

How About Them Apples? A History of Apples in America

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Remember that small grove of McIntosh apple trees in the back field of the family farm? It took a few thousand years, but ancestors of those trees survived getting swallowed by camels, hot days in the deserts, invading Romans, foggy nights in the West Counties of England, ocean voyages, and freezing nights in Quebec before coming to America. The amazing biodiversity of apples survived even Stalin's purges, but how will it fare with advancing technology, evolving commercial markets, and changing climates?

It's hard to believe, but when the Vikings were traversing our northern shores and when Europeans later made their first tentative explorations along our coasts, there was no such a thing as an apple tree. There were only a couple of indigenous apples then, mainly *Malus coronaria*, a small crab tree covered with thorns and little apples. Reports suggest that islands off the coast of New England were the first spots in North America during the 1500s where apples as we think of them appeared. Fishermen and other explorers from Portugal and other European countries brought apples along in barrels to eat as they worked. Stop by an island for a few days of R&R on solid land, eat a few apples, throw the cores away, and welcome to America, Mr. Apple (*Malus domestica*).

But as we'll learn a bit later, not all *Malus domestica* are equal. You know this intuitively if you've ever gone for a nice walk on a lovely fall day, spotted an apple along an old rock wall, reached up to grab a shiny red beauty, and bit into it only to recoil. The writer Henry David Thoreau lived in a little cabin near Walden Pond and spent years wandering through the backwoods of New England. He loved to eat wild apples and wrote a whole treatise on the topic. He poo poed domesticated apples, saying that "they are eaten with comparatively little zest, and have no real *tang* nor *smack* to them." He conceded, however, that wild apples weren't for the faint of heart, noting that usually they were "sour enough to set a squirrel's teeth on edge and make a jay scream."

Thoreau fretted that there would be a day when "the era of the Wild Apple will soon be past. It is a fruit which will probably become extinct in New England." Thoreau observed, of course, that as the wildlands were tamed and agriculture bloomed, those nasty domesticated apples popped up everywhere, first on small farms, then eventually in commercial orchards.

Though Thoreau viewed domesticated apples as an affront, he was in the minority. There was a time in America, not really all that long ago in the mid to late 1800s, when there were literally thousands of varieties of apples. Common knowledge of the day was that in this cornucopia there were apples ideal for blue ribbon pies, others that would keep well until the dandelions sprouted in spring, and those that were ideal for drying. Some apples had hints of flavor from other fruits such as pineapple, banana, and citrus. Everyone, from our founding fathers (including Washington, Jefferson, and Franklin) to the ordinary man, consumed copious daily amounts of what we now know as "hard" cider instead of water (which was often hazardous to one's health).

Some apple trees can live 150 years or more. I grew up in Maine, and the pesky domesticated apple trees growing when Thoreau was swatting blackflies were still around when I was a small kid in the 1960s, though the remnants of orchards were beginning to show signs of rapid decline.



Old Rhode Island Greening Apple Tree (1986), Locust Grove Fruit Farm, Milton, NY. (©William Clift 1986. All rights reserved.)

“It is remarkable how closely the history of the apple tree is connected with that of man.”

— Henry David Thoreau

By the time of my childhood, there were no longer thousands of apple tree types, but there were still a number of what we now call heritage varieties. Like wizened old farmers, they were just part of the landscape. Most of the time, I thought of the trees as kind of trouble makers. Why couldn't apple trees be like those in the Wizard of Oz, who, with a little friendly coercion, would make life easy and shower one with fruit?

Instead of being at my favorite swimming hole with Debbie, my best friend's older sister, subject of my arms-length ardor (the “apple of my eye”), it was expected I'd pick summer apples for my grandmother's apple sauce. In early fall I'd have to interrupt careening through the swamps on my dirt bike to pick crab apples for jelly. Even later in October all too often I'd have to miss out on fine partridge hunting (often in abandoned orchards) to pick what I now know as Baldwin apples to be used in winter pies and in my grandfather's “hard” cider. (Only later in life did I figure out that there was a connection between my grandfather's popularity in my little town and the 3 barrels (150 gallons) of cider we'd wrestle into the basement each fall). Several modest-sized commercial orchards were within a half hour's drive, but we usually didn't bother with them.

