

RESEARCH LABORATORY TECHNICAL REPORT



Gas Injury To Trees and Shrubs

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Gases in the soil have been damaging trees and shrubs along streets ever since the first illuminated gas transmission lines were installed in Pall Mall, England during the early 1800s. However, it was only recently recognized that gases from landfills can migrate into the soil covering the refuse and then into adjacent properties killing trees, shrubs, and turf.

Gas Kill Along Streets

Natural gas is comprised primarily of methane (CH₄) but other combustible and non-combustible components can account for 2-5% of the gas volume. This gas can leak from underground pipes and move vertically and horizontally into the soil surrounding the leak, causing root asphyxiation in the contaminated area. Gas usually reaches the surface in an unpredictable manner.

Plant Symptoms

Gas injury symptoms range from slow decline and chlorosis to necrosis and death. Affected plants may have tiny leaves if the leak is small and has been there for several months during the growing season. The tree may decline quickly (over a period of one to three weeks) if a large quantity of gas is leaking under considerable pressure. Frequently, the grass and weeds in the area will be affected if the gas reaches the soil surface. They will become chlorotic and then necrotic or will quickly dry up in a few days to a week.

Diagnosis

Proper diagnosis of a gas kill problem requires a combined soil and plant investigation. After symptoms are observed in an area, use Table 1 to check

for the typical changes in soil characteristics. To do this, dig three to four eighteen inch (18") deep holes around the drip line of the tree. If the odor, color, texture, and moisture changes described in the table are observed in soil suspected of being contaminated compared to normal soil from the same property, then the gas company should be called out to check for gas. They will usually respond within several hours. If gas is found, then the likely cause of the plant's poor health has been confirmed.

Table 1: Characteristics of normal and gas-contaminated soil

	Normal Soil (Aerobic)	Contaminated Soil (Anaerobic)
Odor	Pleasant	Septic
Color	Light	Dark
Texture	Not Sticky	Sticky
Moisture	Low	High

Gas Kill on Landfills

Many landfills throughout the United States have been converted into parks, golf courses, and recreation areas because of increased land pressure. Thin cover

soil over the refuse, poor-quality soil, soil with low organic matter, soil compaction, lack of irrigation facilities, and incorrect plant selection are contributing factors to poor plant growth on these reclaimed sites; however, gas contamination of the root zone is an important factor responsible for poor tree growth in these areas. The problem is caused by one or more of the following factors: (a) lack of oxygen in the root zone; (b) toxicity of carbon dioxide to the roots or; (c) anaerobic soil, which permits metals such as iron, manganese, and zinc to become available to the vegetation in toxic concentrations.

In some cases, the trees may die while the more shallowly-rooted shrubs and ground vegetation survive. Generally, when landfill gases are present in the surface soil, the concentration increases at deeper soil layers. Diffusion of ambient air into the soil and diffusion of landfill gases out of the soil frequently result in the soils nearest the surface (top several inches) remaining in an aerobic condition, while the areas where the deepest roots are present can be anaerobic.

Diagnosing issues affecting plants on or near landfills are more complex than on non-landfill areas; however, the same general diagnosis procedures apply in these cases as in gas damage along streets. Consult the Bartlett Tree Research Laboratory staff if you require diagnostic assistance for possible gas contamination issues.



Founded in 1926, The Bartlett Tree Research Laboratories is the research wing of Bartlett Tree Experts. Scientists here develop guidelines for all of the Company's services. The Lab also houses a state-of-the-art plant diagnostic clinic and provides vital technical support to Bartlett arborists and field staff for the benefit of our clients.