

## **HACIENDOLO BIEN DESDE EL PRINCIPIO: EL CASO DE LA DETERMINACION DE SITIO PARA EL ESTABLECIMIENTO DE PLANTAS EN AREAS URBANAS.**

### **DOING IT RIGHT FROM THE START: THE CASE FOR SITE ASSESSMENT IN URBAN PLANT ESTABLISHMENT.**

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With all of the best of intentions, anyone trying to plant trees or create a landscape in an urban context needs to have a firm understanding of environmental resources that allow trees to grow to their envisioned ultimate size. It is only through efforts that recognize and provide for the needs of the tree, will we gain the benefits for which we planted these plants in the first place – whether they be for shade, pollution reduction, reduced storm water runoff, increased property values, erosion control, habitats for wildlife, windbreaks, blocking undesirable views, creating parks for recreation and providing a link between our increasingly urban existence and the natural world, among many others.

Most of the places we live in whether rural, suburban or urban have been significantly impacted by human activities whether it is by building a house, creating roads, or laying pavement for a sidewalk or parking lot. These alterations are unquestionably more numerous in an inner city area than a rural village, yet they are fundamentally the same in impact.

We need to approach planting trees in human impacted landscapes as rigorously as we engineer the urban environment into which we place them. No one would think of building a house without adhering to sound construction principles from a solid foundation through sturdy walls and a non-leaky roof. Yet with trees in the urban context, we seem to feel that they will take care of themselves. The urban landscape has changed urban soils through

their removal, re-grading, compaction, cutting and filling and contaminating it in the process of creating buildings, roads and pavements. All these impacts profoundly change the physical, chemical and biological nature of soil, the very substrate that trees depend on for so many of their vital resources.

#### **Back to Basics**

The process of investigating the proposed planting site for plant suitability is called site assessment. It asks these questions of the site. Where is the water coming from? Is there too little due to soil restrictions or too much due to lack of drainage or a high water table – or perhaps both alternating at different times of the year? Is the soil so dense that roots cannot grow limiting their ability to take up water in a restricted soil volume.

Are there enough available nutrients in the soil? Soil pH, the acidity or alkalinity of the soil can make nutrients more or less soluble and therefore available to be taken up by plant roots. In urban environments because of human junk incorporated into the soil, pH can vary significantly. Is there enough oxygen? All parts of the plants, shoots and roots, need oxygen. If soil drainage is impaired and all soil pores are filled with water, oxygen will not be able to get to the roots and they may die. Or if a gas leak displaces oxygen in the soil, plant roots will also die. Lack of oxygen in the root zone is one of the quickest killers of trees.

Is there enough light for tree growth? Light is the driving force of photosynthesis. Many plants

have evolved to take advantage of varying levels of light; however, trees for the most part, being the tallest plants in the landscape require full sun estimated at about 4-6 hours of sun/day in the growing season. Some smaller trees will tolerate lower levels of light. Urban environments with tall buildings that cause false horizons can limit the amount of direct sunlight that trees receive. Carbon dioxide is rarely a limiting factor in the urban environment or elsewhere. It is the essential gas necessary for the production of carbohydrates during photosynthesis. If plants are under drought stress their stomata close to prevent greater water loss. Low light levels will also close stomata. In doing this carbon dioxide is prevented from coming into the leaf and photosynthesis is reduced.

Are temperatures appropriate for plant growth? Large urban areas are found to create 'heat islands' which can increase temperatures a few degrees from the surrounding countryside. But this is generally not a problem for most plants. More important are the microclimate effects of building facades, increasing the reflected and re-radiating heat from car tops and asphalt that can cause trees to lose water faster or in extreme cases directly damage leaves. On a 72° F (22.2°C) sunny day in NY, I measured a 125° F (51.8°C) surface temperature of a south facing brick wall three feet adjacent to some green ash trees. The trees were in restricted soil conditions so that the increased demand for water caused by the leaves losing water so rapidly could not be met by increased water uptake from the roots. The trees would defoliate 2 or 3 times a summer until we were able to modify the trees root zone so that water supply was no longer limiting.

#### A Process of Establishment

With a good handle on site conditions that provide opportunities for planting or those that are limiting, it is now possible to proceed in the plant establishment process. After site assessment, we can then ask about what plants are best adapted to the site? Aside from the

basic environmental factors that should be assessed at the site, other constraints should be factored in too. Are there barriers to plant growth underground or above ground? Legal factors such as rights-of-way, easements and historic districts can also be factored in before planting can occur.

Matching up the site constraints or opportunities to plant requirements is the important next step in plant establishment. However, in some cases it is important to recognize when site limitations make the plant choices so restricted (or non-existent) so that sites need to be modified before successful planting can occur. Generally speaking, the more one can modify the site towards ideal conditions, the larger the potential number of plants that will do well there. However site modification is often labor intensive. If plant selection alone can match the site conditions, then it should be used to do so.

The final steps in the plant establishment process are proper transplanting and early maintenance practices. Unfortunately, it is common that although good decisions could be made up to this point, the plants might still fail due to improper transplanting. Common problems such as allowing the plants to dry out before planting, planting too deep, over mulching or no mulching, lack of water during the initial season growth, mechanical damage by mowers, over pruning and others can set back or even kill plants that are already under considerable stress because of the removal of part of their root system in the digging process.

In the most challenging situations where numerous environmental stresses and design constraints overlap, a combination of site modification strategies and appropriate plant selection provides the best result. With what we know now we can come up with enough creative solutions using all the strategies at our disposal to achieve a greener urban environment.