

## NOTES ON "COFFEE" FROM THE KENTUCKY COFFEETREE (*GYMNOCLADUS DIOICUS*, FABACEAE)

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### ABSTRACT

The roasted/ground seeds of the Kentucky coffeetree (*Gymnocladus dioicus*, Fabaceae) were sparingly used in pioneer times as a substitute for arabica coffee. Preparation of the beverage, opinions on its smell and taste, toxicity of the plant, and history and present-day status of this use of the seeds are discussed.

### RESUMEN

Las semillas del café de Kentucky (*Gymnocladus dioicus*, Fabaceae) se usaron en los tiempos de los pioneros como un sustituto del café. Se discute la preparación de la bebida, opiniones sobre su olor y sabor, toxicidad de la planta, historia y estatus actual del uso de las semillas.

### INTRODUCTION

The assertion that the roasted and ground seeds of the Kentucky coffeetree (*Gymnocladus dioicus* (L.) K. Koch; Fabaceae) (hereafter KCT) can be brewed into a coffee-like beverage and that the Kentucky and Tennessee pioneers made such a beverage from them is repeated frequently in American and even European literature on New World edible wild plants (e.g., Allen & Allen 1981; Bean 1973; Browne 1857; Fernald & Kinsey 1958; Loudon 1838; Loz 1890; Nicholson 1883; Peterson 1978; Rogers 1905; Sargent 1889; Saunders 1920; Vannorsdall 1958; Wampler 2000). Most of the reports are quite definite concerning the pioneers: yes, the seeds were indeed so used by them. Some, though, are a bit uncertain, e.g., "Pioneers may have made a coffee substitute from [the] seeds" (Stacy 1992). Braun (1961) noted that the making of "coffee" from the seeds in Kentucky was in the Bluegrass region, where the tree is as common as or even more common than in most other places.

The Kentucky coffeetree ranges from New York to South Dakota, south to Virginia, and Oklahoma (Little 1977 [range map]; Spaeth n.d.). Its seeds (Fig. 1) are borne in large, woody, brown pods (legumes) (4.3)12–16.5(25?) cm long, 4–5 cm wide, and 1–2 cm thick. The pods remain on the tree throughout much of the winter; at a distance the tree appears to have a flock of birds among its leafless branches. Each pod contains a fleshy pulp in which are embedded 1–9 dark olive brown, hard seeds 1.1–2 cm long and wide and 0.6–1.3 cm thick. The seeds are rock hard—"adamantine," as Rogers (1905), with but slight hyperbole, well



FIG. 1. Kentucky coffeetree (*Gymnocladus dioica*). Left, pods. Lower right, seeds (a U.S. penny included for size comparison). Upper right, ground seeds, the "coffee."

described them. Later, Rogers (1917) wrote: "How the pioneers ever crushed [the seeds] is a puzzle to all who have tried to break one with a nutcracker."

Living in the Bluegrass region and having access to an ample supply of the seeds, we decided to experiment by preparing a potable drink from them. Next we investigated the matter of toxicity of KCT and the history of beverage use of the seeds. Results of our trials and studies are reported here.

#### THE "COFFEE"

We found only four recipes for roasting the seeds. One internet site suggested roasting a cup of seeds, one layer thick, in an oven for 30 minutes (Rolen 2001). No temperature was specified, and 30 minutes did not seem to us long enough for any toxins possibly present in the seeds to dissipate (see "Toxicity" below). Another source, which we followed, gave more details: Brill and Dean (1994) suggested a "safe" way to make KCT coffee: bake the seeds in a "covered roasting pan" at 300° F for 3 hours (similar instructions are in Brill [2002] and Phillips [1998], although Phillips suggested 350° F).

On 5 Aug 2003, we put 30 seeds into each of four Pyrex jars labeled 1, 2, 3, and 4, respectively. One layer of seeds covered the bottom of each jar. The jars

were roasted at 150° C ( $\approx$ 300° F). During the roasting, the room had at first an aroma of peanut butter. Jar 1 was removed after 2.0 hours, jar 2 after 2.5 hours, and jar 3 after 3.0 hours by which time four of the seeds had burst ("popped"). By the time jar 4 was removed (3.5 hours), the room had an aroma of something burning; 11 seeds had popped.

