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REYNOLDA GARDENS  
of Wake Forest University

Fall  
2016

# Gardener's

## JOURNAL

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## An Overlooked Plant: The Rich Beauty and History of Goldenrod

by Forrest Allred, *RGWFU head horticulturist*

In the fall of 2015, the Reynolda Gardens staff had the opportunity to visit the exhibit *The Artist's Garden: American Impressionism and the Garden Movement, 1887-1920* at Reynolda House Museum of American Art. In the exhibit, there were two different paintings that featured goldenrod, "A Spray of Goldenrod" (Charles Courtney Curran, c. 1916) and "Meadow Flowers, Goldenrod and Asters" (John Henry Twachtman, c. 1862). While we were admiring one of the paintings, a staff member at Reynolda House asked, "Is goldenrod a weed?" There were a number of opinions based on our individual knowledge and biases. Goldenrod often has the reputation of being a weed because it is so common in fields and along roadsides. This discussion inspired me to take a closer look at this plant, and I soon discovered its rich history. Although plants are quite often depicted in art, I have observed plants in their natural habitat and believe they are works of art in their own right.

According to the U.S. Department of Agriculture, goldenrod, which is in the genus *Solidago*, is a native plant found in most of North America except for Greenland.



GOLDENROD, *SOLIDAGO* SP.

There are more than a hundred species worldwide, most of which are found in the United States. A dozen or so occur naturally in South America, Europe, and Asia as well. The significant number of species appears to be the result of the plant's ability to hybridize naturally. Goldenrod is a single-stemmed, woody perennial, growing one foot to eight feet tall. The leaves are simple and alternate, often in rosettes, with larger leaves at the base and smaller leaves at the top. They can be very narrow, large, egg-shaped, serrated, or smooth. Some leaves are attached by a petiole (Zigzag goldenrod), while others are sessile (Blue-stemmed goldenrod). The goldenrod blooms from mid-August to November. The beautiful flower heads have yellow ray flowers surrounded by yellow disk flowers. While the flowers are small (one-eighth of an inch), they bloom on numerous backward-curved stalks that originate at a central axis.

Goldenrod has often been falsely accused of causing hay fever, but the true culprit is ragweed. The pollen of ragweed, *Ambrosia artemisiifolia*, is wind-borne, which causes

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**An Overlooked Plant: The Rich Beauty and History of Goldenrod**

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allergic reactions to many sinus sufferers. Conversely, goldenrod pollen is not wind-borne; it is heavy and sticky and has to be transported by insect pollinators, such as bees. Native Americans used goldenrod for many centuries as a medicine. They boiled goldenrod leaves, flowers, and roots into a poultice or tea to treat burns, boils, inflammation, periodontal disease, kidney stones, urinary tract infections, and more. According to the University of Maryland Medical Center, a few animal and test tube studies suggest goldenrod may actually help reduce inflammation, relieve muscle spasms, fight infections, and lower blood pressure. It acts like a diuretic and is used in Europe to treat urinary tract inflammation and to prevent or treat kidney stones.

Plant names are often derived from characteristics of the plant. Sweet goldenrod, *S. odora*, gives off an anise scent; Rough-stemmed goldenrod, *S. rugosa*, has rough stems; Showy goldenrod, *S. speciosa*, has dense, pyramid-shaped, showy flower clusters; Zigzag goldenrod, *S. flexicaulis*, has irregular, snaking stems; Blue-stemmed goldenrod, *S. caesia*, has light blue stems; and Elm-leaved goldenrod, *S. ulmifolia*, has foliage similar to elm leaves. The word *Solidago* is also reflective of its medicinal properties as it means to make whole – “solida” meaning “whole” and “ago” meaning “to make.”

Goldenrod has an interesting history that involves two wars. On December 16, 1773, just prior to the American Revolution, Samuel Adams and the Sons of Liberty boarded three ships and dumped forty-five tons of tea into the Boston harbor. This dumping of tea and the subsequent boycott in defiance of British taxation without representation led to the need for a substitute

tea for the colonies. Sweet goldenrod, *S. odora*; betony, *Stachys officinalis*; New Jersey tea, *Ceanothus americanus*; and red clover, *Trifolium pratense*, became the substitute teas, referred to as the “Liberty Teas.”