Nowadays, things are much different. Folks riding in the subway or stuck in commuter traffic wistfully recall America's earlier agrarian days.¹ The U.S. apple growing industry claims there are around 100 varieties of apples grown commercially in the U.S. In 2006, 15 varieties accounted for 90% of all apple production.² Most total sales come from only a handful of varieties – a few that are interesting but too many that are relatively tasteless (for a few reasons, including the fact that they were picked before fully ripe) available in the local grocery. Depending on the time of year, your grocery store apples may have travelled from faraway places like Chile or New Zealand. If you live in a region where apple growing is common, roadside stands can offer a bit more variety and freshness for a while in the fall. The farmer's market movement continues to grow, and you may be able to find a few more interesting “heritage” varieties, albeit at premium prices, at one of these.

¹ [Common Ground Country Fair](#). August 29, 2017.

² [Commodity Apples](#). Malinda Geisler, Agricultural Marketing Resource Center, Iowa State University. Rev. December 2013.

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When I was a youth, hard cider was something that old farmers drank on a hot spring day and that poor people who couldn't afford a quart bottle of Schlitz beer would consume while playing cards at the volunteer fire department. I wouldn't have dreamed then that hard cider would eventually become "chic." In recent years, hard cider has gotten very trendy and is now the fastest growing beverage category in the U.S.³ Even before it became a fad, I'd decided that orchards and a cidery would be my retirement project. While grandpa provided plenty of hands-on experience in the fundamentals of cider making, I realized there was a lot to learn about all aspects of apple cultivation and the finer details regarding the science of fermentation. As a result, I spent a lot of effort researching all things apple.

What You Eat Is What You Are?

As it turns out, there's a really cool backstory to old apple trees in America. I was lucky that one of the first books I stumbled upon was "The Botany of Desire: A Plant's-Eye View of the World" by Michael Pollan. It relates how humans go about fulfilling basic desires (such as the quest for sweetness), which influences which plants flourish in our world and which kind of fade away. These desires influence not only the plants themselves, but also many aspects of our environment and the world around us.

I'd commend the book to anyone. It caused me to explore the idea of connections between how we pursue fulfillment of our needs and desires, what we do on our landscapes, and how the cumulative effects of these decisions ripple through time. *The story of apples in America – newly arrived immigrant, acculturation and growth, renewal and rediscovery is a metaphor for the development of our great land and its people.*

This is a story of how America and its apples grew up together and continue to evolve.

The Well-Traveled Apple

While "American as apple pie" is a well-known phrase worldwide, the original "Garden of Eden" for apples is, in reality, in Central Asia just south of Russia. In southeastern Kazakhstan (a former Republic in the Soviet Union), near a city named Almaty high up in the mountains of the Tian Shan Valley, are the **ancestors of all apples (*Malus sieversii*) worldwide.**

As it turns out, for a few thousand years the Tian Shan Valley was part of the Silk Route that traversed Asia, the Middle East, and into Europe (the Silk Route through these valleys was declared a World Heritage Site by the United Nations in 2014⁴). Transport yourself back to the day when a good camel or horse, a pair of slippers, and lots of willpower moved millions of pounds of goods (such as China's silk) to markets continents away. As you arrive near Almaty, you're aware it's a big hump over mountains to your destination. Foodstuffs that include something that's compact, sweet, and filling would be great.

Apples growing in this region aren't scattered here and there – they often occur in large, pure stands. They also don't look a lot like apple trees nowadays in most parts of the world, towering 60 to 80 feet or more and living for up to two or three hundred years. Every tree here is genetically distinct from all of the others. Many of these trees produce apples that would look familiar, but like Thoreau's wild apples, many of these are spitters. However, in a situation where each tree is genetically distinct, randomness will produce some trees that produce lovely, luscious apples. You groove on these apples and know that others along your trade route will too, so you load up a few camels with them and hit the dusty trail.

³ [Consumer Trends in Hard Cider](#). Sally Colby. Wine & Craft Beverage News. July 2016.

⁴ [Silk Roads: The Routes Network of Chang'an-Tianshan Corridor](#). United Nations Educational, Scientific and Cultural Organization.

