

Georgia Tree Planting & Care Series

Site Selection & Assessment



**Center for Invasive Species
and Ecosystem Health**
UNIVERSITY OF GEORGIA

Introduction

Planting a tree is a lifelong investment requiring careful planning and execution to achieve maximum environmental, economic, and social benefits. How well this investment grows depends upon attention to detail in site assessment, the first step in the process of planting a tree. Site selection mistakes are difficult and costly to correct later (Figure 1).

Community trees may occupy sites which are much less suitable for tree growth and longevity than native forests. Site assessment involves evaluating whether basic needs of a tree (space, water, light, oxygen, carbon dioxide, essential elements and appropriate temperature) are provided by a site. When a site assessment is completed, the information gathered should help determine the most appropriate species for the site.

This is the first of three publications in the Georgia Tree Planting & Care Series (see references for others). The methods outlined in this publication are meant to summarize for homeowners and community tree care specialists within the state of Georgia specific Best Management Practices (BMPs) developed by the International Society of Arboriculture (Watson, 2014) on how to thoroughly assess planting sites. This document is meant to be introductory and cannot fully answer all questions. Specific questions can be directed to a local extension office and further information can be found in the references listed at the back of this publication.

The questions to keep in mind when assessing a tree planting site are:

- What is the purpose and use of your planting?
- What are the site conditions above and below ground?
- What type of maintenance will be required?
- What is the best tree species for long-term success?



Figure 1: As a tree grows larger in an improper site, it can lead to infrastructure damage and may become a liability to a site.

Belowground Assessment

Many community tree health issues arise from belowground conditions with soil/root interactions. A tree is dependent both structurally and nutritionally upon healthy roots, so anything which compromises its root system- either directly or indirectly- can result in future health problems.

SOIL

Soil provides trees with water, oxygen, essential elements and support. The most important factor of soil is its air pore space, which growing tree roots utilize to penetrate soils (Figure 2). In the forest, soil is a dynamic, living part of the ecosystem, but in the developed environment, it can be vastly altered and lack these necessities (Figures 3 & 4).

- Compaction may prevent water absorption, drainage, and aeration. If water stands on the surface after a rain event, or soil is grey or smells foul, the site may have poor drainage.
- Soil in developed areas is subject to a variety of contaminants from the surrounding environment. Try to get an idea of historical site use.
- Soil pH affects the availability of 16 essential elements for trees (Figure 5).

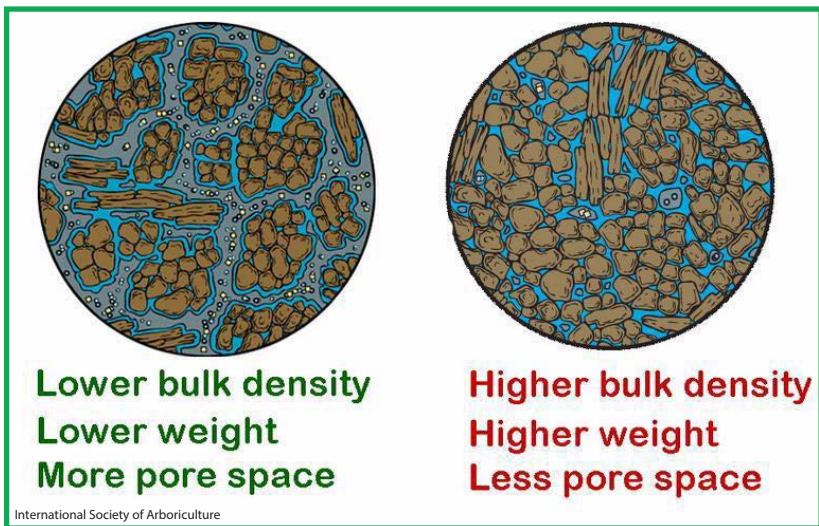


Figure 2: Soil texture is determined by relative amounts of particles of sand, silt and clay; it includes solid matter, pore spaces for air and water, organic matter and microorganisms.

Figure 3: Community soil can be contaminated from chemical and hardscape runoff and construction. Soil layers can also be disturbed due to historical use and grade changes.