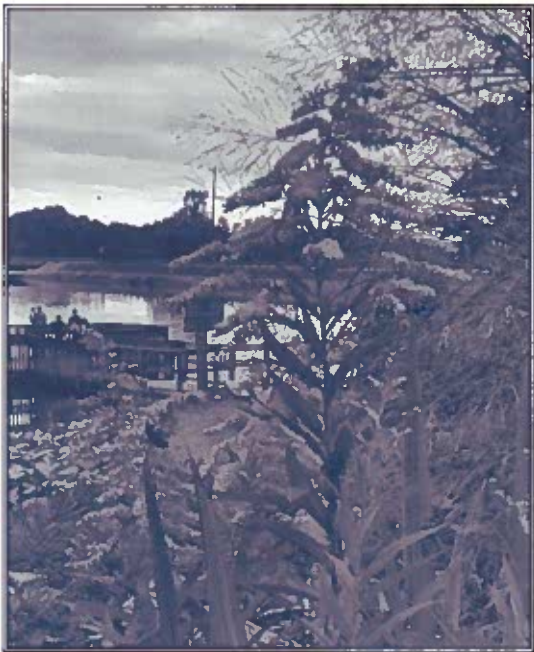
The mass production of the automobile and the onset of World War I escalated a demand for natural rubber. In 1908 American engineer Henry Ford released the first Model T Ford as a simple, reliable, and affordable car for the average American worker. By 1914 Ford had also perfected the assembly line and claimed nearly fifty percent of the automobile industry. Due to fluctuating prices for rubber as a war commodity and an embargo by England against rubber coming out of Asia, goldenrod almost became a natural substitute that would change an industry.

Historically, latex used in rubber production was harvested from *Hevea brasiliensis*, the Para’ rubber tree, in South America and exported to the United States. American engineers like Ford realized that they could no longer depend on other world markets for such a premium commodity, especially during a war and rapid industrial growth. It was time to pursue the development of rubber domestically. Ford approached long time business associate, fellow inventor, and neighbor Thomas Edison about the harvesting of latex from plants that were growing in North America. Edison experimented with thousands of plants that contained latex including honeysuckle, milkweed, and goldenrod. He determined that goldenrod, which contains seven percent latex, would be the best to cultivate for rubber production. During his cultivation and crossbreeding of goldenrod, Edison was able to develop a species later named *Solidago edisoniana*, which had the potential to grow twelve feet tall and yield twelve percent latex. Thomas Edison died in 1931, but the USDA continued his research. The United States later decided to invest in synthetic rubber being developed from coal and petroleum prod-

ucts in Germany. *Solidago edisoniana* never became a rubber substitute, and the plant no longer exists.

The possibilities for the use of goldenrod in the landscape are numerous. Goldenrod naturally spreads by seed and rhizomes, but with today's hybridization, we now have clump-forming, noninvasive varieties. Some will grow in partial shade such as Zigzag goldenrod, Elm-leaved goldenrod, and Blue-stemmed goldenrod. Although we usually associate goldenrod with fields, prairies, and roadsides, there are a number of species that are at home in wetlands including Bog goldenrod, *S. uliginosa*; Ohio goldenrod, *S. ohioensis*; and Roundleaf goldenrod, *S. patula*. Seaside goldenrod, *S. sempervirens*, grows well in salty seaside areas. With all this information in mind, you should be able to select a suitable goldenrod for your own home garden. If a naturalized area or meadow is what you desire, you may be able to accommodate the self-seeding and rhizomatous species, but if you have a small garden, select a clump-forming, noninvasive species.

In 1995, the Chicago Botanic Garden conducted a five-year evaluation of goldenrod.



The following cultivars received top marks and are good choices for home landscapes:

- 🌿 *Solidago* 'Baby Sun' – This low-growing, early-blooming goldenrod remains upright and rarely flops, even after flowering. Its short, two-foot stature makes it a good choice for small gardens. It blooms from early July to mid-August.
- 🌿 *Solidago flexicaulis* 'Variegata' – A good selection for semi-shaded wooded areas with its bright, variegated foliage. This cultivar grows taller than four feet and has a spreading nature. It blooms from early September to mid-October.
- 🌿 *Solidago* 'Goldkind' or 'Golden Baby' – Comparable in size to 'Baby Sun', 'Goldkind' is a good choice for high flower production, sturdy habit, and disease resistance. It blooms from late July to September.
- 🌿 *Solidago rigida* – One of the tallest goldenrods at over five feet, this stiff goldenrod remained upright and clump forming throughout the trials. The grayish-green foliage contrasts nicely with its flat yellow flowers. It blooms from late August to early October.
- 🌿 *Solidago rugosa* 'Fireworks' – This one received the highest ratings due to its fine-textured foliage and arching stems bursting with tiny yellow flowers. This selection is a slow spreader that stays under five feet. It blooms mid-September to late October.
- 🌿 *Solidago sphacelata* 'Golden Fleece' – The most compact of all the goldenrods, which stays under two feet, and will spread slowly to over three feet. It blooms from late August to late October.

