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EXCESS WATER PROBLEMS ON WOODY ORNAMENTALS

Excess water can be a serious problem for many woody ornamentals. Roots in flooded or water-logged soils are damaged and die from oxygen deficiency. In addition to this direct damage to the root system, flooding has also been associated with inciting physiological changes in woody plants that influence their growth and other processes. The feeder roots, which are non-woody and important for uptake of water and nutrients from the soil, are particularly sensitive and are frequently the first ones damaged by water-logging. Woody roots are more tolerant than non-woody roots to flooding. When feeder roots are damaged, they are unable to provide water to the top of the plant and a water deficit develops. Damage can be sudden or gradual, depending upon the plant and the flooding conditions. This can occur on plants in obviously wet sites and on those in marginal sites or soils with more subtle water problems such as along city streets or in areas where high clay content in the soil impedes drainage. Most trees and woody shrubs cannot grow in water-logged soils for very long and can die if flooded for only a few days during the growing season. Visible symptoms are *often* not evident until considerably after the damage has occurred, especially when the root damage is gradual.

SYMPTOMS:

Symptoms of excess water depend upon the plant and are highly variable. These include epinasty or downward rolling of leaves, stem swelling, chlorosis or yellowing of the foliage, edema, reduced and stunted growth, twig dieback, leaf drop, root death, and in extreme cases, whole plant death.

Seedlings and new transplants are more sensitive to excess water problems than are established plants. This can be attributed to the lack of an established root system and to feeder root damage during transplanting. Needled evergreens are generally considered more sensitive to water-logged soils than broadleaved deciduous plants. Symptoms of water-logging may not develop in a woody ornamental until water demands on the root system increase, typically during the hot summer months when the canopy is actively losing water through transpiration. This is sometimes exhibited as a sudden collapse of the tree or shrub. Other trees appear to lose vigor and slowly decline over a period of years. This can occur on trees that have been otherwise "healthy" for 10-15 years but are growing in poor sites or heavy soils. Dormant plants generally appear to tolerate flooding longer than those in active growth. In addition to direct root damage, trees in flooded soils are predisposed to secondary

pathogens and other opportunistic pests such as the fungal root rots caused by *Phytophthora* and *Armillaria*.

MANAGEMENT STRATEGIES:

Strategies for minimizing wet soil problems include: 1) selection of an appropriate site and use of proper planting practices; 2) cultural practices that maintain plant vigor and stimulate growth; 3) selection of appropriate species for soil and site conditions: water-tolerant (red maple, larch, green ash) vs. water-intolerant (crabapple, spruce, hemlock, yew, white pine); and 4) pruning dead or dying tissues to minimize secondary invaders and opportunistic pests.

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