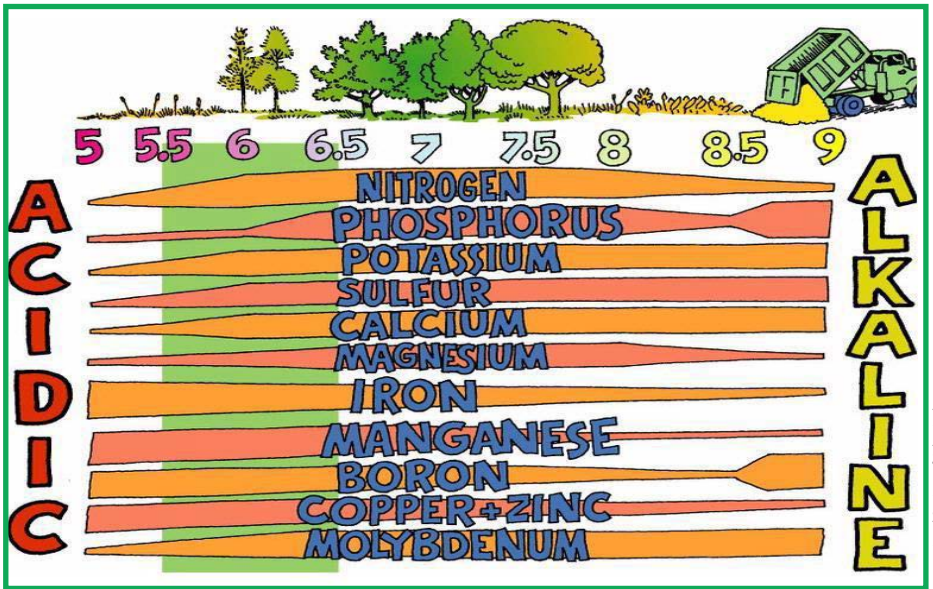


L. Morris, University of Georgia



J. Hartman, University of Kentucky

Figure 4: Compaction from construction activities, foot traffic and watering regimes reduces pore space needed for air, water and roots.



International Society of Arboriculture

Figure 5: Essential element availability as affected by soil pH. The green box is the optimal pH range (5.5-6.5) for mineral uptake. Soils in older developed areas tend to be alkaline (>7.5) due to runoff from limestone-based building materials, but newly-developed areas on old cropland, pasture and hay-fields in Georgia tend to be more acidic. University of Georgia offers soil testing (find your local extension office: 1-800-ASK-UGA1).

GROWING SPACE

Soil volume requirements for trees depend upon the mature size of a tree species and existing soil quality. Inadequate rooting space limits resources and stability— the less soil volume, the smaller the tree will grow, and the shorter its functional life span.

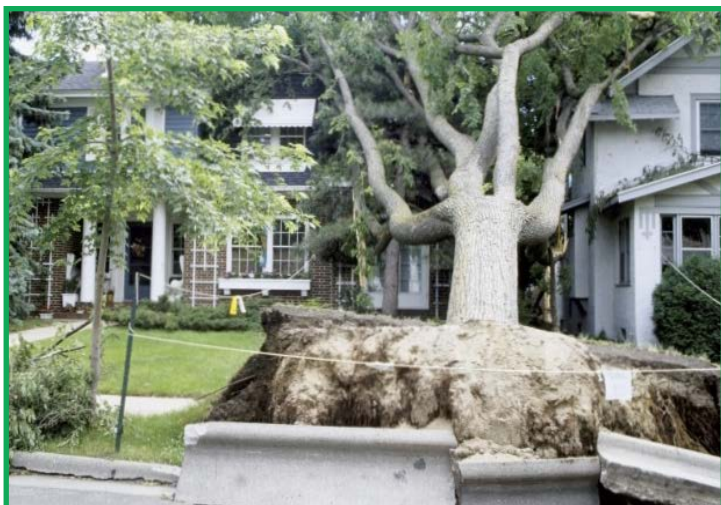
- Tree roots grow primarily in the top 2 feet of soil, where water and air are more accessible (Figure 6). Below 2 feet, conditions are less viable for root growth in most soils.
- Underground utilities, paved areas, sidewalks and buildings can all restrict rooting space.
- Species with tenacious surface roots can cause damage to hardscapes like pavement and sidewalks when not given enough rooting space (Figure 7).
- Inadequate soil volume can make a tree less windfirm or stable (Figure 8).
- Last, but certainly not least, call Georgia 811 **before** digging planting saucers in order to locate underground utilities and other objects!



Figure 6: Trees grow more “out” than down, therefore trees need more width than depth in a planting site.



Figure 7: Dangers of inadequate ecologically viable soil volume include tree and hardscape damage.



