What do Plants Mean?

By KATHRYN M. FLINN

As a college student, I was torn between two different worlds: literature and botany. Grasping at threads to connect them, I held on to the cultural meanings of plants, from the hazel and rowan trees of Irish myth and the jasmine and anemones of Arabic songs to Huysmans' aroids, orchids, and bromeliads. Above all, I questioned how these plants had come to mean what they mean. In the Hebrew Bible, why does a particular plant called spikenard represent allure, or mandrake fertility, or hyssop purification? How had this specific significance grown out of biological reality?

During this time I started studying ginseng, a plant more invested with meaning than most. This species made the perfect study organism for an overly imaginative English major. Its fame originated in the Doctrine of Signatures, the principle common to the ancient world and famously expounded by Foucault, that plants resemble the body parts they were meant to treat. Walnuts heal the brain, and so on. Since forked ginseng roots looked like whole persons, ginseng must be a panacea. In fact, hundreds of pharmacological studies have documented multiple and complex effects, including anti-inflammatory and anti-cancer properties; ginseng is also used to treat diabetes and cardiovascular disorders, though clinical evidence is scarce. This medicinal use is the nub of ginseng's value in Asia, but around that grew a whole mythology involving tigers, lightning strikes, glowing roots, cherubic spirits. Trying to understand how and why ginseng inspired such myth-making, I dug deeply into this cultural murk, to the evident dismay of my biology advisor.

But what I really wanted to know was what ginseng meant to Americans. Closely related to the legendary Asian species, American ginseng is native to eastern North America. Surely it meant something different and unique in American culture. Ginseng has played small roles in Native American and new age medicine. But as I pored over three hundred years of American writings on ginseng, I found that, in America, ginseng mostly only meant one thing: money. As the *Wall Street Journal* quoted one digger, "I never found it worth a damn for anything but to get money out of."

How disappointing. Like bison and beaver and so many other living things, ginseng had simply become a commodity. Its cultural meaning seemed divorced from its biology. But gradually the nuances of the story grew on me, and I realized that even if it brought the same price, a sack of ginseng would never mean the same thing as a bushel of corn or soybeans. The specific biology of American ginseng has colored its meaning as money. As the plant's distribution and abundance, ecology and evolution changed over time, its meanings as money changed, too.

In colonial America, commerce in American ginseng centered on the fur trading posts of Montreal and Albany. Gathering ginseng went along with hunting and trapping, and fur traders bought the roots. Indians exchanged ginseng for cloth, blankets, kettles, guns, and other technologies of an easier life, from fishhooks to thimbles. The ginseng made its way to Canton (now

Guangzhou) via French and British firms.

Indians near Stockbridge, Massachusetts, began selling ginseng in 1752. According to Jonathan Edwards, the trade led to decadence among his flock:

> This has occasioned our Indians of all sorts, young and old, to spend abundance of time in wandering about the woods, and sometimes to a great distance, in the neglect of the public worship and of their husbandry; and also of their going much to Albany (which proves worse to them than their going into the woods) to sell their roots: where they are always much in the way of temptation to drunkenness, especially when they have money in their pockets.

American ginseng has some of the attributes of commonness—it has a large geographic range and grows in many kinds of habitats. The species occurs throughout eastern North America, from Ontario and Quebec to Georgia, and west to the states on the west shore of the Mississippi River. Ecologist Jim McGraw of West Virginia University, who has spent most of the last thirty years studying American ginseng, quantified its distribution across the central Appalachians. Despite the stereotype that ginseng prefers moist, base-rich, north-facing coves, he found it in all the elevations, aspects, and forest types he sampled.

But populations tend to be small. In 293,200 meters squared, McGraw and his students found only 539 ginseng plants. They concluded that American ginseng has an unusual form of rarity, in which it is widespread across many habitats, but nowhere very abundant. This is exactly the distribution one would expect for a plant that has been harvested for hundreds of years, especially in supposedly typical habitats, and especially in places where it was plentiful.

After the American Revolution, the ginseng trade was freed from British middlemen. The first American ship to trade directly with China arrived in Canton in August 1787, loaded with thirty tons of ginseng. It returned to New York with tea, silk, and porcelain, which made the ship's backers a 30 percent profit.

Both Britain and the States had trade deficits with China, paying for most of their tea and china with silver money. But ginseng enabled Americans to close the gap. American consul to Canton Samuel Shaw vaunted this advantage in a 1787 letter to Foreign Secretary John Jay. "While the nations of Europe are, for the most part, obliged to purchase this commodity [tea] with ready money," Shaw wrote, "it must be pleasing to an American to know that his country can have it upon easier terms; and that the otherwise useless produce of her mountains and forests will in a considerable degree supply her with this elegant luxury."