The next step was to establish a method of breaking the seeds, which were still rock hard. Without a corn grinder available (and fear that if we did have one, the seeds would break the grinder), we used pliers and a mortar and pestle. The seeds were first cracked open one-by-one with the pliers over the mortar. As they were cracked, most shattered or exploded so the cracking was done under a cloth that covered the mortar. They were then coarse-ground with the pestle, pulverized (Fig. 1) in a coffee grinder, and placed back into their respective jars, which were covered in plastic wrap to retain freshness. There appeared to be no relationship between the ease of cracking the seeds and the roasting times.

To make the "coffee," one heaping teaspoonful of ground seeds was placed in  $3/4$  of a cup ( $\approx$ 175 ml) of boiling water. (This probably would have been the method used by pioneers.) The grounds were stirred and allowed to settle to the bottom. Twenty people were granted the opportunity to smell and taste this historical drink; their responses are listed in Table 1. No one claimed to enjoy the taste or the experience. All agreed that an overpowering and persistent aftertaste remained.

When the "coffee" was sweetened with sugar, the brew became "more palatable." The four participants who tasted it rated it as "acceptable," "like sweetened tea," "still rather unpleasant," and "could get used to it." The general consensus was that KCT "coffee" is not destined for supermarket shelves. A lot of work, with little pay-off, goes into roasting and grinding the seeds; this may be why some literature rates the brew as a poor substitute for coffee. The second author of the present paper drank about  $1/3$  cup of sweetened KCT "coffee" every day for 2 weeks, hoping that, with familiarity, the flavor might improve for him; it did not.

Yet, in contrast, some individuals rate the beverage more highly. Brill (2002) called it "the world's best caffeine-free coffee substitute"; his wife, too, likes the drink (Brill, pers. comm., Oct 2003). Phillips (1998) wrote that the beans make "a decent cup of caffeine-free coffee." The brew has been described also as "palatable and wholesome" (Thwaites 1905).

#### TOXICITY

Anyone wishing to prepare "coffee" from KCT seeds will probably have some interest in reports of the plant's toxicity to various organisms. KCT has long TABLE 1. Opinions of the taste and smell of "coffee" brewed from ground, roasted seeds of Kentucky coffeetree in a 20-person taste/smell test, October/November 2003, Northern Kentucky University. Identical opinions were expressed by

several participants.

Taste	Smell
Akin to mud	Earthy
Horrible	Chocolaty
Fruity	Stale coffee
A little bit like coffee	Hint of mocha
Why bother?	Chocolate coffee
Like coffee with a touch of chocolate	Low-quality coffee
Like espresso	Like bakers chocolate
Bitter	
Like mocha	
Like bargain coffee	
Three-day-old brewed coffee	
Not worth the effort	
Hint of sour	
Really bad	
Bad after taste	
Pungent	
Not at all like coffee	

been known to possess poisonous properties, both for livestock and humans, though it is by no means a toxic plant of major significance (Kingsbury 1964). The toxin appears to be water soluble; intoxication of livestock has been reported after the animals drank water into which KCT pods had fallen. An extract from the leaves is said to poison flies (Bronaugh 1991; Chesnut 1898; Millspaugh 1887), a report that should be investigated. Toxins are found in all parts of the plant, especially fresh growth, and can cause "stomach and intestinal disorders with diarrhea, vomiting, irregular pulse, and coma" (Hardin & Arena 1974). For over a century, this poisoning has been attributed to the alkaloid cytisine (e.g., Chesnut 1898), but the presence of this compound has never been confirmed in KCT. Unusual amino acids and an alkaloid are reported from the seeds (Southon 1994), but these compounds are not likely to be of toxicologic significance (Burrows & Tyrl 2001).

One's desire to try making "coffee" from the seeds would probably be tempered by statements such as the following: "Only a few cases of human poisoning have been reported from eating the seeds or using them to make a coffee substitute" (Stephens 1980). "... chewing one or two [seeds] would not be expected to produce toxic effects" (Lampe & McCann 1985). "Eating the seeds" or "chewing one or two" would, of course, be most unwise because they are so hard; chewing them would be like chewing small rocks.

It appears, though, that there is probably little to worry about with the "coffee." "The toxin is heat labile" and "[the seeds] are not toxic when parched" (Bur-

rows & Tyrl 2001). Nevertheless we do not recommend the "coffee" until more is known about the poisonous compounds in the seeds.

