# Anthracnose Management: <u>A Guide for Salt Lake City Trees</u>

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#### **1.0 Understanding Anthracnose: A Unique Challenge for Salt Lake City**

Salt Lake City's tree stewards have taken notice of a fungal disease blighting their London Plane and Sycamore trees, anthracnose. Anthracnose is caused by a group of pathogens that can affect a variety of plant species, including trees commonly found in urban landscapes. This disease manifests through symptoms such as leaf necrosis, premature defoliation, twig dieback, and branch death in severe cases. The fungus overwinters in buds, twigs, fruit, and fallen leaves of infected trees. Anthracnose can remain in infected tissue for extended periods of time, leading to reinfection in subsequent growing seasons. The spores spread through air and water, thriving in temperatures between 50–68°F, particularly during periods of high humidity and moisture.

Managing anthracnose in the Salt Lake Valley is complicated by several factors. Anthracnose only occurs during the area's brief, cool, and wet spring period. However, these spring conditions are often followed by long stretches of extreme heat and low precipitation. As temperatures rise, the anthracnose fungus becomes inactive, but trees face a new challenge—heat stress.

In other regions where anthracnose is common, trees typically recover by producing a flush of healthy foliage during summer months, allowing them to better recover from the fungal infection. Producing a new flush of leaves following spring defoliation is taxing on a tree's stored energy reserves. In regions with regular summer rainfall and humid conditions, trees can use this time to rebuild energy reserves needed to survive winter. In Salt Lake City, however, when this new flush of leaves emerge, intense summer heat can further stress trees and exhaust energy reserves, leading to a decline in health. This creates a destructive cycle where trees not only struggle with the initial fungal infection but also face further damage from the extreme heat. Insects that thrive during summer conditions can further compound these issues. Insects such as sycamore scale and sycamore plant bug begin crawling and eventually feeding on leaves. Symptoms of these pests are similar to those of anthracnose, beginning with deformed leaf development, followed by leaf spotting and necrosis. These conditions significantly hinder photosynthesis and lead to further stress. As a result, stressed trees are more susceptible to fungal diseases such as anthracnose, leading to a decline in tree health in Salt Lake



**Figure 1** An idyllic street in Salt Lake City lined with mature London Plane (Platanus × acerifolia)

City. This document aims to address these challenges by outlining preventative strategies and treatment options for managing Anthracnose. While the recommendations provided are informed by current practices and research, they remain experimental and are intended for informational purposes only. The effectiveness of these treatments may vary based on several factors, including the

severity of the disease and environmental conditions.

The primary goal of this guide is to offer a range of both preventative and curative approaches to aid decision-making for managing Anthracnose in Salt Lake City. Emphasis is placed on adopting cultural practices to promote tree health, minimize the need for intervention, and reduce environmental impact. Where chemical treatments are necessary, application should be completed by a certified professional to ensure safety and effectiveness.

Given the unique conditions of Salt Lake City's urban forest, further field testing and evaluation are essential to refine and improve these recommendations. This document serves as an initial step in addressing Anthracnose, with the goal of preserving the health and longevity of the city's trees while supporting the broader goals of urban forestry and environmental stewardship.



DID YOU KNOW?

Anthracnose likely came with the introduction of crops from Europe during early agricultural trade. The first reports of anthracnose affecting crops in the U.S. emerged as commercial agriculture expanded 19th and early 20th centuries

#### **2.0 Prevention through Cultural Practices**

The leading form of plant health care has always been prevention, achieved through cultural practices. Ideal cultural practices are the cornerstone of maintaining healthy trees, as they are significantly more effective and manageable than addressing pest infestations or diseases after they occur. Once a tree becomes infected, combating these issues can be a costly and time-consuming uphill battle, often with limited success.

By adhering to these practices, an environment is established where trees are more resilient and better equipped to defend themselves against pests and diseases. These practices function as proactive measures, promoting robust tree health and minimizing the likelihood or severity of infection.

