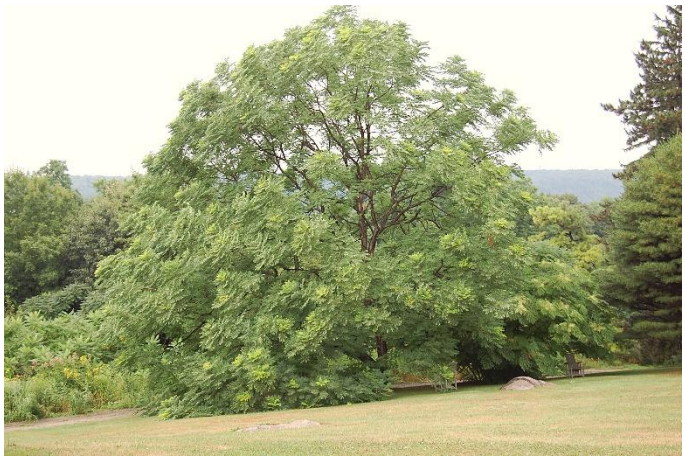
A Bold Living Sculpture

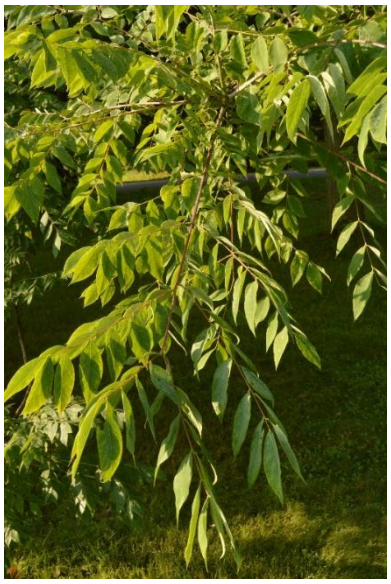
One of my winter pastimes is studying and enjoying the different branching habits of deciduous trees. Some folks find winter to be lackluster due to the absence of foliage, but I find the leaf-bare silhouettes a fun study against the blue winter sky. Albeit less common in temperate regions, a coarse textured tree certainly adds a nice contrast to its finely branched cohorts. Throughout the years of working with trees, I have found Kentucky Coffeetree, botanically known as *Gymnocladus dioicus* to be one of the best for adding that touch of thick and rough texture necessary for visually enriching the winter tree-line. A low branched specimen is seen at right in September at Wave Hill in NYC.



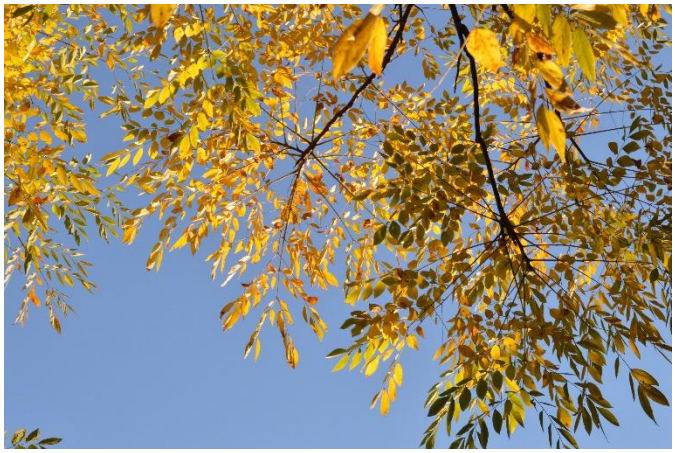
Kentucky Coffee Tree is a member of the Fabaceae, commonly known as the Legume or Pea Family. The tree was originally and mistakenly described as *Guilandina dioica* in 1753 by the Swedish naturalist and botanist Carl Linnaeus (1717-1778). To his credit, the species epithet did properly describe the dioecious nature of the tree, explaining how some plants bear only female flowers while others only male. The genus name of *Gymnocladus* was published in 1785 by the French naturalist and biologist Jean Baptiste Antoine Pierre De Monet De Lamarck (1744-1829) in his multivolume *Encyclopédie Méthodique*: *Botanique.* The name comes from the Greek *Gumnós* meaning naked or bare and *Kládos* for branch, referring to how the plant is often bare of foliage from late October through April. Unfortunately, Lamarck altered the species epithet, naming the plant *Gymnocladus canadensis*. The story of its name finally came to a conclusion in 1869 when the German botanist Karl Henrich Emil Koch (1809-1879) renamed the plant *Gymnocladus dioicus*.