## HISTORY

### Pioneer times

The earliest appearance of the name *Kentucky* [italics ours] coffeetree—as opposed to simply coffeetree—we have noted is in an April 1785 entry in one of the diaries of George Washington: "Planted ... eight nuts from a tree called the Kentucke [sic] coffee tree . . ." (Jackson & Twohig 1978). According to Hill and Fountain (2003), the Kentucky coffeetree was

promoted by early land developers who wanted to get settlers out to the "far west" (which included Kentucky at that time). Coffee, a popular beverage, was expensive and hard to find away from coastal ports. Land developers advertised Kentucky as a place where a tree grew with beans that could be roasted and brewed to make a fine coffee substitute. Although drinkable, the beverage was no substitute for coffee, and the early settlers quickly dropped it as soon as the real thing became available.

We were unable to verify this account in spite of extensive searching of literature and internet.

The earliest link we have found between KCT seeds and the "coffee" is in John Filson's *The discovery, settlement and present state of Kentucke* [sic] (Filson 1784): "The coffee-tree greatly resembles the black oak, grows large, and also bears a pod, in which is enclosed good coffee." This statement, however, does not inspire confidence that the author actually partook of the "good coffee" "enclosed" in the pods or that he knew of the *seeds* being the basis for the drink.

In *Pioneer life in Kentucky 1785–1800* (Horine 1948) a letter is quoted from Kentucky pioneer Daniel Drake to his adopted daughter that is definite on the use of the seeds for a beverage: "[We gathered] those wild fruits which were so precious to us in the absence of the cultivated. Some of them were for immediate use, or little thought of except by the children; others had a more permanent value, and were stored for winter . . . Among the latter, grapes, nuts, crab apples, and occasionally the hard seeds of the coffee tree, . . . of which, by way of change from Bohea tea [*Camellia sinensis*], we made a substitute for coffee." This report, even in the absence of any other, would seem to verify the pre-1800 use of a beverage made from the seeds of KCT.

Bakeless (1965) wrote about the complaints of a man who, during the 1780's, was a guest at one of the "dreadful" hovels providing food, drink, and bed to Kentucky travellers:

Nothing to eat but bear meat and 'corn-meal dodgers.' And nothing to drink but whisky . . . and coffee 'composed of an article that grew some eight hundred or one thousand miles north of where coffee tree [*Coffea arabica*] ever did grow.' This beverage was brewed from the pod [sic] of the Kentucky 'coffee tree.' The resulting fluid was described by a charitable geographer of the period as 'not unlike coffee.' Another traveler, still more charitable, described it as 'a pod in which is good coffee-seed.'

Michaux (1817; French version 1812) wrote that "the name of coffee tree was

given to this vegetable by the early emigrants to Kentucky and Tennessee, who hoped to find in its seeds a substitute for coffee: but the small number of persons who made the experiment abandoned it, as soon as it became easy to obtain from the sea ports the Coffee of the West Indies" (see also Keeler 1900). This, too, has the ring of a reliable report.

The extent of use of the seeds for a beverage recorded by Michaux differs much from that given by others. Saunders (1920) wrote that "a century ago such use of them was quite prevalent in what was then the western wilderness, and travelers' diaries of the time make frequent mention of the practice." Medsger (1972) wrote that "the pioneers apparently made much use of the seeds of this tree, which were roasted and ground, then used as a substitute for coffee." According to Clute (1943), KCT "coffee" was "often" resorted to when the supply of arabica coffee was exhausted. We have made a wide search through the literature—literally many hundreds of sources—and have found nothing that corroborates these statements. Michaux, we believe, was right in his assessment of the frequency of use.

It is perhaps indicative of the *infrequency* of use of KCT "coffee" that Porcher (1863), in his Civil War era *Resources of the southern fields and forests*, did not mention *G. dioicus* even though he listed various coffee substitutes. The tree's range does extend into the far northern part of the area covered in the book (Little 1977; Spaeth n.d.). Perhaps, too, arabica coffee, in spite of war-induced scarcity, was sufficiently available so that substitutes were generally not important; Dick (1974), in his book on the "southern frontier," mentioned that "by 1840 black coffee was coming into use as a beverage." Loudon (1838) noted that the use of KCT seeds for "coffee" had long since been discontinued. Wilson (1905) noted that the "coffee" use had "long since ceased." A 1902 paper on KCT did not mention the "coffee" even though it considered "economic uses" (Anonymous 1902). Gibson (1913), describing the "coffee" as black and bitter and noting that "a little of it would go a long way with a modern coffee drinker," wrote that "when the Kentuckians were able to procure coffee they let the wild substitute alone."

