

THE INFLUENCE OF STRESS ON DISEASES OF NURSERY AND LANDSCAPE PLANTS

There are two points in the life of most landscape species where exposure to stress is most likely to result in plant damage: during and after transplanting and again after plants and their surrounding environment become increasingly delicate and sensitive to change.

Weakening or reduction in vigor of landscape plants usually arises from exposure to stresses, the most common ones being drought, flooding, freezing or extreme temperature fluctuation, defoliation, nutrient deficiency (toxicity), chemical injury (i.e. herbicides), mechanical injury (construction damage), and transplanting shock (including storage and shipping). Exposure to any of these stresses may cause visible physical injury; however, the stresses can have a more subtle effect by weakening the host plant and increasing its susceptibility to non-aggressive pathogens.

Few, if any, non-aggressive pathogens can penetrate healthy, intact plant surfaces directly, but this is seldom an obstacle to invasion since all landscape plants have dead branch stubs or twigs and at least minor wounds present. The likelihood of infection through fresh wounds is influenced by weather conditions at the time of wounding. Fungus spores and bacteria are easily spread during wet weather by splashing rains or on pruning and shearing tools. Severe outbreaks of diseases such as juniper blight and bacterial lire blight are common following pruning and shearing operations conducted under damp conditions.

What kind of symptoms do we usually find associated with the damage when landscape plants are placed under stress conditions to the point where damage occurs?

Drought or water stress

All too often we find the effects of drought damage or stress show up as late as one or two years after the drought year. Since most memories are short, it can be very difficult to convince someone that a drought last year or the year before actually initiated the problem. There is usually a threshold level of water stress required to bring about an increase in disease susceptibility in woody plants. In all cases studied, this level is less than the permanent wilting point and the plant may show little or no signs of water stress, yet may become attacked by nonaggressive stem canker fungi. The effect of water stress in such cases is increased disease damage rather than wilting or other physical drought symptoms.

Excess water and flooding stress

The damaging effects of high soil moisture arise from suffocation of roots rather than an oversupply of water alone . If the supply of oxygen in the soil becomes depleted, root absorption of water and nutrients decreases. Above-ground symptoms are often similar to drought or nutrient deficiency.

High temperature stress

A sudden period of hot spring weather following a damp period can cause blighting and weakening of very succulent plant tissues, which in turn become attacked by pathogens. Thinbarked stems can suffer sunscald. Sunscalded tissues often are colonized by stem-canker organisms. Extreme temperatures may lead to drying and desiccation, which are actually water stresses.

Low temperature stress

Woody plants that cold-harden during slowly falling temperatures can usually survive temperatures below even the coldest temperatures recorded in the region without damage. However, rapid drops in temperatures to below freezing before plants have hardened in the fall can result in considerable injury and weakening of plant tissues.

Frost damage which appears as a blighting of succulent shoots usually occurs in the spring following bud break. In addition to fall and spring freezes, a hard freeze following unusually warm weather during the winter can cause injury on plants in which the cold period required to break dormancy has been satisfied. Winter or low temperature symptoms are highly variable and often difficult to diagnose. Freezing stress or weakening of woody stems, particularly if it occurs from fall freezes may show up the following growing season as girdling, wilting, and dieback of shoots. Even stems that have been completely girdled by freezing, or frost collars may produce apparently normal shoots, which suddenly wilt and die later in the season. "The most effective treatments for diseases associated with plant stress is to restore the vigor of the host plant. Pruning, watering and fertilizing are the common practices recommended to help plants recover ... Selective pruning of the top growth can help restore the balance between the top and an injured or stressed root system. Any practice which promotes plant vigor should help plants recover from the infection by stress-related disease pathogens."

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