

MODERATOR MOREY: Our last talk in this section is by Mr. Bill Armstrong, Highway Landscape Supervisor of the California State Division of Highways. Bill Armstrong.

ROOT CONSTRICTION OF CONTAINER-GROWN NURSERY STOCK

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Any operation by a public agency which requires increased expenditure of public funds is reflected on down to the individual taxpayer. We, therefore, are attempting to eliminate a costly problem which belongs to all of us. If you wanted to assume a selfish attitude, the reverse is also true, inasmuch as any savings by a public agency is reflected in a savings passed on to the taxpayer. From your standpoint, funds spent to replace and maintain defective plant material cannot be used for planting new areas.

The problem which we are attempting to overcome is that of defective nursery stock which is "pot-bound" or "root-bound." Definitions may differ with individuals so let me suggest this: A "pot-bound" plant is a plant which has remained in a pot until the roots have become constricted, usually circling the pot a number of times. The pot is usually 2 to 3 inches in diameter. A "root-bound" plant is one which has remained in any container until the natural root growth has become constricted, usually resulting in a retarded plant.

"Root-bound" plants as just defined may recover from this condition if encircling roots are cut around the outer portion and across the bottom of the ball. "Pot-bound" plants from our experience, will not recover from this condition. Although plants may recover from being "rootbound" after proper plantings, the recovery period delays attaining the desired effects by as much as several years. The cost of this delay amounts to considerable money due to this additional period of intensive maintenance.

In an attempt to reduce the high cost of continuous maintenance, native or drought-resistant plants are used wherever possible. This type of plant is especially sensitive to "pot-bound" root since it is their nature to send roots deep into the earth as rapidly as possible. Once their roots have become constricted and remain in a shallow coil, they die before becoming established, or require care equal to the more domesticated varieties.

Certain varieties respond favorably perhaps for several years or until our plantings normally mature. At this time, plants die of strangulation or snap off at ground level in high winds. Plants like the *Leptospermum* tend to "unscrew" from the ground during windy weather when "pot-bound." Recently an eleven-year-old *Eucalyptus ficifolia* was shoved over with ease while trying to analyze its ailment. The root had never recovered from being "pot-bound." In one area, 100% of all the *Eucalyptus lehmanii* died during the first hot sum-

mer after planting because they had not recovered adequately from being "pot-bound" before the stress period of the year.

Losses such as these result in a costly replacement program. Once replacements have been made, the plant must again receive intense maintenance, just as it did when the original planting was made.

As most of you know, contracts are let or orders are placed in advance for commercial nurseries to propagate and deliver most of the plant material which is used for highway planting. Assume that these plants are delivered to us in a "pot-bound" condition. Once they have been accepted at one of our holding areas, they become state-furnished plants on a landscape contract. Let us further assume that the contractor has a number of "pot-bound" plants which he intends to furnish for the contract. Even though we are permitted to reject the contractor's plants, it is extremely difficult to do so when the state is furnishing the same defective plants.

Experience in growing nursery stock has proven to us that plants can be planted directly into gallon cans, thus eliminating the pot stage. Of course, to do this requires the protection of lath for a period after transplanting. If the potting operation could be eliminated, so would the most serious of our problems in root constriction. We appreciate your effort in the use of peat pots, tarpaper pots, square pots, etc. But to date we have not found the pot which will not constrict root growth.

It is understood that surplus potted material is sold as "liners," affording a market for most of the material raised. Since orders with the state specifies a definite number, it is recommended that plants be placed directly into gallon cans, thus eliminating costly replacements at a later date.

The following is a list of plants which are most frequently lost due to being "pot-bound."

Eucalyptus — all varieties
Melaleuca armillaris
Cistus — all varieties
Photinia arbutifolia
Leptospermum laevigatum
Schinus terebinthifolia
Ceanothus — all varieties
Cinnamomum camphora
Pittosporum undulatum
Prunus lyoni
Ceratonia siliqua
Fremontia Californica
Lagerstroemia indica