace bugs. In nurseries or landscapes, red buds, dogwoods, crape myrtles and other trees are stressed by too much water and susceptible to ambrosia beetle attacks.

Plants that are stressed often smell more attractive to pests, taste better to pests due to fewer defensive chemicals or are more nutritious to pests due to higher nitrogen content. Sometimes all three. Thus, by putting plants in optimal conditions, you can reduce long-term costs of pest management and increase customer satisfaction. Unfortunately, we don't know the right place for many tree species since urban landscapes have such different soil, sun exposure, temperature and other features than the trees' natural habitats. Luckily, for red maples we do.

Red maples (*Acer rubrum*), like most tree species, typically have more pests in urban landscapes than they do in the woods. This is due, in part, to stress created by impervious surfaces, like sidewalks, roads and parking lots that increase air temperature and soil compaction, and reduce soil moisture. Sound stressful? Our research shows that a red maple surrounded by too much impervious surface instead of grass, mulch or flower beds is in the wrong place. These stressed trees are likely to be infested with scale insects and be in poor condition.

Gloomy scale (*Melanaspis tenebricosa*) is the most common and damaging red maple pest in the Southeast. This native armored scale insect is distributed throughout the southeastern and mid-Atlantic states. Gloomy scales live on maple trunks and branches. Severe infestations can completely cover the bark, giving trees a dark gray sort of gloomy appearance. Gloomy scales feed on tree sap and cause branch dieback and reduced growth. These insects, like other armored scales, are small and have a waxy cover that protects them from contact insecticides. Systemic insecticides also don't provide fast or reliable control of gloomy scales.

In Raleigh, North Carolina, we found gloomy scales to be 200 times more abundant on the hottest red maples surrounded by lots of impervious surface than nearby trees with less impervious surface that were also a couple degrees cooler. These trees also tended to be in worse condition than less-stressed trees. Tree condition is assigned by arborists and other tree care professionals to the categories excellent, good, fair and poor. These categories are based on tree shape, canopy density, number of dead branches and other factors, but in essence, it's a tree's appearance. We all want nice looking trees, right?

Heat and drought from impervious surfaces put trees under stress and actually cause gloomy scales to produce more babies. So, getting back to IPM, since impervious surface cover around trees increases temperature, drought stress and pests, we need to know how much impervious surface is too much. To put red maples in the right place, we developed impervious surface thresholds and an easy way to measure the amount of impervious surface around a planting site.

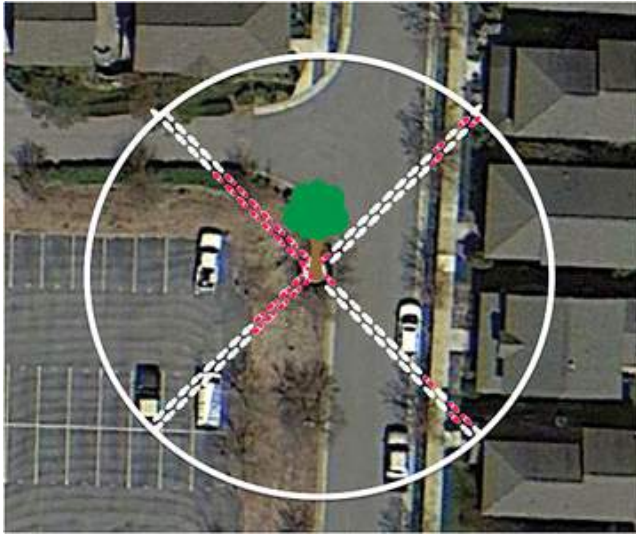


Figure 1. Schematic of the Pace to Plant technique in which white foot prints are on impervious surface and red foot prints are on grass or other pervious surfaces.

We found that gloomy scale abundance and red maple condition are related to the amount of impervious surface cover within a 25-m radius around a tree or planting site. Long story short, we found that trees surrounded by 0% to 32% impervious surface at 25-m radius tend to be in good or excellent condition with few scale insects. Trees surrounded by 33% to 62% impervious surface tend to be in fair condition with sparser canopies and more scale insects. Those surrounded by more than 62% impervious surface cover are uniformly in poor condition with severe scale infestations and damage.

So now we have impervious surface thresholds to help landscapers, and hopefully landscape designers and architects, select planting sites for red maples. Landscape designers and architects can easily measure impervious surface in their planning software. But how is someone in the field or without software supposed to measure impervious surface cover? We developed the “Pace to Plant” technique to measure the amount of impervious surface surrounding a tree or planting site in five steps.

Step 1. Stand at the planting site and identify the closest impervious surface edge. In Figure 1, it’s the curb to the right of the tree. Take 25 steps at 45 degrees to the nearest impervious edge, counting the steps that land on impervious surface (white footsteps in figure).

Step 2. Turn 90 degrees from the initial transect. Take 25 more steps, counting those that fall onto impervious surface.

Step 3. Take 25 more steps, 90 degrees to the previous transect, counting the steps that fall onto impervious surface.

Step 4. Take 25 more steps, 90 degrees to the previous starting point, counting those that fall onto impervious surface. This is the final leg, making an “X” through the planting site and totaling 100 steps taken.

Step 5. The total number of steps that fall onto impervious surface equals the percentage of the surrounding ground area that’s impervious to water. Using the impervious surface thresholds, this percentage can guide tree selection decisions. In the figure above, 66/100 white footsteps landed on impervious surface, meaning that 66% of the area within the circle is impervious. This isn’t a good planting site for red maples.

Trees that live longer, grow larger and harbor fewer damaging pests cost less to maintain and provide more benefits to people and the environment. Impervious surface thresholds and the “Pace to Plant” technique are one approach to inform where to plant red maples and identify red maples that may require extra care.

We’ve tested these impervious surface thresholds on red maples throughout the southeast from Delaware to Florida. They work quite well, but are specific to red maples. Although you should consider similar stressors for every tree you plant, at least for this common species, you can use these new thresholds to put maples in their place. **GT**

Get the full story: Dale, AG, Youngsteadt, E and Frank, SD. 2016. Forecasting the effects of heat and pests on urban trees: Impervious surface thresholds and the ‘Pace to Plant’ technique. *Arboriculture & Urban Forestry*. 42(3) 181-191. Detailed extension material: <http://ecoipm.org/pace-to-plant/>

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