This guide provides clear dos and don'ts for optimal tree care, offering practical steps to ensure trees thrive. Following these recommendations will not only enhance the health and longevity of trees but also strengthen their immune defenses, making them less vulnerable to common stressors. Take preventative measures now to invest in the health and beauty of trees for years to come.



**Figure 2** An American Sycamore (Platanus occidentalis) produces a new flush of healthy foliage after temperatures reach over 69° F(21° C) during warmer months.

#### **2.1 Watering for Tree Health**

Supplemental watering is the most vital aspect of tree care in Salt Lake Valley. How a tree receives water directly impacts its health from the time it is planted until the end of its life cycle. Proper irrigation ensures trees establish strong root systems, maintain vigor, and better recover from environmental stress. A common misconception is that mature trees rely solely on a deep taproot to access groundwater. However, in Salt Lake's high desert climate, natural springs and underground water sources are sparse, and relying on this assumption can jeopardize the long-term health of the urban forest.

The specific amount of water a tree needs depends on factors such as species, location, soil type, and seasonal conditions. Salt Lake City experiences extreme temperatures and microclimates, with fluctuations in heat, cold, and precipitation across the valley. Effective watering starts by understanding a

tree's unique needs and the conditions of its planting site. Salt Lake City Urban Forestry provides an annual watering calendar, which provides seasonal guidelines to help tailor irrigation practices. Please note this calendar is designed for newly planted trees, so a larger more mature tree may need deeper and less frequent watering.



Figure 3 A newly planted Gingko (Ginkgo biloba) is watered by Cemetery staff

## **Quick Tips**

#### **How Much Water?**

The exact amount of water is variable but generally 5-10 gallons per inch of trunk diameter is recommended. Water should be applied evenly at a low flow rate until the soil is thoroughly soaked, which may require a longer duration until the soil achieves saturation. Adjust watering based on weather, soil conditions, and tree species to ensure a tree's specific needs are met.

#### Where to Water?

Watering properly means targeting the critical root zone, which is located within the dripline of the tree, the area beneath the canopy where the tree's branches extend. Ideally, water should be applied to as much of the area within the dripline as possible to ensure even and deep saturation of the soil. Focusing on this zone ensures that the tree's feeder roots, which are responsible for water and nutrient absorption, can access the moisture they need.

#### **How to Water?**

Watering should be done slowly to ensure water penetrates at least 14–24 inches below the soil surface, where most the tree's active roots are located. Applying water too quickly can lead to runoff, wasting water and leaving deeper roots under-irrigated. For best results, use methods such as soaker hoses, drip irrigation systems, or a slow-running garden hose to allow water to seep gradually into the soil. Unlike watering a lawn, the goal of tree watering is to have saturation deep in the soil. Tree roots are usually 18-24" deep.

Season	Condition	Watering Frequency	Notes
<b>Winter</b> December- February	Temperatures above 32°F (0°C) with no precipitation for 7+ days	1 time per month if needed	Water only during prolonged dry periods; skip if rain or snow has saturated the soil
<b>Spring</b> March- May	Ground begins to thaw with variable rainfall and temperatures	1–2 times per month, depending on rainfall	Postpone watering if the ground is deeply saturated by rain or snow
<b>Summer</b> June- August	High heat, low rainfall, and increased stress on trees	1–2 times per week	Ensure deep root watering to a depth of 14–24 inches to combat summer stress
<b>Fall</b> September- November	Cooler temperatures, less evaporation, and potential for intermittent rain	1 time per month if needed	Reduce frequency as temperatures drop and rainfall increases but monitor for dry conditions

#### **2.2 Soil and Tree Health**

Healthy soil directly correlates to tree health. It is widely recognized that the primary cause of poor tree health often originates in the soil, where deficiencies or compaction can severely impact the root system. Healthy soil provides the foundation for strong root development, nutrient uptake, and overall tree vigor.

The soil in Salt Lake City is typically alkaline, with a high pH level. This makes it difficult for trees to absorb essential nutrients like iron, manganese, and other micronutrients, leading to deficiencies that affect trees' ability to recover from environmental stressors and disease.