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Seeds are excreted, new apple trees grow, the tasty ones are eaten and traded, and the spitters fed to cattle. Relying on this process to hop scotch continents isn't particularly efficient, but over millennia these unintended turbaned Johnny Apples distributed apples broadly over Asia, the Middle East, and beyond.

While this all makes for a good story, modern science has allowed this to be validated. In 2012, Research Ecologist Amandine Cornille from Uppsala University in Sweden worked with other scientists across Asia and Europe to track the genetic evolution of apples as they were spread across the Silk Route and other regions. Cornille and others were able to establish that as *Malus sieversii* moved out of the Tian Shan Valley, it crossed with other apple varieties local to areas along its route. While for many years the primary force was random selection, as horticultural knowledge grew over the centuries, it's believed that intentional crossings were probably done by farmers looking to encourage specific traits such as disease and pest resistance.⁵

The Sex Life of Apples

A reasonable question to ask is if you like a particular kind of apple, why not just plant a few seeds of that cultivar? Unfortunately, Mother Nature doesn't cooperate. By now I suspect you're sufficiently titillated to learn the dirty details of the apple's sex life. **It's been known for centuries that apples don't reproduce, as the saying goes, "true."** Want to grow an Albemarle Pippin apple tree just like the one in Grandma's backyard? Plucking a seed from a core and planting it won't work. The precise reason why was established in 2010 when a research team led by Riccardo Velasco of the Edmund Mach Foundation **mapped the genome of the domestic apple and found that apples have more genes than any plant mapped so far—57,000 genes⁶, about 36,000 more than humans.**

Over the centuries and millennia, farmers figured out that while crossing two different varieties of apple with particular desirable traits might produce yet another different apple with those same traits, the unchaste nature of apples made success far less than certain. If you've got a particular apple that you want to reproduce (like Grandma's Albemarle Pippin) and apples continue to express their wild side, what is one to do? Recalling your college botany class, you may remember the term asexual reproduction or, if you are a sci fi fan, cloning.

In the apple world, to reproduce an identical apple one only has to **graft** another variety onto an existing tree or tree root. No one knows exactly when, but evidence suggests that it was at least 3,000 years ago that someone discovered that if one grafts a scion (think of it as a young twig) of a particular variety of apple onto another apple tree (or apple tree root), an apple that is the variety of the scion will eventually be produced. There are a number of methods of grafting. For those of you who are foresters or botanists and remember what cambium is, grafting is essentially putting the cambiums of the scion and its host together and securing them in place with tape, rubber bands, or adhesives.⁷ Learning that trees could be "cloned" via grafting to produce trees that were identical really changed the game.

⁵ [New insight into the history of domesticated apple: secondary contribution of the European wild apple to the genome of cultivated varieties.](#) A. Cornille and others. National Center for Biotechnology Information, U.S. National Library of Medicine. May 2012.

⁶ [The genome of the domesticated apple \(*Malus x domestica* Borkh.\).](#) R. Velasco and others. Nature Genetics. August 2010.

⁷ [Whip and tongue graft.](#) Stephen Hayes. YouTube video. April 2009.

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There is, of course, a downside to asexual reproduction. While particular desirable traits are maintained, random combinations of genes that might produce other desirable traits are constrained. At the end of this article I'll share a story of how one Russian scientist lost his life to Stalin's gulag and another teetered at its gates to keep our options open.

I had the privilege of learning how to graft from someone considered to be kind of the granddaddy of the heritage fruit movement in America, Tom Burford from Virginia. Burford, an apple man all his life whose ancestors were orchardists in the earliest days of colonial America and who was hired by the National Park Service to reestablish Thomas Jefferson's orchards at Monticello, has written a lovely apple book.⁸

Burford shares that "by 2500 B.C. apples were growing throughout Mesopotamia and Persia and varieties were dispersed, intentionally planted, and named to become part of the food cultures of the world."

