The Root Of The Problem

Four steps to determine proper substrate aeration

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The amount of air space (aeration) in a substrate is critical for good root growth. Often reductions in root growth will slow shoot growth and increase production time and cost.

Aeration of substrates can be easily determined by nurserymen. If a series of substrates is made using different percentages of components, a nurseryman can quickly decide which blend should produce the better plants and whether a different mixture is better than what he is currently using. The following procedure was adapted from the Australian Standards Manual for potting substrates.

The best substrates should have initial aeration of 18 to 28%. Aeration declines with time due to decomposition. Initial aerations less than 15% impede root growth quickly after potting. Aerations greater than 30% are excessively drained, have poor water-holding capacities, and require very frequent irrigation. By weighing the substrate after draining and air-drying for two days, one can estimate available water-holding capacity of the substrate.


Aeration Testing

1. Glue a cap to a 6-inch long section of 3-inch PVC pipe and determine the total volume with water. Flatten the end of the cap slightly so that the assembly will stand upright. Drill four 1/4-inch holes in the bottom of the cap where they can easily be covered with fingers. Loosely fit a 3-inch PVC coupler on top and fill the assembly with a moist sample of the substrate to be tested. Drop the tube from 3 inches twice to pack. Refill each time after dropping.

2. Then fill the tube and place it in the water to the top of the coupler. After three hours remove the tube and drain for five minutes. Carefully remove the coupler and level the top of the substrate to that of the pipe.

3. Cover the top of the pipe with a thin cloth held in place with a rubber band. Submerge the assembly again underwater for 10 minutes, then lift, drain, and resubmerge.

4. Half an hour later, lift the tube with fingers covering the holes in the cap. Then place the tube in a pan elevated above the bottom and allow it to drain for 10 minutes. A cake rack works fine. The drainage volume is the air space volume of the substrate. When you divide drainage volume by the total volume of the capped tube, you can calculate the percent aeration.