Do Anti-Transpirants Improve Transplant Success?

NURSERYMEN didn't write the last word on transplanting when they developed balling and burlapping tree roots. T. T. Kozlowski, University of Wisconsin forestry researcher and some associates have just concluded research that reinforces common transplant practices in some cases but bursts other common transplant beliefs.

"Trees undergo large water deficits even if they are not moved," explains Kozlowski. "But if they are moved . . . the danger of desiccation (drying out) and death is very great." Kozlowski said nurserymen must move away from the attitude that balling and burlapping are the final answers to transplanting problems. A tree's physiology and water needs are far more complex for such simplistic solutions.

Transplanted trees have a better chance to survive and maintain healthy growth if transpiration can be reduced, water absorption increased, or both. Water absorption can be improved by proper transplant timing, handling, root preparation, and site preparation. Transpiration can be reduced through anti-transpirants, chemical agents that hinder water release by treating the stomata of the leaves. These treatments reduce the tree's water needs by limiting water loss during the stressful transplant period.

Anti-transpirants come in two forms. Film-types coat the stomata, physically reducing the water loss. Metabolic anti-transpirants work internally to induce stomata closure. These two types have limited applicability for all trees. When using an anti-transpirant, Kozlowski recommended nurserymen approach each species and experiment, keeping in mind the toxicity potential.

Toxicity varies depending on variables like type and brand of anti-transpirant, dosage, species, soil conditions and temperature at application time. Anti-transpirants may cause reduced photosynthesis, altered metabolism, leaf lesions, chlorosis and leaf browning and leaf fall and possible death.

Pines and sugar maples, for instance, cannot tolerate certain film-type anti-transpirants. The stomata are already partially filled with a or degrade. If sufficient numbers of stomata are blocked off, the tree dies. Kozlowski recommends "an anti-transpirant that isn't too efficient." In other words, an anti-transpirant that hinders but doesn't totally stop transpiration should be used.

All anti-transpirants do not have comparable results on all species. What works on broad-leaved species may prove to be detrimental to conifers. Again, each nurseryman should experiment with his own stock to find the best anti-transpirant for his region and needs.

Another limitation to film-type anti-transpirants is a decrease in efficiency at high temperatures because they tend to dry out and crack. Kozlowski's experiments showed "at high temperatures, very

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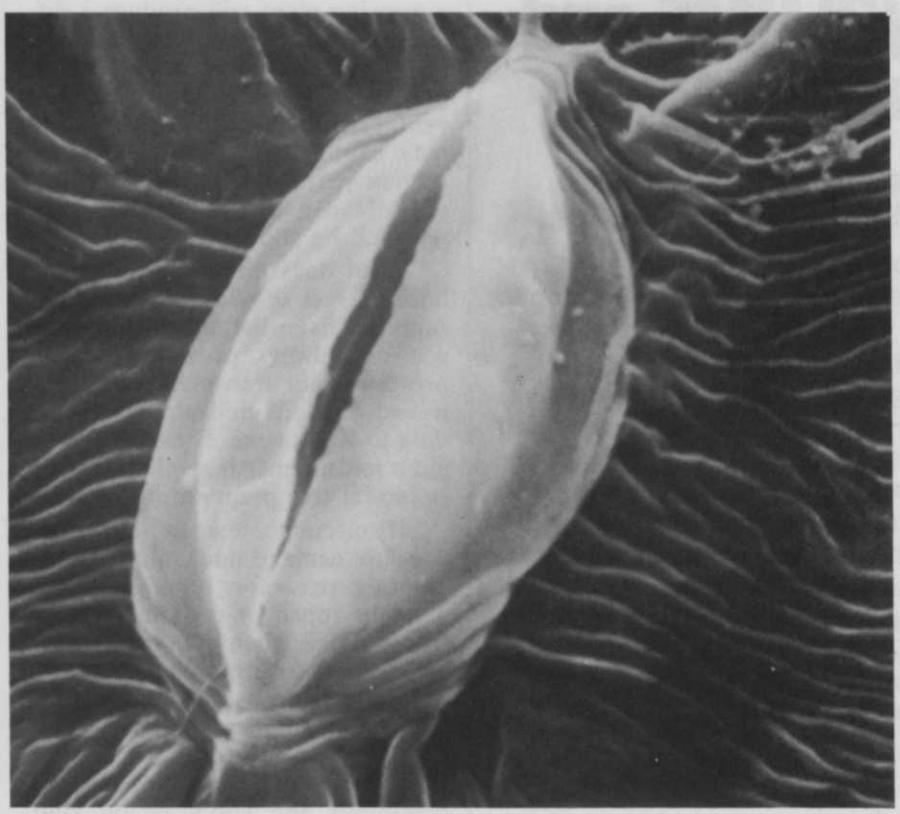

This photo shows the pore of an untreated ash leaf. The photo was taken with a scanning electron microscope (SEM).

This is a scanning electron microscope photo of an ash leaf pore treated with a film-type antitranspirant. The pore is closed and moisture loss during transplanting is minimized.

waxy substance that protects the interior of the leaf. This wax and the anti-transpirant can combine to form a plug that does not wash away different results can be obtained with a given anti-transpirant under varying environmental conditions, from a 50 percent decrease in transpiration to a 50 percent increase".

Wind may also effect anti-transpirant efficiency. In the field, high winds may disrupt the film and cause uneven spraying, resulting in leaf suffocation.

Metabolic anti-transpirants induce stomatal closure internally. The tested compounds had variable results ranging from outright toxicity to very satisfactory transpiration control. Kozlowski's research seems to indicate only one metabolic type, abscisic acid, was highly successful. However, this compound is not commercially available.

"Our studies underlined the difficulty of making specific recommendations for anti-transpirant use," Kozlowski said. "Compound and dosage, species and environmental variables are important in determining the physiological responses of anti-transpirant application."

"Anti-transpirant application to a growing plant will produce a different result than application to a plant that has completed its seasonal growth. Reduction of photosynthesis from anti-transpirants may cause death or influence the current year's growth or reserve accumulation for the following season," he added.

What does this mean to the arborist? Trees shouldn't be moved in summer. Even the anti-transpirants will not always provide adequate protection for transplanting broadleaved trees in midsummer according to Kozlowski. The only way to aid a midsummer transplant success is careful tree preparation.

If circumstance or customer pressure demand midsummer transplanting, remember to have a balled and burlapped or container grown tree to move. Then keep the number of branches to a minimum by pruning, be sure to use only light anti-transpirant applications and water to a depth of fifteen inches. After that hope for favorable growing conditions and you'll be on your way to reduced transplant losses.