M. Mielke, USDA Forest Service

Figure 8: Dangers of inadequate soil volume include whole tree failure.

Aboveground Assessment

STRUCTURAL FACTORS

When selecting trees for planting, be sure to consider their *mature* height and spread, and select the correct species for the location.

- Overhead wires, signs, lights and other utilities or roof overhangs can be troublesome for trees trying to reach their full mature height (Figures 9 & 10).
- Utility companies must keep delivery lines functional and safe. Storm damage and old pruning wounds can lead to tree problems near utilities (Figure 10).
- Tree pit and planter design is best left to professionals (Figure 11).
- Trees may engulf objects such as fencing, signage, leftover staking implements and even walkways if placed in close proximity (Figure 12). This may affect their structural integrity.
- Improperly placed trees can obstruct lines of sight, or strike people and machines. They need to be pruned for the safety of motorists and pedestrians (Figure 13).



R. Ambrose, Kansas Forest Service

Figure 9: Planting too close to a building limits a tree's canopy.

RIGHT TREE RIGHT PLACE



Figure 10: Consider aboveground restrictions like overhead wires on a site. Limit selection of trees to those with a mature height and spread that will not interfere and require drastic pruning later in life. See the next publication in this series on planting stock selection, listed in the references section.

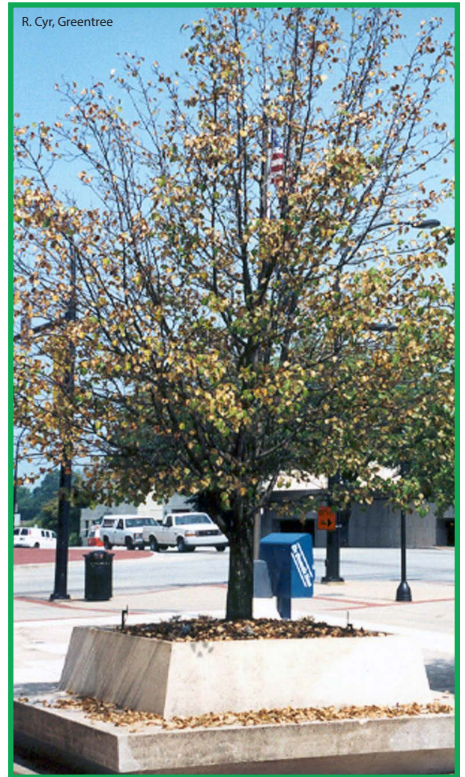


Figure 11: Improperly-placed trees can perform poorly and end up costing more in the long run in maintenance!



Figure 12: Trees can engulf objects and obstructions, which can compromise their structural integrity and health.

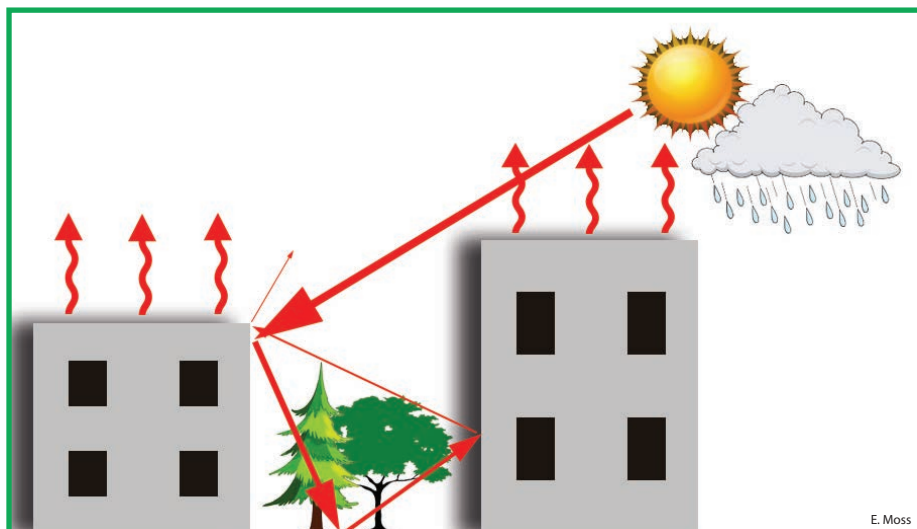


Figure 13: The wrong tree in the wrong place can become more of a burden than a benefit as it grows larger.

