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# The BUCKEYE

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# Educational Update

The **BUCKEYE**



This article is provided to you as a benefit of membership in the Ohio Nursery & Landscape Association.

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## Phlox 101: Perspectives on an Underutilized Genus of Native Plants

As part of its mission to serve the Floriculture and Nursery industry, the Ornamental Plant Germplasm Center (<http://opgc.osu.edu>) is compiling germplasm of native plant species that may provide important novel traits to currently popular plants, such as the summer phlox (*Phlox paniculata*) or the black-eyed susan (*Rudbeckia hirta*) and also introduce entirely new plants that could be used by the industry. This article provides information on interesting and potentially useful aspects of the genus *Phlox*, one of the OPGC's priority genera. The information has been compiled from published sources as well as from extensive observation of the plants in natural habitats done by one of us (P.Z.)

### Introduction

Native Plants continue to be a popular category of ornamentals, and for good reason: they help provide a 'sense of place' by their association with particular habitats and areas; they can be easy to grow; they can be strikingly beautiful; some have good disease and insect resistance; and most can provide ecological services that many exotic species cannot. Some ecological services, such as food or substrate for a variety of insects and fungi can be viewed as incompatible with the 'manicured and controlled' look desired in

some constructed landscapes. A prime example straddling both these 'beauty and beast' extremes is the genus *Phlox*. The name of this genus is descended from the greek word for 'flame', attributed to the fiery color of inflorescences. These plants are well-known staples of temperate gardens throughout the world. The most popular species, *Phlox paniculata*, has been the subject of intensive breeding and development, but still, most cultivars are highly susceptible to infection by powdery mildew (*Erysiphe cichoracearum*) and leaf spot (*Septoria* spp.). Interestingly, the susceptibility of *P. paniculata* to powdery mildew may be much more prevalent in the cultivated forms than in the wild stands of this species that occurs throughout the Eastern USA. In the process of domestication, horticulturists may have kept ornamental attributes but enhanced susceptibility to disease. Wild forms of *P. paniculata* may provide a source of resistance to cosmetic diseases while maintaining other ecological services of the species.

Despite the obvious ornamental characteristics *P. paniculata*, there are 65 other species of phlox native to North America, most of which are poorly understood, many that can be highly ornamental and pest & disease resistant (especially to powdery mildew), and

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almost never grown in gardens. While the largest number of species occur in mountain areas with alpine climates, the Eastern half of North America includes other species that merit greater use in our gardens. As we have explored this variable genus in greater detail, it soon became apparent that many species are widely adaptable to a variety of garden settings, and have the potential to become popular and utilitarian plants in the nursery, restoration, and floriculture industries.

### The Essence of Variation

When observing phlox in their native habitats, one cannot help but be awestruck by the extreme range of variation that can occur for numerous plant traits: habit; foliage shape, cover (e.g. hairs) and abundance; flower color; ecological preference – almost any character that can be used to segregate Phlox species - can vary widely between neighboring plants of the same species. Plant biologists have known this for a long time and have used phlox in basic studies of plant evolution. Phlox drummondii, an annual species from Texas that can produce stunning red flowers, has been used extensively as a model species for deciphering mating systems and examining genetic differentiation. The result of this work, and other work on different Phlox species has show that almost all phlox appear to be obligate out-crossers. In order to set seed, an individual plant must be cross-pollinated with the pollen of another plant for seed set to occur. Plants that have developed this mating system can be extremely variable in morphological and adaptive characters. In the case of Phlox nivalis, for example, this high variability can be obvious even within a single population (Figure below)! This diversity has perplexed taxonomists, but leaves the horticulturist with a seemingly endless supply of variation from which selections can be made and improved.

### Ecological Services

Ecological service can mean many different things, not all of which are necessarily 'good' in the context of constructed landscapes. Ornamen-



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tal plants contribute to many important services of ecosystems such as food for other organisms (e.g. pollinators), carbon sequestration, purification of water and air, nutrient cycling, etc. The primary pollinators of all phlox species are butterflies and moths. In the Oak Openings region of northwestern Ohio, there is evidence that *Phlox ovata* and *Phlox pilosa* serve as nectar plants for the re-introduced, once state-extirpated Karner Blue Butterfly (*Lycia melissa samuelis*), and also for many other Lepidopterans. While it is unlikely to attract a Karner Blue in garden settings, it is true that much more common swallowtail and hummingbird moth species will be attracted to a variety of phlox flaunting their flowers. Such positive services are typical of many native (and some non-native) ornamental plants.

