

## In the Greenhouse...An update on USDA research projects at TBG

For the past year and a half, the USDA Greenhouse Production Research Group has been involved in small-scale propagation, horticultural studies, disease expression, and germplasm curation activities involving herbaceous floricultural crops. With completion of the expanded poly bays and installation of a concrete floor and drain system in Bay 5, the scale of research trials has expanded and greater utilization is being made of the leased greenhouse facility. Medani Omer, Ph.D. Plant Pathology, and Ann Widrig, M.S. Horticulture, have been hired by the USDA and are involved in setting up and conducting many of these greenhouse trials.

Currently, a multidisciplinary trial is being conducted in Bay 5 to evaluate the engineering aspects of spray application (nozzle droplet size and spray volume) using low volume equipment and the resultant ability to control an emerging disease of poinsettias (powdery mildew). Information obtained from this trial will enable USDA engineers, working in collaboration with sprayer manufacturers, to determine the potential to get penetration of tight plant canopies in confined spaces. By performing spray residue analysis on targets placed within the plant canopy, analytical chemistry is being used to quantify the amount of spray that was deposited on leaves at different positions within the individual plant canopies as well as within plants on the bench. Individual leaves, representing various positions on the plant relative to the application direction of the spray, were analyzed for total fungicide residue in the laboratory using an ICP analytical instrument. Plant pathologists are eagerly following the development of powdery mildew across the greenhouse bench plots relative to both spray treatment, location of pot within the bench plot, and leaf position relative to spray direction. Inoculum of the powdery mildew fungus was introduced into Bay 5 following the spray treatments via hanging baskets of poinsettias that had been intentionally infected prior to the trial. The HAF fans serve to shower the fungal spores evenly over the entire test plant canopy. The degree of disease development is being monitored and differences will be measured using digital imagery. Ideally, this analysis will provide information about the effect of the fungicide as well as any differences in control related to leaf position in the canopy or plant position on the bench.

Another research study ongoing in the smaller greenhouse cubicles involved the effect of hydrogel amendment in soilless media on root disease development and whole plant growth using geranium as the test plant. This trial introduces the added factor of disease interaction in plant production to previous horticultural studies that were conducted and reported for the use of hydrogel in soilless media. Other trials are focused on the role of plant nutrition on disease development. The role of individual elements, such as silicon and potassium, are thought to be involved either directly or indirectly in plant resistance to disease. Actual cell wall composition or the activation of defense mechanisms within the plant may be involved. The two most common foliar greenhouse diseases, powdery mildew and botrytis gray mold, are being used as models to evaluate the potential role of these elements on plant resistance to these economically important diseases. This research is intended to provide information that will lead to specific plant nutrition

management approaches to reduce or eliminate the dependence on pesticide applications to keep these diseases under control. Trials are also being conducted to determine if there are non-destructive physical measurements, such as leaf temperature or reflectance, that can be used to predict disease onset before symptoms of the disease are evident. Such a measurement might enable growers to address the disease before aesthetic value was decreased and economic consequences resulted.

These research trials represent a sampling of projects that are being conducted by the USDA Greenhouse Production Research Unit through cooperation with TBG and the use of the greenhouse facilities.