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## A Living Fossil

by Preston Stockton, RGWFU Manager

I grew up in a family of gardeners. Both of my grandmothers had beautiful gardens, full of peonies, camellias, gardenias, tea olives, and cowslips. My grandmother in South Carolina also had a large ginkgo tree at the corner of her back porch. I remember in the fall sitting in the buttery yellow leaves and gathering them into bouquets, which I proudly handed to my mother and aunts. I always thought it was fate when my family moved to a house next to the magnificent ginkgo that grows in Runnymede Park in Winston-Salem. A good part of my childhood was spent climbing that tree.

Many people know the ginkgo as the "Maidenhair tree" as the leaves are shaped like the leaflets on the Maidenhair fern. Charles Darwin coined it the "fossil tree" because fossil records show that the genus dates back 270 million years. At one point, there were nineteen species of ginkgo, but by the Tertiary Period (65 million years ago) that number had dropped to four. Today we have just one species, *Ginkgo biloba*, and it grows in the wild in only two sites in China. The reason for the tree's decline and disappearance is unknown but may be due to the ice age or to the extinction of dinosaurs, which are considered the natural seed dispersers.

We know from Buddhist writings that monks cultivated the ginkgo as early as 1100 AD, where they were planted near temples, tombs, and other historic places. The monks took seed to Japan and Korea around 1192 AD, helping preserve the species. In 1691, Engelbert Kaempfer, a surgeon employed by the Dutch East India Company, discovered a ginkgo in Japan. A few sources believe that he took seed back to Europe in the early 1700's, but that is probably unlikely. It is thought that the first ginkgo was planted in Utrecht, Holland, between 1730 and 1767. However, the Belgians believe that a tree in

Geetbets was planted about the same time. Either way, both trees are well over 250 years old and still growing.

The first record of planting a ginkgo in the United States was in 1785.

William Hamilton, a wealthy landowner in Philadelphia, had three trees sent to the U.S. from China via London. Two were planted at his large Woodlands estate, which later became part of Woodlands Cemetery in west Philadelphia, and one was sent to his cousin John Bartram, an early American botanist, horticulturalist, and explorer, who lived nearby. Hamilton's original trees remained for years in the Cemetery, but the last one was cut down in the 1980's. John Bartram set aside one area of his small farm to grow interesting plants and later started a successful plant and seed business. Today Bartram's Garden is a forty-five acre National Historic Landmark run by the John Bartram Association in cooperation with Philadelphia Parks and Recreation. It is the oldest surviving botanical garden in North America. Bartram's tree is still thriving and is considered the oldest ginkgo in the U.S.

The ginkgoes I've just described are relatively young, though. When plant explorers were finally able to move freely around China and Japan in the late nineteenth century, they were stunned to find trees measuring one hundred feet in height, with fifty foot diameters, growing around Buddhist monasteries and temples. Today it is estimated that there are at least one hundred ginkgo trees in China that are 1,000 years old or more.

Under good conditions, a ginkgo can grow to one hundred and twenty feet in height; however, fifty to seventy feet with a spread of fifty to sixty feet is more likely. Seedling trees vary considerably in growth habit.



When young, a ginkgo shoots up with little lateral growth. This could be an evolutionary trait that allows the tree to compete with dense understory plants in reaching the sunlight, since the ginkgo does not tolerate shade well. When lateral branches do develop, they have short spurs that grow only a few inches per year. The leaves have a very distinctive fan shape, with veins radiating from the base and a notch at the apex. They are very leathery, one and a half to two and a half inches long, and are very tough and resistant to decay, which explains why they made such good fossils. In the fall, the leaves turn a bright yellow and will all drop within one or two days, unlike oaks and other landscape trees that can drop leaves for weeks. The ginkgo is very resistant to pollution, diseases, and pests. In fact, they are so tough that six trees growing within a mile and a half of the atomic bomb impact site in Hiroshima, Japan, in 1945, were among the very few living things to survive. All of them were defoliated after the blast, but they are still alive today. No wonder they can live 1,000 years!