Kentucky and Tennessee were not the only places where this beverage was tried. Thomas Nuttall (1821) apparently had drunk the "coffee": in early 1819 he wrote in the record of his journey into the Arkansas Territory, "Among the trees, we still continue to observe the coffee-bean (*Gymnocladus canadensis*), now loaded with legumes, the seeds of which, when parched . . . produce a substitute for coffee greatly inferior to the *Cichorium* [chicory]." At that writing, he was near the confluence of the Ohio and Mississippi rivers. And in southwestern Iowa during the winter of 1819–1820, KCT "coffee" was drunk by members of S.H. Long's expedition to the Rocky Mountains (Thwaites 1905).

Seeds of KCT were not the only coffee substitute used in early Kentucky.

Another report on the pioneers (Goode 1989), from an area of the state in which KCT is lacking or exceedingly rare (Little 1977), stated that ground parched corn sweetened with honey made a "reasonably tasty substitute for coffee." Other substitutes included parched "tubers," rye, wheat, acorns, beans, chestnuts, chicory, chinquapins, cotton, grapes, peanuts, English peas, persimmons, okra, sorghum, sugar cane, "Irish" and sweet potatoes, and dandelion—and even, in desperation, wood shavings (Anonymous n.d.; Howard 1975; March 2000; Mitchell 1991).

Writing about pioneer Kentucky, Cotterill (1917) mentioned that "Tea and coffee were reserved for the sick and were considered as a mark of effeminacy if taken by people in good health." Was this, in addition to the scarcity of arabica coffee in those early times, maybe one reason to seek a coffee substitute?

One might wonder where the pioneers got the idea of preparing a beverage from these seeds, which seem to us to be a most unlikely source. The seeds certainly do not look like the "beans" of arabica coffee, and the task of preparing them for brewing is daunting. The pioneers might have learned the process from Native Americans; Smith (1928) reported that the Meskwaki Indians cooked the seeds and then ground them and boiled them to make "coffee." These Indians, however, were in Wisconsin, not Kentucky. But perhaps some Kentucky tribes knew of the use and shared the information with the pioneers. Indians of the Missouri River region (Gilmore 1991; Moerman 1998) knew of KCT but apparently did not make a beverage from the seeds although they roasted and ate the seeds and prepared a "food" from the pounded seeds. According to Phillips (1998), "the roasted beans are a reasonably good nut, especially when salted or soaked in salted water and re-baked." We infer that the roasting time, though not stated, is about 1/2 to 1 hour.

It is also possible that some pioneers familiar with arabica coffee but suffering coffee deprivation simply tried to make a beverage from KCT seeds, producing a brew that they liked and about which they spread the word.

#### **KCT "coffee" during the Civil War**

During the early days of November 2003 we were told by a Civil War history buff (who wishes to remain anonymous) that he had heard from a Civil War re-enactor that, during that war, quite limited use was made of KCT seeds as "coffee." The taste of the "coffee" was reportedly so bad that it made hardtack—those plain flour-and-water biscuits that were often moldy or infested with maggots and weevils (Billings 1887)—seem good by comparison. In her *Civil War plants and herbs*, Mitchell (1996) noted that the seeds are the basis for a "coffee," a report apparently based on Anonymous (1995). But she gave no indication that they were actually used for that purpose during the war although, of course, they could well have been. Arabica coffee was apparently a favorite non-alcoholic beverage of soldiers ("how delicious the aroma of it, and how

readily each man disposed of a quart" [McCarthy 1882]). Although arabica coffee was available at least some of the time (Locke 1870), its supply in the south was sometimes uncertain because of the vicissitudes of war on land and the Lincoln-ordered blockade of southern ports from Virginia to Texas.

