ARNOLD ARBORETUM
HARVARD UNIVERSITY BULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

JULY 15, 1921

Linden Trees. Midsummer is the time when the fragrant flowers of Linden-trees open and scent the air with their fragrance. *Tilia*, the name of the Linden, is one of the widely and generally distributed genera of the trees of the northern hemisphere; it is absent, however, from western North America, and no Linden has yet been found in the forests which cover the Himalayas. Eastern North America with fifteen species is richer in Lindens than all the rest of the world, and in eastern North America Lindens are found from New Brunswick westward to Lake Winnipeg and southward to northern Florida and northeastern Mexico. To the two species which grow in Canada another is added in New York and Pennsylvania; southward in the forests which cover the high slopes of the Appalachian Mountains and in those of the coast region of the Carolinas and Georgia the number increases. Lindens are common in all the Gulf states, and abound in eastern and southern Texas where five species and several varieties occur and where Lindens grow by the scanty streams, and under the bluffs of the Edwards Plateau, a region in which Lindens would hardly be expected to flourish.

The ability of the southern species to grow in New England has still to be demonstrated in the Arboretum, and only three northern and one southern Appalachian species are established here. These are *Tilia glabra*, more often called *Tilia americana*, *T. neglecta*, *T. heterophylla* var. *Michauxii*, and *T. monticola*. *Tilia glabra* is a splendid great tree in the forests of the north where it was once abundant, with individuals more than a hundred feet high with trunks from three to four feet in diameter. Such trees are no longer common, for the wood of the northern Linden, usually known in commerce as white wood, has

been in popular use for many years and a large part of the trees of merchantable size have been cut. This Linden has been a good deal planted as a shade tree in New England, but the leaves are too often disfigured, especially in dry summers, by the attacks of the red spider. *Tilia neglecta*, which finds its northern station in the valley of the St. Lawrence River in the neighborhood of Montreal and is not rare in the northern states and along the Appalachian Mountains to North Carolina, is easily distinguished from *Tilia glabra* by the short persistent gray down on the lower surface of the leaves, the lower surface of the leaves of *T. glabra* being green and lustrous and destitute of hairs with the exception of those forming the large tufts in the axils of the principal veins. Although for many years confounded with *T. glabra*, *T. neglecta* does not appear to have been often planted as a shade tree in this country. In the Arboretum it is growing rapidly and now gives every promise of success. The other northern Linden, *T. heterophylla* var. *Michauxii*, is one of several species with leaves covered below by a permanent coat of white tomentum. This is a common tree from Pennsylvania and western New York to southern Indiana and Illinois, Missouri and southward along the Appalachian Mountains to North Carolina and northeastern Mississippi. This handsome tree is growing well in the Arboretum and is well worth a place in collections of ornamental trees. It grows less rapidly, however, and is not as handsome as the other hardy American Linden, *T. monticola*, a tree with leaves often seven or eight inches long and, like the last, covered below with white tomentum. The flowers, too, are larger than those of other Lindens. The leaves, hanging on long slender stems and swayed by the slightest breeze as they turn their snow-white lower surface to the eye, make in contrast with the dark Hemlocks among which this Linden often grows one of the beautiful features of the splendid forests which still cover the slopes of the southern mountains.

The studies of Linden-trees at the Arboretum have shown that the European species grow more rapidly and give every promise of being better trees in this climate than the American or Asiatic species. This is unusual, for of other European trees only the Beech and the white Willow grow better here than their American relatives, and except Lindens all eastern Asiatic trees are more at home in eastern North America than the trees of Europe. The five European species, *Tilia platyphyllos*, *T. cordata*, *T. vulgaris*, *T. tomentosa* and *T. petiolaris*, and several varieties of the first, are growing here in a satisfactory manner. The first of these trees is easily distinguished by the hairs which cover the lower surface of the yellow-green leaves and the young branches. This tree is the first of the European species to flower. It has long been cultivated in the eastern states; indeed it appears to be the common European Linden sold by American nurserymen, although as an ornamental tree it is the less desirable of the European Lindens. *Tilia cordata*, distinguished by its small cordate leaves pale and glaucous on the lower surface, is the last of the Lindens to flower. It is a beautiful tree which also in Europe grows to a large size; it is not very often seen in this country. A better tree here than either *T. platyphyllos* or *T. cordata*, *T. vulgaris* is now generally believed to be a natural hybrid of these species. The leaves are dull green on the upper surface, paler on the lower surface, and without hairs with the

exception of those in the tufts in the axils of the veins below. This tree, which is not rare in the northern and middle states, is one of the best trees to shade the streets of northern cities. The largest and handsomest Linden-trees in the neighborhood of Boston are of this hybrid.

The two Lindens of eastern Europe, *T. tomentosa* and *T. petiolaris*, are distinct and handsome trees with leaves silvery white on the lower surface, and can be easily and successfully grown in southern New England. *T. tomentosa*, which is common in the forests of Hungary, in this country forms a broad, compact, round-topped head with erect branches and large leaves erect on short stalks. *T. petiolaris* is a more beautiful tree with pendulous branches which form a narrow head and leaves drooping on long slender stems. It has proved to be one of the handsomest exotic trees which can be planted in the eastern states. It is occasionally seen in the neighborhood of Boston, but it is more common southward, especially in Newport, Rhode Island, where there are a number of noble specimens.

It is too soon to speak with much knowledge of the value of the Asiatic species as ornamental trees in this climate. Most of them have been introduced in recent years, and the oldest Asiatic Linden now in the Arboretum, *Tilia japonica*, was raised here from seed only planted in 1893. A comparatively large tree in Japan, the Arboretum species are now from twenty to twenty-five feet high, and are attractive trees with gracefully drooping branches and open habit. The leaves unfold earlier in the spring than those of any other Linden in the collection, and are small, cordate at base and pale on the lower surface, like those of the small-leaved European Linden (*T. cordata*) to which the Japanese tree bears some resemblance. The Arboretum trees have now flowered every season for several years, and the flowers are large, bright yellow, and like those of other Lindens, very fragrant. For its flowers, which appear when few trees bloom in this climate and are beautiful and conspicuous, this Linden should be better known. An earlier Asiatic Linden to reach the Arboretum, where it was first raised in 1883, was the north China *T. mongolica*. This was a small tree, at least in this country, with small, nearly triangular, lustrous leaves. When only a few years old it began to flower and produce fertile seeds. It proved, however, to be short-lived here and soon disappeared, to be replaced by what are still young plants of a later generation or of different introduction. All the other Asiatic species are or have been in the collection at different times. They are all hardy enough, but at best grow slowly, and appear to lack vigor of constitution. Of the species lately introduced *T. Oliveri* now appears the most promising.

Hybrid Lindens. As in many other genera of plants, the union of two species has produced Lindens superior to the parents. As has already been stated, *Tilia vulgaris*, which is believed to be a natural hybrid, is a better tree, at least in this country, than either of the parents. The Crimean *Tilia euchora*, with dark green, lustrous leaves, is believed to be a natural hybrid between *T. caucasica* and *T. cordata*. This handsome tree is hardy in the Arboretum but does not grow as well here as in western Europe where it is often recommended as a street tree. One of the handsomest Linden-trees in the Arboretum collection, *T. spectabilis*, is believed to be a hybrid of *T. glabra* and

1921. "Linden Trees." *Bulletin of popular information - Arnold Arboretum, Harvard University* 7(14), 53-55. <https://doi.org/10.5962/p.321160>.

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