Ginkgoes are unusual for several reasons. First, they are gymnosperms, like conifers and cycads. In a gymnosperm, the seeds are not enclosed in an ovary. Second, ginkgoes are also dioecious, meaning that there are separate male and female trees. The female tree must be mature before bearing seed, which usually happens anywhere between twenty and forty years old. In early spring, the tree forms green-covered, paired ovules on short stalks. Each day, a watery drop of fluid—the pollination drop—is produced on top of the ovule. Meanwhile, the male tree is producing pollen in catkins that flower on short spurs, which will be dispersed by the wind. For pollination to occur, the pollen must land on the pollination drop on the ovule, where it takes approximately 133 days to develop into a sperm. The sperm, which is three times larger than a human sperm, then swims to the ovule and fertilizes it. Ginkgoes and cycads are the only seed-producing plants that have motile sperm. I told you this was an unusual plant!

The seed will not germinate until the following spring.

The Chinese name for Ginkgo is *yinxing*, meaning silver apricot, referring to the fruit. It was translated into Japanese as *ichō*. The Japanese pronounced it as *ginkyo*, but due to a translation error, Kaempfer misspelled it as *ginkgo*. The seed is about three-quarters of an inch long with a woody inner nut covered with a fleshy outer layer. In the fall, the outer covering turns yellow and falls to the ground before the leaves drop. When the outer layer begins to decay or is ruptured, it produces butyric acid and is very foul smelling. I think it smells like vomit, although some people say it smells like rancid butter. Either way, you want to avoid planting a female tree. Today most trees sold on the market are grafted males. When I was in school in Chapel Hill, there was a row of female ginkgoes leading to one of the entrances to the hospital. Very bad planning.

The seed have a soft, dense texture. In Asia, they are cleaned, roasted, and eaten in desserts, soups, and with meats. In Japan, they are called *ginman* and are grilled for eating while drinking sake. They are high in niacin, starch, and protein but low in fat. In China trees selected for large nuts are grown in small orchards, and it is estimated that there are as many as 800,000 trees producing up to 7,000 tons of nuts each year. Some people are allergic to ginkgo seeds, so you should be careful the first time you eat them.

Historically, the ginkgo has been used to treat blood disorders and memory issues. Today most of the *Ginkgo biloba* extracts (GBE) are made from dried leaves. Studies have shown that GBE does improve circulation by opening up blood vessels and making blood less sticky. The ginkgo also contains flavonoids and terpenoids, which are antioxidants. In a 2007 National Health Interview Survey, ginkgo was one of the top ten natural products used by Americans. It is so widely used that researchers led by Dr. Steven T. DeKosky, dean of the School of

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## A Case for Natives

by Hayden Shuping RGWFU greenhouse manager

The typical home landscape has a lawn that is fussed over, shrubbery pruned into round meatball shapes, a tree or two in the front yard, and a few flowers. This is the landscape that many of us see every day; entire neighborhoods built with cookie-cutter landscapes. Though contractors are certainly not landscapers, many of the original plants are selected and installed by the contractor when the home is completed. The plant has a role within that landscape. We designate certain plants for particular roles such as softening the foundation of the home, providing shade, acting as a screen, or serving as a focal point.

Today, garden centers and plant nurseries have plants from all over the world. Exotic rarities, fancy cultivars, hybrids, and tropical plants excite and inspire most of us. As great as these plants might be, the majority of plants grown and sold in America are not indigenous or native.

Five and half years ago, after graduating with a degree in horticulture, I found a job at a retail garden center. I routinely found plants for my customers that met the needs of their landscape and had some ornamental value, but often those plants were not natives. I had nothing against native plants; I was just absorbed in all the unusual exotics that were available. With time, I developed a better understanding of the plants that I was selling. Some of the plants I sold were fancy versions or cultivars of exotic plants. A cultivar by definition is a variety of plant that originated and persisted under cultivation. In layman's terms, it means the plant has been found or bred by humans for a particular characteristic and continues to be cultivated for that characteristic, usually via asexual propagation. The name of a cultivar is always set off by single quotations. For example, *Hydrangea paniculata* 'Limelight,' where *Hydrangea* is the genus, *paniculata* is the species, and 'Limelight' is the named cultivar. Plants can be exotic and even invasive when they are not native to a particular area. They are an alien species whose introduction could likely cause harm to the economy, the environment, or human health. Non-natives are not only found in the world of plants; insects, animals, and even fungi all can be invasive. These invasive plants escape their original landscape and can begin to grow wildly in our environment, competing with our native plant species.