By the heyday of the Greeks and Romans, grafting had "taken root." According to Burford, "The classical Greek period of the fifth to fourth centuries B.C. contained considerable horticultural knowledge, particularly regarding the act of grafting in which specific apples of merit are deliberately joined to a separate root system. The Greek writer Theophrastus was aware that apple seeds would not produce the same apple when planted and wrote, 'Seedlings of . . . apples produce an inferior kind which is acid instead of sweet . . . and this is why men graft.' Armed with information gained from the Greek horticultural experience, the Roman Empire of the first century B.C. further advanced the art and science of fruit growing. The Roman writer Pliny the Elder in 77–79 A.D. described more than twenty named varieties in his *Natural History*." Romans eventually spread their knowledge of grafting to continental Europe and the British Isles through invasions that began around A.D. 45.

In England, apples are an important food crop but cider is beloved, with a large portion of the world's "hard" cider consumed there. To this day, there are cultural "echoes" of ancient beliefs and ceremonies honoring the role of apples in society. In England during mid-January of each year, Brits gather to go **wassailing**. Medieval dress and dancing are encouraged along with copious amounts of cider. Toast dipped in cider is offered to the apple tree, which is exhorted to be productive come spring. While the ritual's mojo as a catalyst for the tree's fertility is embraced now only with tongue in cheek, a festive gathering during Britain's dreary winter is a welcomed relief. Observing the ceremony in action helps outsiders to better understand the cultural origins of Monty Python.⁹

After being in Britain for many centuries, apples were poised to "jump the pond" to America.

Early Apples in America

Sacks of apple seeds traveled with early settlers to North America from Britain and France. Like their turbaned compatriots in the mists of the ancient past, settlers to America were anxious for something sweet, soothing, and familiar. A little taste of "back home." Available evidence suggests that the earliest settlers didn't rely a lot on grafting initially, instead choosing to plant apple seeds they'd brought from the old country. In apple parlance trees growing up from seeds are called "seedlings."

Playing the genetic lottery and risking that one would get a spitter wouldn't make sense except for one fact – it didn't matter. By the time that America was being settled by the British and French, both had been involved in the making of hard cider for many hundreds of years back home. Hard cider doesn't require sweet dessert apples; in fact, some of the most interesting ciders are blends of many different

⁸ [Apples of North America: 192 Exceptional Varieties for Gardeners, Growers, and Cooks](#). Tom Burford.

⁹ [Wassailing](#). YouTube video. February 2010.

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apples, including spitters. (One contemporary cidemaker/orchardist describing this phenomenon as “being able to explore that whole palette of flavors was like if your parents gave you only a charcoal pencil to draw with, and then you get your first box of Crayola Deluxe, and suddenly you’ve got 108 different colors.”¹⁰) Spitters were quite acceptable for cooking too. According to the book *Apples of New England: A Users Guide*¹¹, historically sour or bitter apples were considered quite adequate since they “can be transformed in cooking, especially if fortified by spices; sweeteners such as honey or molasses; or other ingredients or fruit.”

As a result of the genetic lottery earlier described, while many of the trees planted from seeds yielded spitters, a few would produce apples of fine flavor. Fruit yielded might have other attributes that were important such as ripening early or late, size, resistance to disease, ease of shipment, or ability to store late into the winter. Trees that could withstand cold were valued in the more northern States. A good deal of attention was paid to these factors, and for those most suitable, cuttings from trees would be removed and grafted or shared with neighbors and friends. The Roxbury Russet, America’s first cultivar discovered using this process, was being grafted by 1650 in and around Roxbury, MA, and is still available today.

At a time in America when a large proportion of Americans lived on farms, this process of culling through trees produced dramatic results. “A 1905 publication of the U.S. Department of Agriculture, *Nomenclature of the Apple*, lists the names of approximately seventeen thousand apple varieties that appeared in nineteenth-century American publications. During that era there was an apple for every community, every function, whether for cider, storage, baking, drying, or eating out of hand; there was an apple for every taste, crunchy, soft, sweet and tart, and an apple for every season, especially in the winter when few fruits or vegetables were available.”¹²

If you discovered a special apple, you of course got to name it to distinguish it from others. Many apples were named for the farmer who discovered it, for the town where it was found, for something to do with its color, or for an animal (there’s a Holstein (which is a cow) variety, there is an old woodpecker (now called a Baldwin), a Crow Egg apple, a Sheepnose Apple). There are lots of heritage varieties with Pippins in the name, which is the old English word for “coming from seed.”