In addition to its alkalinity, soil composition in the area can vary, often being a mix of clay and sand. This can result in poor drainage and limited nutrient uptake. Many areas also experience soil compaction due to development and construction, which disrupts the natural soil structure. Compacted soil limits water infiltration and root penetration, making it even more difficult for trees to access the moisture and oxygen needed to thrive.

Utah State University provides a service for soil testing, which can provide valuable insights into pH levels, nutrient content, and other factors that may influence tree health.

Steps can be taken to improve soil quality and create a more favorable environment for root growth and nutrient uptake. Simple actions can significantly enhance soil structure, providing trees with the resources they need.

#### How To: Soil Care for Tree Health

Eliminating grass around the base of a tree is a simple and effective method of improving soil in a tree's root zone. Grass competes for vital water and nutrients, which can limit the resources available to the tree's roots. Additionally, the presence of grass increases the risk of mechanical damage from lawn mowers and weed trimmers, which can harm the tree's trunk and roots. Ideally, a grass-free ring should extend to the tree's drip line. If this is not feasible, a minimum radius of 3–4 feet is advised. Within the ring, apply a thin layer of organic mulch or compost around the base of the tree. Mulch helps retain moisture, regulates soil temperature, and provides essential nutrients as it decomposes. However, it is critical to ensure the root flare—the area where the trunk transitions into the root system—remains fully exposed. Covering the root flare with mulch or soil can trap moisture against the bark, leading to rot and other health issues. Mulch should be applied in a shallow layer, approximately 2–4 inches deep, and kept at least 2–3 inches away from the trunk to prevent issues.

Avoid placing materials such as rocks, gravel, or non-organic materials made of rubber or plastic within the mulch ring. Rocks, for instance, can absorb and retain heat, effectively "cooking" the roots and trunk during hot weather. This can lead to severe stress and damage to the tree's vascular system. Materials such as old tires, rubber mats, or other artificial substances can cause leaching, releasing harmful chemicals into the soil. Additionally, these barriers trap heat and moisture, creating conditions conducive to root rot or girdling, which severely compromise tree health.

Though commonplace, weed barrier fabrics often compromise soil health. While these materials are semipermeable, they can hinder the movement of water and nutrients into the soil. Over time, weed barriers also restrict root growth and lead to girdling at the tree's base. For these reasons, it is best to avoid using weed barriers in the landscape altogether.

Maintaining healthy soil, removing competing vegetation, avoiding nonorganic materials, and providing a protective mulch ring with the root flare exposed, creates an environment where roots can thrive. These practices support the long-term health, vigor, and success of trees in Salt Lake City's unique climate.



Figure 4 Blue Giant Sequoia (Sequoia giganteum 'Glaucum') with an ideal mulch-ring

#### **2.3 Prevention of Spread**

Anthracnose fungus can persist in foliage, twigs, branches, and stems for several months. Another critical step in managing this disease is preventing spread through removal of infected tissue. If not managed properly, infected material harbors the fungus, allowing it to reinfect and spread to nearby trees during favorable conditions.

Routinely removing fallen leaves and twigs throughout the spring, summer, and fall can reduce anthracnose spread. This helps to limit the environment where fungal spores can remain active and reduces the likelihood of reinfection. It's important not only to clear debris but to dispose of it properly, ensuring debris is disposed of in a way that prevents it from infecting other nearby trees or plants. Simply moving debris around the yard or leaving it in a pile can lead to spores spreading to healthy trees. Keeping the base of the tree free from debris is an essential part of anthracnose prevention.



Figure 5 Side-by-side comparison of two London Plane trees: one heavily infected with anthracnose, the other mildly affected

Infected twigs and branches in the canopy should be pruned from the tree. Consult an ISA-certified arborist for pruning to ensure proper techniques are used to avoid unnecessary damage to the tree. Professional arborists have the expertise to identify and remove infected tissue effectively while preserving the tree's overall structure and health.