#### **The George Rogers Clark connection**

In going through hundreds of KCT websites we came upon one from Storm Lake, Iowa, a city that has a "tree museum" in which various "historic" trees are planted (Anonymous 2003b), among them a "George Rogers Clark Kentucky Coffee tree." The text concerning the tree is as follows: "During the Civil War, George Rogers Clark attempted to develop a coffee bean tree to replace regular coffee which was unavailable during that time. However, since the coffee was not pleasant to the taste, the project failed." Is this statement credible? Certainly not in the timing of Clark's posthumous interest; he died in 1818. One wonders, too, how one could "develop" a tree during the short time span of the Civil War. But we decided to investigate further.

We directed a query to Storm Lake, hoping to learn the source of their KCT. We were given the name of an individual in Louisville; later checking showed that he and another person were involved in a heritage tree program and that one of them is deceased. Two letters to the first man have gone unanswered; we suspect that he, too, has died.

We learned that Clark did send KCT seeds to Thomas Jefferson at Monticello. Indeed, in the Kentucky legislation (Anonymous 2003a) that established *G. dioicus* as the state tree of Kentucky (S.B. 150, approved 8 Mar 1976; later rescinded), one of the "whereas's" is this: "WHEREAS, in 1783 General George Rogers Clark did send seeds of the Kentucky coffeetree to Thomas Jefferson at Monticello and which seeds produces [sic] trees still gracing the grounds of Monticello." In a letter dated 4 Dec 1783 Jefferson wrote to Clark: "We received here about a week ago your obliging letter of Oct. 12. 1783, with the shells and seeds for which we return you many thanks" (Jefferson 2003). One can but assume that among the included seeds were those of KCT. (As an aside, this letter is the one in which Jefferson asked Clark if he would like to lead [an exploration party] into the country from the Mississippi to California.)

We found a brief quote said to be from Clark's October 1783 letter to Jefferson: speaking of KCT, Clark wrote "It makes beautiful shade and we think it will flourish with you" (Anonymous 2003a). Did Clark also mention in the letter the "coffee" use of the seeds of the tree? Inquiries to the Jefferson collection at the Princeton University Library (Linda Monaco, pers. comm., 16 Oct 2003) and to the Monticello Library (Bryan Craig, pers. comm., 16 Oct 2003) elicited the response that the letter is apparently lost.

Finally, we were referred to a person said to be knowledgeable about GRC's



correspondence: Julia Parke, former director at Locust Grove, Clark's Louisville home. In an October 2003 telephone conversation with her, the second author was told that she had known of the 12 Oct 1783 letter and that yes, GRC did mention in the letter not only the horticultural possibilities of the tree but also the use of Kentucky coffeetree seeds for "coffee." Thus the Storm Lake report of Clark's interest in KCT had been somewhat exonerated.

#### CURRENT USE OF KCT "COFFEE"

In an article on various wild-growing substitutes for arabica coffee, Serlin (1977) wrote, "All last winter, along the Ramble in New York City's Central Park, I've seen people pinching coffee costs by scuffing through fallen leaves for precious pods under a stand of Kentucky Coffee Trees." In October 2003, wondering about the frequency of such foraging by New Yorkers, we telephoned Steven Brill, well-known author and educator on the subject of wild edible plants. He told us that, in his years of visiting Central Park, the only foragers he had seen were those accompanying him on his field trips.

According to some of these foragers, the seeds apparently can be used as a chocolaty seasoning in cakes and cookies (Brill & Dean 1994). One seed added to carob-flavored ice cream can make the product "taste more like chocolate than ever" (Brill 2002).

We checked with several more people knowledgeable about the subject of edible wild plants. None knew of anyone who had prepared a drink from KCT seeds.

Other than the reports of Brill (2002), Brill & Dean (1994), Phillips (1998), and Serlin (1977) and the recent brewing of "coffee" from KCT seeds here at Northern Kentucky University, we have located no evidence of significant extant use of the beverage. Even if current edible-plant books mention the use, we suggest that KCT "coffee" is mostly a curiosity from a time now past, being indulged in only by an occasional one of those individuals who eat their way through the landscape (often with tasty rewards). It poses no serious threat to Maxwell House or Starbucks.

#### CONCLUSION

Limited use of KCT seeds as a coffee substitute was made in pioneer Kentucky and elsewhere. It would appear that the many post-pioneer reports of a KCT-seed-based beverage derive ultimately from a few early accounts; Drake's, Long's, Michaux's, Nuttall's, and possibly Clark's. The Kentucky coffeetree is of essentially no present-day concern as a beverage plant.

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