If one didn’t want to play the genetic lotto, early settlers might request a cutting (scion) from one of their favorite trees from back home or purchase one from nurseries that were popping up in their new homeland. Examination of a “broadside” advertisement for one of the earliest large nurseries in America (the William Prince Nursery in Long Island, NY) from 1790 shows a mix of English varieties as well as some American apples that had already gone through the culling process. The broadside includes the Lady Apple (called Api in French),



Northern spies...great for pies! (Courtesy photo by Russell Steven Powell for the New England Apple Association)



Blue pearmain, a heritage variety. (Courtesy photo by Scott Farm Orchard, Dummerston, VT)

¹⁰ [The Monk in the Apple Orchard](#). Rowan Jacobsen. Yankee Magazine. September 2014.

¹¹ [Apples of New England: A User’s Guide](#). Russell Powell. September 2014.

¹² [The Fruits and Fruit Trees of Monticello](#). Peter J. Hatch. May 2007.

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which is believed to be of Roman origin coming to America via England. It is usually credited with being the world's oldest cultivated variety. The Lady Apple can still be found in the U.S.

The 1800s was the heyday for apples in America. Due to the importance of small farms, horticultural societies had formed to share the latest news and information on growing crops, including apples. In some instances, pomology societies (pomology is the science of growing fruit) were specifically formed.

Johnny Appleseed

Probably America's best known apple fanatic, the Johnny Appleseed I read about as a kid seemingly singlehandedly populated America with apples. While he did play an important role, the reality is that J.A.'s activities were pretty much limited to Ohio and Indiana from 1806-1845. He came to notoriety, and that notoriety has endured, because of how different he was from most at the time. A small, wiry man, he was said to often rely on feed sacks for clothes. Spending apparently years at a time living outside, essentially alone, he is said to have lived one whole winter in a hollowed out tulip poplar log surviving pretty much solely on butternuts. Legends abound of him freeing animals from traps (including a wolf he kept as a pet), refusing to kill even mosquitoes, and buying a lame horse to keep it from slaughter.

While it might be easy to be dismissive of Johnny as just another nut job, that would be inaccurate. In addition to everything else, Johnny was apparently an astute businessman. In order to encourage settlement at the time, the government required certain conditions to be met in order to be given free land. One of these requirements was to plant at least 50 fruit trees. Capitalizing on this, Johnny traveled throughout Ohio and Indiana establishing apple tree nurseries at the confluence of rivers, usually in areas just ahead of where settlements were expected to occur. Because of his religious beliefs, he refused to graft apple trees, instead planting apple seeds. Conscripting locals to tend nurseries and sell his trees, he'd be on his way. The result was, of course, lots of spitters. No matter; like settlers everywhere in America, apples for cider and cooking was first priority. With time, these settlers would eventually discover a few special varieties and would graft them. While the historical record is unclear, most suggest that Johnny A. died a wealthy man with vast, but scattered, land holdings.

Benefits of Biodiversity

While early settlers in New England, Thomas Jefferson at Monticello (his cider orchard was bigger than his dessert apple orchard), and Johnny A. didn't really think of it in those terms, all were exploiting the genetic variability of apples. While specific cultivars planted in Europe and elsewhere would grow in America, the climate and soils in America were often different than their native habitats. Jefferson and Washington both noticed, for example, that many English varieties did poorly in the clay soils, high heat, and humidity of colonial Virginia. By relying on seed and selecting those that did best in their respective regions, settlers were "fine tuning" apples to the unique conditions in their new American microclimates.

There are, of course, many reflections of biodiversity's influence. While plant survival is often top of mind, there are even more subtle expressions. Winemakers and cidemakers know that there can be marked difference in their products based on interactions between the plant and its soil, topography, and other factors. This phenomenon is known as [terroir](#).

Shrinking Cider and Disappearing Apples

A number of factors converged to change the place of cider and apples in American lives. L.H. Bailey, the renowned horticulturalist and champion of all things rural, is quoted in the Cyclopedia of Horticulture in 1936 saying, only partially tongue in cheek, that, "The gradual change in customs, whereby the eating of the apple (rather than the drinking of it) has come to be paramount, is a significant development."