Knowing what is and is not an invasive plant requires a little investigation. Labels generally provide the genus and species of the plant. Taking the time to ask your local garden center or nursery about a plant is important, but further research may be necessary. While the selection may meet a need in the landscape, it could cause other problems. The Cooperative Extension Agency in your county is a great resource for identifying invasive plants in the area. A simple web search for reputable, science-based websites, such as the USDA plant database, can also provide lists of invasive plants and native alternatives.

I soon realized that I was selling plants that could eventually become weeds and severely invasive in the landscape. English Ivy, *Hedera helix*; Privet, *Ligustrum japonica* and *L. chinensis*; Russian Olive, *Elaeagnus angustifolia*; Wisteria, *Wisteria florabunda* and *W. japonica*; and even the infamous Bradford Pear, *Pyrus calleryana*, are all very common plants that are not advertised as a nuisance. However, if left unchecked and unrestricted, they can be troublesome. These are just a few species that are ranked high on local, regional, and national lists as invasive plants, and all are found commonly throughout garden centers and grown nationwide in nurseries. These plants take full advantage of a new environment, with little to no competition. Since not originally from this region, they essentially grow unimpeded and can be diminishing to local populations of native plants.

Using a native plant in place of a non-native can provide several benefits beyond aesthetics. Native plants have evolved to grow well in their particular region, and minimal soil amendments and little to no fertilizer are needed to establish and sustain them. After planting, supplemental watering is necessary for any plant, but native plants need less water. Well-established native plants are much more adaptable to a wide range of environmental conditions than non-native species. Just be sure to select a plant that will fit the location. Native or not, a plant that will grow into a large shrub or small tree is best used as a hedge or screen and not a foundation planting. If the correct native is chosen for a particular spot, then little to no maintenance is needed for the desired effect.

Planting natives also helps wildlife. Many natives are host plants for a number of insects including butterflies and moths. These pollinators are sometimes a second thought to our beloved honeybee. Birds benefit when natives are planted because they provide seeds, berries, and insects for food, as well as materials and areas for nesting.

Mammals also benefit from native plants. The stems, leaves, and fruits provide a food source for small mammals such as squirrels, chipmunks, and deer.

Planting trees and shrubs such as Hawthorne, *Crataegus sp.*; Serviceberry *Amelanchier sp.*; Winterberry, *Ilex verticillata*; and Possumhaw, *Ilex decidua*, will feed your local birds deep into winter with bright red berries. In the spring, Hawthorne and Serviceberry trees provide a wonderful show of white flowers that is a great early food source for pollinators. They have a pleasing flush of fall color and an equally pleasing display of red berries on bare branches. Southern Magnolia, *Magnolia grandiflora*, is a native evergreen that provides habitat for birds and mammals, berries for birds, and large, fragrant, white flowers for us and a variety of pollinators. Many cultivars of Southern Magnolia range in size and are ideal for the landscape, fitting a variety of needs. There are a number of native evergreen shrubs, both sun and shade tolerant, that are great for foundation plantings, hedging, screening, or a floral display. The evergreen shrub Star-anise, *Illicium floridanum*, has a number of

cultivars with varying features, is somewhat fast growing, and is great for foundations, hedges, or screening in shady locations, but it will also grow in full sun with adequate moisture. Dog Hobble or Fetter-bush, *Leucothoe axillaris* and *L. fontanesiana*, are wonderful, low-growing, evergreen shrubs. In the spring, they produce small, white flowers that originate at the tips of the branches and resemble blueberry flowers. The dark green foliage takes on a blush of purple-maroon in the colder months for added winter interest. Often they are found by streams or under Rhododendrons or hardwood trees. There are a number of named cultivars available on the market, which can provide cool shade, vivid fall color, and dazzling displays of flowers.

