Windthrow and Other Problems Associated With Eucalyptus

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Approximately 85 species of *Eucalyptus* have been grown over the years at the Boyce Thompson Southwestern Arboretum as part of a testing program to determine their adaptability, in terms of hardiness and drought tolerance, and their usefulness in terms of shade and timber, when grown under central Arizona conditions. The project also involved experimental induction of polyploidy in an attempt to alter the genetic potential of some of the species. A discussion of the findings of the *Eucalyptus* research project on a species-by-species basis will be presented in the future.

While growing *Eucalyptus* over the years some problems have become apparent which are presented in this interim report. Partly on the basis of the Arboretum’s *Eucalyptus* research (since the decade of the 1920’s) and its displaying of specimen trees with nameplates, *Eucalyptus* has become popular in arid region landscaping in the American Southwest. In the 1981 book *Plants for Dry Climates*, Mary Rose Duffield and Warren Jones report that *Eucalyptus* has become the most commonly planted skyline tree in warmer parts of the Southwest. Perhaps the most ubiquitous of *Eucalyptus* in mature plantings of arid regions are species like *Eucalyptus camaldulensis* (= *E. rostrata*) and *E. rudis*. Such species are undoubtedly chosen by home-owners because they make such rapid growth that relatively few years are spent waiting for shade. Eventually the rapid growth may present a problem, however.

Many of the problems associated with *Eucalyptus* in planned landscapes result from over-maturity, with the most rapid growing species becoming over-mature at the most rapid rate. In many respects the problems of *Eucalyptus* are somewhat generic, although more pronounced and obvious in species such as *Eucalyptus camaldulensis* and *E. rudis*. That *Eucalyptus camaldulensis* is a highly successful organism is shown by the fact that although there are 500 or more kinds of *Eucalyptus* native to Australia and surrounding islands, *E. camaldulensis* is credited by the Australian Forestry and Timber Bureau as being the most widely spread of all. To become successful *Eucalyptus camaldulensis* and *E. rudis* have adapted to both drought and excess water! The same is true of many other *Eucalyptus* species to varying degrees. For example, although we think of *Eucalyptus microtheca* as a species par excellence for the Arizona desert, back home in Australia it is given the name Flooded Box. In the 1975 book *Forest Trees of Australia* published by the Australian Department of Agriculture, *E. microtheca* is said to be a species of open savannah on seasonally inundated country around edges of swamps and lagoons or in open belts along water courses! Perhaps this habitat is similar to some of the irrigated yards in central and southern Arizona, or to the floodplain of Queen Creek at the Arboretum.

Although we frequently refer to *Eucalyptus rudis* in the United States as Desert Gum, it is frequently referred to as Swamp Gum in Australia or as Western Australian Flooded Gum by the government there. The *Eucalyptus camaldulensis* so commonly planted in Arizona goes by three names in Australia, all of which refer to rivers: River Red Gum, River Gum, and Murray Red Gum. The latter name refers to the Murray River, along which it is very abundant.

In Arizona problems associated with *Eucalyptus* include windthrow, branch fall, root heave, messiness, chlorosis, outgrowing small areas, chemical inhibition of other plants,
Hugh Haennelt stands next to the upturned roots of a huge Eucalyptus which fell at the Arboretum during the Spring of 1984. Photograph by Sharon Haennelt.