As earlier noted, cider (both hard and sweet) was the dominant drink of choice in early America. Middlesex County, Massachusetts, produced 33,436 barrels of cider in 1764, or seven per family, well over a barrel for every man, woman, and child. Farmers stored up to 50 barrels, enough to last a year.¹³ Berkshire and Hampshire Counties in western Massachusetts produced 265,000 gallons of brandy, known colloquially as applejack, in 1810 (think of it as apple-flavored jet fuel).



Apple grown by the author. (U.S. Forest Service photo by Robert Lueckel)

America's love of cider didn't go unnoticed by those who viewed it as a symptom of American debauchery. Even before the Declaration of Independence had been signed, temperance movements had formed to put the lid on drink. Over the decades, these movements became larger and well organized with many chapters throughout the U.S. As America grew and immigration increased, much of this growth occurred in urban centers with many folks of German origin. Coming from a beer tradition, these immigrants quickly set up breweries in their new homeland. A function of the processes involved, it's easier to produce large quantities of beer in cities than cider. Cider production in America was nearly extinguished with passage of the Volstead Act that brought Prohibition to America in 1919. After the

lifting of Prohibition, cider production remained the something that old farmers like my grandfather and the occasional weekend warrior would undertake.

The re-emergence of cider began with Terry and Judy Maloney in western Massachusetts. Planting a red-fleshed apple of Russian extraction, they created a rose-colored cider and became the first winery in America to specialize in cider. Steve Wood of Poverty Lane Orchards in Lebanon, NH, recognized the limitations of the commercial apple business and, following a trip to England, converted an orchard of New England classic varieties (Mac and Cortland) to English varieties, which can result in ciders with more complex flavors (Farnum Hill Cider). Only in the last handful of years has cider become the "it" new drink (especially amongst millennials). Cyder Market LLC now reports hundreds of cideries.¹⁴

Apples per se suffered a similar contraction. Subsistence farming, horticultural societies, and the likes of Johnny Appleseed had been the wellspring of a huge proliferation of cultivars. While they fulfilled a localized niche, eventually market forces and new technologies began to exert influence. After the Civil War, the pull of vast lands to the West caused many New England subsistence farmers to abandon their land for greener pastures. The production of apples became increasingly difficult as pests and diseases, unknown during Jefferson's time, became commonplace and methods to control them became increasingly expensive. As railroads spread across the Nation, it became easier to transport apples long distances. Apples could be grown in climates highly favorable to some apple varieties, such as Washington State, and shipped by train to eastern markets. As apples became another commodity with larger orchard sizes, farmers looked to standardize production to increase efficiencies. Apple varieties with rich, deep colors, which stored and shipped well, and could be more easily grown, were sought out. The discovery that if apples stored in a room with inert gases instead of oxygen dramatically extended storage further changed the nature of apple farming. It's through these and similar processes that our

¹³ [Apples of New England: A User's Guide](#). Russell Powell. September 2014.

¹⁴ [Current USA Cider Markers Survey](#). Updated July 2017.

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choices for apples were winnowed down to a modest few. In the struggle of the commercial marketplace vs. the Botany of Desire, the marketplace appears to have won this round.

Got to Get Ourselves Back to the Garden?

I'll now take you back to where our story began, in the Tian Shan Mountain Valley in Kazakhstan. As you learned earlier, it's whimsically referred to as the apple's Garden of Eden and that modern science had definitively proved it.