With some research and a bit of advice, it is easy to find a native plant that is functional in the home landscape but is also aesthetically pleasing and friendly to nature. Taking advantage of the plants that occur naturally in our area is something that carries significant benefits for both the short term and the long term. After learning about them here, why not use natives?

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Robinson; Hugh Taylor; John  
R. Taylor; Douglas and Leslee  
Wright; Julie Anna Wright

Here are a few native selections we suggest.

Genus	Species	Cultivar	Height	Width
<i>Ilex</i>	<i>verticillata</i>	'Red Sprite' (FM)	3'-6'	3'-6'
<i>Ilex</i>	<i>verticillata</i>	'Jim Dandy' (M)	4'-8'	4'-8'
<i>Ilex</i>	<i>vomitorea</i>	'Schilling's' (M)	3'-6'	3'-6'
<i>Ilex</i>	<i>vomitorea</i>	'Pendula' (FM)	10'-20'	6'-15'
<i>Kalmia</i>	<i>latifolia</i>	'Pristine'	4'-4'	4'-4'
<i>Leucothoe</i>	<i>axillaris</i>	'Curly Red'	15"-18"	12"-24"
<i>Leucothoe</i>	<i>axillaris</i>		2'-4'	3'-6'
<i>Leucothoe</i>	<i>fontanesiana</i>	'Girard's Rainbow'	3'-5'	3'-5'
<i>Magnolia</i>	<i>grandiflora</i>	'Little Gem'	20'-25'	10'-15'
<i>Magnolia</i>	<i>grandiflora</i>	'Bracken's Brown Beauty'	30'-50'	15'-30'

\*Please note for these particular *Ilex* cultivars you will need at least one male pollinator specimen for the female plants to produce fruit.

PUBLISHED TWICE YEARLY BY REYNOLDA  
GARDENS OF WAKE FOREST UNIVERSITY

Communications about Gardens  
donations should be addressed  
to Preston Stockton, manager.  
Correspondence concerning *The  
Gardener's Journal* should be  
addressed to Amanda Lanier, editor.

A calendar of events is published  
separately in February and September.

Website: [www.reynoldagardens.org](http://www.reynoldagardens.org)



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fiber, including 30% post-consumer  
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## A Living Fossil

CONTINUED FROM PAGE 5

Medicine at the University of Virginia, conducted a trial called the Ginkgo Evaluation of Memory (GEM) study, which was conducted at four clinical sites over the course of eight years on 3,000 older adults. The study, published in the 2008 *Journal of the American Medical Association*, found that GBE was ineffective in reducing the development of dementia and Alzheimer's disease in the test subjects. Although disappointing, Dr. Jeff Williams, a geriatrician and principal investigator of the GEM Clinical Coordinating Center at Wake Forest University, said "While this study revealed that ginkgo does not have an effect on reducing dementia in the study population, it does provide us with important information about how to design and conduct large dementia prevention trials in older adults. Future analyses will provide us with additional information on ginkgo's possible effects on cardiovascular disease, cancer, depression, and other age-related conditions."

Of course, I think the best use of ginkgoes is in the landscape. It is a perfect tree for tough urban life and can be used as a specimen tree or in groups, as well as along avenues. It is easy to grow and needs

moderately fertile, well-drained soil; full sun; and is hardy in zones 4 through 9. It is a relatively slow grower when young.

There are a large number of cultivars on the market today that will fit most all landscapes: dwarf ('Gnome' or 'Mariken'), weeping ('Ross Moore' or 'pendula'), columnar ('Alberta' or 'Bryson City'), small ('Chase Manhattan'), variegated ('Majestic Butterfly'), or normal ('Autumn Gold'). Remember to only buy one that is a grafted male, or you will be most certainly not be the hit of your neighborhood!

This summer I read the book *Ginkgo* by Peter Crane. I know, I am a total plant geek! Mr. Crane just stepped down as the dean of the Yale School of Forestry and Environmental Studies and is a former Director of the Royal Botanic Garden at Kew. He has had a long fascination with this plant, which I can certainly understand. Crane makes an interesting observation in his book that most people have a special and significant tree in their lives. He lists several of his, which include the "Old Lion," a ginkgo tree in Kew Gardens that was planted in 1762 by Princess Augusta and Prince Frederick. I know that my ginkgo in Runnymede Park was not planted by royalty, Buddhist monks, or a Dutch plant explorer, but it is still special to me. 🌳



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