GROWING KNOWLEDGE

Series content is coordinated by Dr. Jay Pscheidt, professor of botany and plant pathology at Oregon State University in Corvallis, Oregon.

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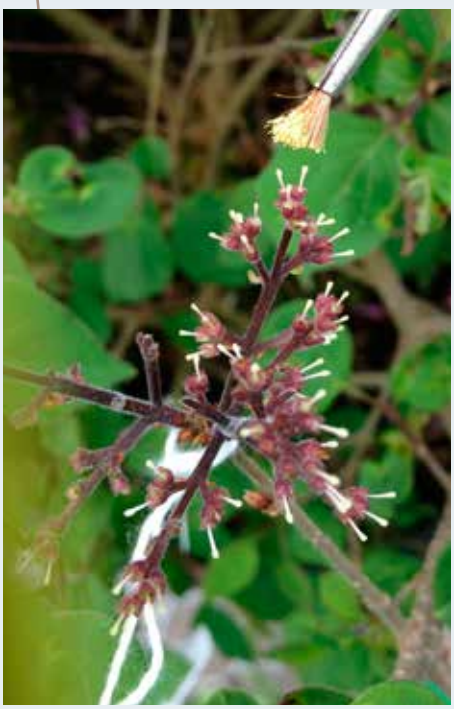

Left: 'Miss Kim' lilac flowers beginning to open in early spring. PHOTO BY PAT BREEN *Right:* Pollinating emasculated flowers of 'Bloomerang' lilac. Anthers are removed to ensure cross pollination by preventing self-pollination. PHOTO BY JASON LATTIER

A tale of two lilacs: Part II — *Pubescentes*

By Jason D. Lattier & Ryan N. Contreras, Ph. D.

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LILACS ARE MEMBERS of the family of twos (*Oleaceae*), characterized by two-merous flowers with two anthers, two-loculed ovaries and other reproductive structures.

Phylogenetic analyses partition the lilac genus (*Syringa* L.) into six series: *Pubescentes*, *Villosae*, *Ligustrina*, *Ligustrae*, *Pinnatifoliae* and *Syringa*[1]. From these six series emerged two clades that are as different as they are important to the horticulture industry: series *Syringa* and *Pubescentes*.

Though the garden classics of series *Syringa* have a long and storied horticultural history, breeding within series *Pubescentes* offers opportunities to challenge the lilac paradigm by enhancing traits such as low chill requirements and summer reblooming.

History of *Pubescentes*

Far from the European home of the common lilac, the first member of series *Pubescentes* was discovered in China.

Syringa pubescens was found growing in areas of open canopy among spruce, oak and linden-birch forests. Populations were also found thriving in the mountains at moist, high-elevation altitudes[2].

Most Chinese species remained undiscovered until the late 1800s. As China opened up to missionaries, botanists and plant explorers, the family of lilacs grew rapidly during the 1800s and early 1900s. As plant explorers turned their gaze to the mountains of Korea in the 1900s, not only were new forms of *Syringa oblata* discovered, but also *Pubescentes* were further expanded.

During one of these expeditions, a selection from seed collected by Elwyn Meader in the Pouk Han Mountains would be named 'Miss Kim' lilac[2], which remains a popular cultivar.

While stationed in China as a translator, the Belgian Joseph Hers began a storied correspondence with the Arnold Arboretum in his avocation as a plant hunter. Hers was the first to note remontant (repeat) flowering in a wild speci-

Collecting pollen from a lilac parent to use in controlled crosses. PHOTO BY JASON LATTIER

men of *Syringa pubescens*[2].

Material was later evaluated at the Arnold Arboretum, where director Sargent commented, "… if it keeps up its habit of flowering a second time in autumn it will at least be interesting even if other lilacs are more beautiful." This understated observation stands in stark contrast to the ever-increasing interest of modern horticulture in developing remontant shrubs.

In contrast to the long history of breeding in common lilac, and the thousands of named cultivars it produced, breeding efforts in series *Pubescentes* have been rare and limited to only the most adventurous lilac hybridizers.

Frank Skinner was improving cold-hardiness in a range of trees and shrubs at his nursery in Manitoba, which included not only common lilac, but also lesser-known lilac species[2]. He was contemporaries with the intrepid Isabella Preston

and began producing his own improvements on *Syringa* × *prestoniae* hybrids.

However, it was from E.H. Wilson's Diamond Mountain expedition in Korea that Skinner received seed of *Syringa pubescens* subsp. *patula*, which he began hybridizing with selections of *Pubescentes* from China. During the course of his life, Skinner released 144 new cultivars of ornamental plants, including many improved and wide hybrids in lilacs[2].

In Ohio, the devout plantsman and consummate lilac collector Father Fiala delved into the world of series *Pubescentes*, creating hybrids using lesser-known infraspecific taxa of *S. pubescens*. Fiala's gardens at Falconskeape and numerous publications would provide a wealth of knowledge for future lilac breeders[2].

Modern *Pubescentes* breeding

Most of the great advances in breeding within *Pubescentes* have occurred in the modern era.

In the mid-1900s, the team of plant hunters and breeders at the University of New Hampshire, including Elwyn Meader and Albert Yeager, were responsible for some of the early advances in selection and breeding of *Pubescentes*, including the aforementioned 'Miss Kim' lilac[2]. By the 1960s, the French academic Georges Morel produced a complex cross that would later become 'Josée' and was introduced into the trade by Pépinières Minier.

Further groundbreaking work was contributed by Neal Holland at his nursery in North Dakota, which produced the Fairytale® series of lilacs introduced by Bailey Nurseries[2]. These crosses utilized the special *Syringa pubescens* subsp. *patula* ('Palabin') discovered high in the mountains of Korea and noted for its ability to set abundant seed.

Canadian horticulturists Frank and Sara Moro (Select Plus International Lilac Nursery, Quebec) have also introduced improved cultivars of *Pubescentes* including 'Cinderella', 'Colby's Wishing Star' and 'Snowstorm'[2]. Other industry-leading *Pubescentes* have come from the Proven Winners® remontant series, including the powerhouse 'Bloomerang' lilac.

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Lilac research in Oregon

The ornamental breeding program at Oregon State University is exploring new possibilities in lilac breeding hidden within series *Pubescentes*. Topping the list of important breeding objectives is the development of remontant, disease-free cultivars.

In the past several years, after making numerous cross combinations, we have observed a high degree of variability among our breeding parents and progeny populations in susceptibility to bacterial blight and degree of remontancy.

In response, we are using next-generation sequencing to discover genetic markers for remontancy and disease resistance. Identifying these markers will allow our program and future breeders to include marker-assisted selection in their breeding toolbox.

Genetic markers will enable identification of progeny with genes for disease resistance and/or remontancy at the seedling stage. This will reduce the size of populations needed to be grown and reduce the amount of time to identify superior selections.

Even though great cultivars (i.e., 'Miss Kim') and traits such as reblooming were identified decades ago, we are still in the process of realizing the full potential of this exciting group of plants. We will keep an eye on the groundbreaking work of our predecessors, while new technology allows us to make what's old new again.

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Citations

[1]Li, J., B. Goldman-Huertas, J. DeYoung, and J. Alexander, III. 2012. Phylogenetics and diversification of Syringa inferred from nuclear and plastid DNA sequences. *Castanea* 77(1): 82–88.

[2]Fiala, J.L., and F. Vrugtman. 2008. *Lilac: A Gardener's Encyclopedia*. 2nd ed. Timber Press, Portland, OR.