Significance to the Horticulture Industry

Ammonia Volatilization from Turf

Comparing Closed Chamber Measures of Ammonia Volatilization from Kentucky Bluegrass Fertilized by Granular Urea. Maxim J. Schlossberg, Benjamin A. McGraw, and Kyle R. Hivner. *Journal of Environmental Horticulture* 36(3): 85–91.

Concerns over climate instability have prompted scrutiny of large-scale anthropogenic processes worldwide, and include horticulture's influence on atmospheric dynamics. Resultantly, accurate quantification of sink/source attributes increasingly comprises agronomic/horticultural research objectives. Numerous methods of measuring gaseous efflux from horticultural systems have been developed and resulting data published. Yet it is paired method comparisons that support both meaningful interpretation of past findings and efficacy in developing future protocols. Experimental results describe how inexpensive, yet reusable, dynamic/flux chambers are quickly constructed, installed, and employed for measurement of gaseous emission from soil/media surfaces. While less costly and complex, static chambers significantly underestimate ammonia emission from fertilized turfgrass under the described conditions. Nitrogen fertilization is essential to the function, resiliency, and aesthetics of turfgrass systems. Turfgrass requires greater quantities of N than any other plant essential nutrient, and N sufficiency is promptly supported by soluble N fertilizer application. Of the soluble sources, urea (46-0-0) is the least phytotoxic and most cost effective on a unit N basis. Yet, results confirm that over three days of dry conditions, 23% of broadcast-applied granular urea-N can volatilize from mature turfgrass systems. For this reason, continuing best management practice (BMP) development remains a priority of horticultural and turfgrass scientists. One of the more effective granular-urea fertilization BMPs, for reducing the likelihood and extent of volatilization, is 'soil incorporation' by coincidental rainfall or scheduled irrigation event(s). However, turfgrass managers' short-term prioritization of nutrient sufficiency and clientele satisfaction often preclude rainfall/irrigation concomitance. This research confirms the cost of such inaction. Future research should employ effective chamber methods to quantify volatilization loss following unincorporated application of commercially-available 'stabilized' or 'urease inhibitor enhanced' granular urea fertilizers.

Coir Dust in Substrates

Increasing Amounts of Coir Dust in Substrates Do Not Improve Physical Properties or Growth of Tree Seedlings in a Novel Air-pruning Propagation Tray. Ryan Munroe, Darby McGrath, and Jason Henry. *Journal of Environmental Horticulture* 36(3): 92–103.

The development of air-pruning tree propagation trays has been encouraged by the demand for better root systems. Although using air-pruning techniques can improve tree root systems by reducing the number of root deflections (e.g. root circling, ascending and descending roots), it causes quicker substrate dry-out, which complicates moisture management for the growers using this technology. More rapid substrate dry-out can result in greater use of water, which in turn increases cost of production. Commercially, there is a wide range of substrate mixes available for use, typically including several ingredients at different ratios (e.g. peat, perlite, coir). The goal of this study was to evaluate coir dust in an air-pruning propagation tray, RootSmart™, to determine if using higher proportions of coir dust in a peat and perlite mix could improve the water holding capacity and performance of the substrate. This is important to the industry, especially since air-pruning propagation trays are becoming more widely used by growers, which will require research into how substrates perform in these types of systems to improve moisture management. While the addition of higher proportions of coir dust in the experimental substrates resulted in reduced seedling growth, with the exception of red oak, further research is recommended to evaluate the performance of finer sized coir particles in similar proportions.

Crabgrass Management in Turf

Impact of Mowing Height and Nitrogen Fertility on Crabgrass Cover in 'RTF' Tall Fescue. Matthew Cutulle, Jeffrey Derr, David McCall, Adam Nichols, and Brandon Horvath. *Journal of Environmental Horticulture* 36(3): 104–107.

Tall fescue is the predominant cool-season turf species in the transition zone. This study was conducted to determine the impact of mowing height and fertilization rate on the ability of smooth crabgrass to invade tall fescue turf. When the mowing height was reduced from 10 cm (4 in) to 6 cm (2.5 in), smooth crabgrass cover increased significantly. Increasing the nitrogen fertilization rate from 49 to 220 $kg \cdot ha^{-1}$ (44 to 196 $lb \cdot A^{-1}$) did not impact smooth crabgrass density. Tall fescue cover decreased dramatically when mowed at 6 cm, with essentially no turf cover at 18 months after study initiation. Tall fescue cover did not decrease as dramatically when moved at 10 cm, and its cover appeared to be higher at higher nitrogen rates.

Drought Stress in Zinnia

Transpiration and Drought Stress Recovery of Three Zinnia Cultivars. Bruce R. Roberts and Chris Wolverton. *Journal of Environmental Horticulture* 36(3): 108–113.

Data from the current study illustrate differences in drought tolerance and drought stress recovery between container-grown zinnia species and between cultivars of the same species. Seedlings of Zinnia haageana 'Persian Carpet', seeded in plug trays and transplanted into marketable pots after 4 weeks, transpired at a faster rate and took significantly less time to reach a prescribed substrate dry-down endpoint than did similar seedlings of Zinnia elegans ('Lilliput' and 'Thumbelina'). Within the same species, the normalized transpiration ratio of both 'Lilliput' and 'Thumbelina', when plotted as a function of the fraction of transpirable substrate water (FTSW), showed that the decline in transpiration for 'Lilliput' occurred at a higher FTSW than for 'Thumbelina', indicating that the former cultivar is more water-conserving and better able to withstand drier substrate conditions. All three drought-stressed cultivars recovered well during the stress amelioration period, especially Z. haageana 'Persian Carpet', where xylem water potential decreased from -2.47 MPa to -0.54 MPa one week after re-watering. The data from this study suggest that plant-water efficiency in zinnia production can be improved by testing changes in the transpiration rate of different genotypes in response to substrate drying.

Weed Control

Early Postemergence Control of Woodland Bittercress (Cardamine flexuosa With.) and Yellow Woodsorrel (Oxalis stricta L.) with Dithiopyr and Isoxaben Combinations. Debalina Saha, S. Christopher Marble, and Annette Chandler. *Journal of Environmental Horticulture* 36(3): 114–118.

Preemergence herbicide applications supplemented by hand-weeding are the current methods of controlling several bittercress (Cardamine spp.) and woodsorrel species (Oxalis spp.) that are problematic in container nurseries. In the southeastern United States, preemergence herbicides may dissipate rapidly from containers and reemergence of weeds can occur before sequential applications can be made. Utilizing preemergence herbicides that provide some early postemergence control can provide growers greater flexibility with preemergence applications. Previous research has shown that sprayable formulations of isoxaben and indaziflam provide early postemergence control of bittercress species and yellow woodsorrel, respectively. This research showed that sprayable formulations of dithiopyr and dithiopyr + isoxaben combinations can also provide early postemergence control of these weeds, but efficacy will be dependent upon growth stage. While growers should always strive to make preemergence applications to weed free pots, research presented here offers options for situations when this may not be possible.