Some services, such as the previously mentioned disease well-known to certain phlox is an example of a natural process of decay (that may contribute to some nutrient cycling) that unfortunately present a negative aesthetic aspect (diseased plants are ugly!). One of our goals is to explore phlox diversity for resistance to cosmetic diseases so compatibility between ecological services and ornamental function is maintained.

## Survey of Phlox Species

### *Phlox paniculata*

*Phlox paniculata* is the species most people are familiar with, commonly and simply referred to as “phlox.” The group within *Phlox* that includes this species, section *Paniculatae*, is among the smallest in the genus, and contains only *P. paniculata* and *P. amplifolia*. On the surface, these appear to be two well-defined and discrete species but further investigation yields an array of intermediate and confusing forms which merit



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botanical and horticultural study. *P. amplifolia* is superficially similar to *P. paniculata*; it may have the most garden potential of all species discussed herein such as a long flowering period, typically beginning in June; a shorter overall plant habit; and, perhaps most importantly, a potential source of powdery mildew resistance. *P. amplifolia* has densely pubescent leaves, a trait associated with powdery mildew resistance in *Phlox pilosa*, but since the true *P. amplifolia* species has yet to enter horticulture, this hypothesis has been little tested.

If *P. amplifolia* proves to have durable and heritable powdery mildew resistance, it can be used in hybridization studies with *P. paniculata* to develop resistant cultivars. We are currently evaluating accessions of this species and hope that in the future it will become available for wider distribution.

Powdery mildew resistance in *Phlox paniculata* is an uncertain subject because a cultivar may appear resistant in one climate (such as the mild conditions common in Europe) and yet be susceptible in another (such as much of Eastern North America). While disease susceptibility can be regional and depend on local climatic conditions, our trials have shown that several cultivars appear to be ‘good-doers’ on a yearly basis. The following cultivars should be sought out for such reasons: ‘Delta Snow’, ‘Robert Poore’, ‘Jeana’, and ‘Red Riding Hood’ are among the best.

### *Phlox glaberrima*

Another tall phlox resembling *P. paniculata* in several respects, *P. glaberrima* is morphologically and ecologically distinct and has much to recommend it as a plant for rain gardens and conservation plantings. There are three subspecies recognized in this species. *P. glaberrima* ssp.



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*P. glaberrima* is dispersed over a wide geographic range, occurring in wet woods and meadows. *P. glaberrima* ssp. *interior* is an upright species of wet or mesic tall grass prairies. Two excellent cultivars of these subspecies are available in the trade. 'Anita Kister' produces large, vigorous clumps of deep green, lustrous foliage topped in June with large, rounded pink flowers with a white center. 'N3 Springfall' was introduced from material originating in the southern portion of the species range, and provided ample moisture, has the ability to produce flushes of fuchsia-infused flowers from May until October and is an ideal candidate for well-watered perennial borders and rain gardens.

*P. glaberrima* ssp. *triflora* stands out from the other types in both habit and habitat preference. It grows in hilly or mountainous regions in dry deciduous woods where it flowers in May; about one month earlier than other *P. glaberrima*. Taxonomists have recently decided that this taxon is synonymous with ssp. *glaberrima*, yet comparison of living plants show a clear difference in this taxon that may not be immediately recognizable when assessing herbarium specimens. Instead this subspecies may be more closely related to *Phlox ovata* (syn *P. latifolia*) and *Phlox pulchra*, which all share a similar decumbent growth habit of sterile stems, ecological adaptation, and flowering time in mid to late May. *P. glaberrima* ssp. *triflora* is highly adaptable to garden conditions and prefers light shade and moist or dry soil that is slightly acidic, although further trialing is necessary. 'Morris Berd,' a clone of this variety given by phlox authority Edgar Wherry to a friend, is widely available in the trade, and was one of the highest rated phlox tested in the Chicago Botanic Garden Phlox trials. It is distinguished from the species by its larger, rounder and more pleasantly pink flowers. Another cultivar, 'Bill Baker' appears to be a synonym of this species, sent to England, renamed, and sent back to the U.S. We are currently evaluating additional germplasm of this species from our collections in Ohio, Kentucky, and Virginia. The northernmost populations of this species occur in Ohio, and non-bloomed seedlings in our trial display a range of leaf shapes and growth habits; all with excellent potential as disease-free garden plants.