For trees located on city property, residents should contact Salt Lake City Urban Forestry for pruning and maintenance needs. This will ensure that all work performed is in accordance with established code, arboricultural standards, and help protect tree health.



Figure 6 Salt Lake City's Urban Forestry has a team of skilled arborists available to maintain city trees

### **2.4 Other Considerations**

#### Weather Conditions

Weather conditions significantly influence tree health and make year-toyear comparisons a challenge. Wet springs, characterized by high humidity and consistent rainfall, create ideal conditions for the anthracnose pathogen. In contrast, drier springs limit the fungus' spread, resulting in healthier looking trees with fuller foliage. The severity of summer heat in Salt Lake City is also a consideration. Long, hot summers following cool, wet winters cause intense stress and worsen the impact on tree health. These weather variations make evaluating the success of treatments difficult. Therefore, it is crucial to account for fluctuations in weather when assessing treatment efficacy to ensure accurate evaluations.

#### **Root Zones and Tree Location**

A tree's root zone supports water and nutrient uptake as well as structural stability. The location of a tree and the condition of its root zone directly impacts its long-term health. Trees planted in park strips face restricted root growth. Barriers such as sidewalks, driveways, and streets limit root expansion. This reduces the tree's ability to access essential resources. Trees in open spaces with unrestricted root zones are better positioned to develop extensive root systems, improving their resilience and ability to thrive. While planting in an open space is ideal, this is not always a possibility in urban environments. It is important to set realistic expectations of tree health and life expectancy when planting in these restricted areas.

#### Tree Age

The age of a tree in an urban environment must be considered. External factors such as poor soil quality, root zone restrictions, pollution, and physical damage can result in immune systems becoming less efficient and cause

physiological processes to slow. This results in a natural decline in health and vigor. In an urban environment, the average life expectancy of a tree is typically 10–30 years, significantly shorter than trees found in natural forests. Species selection, proper planting techniques, routine maintenance, and resource availability determine the longevity of urban trees.

**3.0 Chemical Application: An Integrated Approach to Plant Health Care** 



Figure 7 Systemic insecticide is applied via soil drenching at the base of a Horse chestnut (Aesculus hippocastanum)

Chemical applications serve as both a curative and preventative measure in managing tree health and play a critical role in plant health care when cultural practices prove insufficient in mitigating severe infections or infestations. While effective, chemical treatments should be approached with careful consideration and be completed by a certified professional.

One of the primary challenges of chemical applications is the likelihood of non-target organisms or waterways being affected. Chemical treatments can have unintended consequences that extend beyond the targeted pest. These chemicals, while effective in controlling disease and pests, can drift or leach into surrounding environments, posing a risk to beneficial insects, wildlife, and aquatic ecosystems. The impact on non-target organisms can range from minor disturbances to significant population declines. Contaminated waterways can lead to long-term environmental damage, highlighting the need for careful application to mitigate risk

Another consideration is cost. Fungicides, insecticides, and other chemical agents often require



Figure 8 A mantid rests on the branches on a Flowering Pear (Pyrus calleryana)

specialized equipment and certified professionals to ensure proper application. Additionally, most chemical treatments need to be reapplied regularly to maintain efficacy, making this method an ongoing investment rather than a one-time solution. The frequency of application depends on factors such as the target pest or pathogen, environmental conditions, and the product used.

When applying chemicals, minimally invasive methods are preferred to protect tree health. Techniques such as bark banding, which applies treatment directly to the trunk, and soil applications, which deliver the treatment to the root zone, avoid causing physical injury to the tree. Canopy sprays can be effective and are non-invasive to the tree, however, can cause drift which may disturb the local environment and are typically limited to smaller trees where the entire canopy can be sprayed from ground level. In contrast, trunk injections, which require drilling into the tree, can create wounds that compromise the tree's natural defenses, increasing vulnerability to other pests and diseases. Stressed trees, especially those already affected by anthracnose, may not recover well from such injuries. Trunk injections should only be considered when other methods are impractical or ineffective.