What I didn't share then was that it might not have ever been discovered, at least in time. As the leader of the Soviet Union from the late 1920s through mid-1950s, Stalin was a paranoid of the first order. Suspicious of his people, he ordered a series of purges over the years, including scientists. Failure to conform to a prescribed line of thinking would eventually result in a midnight knock on the door and a ride in a black sedan accompanied by Stalin's goons. If one was "lucky" one would exit emaciated from a Siberian gulag after a few years of mining coal, mining timber, or building railroad. One of those who died in Stalin's gulags was Nikolay Vavilov. A distinguished scientist of the time, Vavilov was a plant breeder and geneticist who collected seeds from all over the world. The vast collections he made and theories developed on the origins of cultivated plants laid the foundation for the future improvement of crop plants and of one of the largest and oldest seed banks in the world even today. Vavilov set up more than 400 research institutes and experimental stations in a few years, the combined staff totaling 20,000 by 1934.¹⁵

It was Vavilov who first concluded that the Tian Shan Valley was the world's cradle of apples. This knowledge might have died with him but for a skinny kid in the region named Aimak Dzangaliev.¹⁶ Inspired by Vavilov's work, Dzangaliev eventually studied under Vavilov in then Leningrad, Russia (now St. Petersburg) until Vavilov was removed to the gulag. Keeping his head down and his mouth shut, Dzangaliev avoided his mentor's fate and quietly continued Vavilov's work for the next half century under communist rule.

With the dissolution of the Soviet Union in the early 1990s, word filtered out about Vavilov and Dzangaliev's work. While it took nearly a couple of decades to definitively prove, there was sufficient certainty of Vavilov's conclusions that horticulturalist Phil Forsline of the USDA Agricultural Research Service (ARS) and plant pathologists Herb Aldwinckle and Jim Cummins traveled to the Tian Shan Valley, eventually collecting more than 130,000 seeds. Seeds were transported to Geneva, NY, where many have been planted at a research farm and lab maintained by the ARS and Cornell University. A very nice article describing the facility and its potential international significance can be found here.¹⁷ As it turns out, these efforts may have been more fortuitous than initially thought. As the post-Soviet economy has improved in Kazakhstan, city dwellers now have more financial resources to build a little get away outside of town, up in the mountains. Known as a dacha in Russian, what better place to build than in a grove, surrounded by lovely fruit trees? Reports are that these groves are disappearing at an alarming rate.

How's Your Crystal Ball?

In a quote attributed to physicist Niels Bohr, he makes an observation that would make Yogi Berra proud – "prediction is very difficult, especially about the future." Does it *really matter* if the biodiversity of Tian

¹⁵ [How Nikolay Vavilov, the seed collector who tried to end famine, died of starvation](#). The Splendid Table. October 2013.

¹⁶ [The Fatherland of Apples](#). Gary Paul Nabhan. Orion Magazine.

¹⁷ [The World of Apples: A Tour of the USDA Apple Collection](#). Robyn Mello. Philadelphia Orchard Project. Oct. 2016.

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Shan's Garden of Eden is protected and that USDA's apple collection in Geneva is maintained, protected, and grown? Are there genes within these trees that can protect future orchards from pests, diseases, and other calamities of various types?

How does a changing climate enter into the mix? After all, apples blossom in the spring as days begin to warm. Predictions are that there will be a good deal more variability in the weather. Will there be increasing instances where warm spring days are followed by a short but deadly-to-apple-blossoms stint of cold weather? This has always happened, of course, but predictions are that weather will be even more variable. Some cultivars of apples (such as some English cider varieties) are known to blossom later in the season. Where does the gene for that come from?

Commercial growers are already engaged in a chemical arms race to keep up with evolving pest and disease resistance (the bacteria that causes fireblight in apples, which is one of the largest sources of fatalities in apple trees, is already exhibiting signs of becoming resistant to the chemicals used to control it). It's been observed that some apple trees in the Tian Shan seem less bothered by pests. Will the tree containing those resistance genes be cut down for a dacha or orchard full of Golden Delicious (the most predominant cultivated apple in the region)?

Your peace of mind depends in part on your faith in science and your tolerance for risk. Science can be a double-edged sword as we know. Some of the very folks who collected apple seeds in the Tian Shan (affiliated with Cornell) have also been involved in the development of apple rootstocks that are resistant to fireblight, accomplishing this feat with transgenic manipulation of genetic material from a silk worm's gut and implanting it in rootstocks. The apple gene mapping project, culminating with the report in 2010 confirming that the Tian Shan is ground zero for apple genetic diversity, is also enabling scientists worldwide to not only engage in transgenic manipulation as was done for fireblight but to alter the genetic code of the apples themselves.¹⁸

A manifestation of this sort of effort is the Arctic apple¹⁹, just being test marketed on store shelves now. By tinkering with the genetic code of Golden Delicious apples, developers have been able to develop an apple that doesn't brown when slices are exposed to air. Expectations within the industry are that Arctic apples will be a commercial success. Want an apple that has a slight hint of banana or pineapple (like a couple of the heritage varieties)? How about an apple that will store a long time?