*Phlox ovata*, recently and formerly known as *P. latifolia*, is a rarely-cultivated species distributed in dry woods and shale barrens of the Appalachian mountains, but is also widely disjunct in the Oak Openings region of Northwestern Ohio. This species has been referred to as the 'Hosta' of the eastern phlox

clan, forming rosettes of large, spoon-shaped leaves that can develop into lush clumps. In Ohio populations, peak flowering occurs in mid-May, producing flowers that range from pink to bright pink with large, overlapping petals. This species has only recently entered the horticulture trade. The adaptability of this taxon to cultivation is unknown, but based on habitat preference should perform well in soils that support rhododendrons and other acid-loving plants. *Phlox pulchra* is the Alabama phlox, a species that has been reported from only 5 counties in its namesake state. This species is very attractive and is reportedly a superb garden plant, which is good news as this species may now be very rare and threatened in the wild.



### *Phlox maculata*

*Phlox maculata* is among the most widespread species of phlox, occurring in moist meadows and ditches throughout the central and eastern US, and is no stranger to horticulture. Taxonomic confusion has pervaded this taxon since its introduction. Several selections have been made, but room exists for improvement. Early

horticulturists described the taxon *Phlox xdecussata*, a purported natural hybrid between *P. maculata* and *P. paniculata*, but through observation of wild species and extensive crossing experiments between different genotypes of these species, it is clear that early horticulturists were likely dealing with one or the other of these species, but not a hybrid.

In southern Kentucky, this species occurs along extensive stretches of undisturbed river-banks with *Phlox paniculata*. Though both species occupy slightly differing ecotones, they often grow intermingled in stretches of wet substrate where the flood waters do not scour away the sand. Extensive observation of this overlapping area did not yield a single plant with intermediate hybrid features. Because of its preference for heavy, moist or wet soils, *P. maculata* may make an ideal, easy to grow garden plant for perennial borders, butterfly and cut-flower gardens, and rain gardens.

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***Phlox divaricata***

Often called wild sweet william, or wood phlox, *Phlox divaricata* is one of the most well-known and cherished wildflowers of the Eastern United States. This species is frequent along wooded stream corridors, and in late April, can form a light blue haze along most river drainages in Ohio and throughout the Midwest,

where it can vary widely in flower and form. Botanists have described two varieties: var. *divaricata* and var. *laphamii*. The major difference is that the former possesses notched apices of the corolla lobes (flower petals) and the latter has entire corolla lobes. These varieties overlap through an extensive distribution range; intermediates can be found in certain populations.

In east-central Illinois, these forms occur together, producing both intermediate-notched forms and pure white-flowered forms that occur among the typical lavender and lilac colored forms. Plants along the southern tier of the species distribution show an array of color forms that may be useful as garden plants and as breeding stock. Plants from the Florida panhandle region possess richly colored purple flowers with a red eye. Plants we found in central Mississippi were pale pink in color with very large, rounded flowers.

On the subject of pink flowered *P. divaricata*, two new pink-flowered cultivars should be sought out. 'Charleston Pink', selected by Wesley Whiteside of Charleston, Illinois forms billowing mounds of pearly pink flowers; this cultivar is still rare in the trade. Another, called 'Tinian Pink' seems almost too good to be true, boasting bright, melon-pink flowers. Despite its relative abundance in the wild, *Phlox divaricata* has yet to be fully embraced as a garden plant. This species is ideal for mass plantings along woodland margins, in moist or wet shady woods, or as a specimen among hostas and other shade-loving plants. It is a spring ephemeral and goes dormant early in the season, so should be planted with other native species such as *Actaea* spp. (bugbanes and baneberries), *Aralia racemosa* (spikenard, Life of Man), *Staphylea trifoliata* (bladdernut), or *Styrax americanus* (American snowbells) to maximize year-round ornamental interest.