Despite the financial and logistical commitment, chemical application remains a valuable tool in Integrated Pest Management (IPM). By combining chemical treatments with cultural practices, tree health can be optimized while minimizing environmental impact. Chemicals should always be applied responsibly, adhering to manufacturer guidelines and local regulations, to ensure safety for both the applicator and the surrounding ecosystem.

This chapter provides an overview of various chemical options. The intention is to empower decision-making with the knowledge to select the most effective treatments for trees' specific needs by understanding the benefits, limitations, and requirements of chemical application.

#### **3.1 Preventing and Treating Anthracnose with Fungicides**

Fungicide applications offer both preventative and curative benefits. These treatments target the fungal pathogen directly, reducing its impact on infected trees and limiting spread. However, the effectiveness of fungicide applications depends on several factors. This includes the severity of the infection, the tree's management history, and environmental conditions.

Reapplication of fungicide is typically required, often indefinitely, to ensure sustained protection until the pathogen is no longer present in the environment. To maximize effectiveness and minimize risks, fungicide applications should always be handled by a certified professional.

Although fungicides generally pose minimal risk to pollinator populations, chemical drift remains a concern. Poor application techniques or unsuitable conditions can lead to unintended exposure of non-target organisms. Proper equipment and methods are essential to ensure environmental responsibility.

By selecting the most appropriate application methods and considering the specific conditions affecting tree health, fungicide treatment can be a valuable part of an Integrated Pest Management (IPM) approach. These efforts help preserve the health and resilience of Salt Lake City's urban forest while minimizing environmental impact.

### **3.2 Indirect Anthracnose Management Through Insecticide Treatment**

Insecticide treatments can play an indirect but significant role in preventing and managing anthracnose by targeting pests that weaken a tree's overall health. Pests such as sycamore scale and sycamore plant bugs feed on chlorophyll in the leaves, which trees rely on for photosynthesis. This feeding not only reduces the tree's energy production but also increases stress, making it more susceptible to infection.

By eliminating these pests, insecticide applications help improve the tree's overall vigor and immune health. A healthier tree is better equipped to fight off anthracnose and other diseases. This derivative effect makes insecticide treatments a valuable component of an Integrated Pest Management (IPM) strategy for anthracnose.

However, a key concern with insecticide treatments is their potential impact on non-target species, especially pollinator populations. While insecticides are effective at targeting harmful pests, they can inadvertently harm beneficial insects if not applied carefully.

While insecticide treatments do not directly target the anthracnose pathogen, their ability to mitigate pest-related stress can significantly bolster a tree's defenses. By addressing pest issues responsibly and effectively, these treatments support the long-term health and resilience of Salt Lake City's urban forest.



Figure 9 a London Plane Tree (Platanus x acerifolia) showing symptoms of Sycamore Scale

### **3.3 Tree Growth Regulators**

Tree Growth Regulators (TGRs) are a chemical treatment option used to control tree growth. While these growth regulators have been commonly used to manage the size of trees in urban areas, such as under power lines, research has expanded into their potential benefit to disease management.

TGRs work by inhibiting the production of gibberellins, hormones responsible for cell elongation during tree growth. Cells divide shorter, leading to more compact branches and leaves. This compaction enhances chlorophyll and phytol production, resulting in thicker, greener leaves. Thicker leaves help conserve water by reducing transpiration due to smaller stomatal pores. Additionally, studies have shown TGRs stimulate root growth and increase fine root density. This increase in root growth results in better nutrient and water uptake in trees, which directly improves tree health. Furthermore, studies have shown treatment with TGRs can reduce the occurrence of fungal diseases such as anthracnose. It is believed to be a secondary effect from the shrinking of the stomatal pores making infection more difficult.

These treatments are applied directly to the soil, minimizing drift and reducing environmental impact. Their effects typically last for about three years, making them a cost-effective option. Although the process is minimally invasive, the formulation can be challenging, as it requires precise application. Treatment must be carried out by a certified professional who understands the specific formulations needed for the species being treated.

