Monitoring Water Use, Nutrient Management, Drainage and Leachate in Pot-in-Pot Nursery Container Production

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Summary

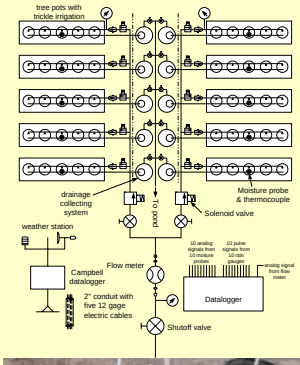
An experimental system to examine water and nutrition application in pot-in-pot nursery container production was established in a commercial nursery field. The system mainly consisted of a plot containing 50 trees planted in 50 pot-in-pot containers and irrigated with micro spray stakes, drainage water measurement devices, container-substrate moisture probes, thermocouples, a weather station and data loggers. Content level of nitrate nitrogen, phosphate and potassium in drainage water was determined by a liquid Ion chromatography analyzer and a Simultaneous ICP analyzer. The system provided a method to monitor not only the use of water and nutrients, drainage water quality, tree growth and substrate temperature and moisture content, but also to monitor level and timing of nitrogen, phosphate and potassium loss through drainage to optimize fertility management practices, and to protect water resources by aiding decisions whether drainage water should be recycled or released from the nursery.

Materials and Methods

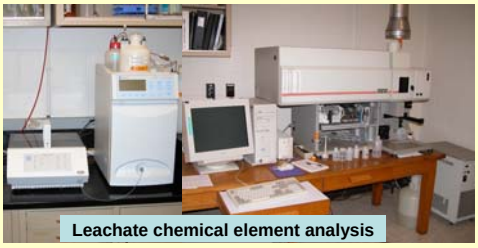

Pot-in-Pot system


Before trees installed

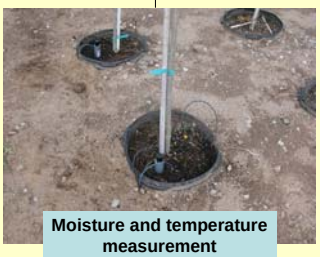

Drainage measurement



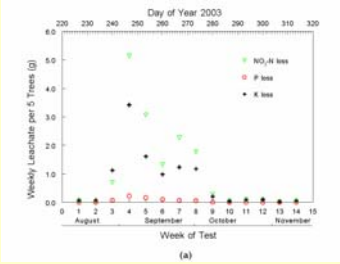

Control room


Leachate chemical element analysis

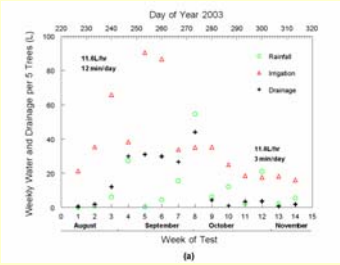

Micro irrigation


Moisture and temperature measurement

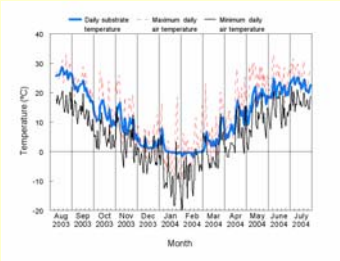
Results



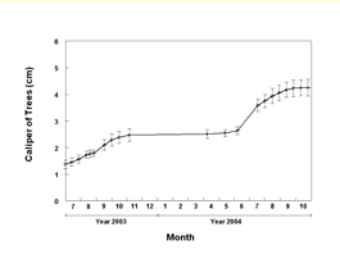
Weekly N, P, K leachate from 5 trees in a #15 pot-in-pot system



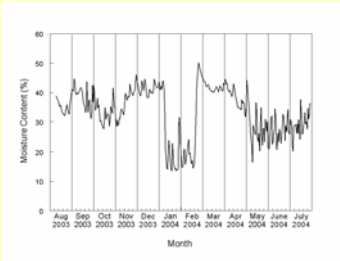
Weekly amounts of irrigation, rainfall and drainage from 5 trees in a #15 pot-in-pot system



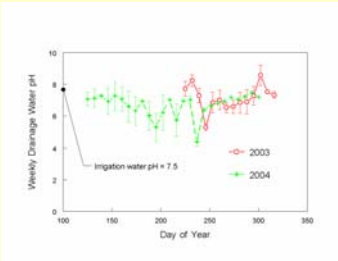
Average daily substrate and min. and max. ambient air temperatures



Average trunk caliper at 18 cm above the substrate during four seasons



Mean substrate moisture content during four seasons



Average weekly drainage water pH during four seasons