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### *Phlox pilosa*

*Phlox pilosa* is the most widespread phlox native to the eastern U.S. and is the epitome of variability within the genus; botanists have described 10 currently accepted intraspecific taxa. An understanding of this variation and distribution of the plants can guide decisions when attempting to incorporate this species



into the garden. Many forms come from dry, sandy prairies and limestone barrens, but there are many others that grow on more mesic sites with soils that are rich in clay and silt. The latter forms are preferable for most gardens as they may have the ability to more readily adapt to the typically nutrient rich soils found in such places.

Ecotypic variation within *P. pilosa* is also an important component of prairie restoration and conservation projects and appropriate selections should be made for these purposes. *Phlox pilosa* occupies a unique position among its prairie brethren, being one of the few noteworthy spring-flowering species to occur in these habitats. *Phlox pilosa* ssp. *deamii* is a poorly understood, and perhaps very rare taxon that occurs in the contact zone between typical *Phlox pilosa* and the northernmost populations of *Phlox amoena*. This taxon occurs in and around post oak (*Quercus stellata*) barrens and develop on clay-rich soils that experience extremes of wet and dry conditions through the



seasons. This habitat preference closely mimics the conditions found in many gardens. To the west is *Phlox pilosa* var. *ozarkana*. This taxon reaches its greatest numbers in southeastern Missouri and northern Arkansas, being a common plant in a variety of ecosystem complexes, and usually occurring where soils become dry during the summer. Edgar Wherry touted this taxon as the best of *Phlox pilosa* clan for garden settings. Despite his assertion, only one clone of this species has become established in the nursery trade. While the reasons for this are not clear, what is obvious is the extreme range of flower color variation and plant habit. The opportunity for selection is both astounding and unexplored. In western Louisiana and eastern Texas, there is a confusing entity called *Phlox pilosa* ssp. *pulcherrima* that is sometimes considered a distinct species (*Phlox pulcherrima*). Despite taxonomic confusion, this taxon is without doubt among the showiest of this group. The foliage is exceedingly narrow and lance-shaped, and the upright stems are terminated in clusters of pink flowers that can be a great deal larger than others in the *Phlox pilosa* group. This taxon has not been trialed in gardens, and its har-

### captions

**1** An extremely variable population of *Phlox nivalis* in Bay Co. Florida.

**2** Flowers of *Phlox pilosa* and *Phlox divaricata* photographed together for comparative purposes.

**3** A black swallowtail (*Papilio polyxenes asterius*) visiting *Phlox ovata* in Lucas County, Ohio.

**4** A hummingbird moth (*Hemaris thysbe*) visiting *Phlox divaricata* in Hocking County Ohio.

**5** Variation in *Phlox divaricata*: Typical form in Ohio woodlands

**6** Variation in *Phlox divaricata*: 'Charleston Pink' in a garden

**7** Variation in *Phlox divaricata*: A white flowered form

**8** The form found in the Florida Panhandle

**9** A field of *Phlox pilosa* near Forrest, Mississippi.

**10** A form of *Phlox pilosa* in Alabama growing on heavy clay soil.

**11** The form of *Phlox pilosa* found in Ohio natural areas.





diness is unknown. We have collected forms of this species from throughout its range and they are among the most robust and vigorous of the *Phlox pilosa* types in our trials. Some cultivars of *Phlox pilosa* have entered the trade and have proved their worth in our trials: 'Lavender Cloud' has been the best, but 'Racy Pink' is a close second. These plants do not like the crowded conditions of most perennial borders and are best where air circulation around the plants in summer is maximized.

Other selections of phlox that warrant garden usage are too numerous to mention here. Mat-forming species, such as *Phlox subulata* are among the most

commonly recognized species of all garden perennials. Despite this, continued selection could be made for longer blooming periods. Other species are only of regional interest, although the student of *Phlox* might be interested in them. In any case, it is time to embrace a wider range of species as gardeners become more cognizant of utilizing native species and promoting garden sustainability. \*

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