MICROCLIMATE

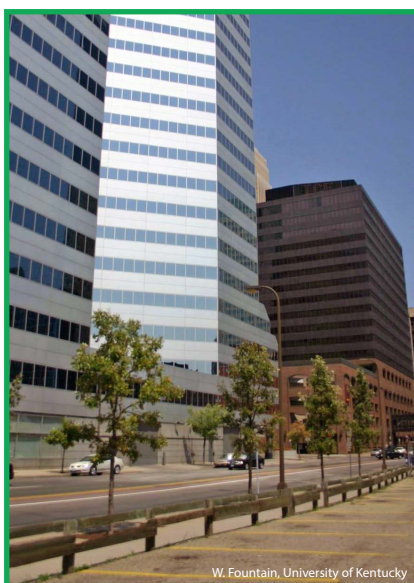
Communities have areas of hardscape that re-radiate heat from the sun, making cities several degrees warmer than surrounding natural areas—a phenomenon called the urban heat island effect (Figure 14 & 15).

- Sites near pavement may need additional irrigation (provided that adequate drainage is also provided) (Figures 15 & 16). Drought and/or heat-tolerant species may be better suited for such sites.
- Buildings can cause rain shadows, funnel drying winds, and block trees from the sun, limiting photosynthetic potential and slowing growth.



Figures 14 & 15: Community hardscapes trap radiation from the sun, making cities considerably warmer than rural areas. Buildings can also funnel wind and create rain shadows, both of which can stress community trees.

- Heat vent outputs, building ventilation systems, and heat pumps/air conditioners can change the microclimate, creating more heat, or change air and soil moisture levels.
- Note sun exposure on a site (full sun= 6+ hours of sun per day) and take into consideration overall climate.
- Areas on hills may be subject to drying winds and droughty soils, while low areas might create frost pockets and have poorly drained soils.



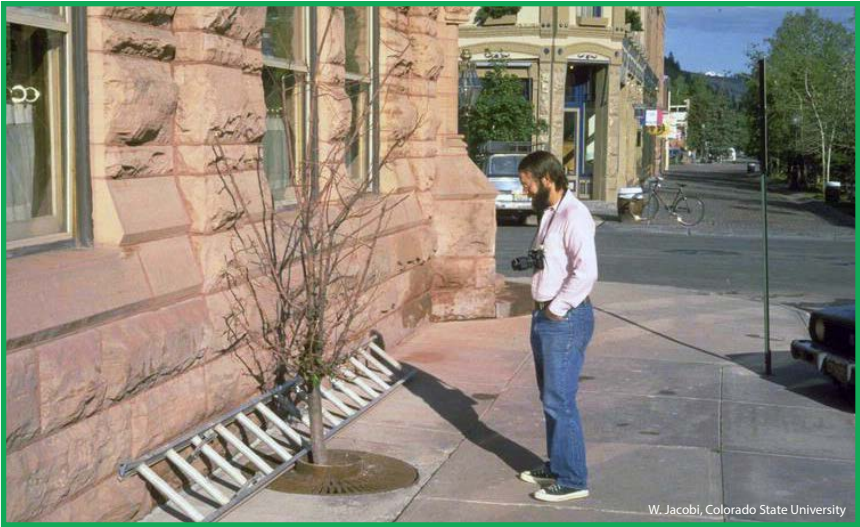


Figure 16: This tree surrounded by hardscape performs poorly because rain cannot reach its roots, it is cooked by re-radiated heat, and its crown is occluded by a building. Traditional tree pits have very restricted rooting space due to size, lack of surface area and subgrade compaction, so they are usually not viable planting sites. Consider a more modern planting strip designed by professionals.

EXISTING VEGETATION

Existing vegetation can give an idea of site conditions.

- Leaf scorch, branch dieback, small off-color leaves, and early leaf drop may indicate dry site conditions (Figures 17, 18 & 19).
- Significant dieback may indicate a pest issue such as an insect or disease.
- Note the presence of witches' broom, water sprouts, or other growth abnormalities that indicate stress.
- Does the site have a history of rejecting the same species of tree repeatedly?

Figure 17: Dieback on existing vegetation is a symptom which indicates less-than-ideal site conditions such as element deficiency, compacted soils, poor soil aeration, inadequate drainage, or droughty soils.





Figures 18 (above) & 19 (below): Yellowing of existing vegetation is a symptom which indicates less-than-ideal site conditions such as element deficiency, compacted soils, poor soil aeration, inadequate drainage, or droughty soils.



Selected References

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