CONSULTING WITH THE PLANT DOCTOR
An Interview with Julie Coop, Manager of Plant Health

T
rees and other woody plants are subject to pressures ranging from diseases to the feeding of insects. Temperature, drought, and soil conditions are among other factors commonly impacting plant health. In 1923, founding director Charles Sprague Sargent suggested in the *Journal of the Arnold Arboretum* that the addition of a diagnostic expert to the staff would benefit the long-term health of Arboretum trees. The idea was finally realized in 2006, when the Arboretum’s benchmarking study of American arboreta proposed the need for a manager to oversee and study the array of plant health issues confronting the living collection. The Arboretum named Julie Coop as its first manager of plant health in 2007, recognizing her exceptional skills and her two decades of horticultural leadership at the Arboretum. Since her arrival in 1988, Julie has also served as a horticulturist at the Case Estates, assistant superintendent of grounds, and, beginning in 1998, superintendent and later manager of horticulture.

Q. The Arboretum’s collections contain over 5,000 species and varieties, and nearly 1,000 plants that are at least 100 years old. What are the challenges in addressing health issues for a living collection of such age and diversity?

A. There are several challenges, and one of the greatest is people-pressure. Often the oldest trees are the most admired and visited by the public. Frequent foot traffic can compact the soil, create erosion issues, or both. To remedy this, we fracture the compacted soil and inject compressed air around the tree, then apply a layer of mulch that both absorbs the weight of foot traffic and reduces further compaction. We did a lot of this work on our centenarian trees along Meadow Road this past spring.

Given our diverse collection, impacts can vary among genera and species, and effective treatment depends on a taxon-specific approach. For instance, we experienced an explosion of fungal diseases last spring and early summer due to frequent rains following the previous summer’s drought. Infestations were particularly extensive within the genus *Pinus*, but not among all species. When applying pesticides—and in this case it was a fungicide—timing is always critical, and the applications have to be made at different stages of candle growth (the development of tender new branch shoots in conifers). Since the infected pines were of different species, each with differing candle growth, I needed to be out monitoring the collection continuously.
Q. IPM (integrated pest management) offers basic tools as well as a philosophy of approach. What aspects of IPM have you found most helpful in your work at the Arboretum?

A. The most valuable attributes are record keeping and evaluation. It is one thing to properly identify the pest, but recording and evaluating the application can greatly improve future results. Part of an IPM program is establishing a pest tolerance level, also known as a threshold, which determines when action should be taken. The threshold might be quite different at the Arboretum than at a commercial nursery. While a nursery has to sell its plants, the Arboretum strives to limit its use of toxic control substances that can affect plant and environmental health. Therefore, as a steward of the landscape's ecological health as well as the living collection, the Arboretum can maintain a threshold that is probably a lot higher than others; for example, we tolerate powdery mildew on our lilacs. I have come to learn that there is a certain amount of pest injury that is acceptable, so I am continually asking myself: “Will this pest kill or harm the tree, or will it just affect its aesthetics?”

Q. With the increasing introduction of exotic organisms from around the world, what do you see as some of the challenges we have yet to face?

A. Well, the discovery of the Asian longhorned beetle (ALB; Anoplophora glabripennis) in Worcester this past summer has occasioned our greatest and most immediate challenge yet. This introduced insect kills a wide variety of hardwoods including but not limited to maples, horse chestnuts, willows, birches, and elms, and has the potential to do extensive damage not only to the Arboretum’s collection but to New England’s forests and economy. Unfortunately, we don’t have pheromone traps for this pest available to us, so monitoring must be done in the field. It involves looking into the canopy of each tree for the typical signs of infestation. We haven’t found ALB at the Arboretum, but if it is in our collections, the sooner that this beetle is detected the better the chances are for eradication. I am trying to be very proactive.

The emerald ash borer (Agrilus planipennis) is another insect pest that has the potential to do much damage. As with other wood-boring pests, they are difficult to detect until it is almost too late to control them. Fortunately for us, science has created lure traps to help with monitoring and early detection.

Q. With over 15,000 accessioned plants across 265 acres, managing plant health has to be a collaborative enterprise. Which members of the horticulture team figure most prominently in assisting your efforts?

A. First and foremost I rely on the Arboretum’s staff of horticultural technologists. They are out in the collections every day, and are assigned to oversee site conditions and plant care in the 62 zones mapped out by the Landscape Management Plan. This has made my job much easier. Now the horticulturists are working with the same plants continuously, becoming very familiar with individual collections and specimens. They are typically the first to notice if there are issues with any of the plants, and they report those issues to me.

I also rely on the arborists. Though they aren’t assigned to zones, they do cycle through the collections on a regular basis. Since much of their work puts them in the canopy of a tree they are able to see things that others cannot from the ground, and that’s very helpful. I also rely on assistance from the curation staff. While they are out doing field checks or collecting GPS points for mapping, they too are looking at the condition of accessions and will notify me if necessary.

Q. For the amateur horticulturist, what information resources are available for enhancing plant health and applying IPM practices?

A. The University of Massachusetts Extension Service is a great resource. They offer many services, both to the home gardener and the horticultural or arboreal professional. Their website [www.umassgreeninfo.org/resources/gardener_info.html] includes fact sheets on pests and diseases, a weed herbarium with images, recommendations for plant culture and maintenance techniques, IPM tools, educational opportunities, and links to further resources. For a small fee they perform soil tests and make continued
recommendations based on the results. The Arboretum’s Plant Information hotline (617.384.5235) is another good resource, particularly for questions regarding woody plants.

Q. As someone who has treated so many “patients,” what is the most basic advice you can offer to the home gardener for growing healthy plants?

A. To start with, I would advise gardeners to use the right plant in the right place, and to make sure to plant a tree or shrub at the right soil depth. Gardeners need to fully understand the moisture, soil, and exposure conditions of the site and carefully consider options to choose the best-adapted plant. Any newly transplanted tree has likely suffered from root loss in the transplanting process and will need to grow additional roots, but it will have a hard time doing so if planted too deeply or in compacted, low-oxygen soil.

Next, I would recommend using mulch in the garden to reduce water usage and to suppress weed growth. With both mulch and water, gardeners need to take care not to use too much or too little. As for weeds, you should at least prevent them from flowering and producing seed to curb invasion. Finally, before adding any soil amendments to your lawn or garden, do a soil test through your local extension service. Depending on pH, texture, and other soil conditions, you may find that amendments are unnecessary or that the wrong ones have been applied.

During the winter of 1934-35, Hugh Raup, a staff scientist at the Arboretum, conducted a study to document variations in temperature across the Arboretum landscape. Each morning, he walked to eight locations on the grounds, gauging temperatures with a minimum/maximum thermometer and recording the results. His study confirmed the existence of several microclimates at the Arboretum, including the area now called the Explorers Garden on the southern slope of Bussey Hill which has long been used to test plants of questionable hardiness.

An expanded and technologically enhanced version of Raup’s study commenced last winter as part of an effort to improve environmental monitoring of the collections. Data logging units, set to take measurements at 15-minute intervals, were installed in trees in eighteen locations to measure temperature and relative humidity. Some of the “stations” identified for study are nearly the same as those that Raup visited in his investigations almost 75 years ago, while others were added to provide additional comparisons. The data collected will help staff create a hardness zone map of the grounds to inform planting decisions and help assess environmental pressures on collections.