Like their new country, many Americans found themselves cash poor and resource rich. In September 1787, while delegates drafted the Constitution in Philadelphia, John Mathews and his team were surveying the Ohio River valley. They camped at a river fork on a Saturday and stayed there to dig ginseng for four days. Mathews recorded that each man dug forty to sixty pounds of root per day. The next fall, Daniel Boone floated fifteen kegs of ginseng up the Ohio River from Kentucky to Pittsburgh. Roads between Pittsburgh and Philadelphia were clogged with wagons, packtrains, and horses loaded with barrels of ginseng. According to botanist François-André Michaux, ginseng was the only product of Kentucky that could pay for its passage to Philadelphia. Each barrel would turn into a small fortune. Ginseng supposedly started the wealth of John Jacob Astor, America's first multi-millionaire.

The plant itself is unassuming. American ginseng is about fifty centimeters tall. Its tuber-like root sends up a single stem each year. A mature plant has three or four leaves. It may grow for five years or more before it starts flowering, and when it flowers, it produces a single inflorescence. The flowers are very small, greenish-white, and what wildflower guides call "inconspicuous." Tiny sweat-bees and syrphid flies visit the flowers.

Like many other herbaceous plants of forest understories, American ginseng has a classic "slow" life history—growing slowly, producing few, well-provisioned offspring, living a long time. In one population studied by botanist Mark Schlessman, most flowering plants had ten to twenty flowers, and the average plant produced four or five seeds per year. (By contrast, an invasive garlic mustard plant in the same forest can produce three or four thousand seeds in a year.)

These few seeds have low chances of making new plants. By marking and following four populations over multiple years, ecologists Danielle Charron and Daniel Gagnon estimated that only 1 to 15 percent of seeds became seedlings, and only 8 to 31 percent of seedlings survived. But once a seedling became established, it was likely to live for twenty years, or fifty years, or longer. All of this results in populations that tend not to grow or decline much, but remain the same size for hundreds of years, in the absence of disturbance. This is exactly the worst kind of organism to harvest, because populations can't rebound.

Until the late 1800s, American ginseng had not been cultivated as a cash crop, but the 1880s began a ginseng-growing boom. Agricultural weeklies, government bulletins, and practical handbooks gave detailed calculations of the potential profits: prices for seeds, seeds per ounce, plants per acre, roots per pound, prices of roots. Plant pathologist H.H. Whetzel wrote, "No wonder that a 'Ginseng craze' broke out and that men sat up nights to figure out on paper the vast fortunes that were bound to accrue to those who planted a few hundred seeds at three cents each and sold the roots in five years at $12.00 a pound."

George Stanton, "father of the cultivated ginseng industry," was a tinsmith and small farmer in the Shawangunk foothills of New York State. Farmers in places like this needed a get-rich-quick scheme in the late 1800s. Commodity prices were falling, equipment debts were rising, banks were foreclosing on their neighbors. Planting ginseng meant self-sufficiency. In a Department of Agriculture publication, Maurice Kains recommended it as an adjunct to raising fruit or poultry. "The [ginseng] crop is one which can be grown incidentally to general farming without any great outlay of capital, and further, if there should be a temporary decline in price, the grower can leave his roots in the ground, knowing that they are improving in quality." Kains followed his ginseng-growing manual with books on gardening, home canning, and animal husbandry, including *Five Acres and Independence*.

Ginseng populations tend to remain stable in the absence of disturbance, but of course the forests where ginseng grows have undergone a number of disturbances over the past three hundred years. Most of these forests no longer exist, lost to agriculture or development. The forests that remain have gained many species from Europe and Asia, including invasive plants. In a survey of thirty ginseng populations across seven states, Kerry Wixted and Jim McGraw found that about one third of ginseng plants were growing within a few meters of an invasive plant.

Since 1950, land-use changes, losses of predators, and game management have led to unprecedented increases in white-tailed deer densities. In seven West Virginia populations, deer ate 10 to 63 percent of ginseng plants and sometimes all the seeds. When Mary Ann Furedi and Jim McGraw fed ginseng seeds to deer and examined the scat, no seeds passed through. They estimated that without deer browsing, almost all of the populations they studied had a 95 percent chance of surviving for one hundred years. With current rates of deer browsing, none of the populations were predicted to survive.