Gymnocladus contains 5 species, with the remaining 4 native to Asia. Kentucky Coffeetree is a large tree, maturing to 60-100’ tall by 40-60’ wide. Coming as no surprise, Kentucky Coffee Tree is a native of Kentucky! Overall, it’s native region extends from Western Tennessee to Oklahoma, stretching north to Iowa and Ontario, with small populations in New York, Pennsylvania and West Virginia. More surprising is the relative scarcity of the plant. In spite of its common name, it

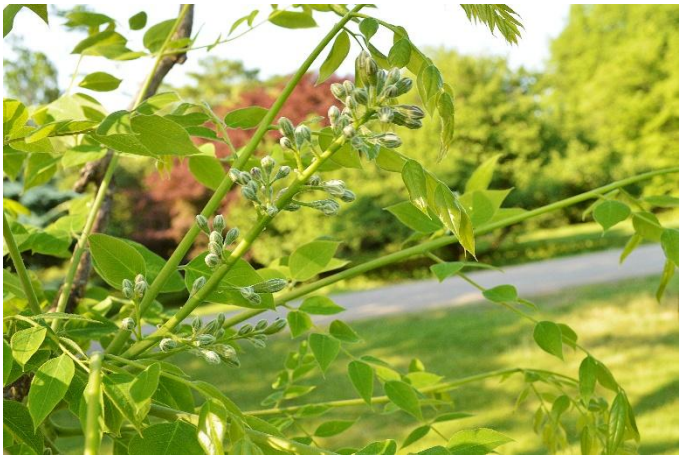
is actually most prevalent in Kansas and Oklahoma and even in those states, the plants are found in small populations. The plants often appear in moister soils, but are also known to establish on rocky, limestone hillsides and ridges. The roots have also been known to produce suckers (as seen in the image above) which ultimately results in a dense grove of genetically identical trees.



Gymnocladus dioicus has many unique qualities, yet probably the most notable quality centers around its magical ability to transform from a delicate, finely textured plant of summer to a coarsely branched plant of winter. The secret to this transition lies in the twice compound foliage which is far more complex than a typical 'simple leaf' – as they are so defined – of Maples or Oaks. Varying from 1-3' long by 1½-2' wide, the leaf of *Gymnocladus* (as seen above) has a central stem called a rachis, from which 5-9 secondary stems called rachilla branch forth. Both of these 'leafy stems' display a nice rosy color along the top. It is along these rachilla that 5-9 pairs of ovate leaflets appear. The leaflets are 1½-3½" long by ¾-1½" wide and are mistaken by most as 'the foliage'. This large leaf may appear overly complex to many gardeners and I must admit, I too was greatly puzzled by its form when I first saw the tree. What environmental pressures could possibly have been present to create such a leaf? As complex as it may appear, twice compound leaves actually have numerous advantages, many of which can be seen by simply gazing up into the canopy, as seen above. The abundant quantity of leaflets serves to increase the total foliage surface area, thereby increasing the plants' ability to capture light and via photosynthesis, create carbohydrates. This leaf structure also reduces potential shading of neighboring leaves below, allowing light to penetrate much deeper into the canopy. This permits efficient photosynthesis to occur in those leaves located deep within the canopy and for foliage to develop in multiple layers throughout the canopy. This abundance of inner foliage also reduces the dense shell of outer foliage typically seen in most