and chain-saw bucking. Just what causes windthrow in Eucalyptus has not been adequately studied but probably relates to a brittleness that may also cause the branch fall. Branch fall is said to be such a common phenomenon in Australia that "Widow-Maker" has been applied there as a common name for Eucalyptus. Often very large branches fall. The brittleness of the branches and roots appear to be characteristic of Eucalyptus rather than being a result of horticultural practices of growing them. Along the Murray River in Australia Eucalyptus camaldulensis trees of the floodplain lean out precariously toward the channel seeking the sun and their huge invasive roots run up and down the floodplain and edges of the channel seeking water. Although capable of surviving during periods of drought, the species attains its immense size and high rate of growth by vigorously reaching out for sun and water. Does a brittleness of branches and roots result from uneven growth brought about by successive periods of rain and flooding followed by drought? Root heave by Eucalyptus causes sidewalks to buckle up and crack and can be destructive to foundations and masonry walls of houses or other buildings. In many respects windthrow, branch fall and root heave are all manifestations of a plant simply growing large. As the above ground parts of a tree become large they represent a considerable weight which is precariously balanced at the point where the tree goes into the ground. The totality of the leaf surface area is in aerodynamic contact with the wind. When the wind blows on any tree there is usually a perceptible movement of the leaves, branches and even main trunks, exerting a shearing force on the supporting roots. Usually, but not always, the roots are strong enough to resist the challenge. In the case of the Eucalyptus pictured here, the point was reached where a chain reaction resulted in the shearing of all lateral supporting roots. The condition is almost identical with that seen in fossil Araucarioxylon trees of Arizona's Petrified Forest and is probably universally characteristic of windthrow and/or flood gouge and scour. Branch fall in Eucalyptus seems to occur when the weight of an outwardly arched branch exceeds the shearing force required to break its supporting base. The extent that the required shearing force varies with the water budget of the tree is not known. Since some Eucalyptus are adapted to both drought and flooding, the water budget would seemingly be subject to great flux. Does the shearing force necessary to break Eucalyptus wood depend on whether the wood is dehydrated, dehydrating, rehydrated, or rehydrating, etc.? Under what circumstance is the wood weakest and most vulnerable to breaking? Root heave is easier to understand. It obviously results when a root simply takes up so much space that it displaces a large amount of soil with the displacement having a domino effect.
on sidewalks, foundations or walls. Root heave can be particularly destructive to septic tanks and leach fields.

Messiness in Eucalyptus results from the seemingly uncontrolled fall of bark, flowers, leaves, branches and seed capsules through the seasons of the year. The messiness and root heave make Eucalyptus a poor choice for planting near swimming pools. Persons who have planted Eucalyptus soon find that other plants rarely come in under them. This is because the litter of leaves, branches, flowers and capsules which becomes incorporated into the soil contains essential oils (such as eucalyptol) which inhibit germination of other plants. This is a serious drawback if a person was planning to grow flowers or garden vegetables from seed either near Eucalyptus or using soil which was once near Eucalyptus. On the other hand, weed seeds fail to germinate also, so we may say that the trees have their own natural pre-emergent herbicide.

Chlorosis results from a lack of iron and is most common in plants growing on alkaline soil and caliche. It has a reputation of being more pronounced following freezing weather. Chlorotic leaves are pale rather than dark green and may be bunched abnormally together. A disadvantage (or at least a disappointment) to many people is that young Eucalyptus trees often have beautiful waxy, bluish juvenile leaves with round or other interesting shapes, but mature to produce run-of-the-mill nondescript leaves. This is the reverse of the ugly duckling turning into the beautiful swan. A further disadvantage of some species (e.g. Eucalyptus microtheca) is that young plants need staking to develop good straight trunks but tend to break away from the stake or pull the stake from the upright position.

Although Eucalyptus makes welcome shade in hot and periodically dry regions, home-owners often forget that there are times of year when rains are heavy and the ground is so thoroughly re-charged with water that the trees put on rank and rapid growth as if they were back home in Australia on the floodplain of the Murray River! They tend to outgrow small areas. Vigorous young plants can put on 10-15 feet of growth per year. They obviously should not be planted anywhere near power lines or eaves of buildings. For many home-owners the only suitable spots for Eucalyptus might be at the edges of the property away from water lines, buildings, sidewalks, and septic tanks.

A final problem associated with Eucalyptus can be referred to as chain-saw bucking. The wood of many Eucalyptus species is spirally arranged and under pressure. In cutting a tree or large branch with a chain-saw, spirals have been known to let go with such force and suddenness that the blade bucks back at the operator with disastrous consequences.

If after reading this far a person wants to plant Eucalyptus, care should be taken to choose young healthy seedlings which are not container-bound. The plants grow so fast that it is hard to keep them in a one-gallon, five-gallon, or even fifteen-gallon can for very long. If a Eucalyptus is purchased which has grown for more than a short time in a container, the chances are good that the main root is so spiralled around the walls of the container that after the tree has been planted and the roots have grown in diameter, a spiralled one will actually choke off and strangle the main taproot which it encircles.