By the 1960s, most people saw ginseng as a relic of the frontier past, persisting only in backward-leaning parts of Appalachia. More specifically, it represented the lost economic opportunity of the frontier past. Americans were nostalgic for times when it seemed any pioneer or homesteader could make it on sheer grit and resourcefulness. Daniel Boone was on TV. *Five Acres and Independence* was reprinted as a back-to-the-land classic. Folksinger Norman Blake sang about a digger called Ginseng Sullivan hoping "next summer if things turn right/The companies will pay high." But there wasn't enough ginseng to justify hopes of a fortune, or even a living. In the song, Sullivan finds "a tow sack full of ginseng/Won't pay no traveling bills."

Eliot Wigginton, an English teacher in north Georgia, sent his students to interview older people about hide tanning, butter churning, and other disappearing "affairs of plain living" for a magazine that became the *Foxfire* books. They talked about "sang hunting" as one of few sources of cash "to pay taxes or buy a new gun or hound dog." As digger Wallace Moore put it,

> Boy, that's a pretty sight to see…Walk up and see big wads of berries just scattered all over the side of the hill and in the holler. Well, I reckon it's about every sang hunter's dream—everybody that's ever dug the sang or fools around with it any—is always a'looking for a patch where he can dig maybe two, three hours, three, four hours, or a half a day in one patch. Everybody you see: 'Boy, if I could just find a patch where I could dig a half a day, I'd be all right!' But them patches are scattered.

Working with Martha Case and others, I measured how much American ginseng has declined in abundance by looking at how many herbarium specimens botanists collected over time. Compared to its close relatives, ginseng collections declined from 1850 to 2000 in Vermont, New York, Pennsylvania, Michigan, Wisconsin, and Minnesota. Since ginseng and related species are affected in similar ways by deer, invasive plants, and habitat destruction, these declines probably resulted from harvesting.

If undisturbed, larger ginseng plants have higher survival rates and produce more seeds, which, if size is inherited, would cause plant size to increase over many generations. But both deer and people tend to take larger plants. From 1900 to 2000 the ginseng

plants botanists collected declined in size, especially height. Jim McGraw counted the annual bud scars on the rhizomes of these plants to determine their age, and the more recent specimens were not younger. Plants of the same age are now smaller and shorter than in the past. Smaller, shorter plants have less leaf area gathering light, so they have fewer resources and make fewer seeds. They contribute less to population growth, so populations of the same size may be less likely to persist.

In the twenty-first century, finding ginseng has become more difficult, and diggers less numerous and more desperate. In 2014, ginseng digging became bizarre and risky enough to debut on reality TV. Over spooky music and sounds of heavy breathing and fast heartbeats, *Appalachian Outlaws* follows diggers who trespass on private property and dig on federal lands without permits. They risk fines, jail time, and bodily harm for payoffs of $550 per pound of root. "It's powerful—it's money," one digger explains. But he's not making fortunes. He doesn't have a steady job. He talks about feeding his kids.

Shaky camera work shows a West Virginia landowner who protects his patch by waiting in the woods at night with a shotgun and installing a "hillbilly alarm system" of homemade land mines. He says his grandfather planted some of the plants. "This stuff means a lot to me," he says. "I mean, that's my retirement fund."

Appalachian Outlaws doesn't much reference conservation ethics, but some diggers do plant seeds. After collecting a motherlode of roots from one hillside, a digger says, "Well, I think I've raped it enough, really."

Diggers, buyers, ecologists, managers all recognize the problem of scarcity. Trade in American ginseng is now regulated by the Convention on International Trade in Endangered Species, which took effect in 1975. Under this treaty, the Fish and Wildlife Service's Office of Scientific Authority decides each year that the upcoming year's harvest "will not be detrimental to the survival of the species." This decision is based on an annual report from each state of how many pounds of root it exported. These numbers tend to track unemployment.

Many states have harvest seasons, intended to allow plants to produce seeds before being dug, and size limits, to let plants get big enough to produce seeds before being dug. Many states also prohibit harvesting in state parks and nature preserves. But when Jim McGraw and his colleagues monitored harvesting in thirty marked populations, only 6 percent of harvests were legal in all respects. They warned that centuries of overharvesting have left Asian ginseng virtually extinct, and American ginseng seems likely to follow. If it does, diggers will be poorer, and Americans' dreams of wild success or self-made security will be poorer, too.

The good news is that the meanings of plants are changeable, and we can change them. If ginseng can mean independence, or insurance, it can also have new meanings that respect its altered biological reality. Ginseng isn't the only species disappearing—many biological communities are impoverished in diversity. If we leave it in the ground, perhaps ginseng can represent a new kind of savings against a leaner future.

Kathryn M. Flinn is a plant ecologist and Assistant Professor of Biology at Baldwin Wallace University in Berea, Ohio. Learn more at https://kathrynflinn.wordpress.com/.