trees. Just gaze up into a mature tree (as seen above left) and not only will you see leaves throughout, but the absence of the outer foliar shell allows for ample views of the sky! The smaller leaflet also reduces the amount of water lost to transpiration and, since the wind is less impeded as it passes through the more open canopy, the tree is less subject to limb breakage. All told, those are a lot of benefits! Come October, the leaflets turn a bright yellow (as seen above right) before falling. The leafless central rachis and rachilla continue to drop throughout autumn and into winter and admittedly, can be annoying to remove from unwanted areas.



The presence – or absence – of the seed pod is another notable quality. As mentioned, the plants are dioecious, with specific trees bearing only female or male flowers. The off-white blossoms appear in panicles, whereby a central stem yields numerous short branches, with each branch bearing multiple flowers. The female flowers have a light and pleasant fragrance with the panicles reaching lengths of 12” and displaying 25-50 flowers (as seen above). By comparison, male floral panicles only reach 4-5” in length with roughly half as many flowers. Once pollinated, the female blossoms transition into 3-6” long by 1½-2” wide pea-shaped pods which can be ornamental or annoying, depending on their location! When ripe, the pods turn from green to a dark reddish brown and persist on the branch tips throughout the winter (as seen in the closing image at Frelinghuysen Arb.) before dropping come spring. When split open, 2-6 round and slightly flattened seeds are revealed that are roughly ½” in diameter and dark brown in color, as seen in a pod at right. The seeds are covered by a very smooth yet hard seed coat. Surrounding the seeds is a gelatinous brown pulp that is sticky to the touch and is also seen at right. The seeds contain hydrocyanic acid, making them poisonous if eaten raw. However, the chemical is heat sensitive and is rendered harmless if the seeds are roasted for upwards of 3 hours at 150°F. Native Americans, followed by the early colonists living in the Kentucky region were known to roast and grind the seeds for brewing a coffee-like beverage. Although uncaffeinated, this beverage served as the impetus for the common name! Children were also known to play games with the seeds much like marbles of today.

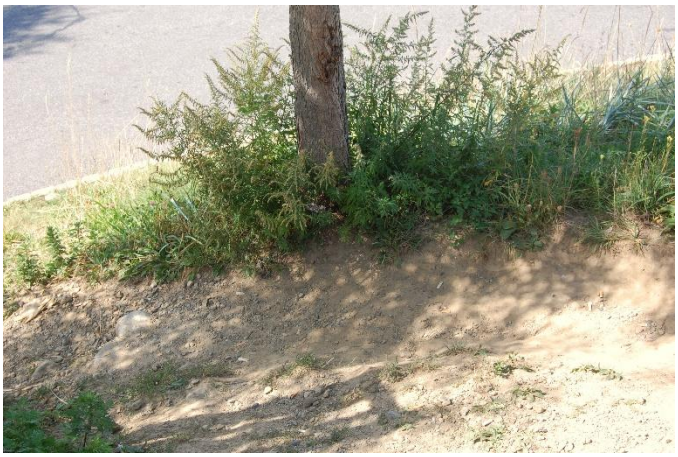
Interestingly, both the seed pod and seed coat are too dense for most insect and animal teeth to penetrate, as evidenced by the number of untouched pods surrounding most female trees. The density of the seed coat also prevents the absorption of water and the resulting process of germination. Many seeds rely on the trees' tolerance of surviving near moist or boggy environments where water can penetrate cracks in the seed coat and allow some of the seeds to germinate. However, only a small portion of those seeds shed in moist environments actually germinate. That begs the question of how the plant was able to spread over such a large area and what enabled the seed to germinate. The secret may lie in the afore mentioned pulp that has a sweet, caramel-like taste. It too has negative impacts upon being ingested as the chemicals contained within block the absorption of nutrients. However, if the animal consuming the pods was the size of the American Mastodon, the impact on the animal would be far less severe when compared to the size of our current population of animals! It is thought the action of the acids within the intestines of the Mastodon combined with the nicking of the seed coat by the large molars allowed for improved germination of the seeds. This process also provided ample amounts of 'fertilizer' for the seedlings while the movement of these animals also served as the primary vector for moving the seeds about to promising new locations.