#### **3.4 Soil Amendments**

Before supplementing soil with any fertilizers or alternatives, it is important to test the soil to determine deficiencies. High-nitrogen fertilizers may seem like a quick fix for boosting plant growth, but often do more harm than good. Excess nitrogen can lead to rapid, weak growth, making trees and plants more susceptible to disease, drought stress, and pest infestations. Additionally, overuse can degrade soil and cause runoff, harming surrounding ecosystems.

An alternative is incorporating organic material such as mycorrhizal fungi and humates, which work with nature to enhance soil health. Mycorrhizae form symbiotic relationships with plant roots, extending their reach and improving nutrient and water absorption. This natural network strengthens plant resilience while reducing the need for synthetic fertilizers. Humates, derived from decomposed organic matter, further support soil structure by increasing microbial activity, improving moisture retention, and making nutrients more bioavailable. These amendments not only provide long-term benefits but also restore soil vitality.

In the Salt Lake area, iron deficiency is a common issue due to the high alkalinity of the soil, which prevents plants from absorbing iron effectively. This iron deficiency leads to chlorosis, where leaves turn yellow due to insufficient chlorophyll production. To amend the soil, EDDHA chelated iron can be applied. Unlike other forms of iron, EDDHA chelated iron is more compatible with alkaline soil and stays accessible to tree roots, allowing for proper uptake.

While these soil-enhancing products are widely available and can be applied by anyone, misuse can lead to damage. Overapplication or improper combinations may disrupt soil chemistry or inhibit natural processes. To ensure the best results and avoid potential harm, consulting a professional is highly recommended before application.

#### 4.0 Conclusion

Managing anthracnose in Salt Lake City's urban trees requires a multifaceted approach. The city's unique climate creates an environment where trees are particularly vulnerable. This guide has outlined several strategies to manage these challenges. By implementing cultural practices such as proper watering, soil management, and the removal of infected tissue, tree health can be better maintained, reducing the risk of anthracnose.

When chemical treatments are necessary, an integrated approach is recommended. Fungicides can help manage the fungal infection, while insecticides can reduce pest pressure, limiting the added stress on trees. The use of tree growth regulators and soil amendments can also support tree health by improving growth conditions and enhancing resilience.

In conclusion, by combining these strategies and adapting them to specific site conditions, the effects of anthracnose can be mitigated on London Plane and Sycamore trees. While continued research is needed to refine these practices, the recommendations in this guide provide a solid foundation for improving the health and longevity of urban trees in the face of this persistent fungal disease.

## Glossary

**Canopy**- the uppermost layer of leaves and branches that extend from a tree or group of trees

**Diameter at Breast Height (DBH)-** a standard measurement of a tree's size. It's the diameter of a tree, measured in inches, at a height of 4.5 feet above the ground

**Drip Line**-the outermost edge of a tree's canopy, where water drips onto the ground

**Environmental stewardship**- the practice of using and protecting the natural environment in a responsible way

Fungicide- a chemical that destroys fungus

**Gibberellin**- any of a group of plant hormones that stimulate stem elongation, germination, and flowering.

Insecticide-a substance used for killing insects

**Microclimate**- the climate of a very small or restricted area, especially when this differs from the climate of the surrounding area.

**Mulch**-material (such as decaying leaves, bark, or compost) spread around or over a plant to enrich or insulate the soil.

**Necrosis**- death of a circumscribed area of plant or animal tissue as a result of disease or injury

**Photosynthesis**- the process by which plants use sunlight, water, and carbon dioxide to create oxygen and sugar by converting light energy into chemical energy that can be used by the organism as food

**Root Flare**- the area where a tree's trunk widens, and its first main roots begin to grow

**Stomatal pore**- a microscopic opening in a leaf that controls gas exchange and water loss

Tree Growth Regulators (TGRs)- a chemical that slows the growth of trees

Trunk-the main stem of a tree that supports the tree and transports materials