Not everyone may have an interest in the female trees since after all, the pods can be a bit of a nuisance. For these areas selections with male flowers are clearly preferred. Most commonly seen in the trade is the cultivar Espresso™, introduce in 1993 by the J. Frank Schmidt and Sons nursery out of Boring Oregon. Aside from not displaying any seed pods, Espresso™ has an attractive, somewhat arching habit.

The last two notable qualities are less apparent to most – the bark and the coarse twisting branches! The bark consists of gray to dark gray, flattened scales that curl outward along the edges. The area between some of the scales, particularly along branches reveals a rich brown under-bark (as pictured above). The thick, coarse stems are what makes the winter appearance so distinct. However, when gazing up into the canopy in summer, the light green, fine texture of the foliage contrasts beautifully with the stubby and thick, dark branches that twist and turn near the branch tips, as seen on the left. Truly an interesting tree for texture throughout the year!

Although *Gymnocladus* is often listed as growing in moist soils or flood plans, Andy Schmitz and Jeffrey Carstens wrote in Arnoldia, the Magazine of the Arnold Arboretum (Volume 76, Number 1) that those trees growing in moist to wet sites often suffer from lackluster growth and decaying roots. This suggests its growth in moist areas is purely because the well hydrated seed is more likely to germinate. They also noted that the plant is most commonly seen in association with Hackberry (*Celtis occidentalis*), a plant which is well adapted to survive in lowlands as well as in well-drained soils and along limestone ridges. Schmitz and Carstens found Coffee Trees growing in these well-drained upland habitats as well, most likely the location where plants would prefer to grow. Sadly, at least for the Coffeetree, the American Mastodon went extinct around 11,000 years ago and in its natural habitat, the plants are now dependent on the seed coat becoming cracked or seeds being deposited near a moist or seasonally moist location for germination to occur. In cultivation, plants grow best in well-drained soils in full sun to light shade where they will grow at a modest rate of 1-2' per year and are hardy in zones 3-8.

I have enjoyed the plants when used in mass or as a specimen planting. The female tree set in the lawn at Frelinghuysen Arboretum is a wonderful sculptural element when viewed from afar during the late fall through early spring. However, placing one near a patio where folks can lie in a lounge chair and observe the thick dark branches against the fresh green foliage is also a wonderful visual treat (as seen above). In addition, its coarse winter outline makes it an ideal candidate for planting on the SW side of a home, since there are few branches to block the warming rays of the winter sun. Since it is a member of the Fabaceae, it is well suited to survive in nitrogen poor soils in urban environments. The male form is a great candidate for use as a street tree where power lines are not stretched above or in urban plazas. As a testament to its survival in challenging sites, in 2001 I was completing a design around a clubhouse and there was one, 2" caliper Kentucky Coffeetree still in need of a home. We picked an area on the backside of the clubhouse, where no topsoil had been spread. It was also adjacent to a future footpath the staff created to get to work. Despite no irrigation, no topsoil and the combination of soil compaction and erosion from the foot worn path, the tree did fantastic as seen in the two images above!



The transition from a fine textured tree to a course, rugged looking tree each fall often startles people who initially find the lack of branches not to their liking – particularly when the tree is newly planted. Fortunately, as the plant grows and expands, its seasonal change in texture becomes better appreciated. In fact, when combined with a sugar coating of snow, I think the Kentucky Coffee Tree may become that bold living sculpture many gardeners could not and should not live without!

Bruce Crawford

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