Does this new industry of genetic manipulation and its ability to produce "designer apples" make notions of local adaptation (as reflected by the thousands of varieties that existed in 19th century America) a quaint but outdated artifice of the past?

Some argue that free market capitalism and technology advances can play an important role in saving biodiversity by reducing cost and convenience barriers to accessing heritage apple varieties.²⁰

In a mass market society, does it matter that the wine or cider you enjoy is the culmination of the grower's skill and the local terroir or is it just as good if a guy in a lab coat creates it?

¹⁸ [Biotechnology and apple breeding in Japan](#). Megumi Igarashi and others. Japanese Society of Breeding. Jan. 2016.

¹⁹ [Why the Arctic Apple means you may be seeing more GMOs at the store](#). Grant Gerlock. West Virginia Public Broadcasting. February 2017.

²⁰ [Heirloom apples: a market taste?](#) Jane S. Shaw. Property and Environment Research Center. June 2001.

Place Your Bet: Which Cider You On?

Everyone can come to their own conclusions on what is “best”, and I’m certainly not qualified to offer advice. While my educational background in forestry, engineering, and an MBA allows me to see many sides of these issues, it doesn’t prepare me well to discern a path forward. I come from conservative Maine Yankee stock – folks who survived by not making too many big, bold moves. It’s said that history can be your guide. I’ll end with two quotes that resonate with me...

“History isn’t just the story of bad people doing bad things. It’s quite as much a story of people trying to do good things. But somehow, something goes wrong.” — C. S. Lewis

“Want of foresight, unwillingness to act when action would be simple and effective, lack of clear thinking, confusion of counsel until the emergency comes, until self-preservation strikes its jarring gong – these are the features which constitute the endless repetition of history.” — Winston Churchill

Resources

[Why are we ‘as American as apple pie’?](#) Kimberly Kohatsu. Huffpost.

[Vegetables and Fruits: A Guide to Heirloom Varieties and Community-Based Stewardship.](#) Compiled by Suzanne P. DeMuth. USDA National Agricultural Library, ARS.

[Apples and more.](#) University of Illinois Extension.

Author’s Note

Now that the reader is well versed in many things apple, we’ll switch gears. I’ll be writing another apple-related article for the Winter 2018 Forest Matters stewardship newsletter. Are you a bit curious about growing one or more apple trees yourself? In an odd way, apple trees can be like getting a new dog. There are more options than you might think, not only in variety. You can just go out and get one, but with a little knowledge you can make better decisions about which one fits you the best and produce the benefits you desire. We’ll also provide some info and resources about how to nurture your new friend when you bring it home in order to increase your odds of enjoying a nice fresh apple off your tree in a few years. If grafting is of interest, we’ll share some resources to get you started there too.

Late Update

A couple of weeks after turning this article into the editor and just prior to final editing and publication, I attended a meeting of apple aficionados and cidermakers from across the United States while on vacation in Maine.²¹ One of the speakers was Dr. Thomas Chao, horticulturalist and curator for plant genetics at the USDA ARS facility in Geneva, NY, mentioned in the article above.²² Dr. Chao shared in his talk that the “Botany of Desire” trees from Kazakhstan were removed a bit more than a year ago. Dr. Chao mentioned the challenge of running out of available space at the facility and the need to make room for additional wild accessions from North America as part of the rationale for their removal. Some of these wild accessions will be stored in an ARS cryogenic facility in Fort Collins, CO.²³ Times change and technology evolves. As a non-horticulturalist or geneticist, it’s hard for me to evaluate the implications of the changes made at Geneva. Then curator of the ARS collection made a compelling argument for maintenance of these biodiversity stocks in 2006.²⁴



*Dudley Winter apple.
(Drawing by John
Bunker, Fedco)*

²¹ [Maine Apple Camp.](#) Todd Little-Siebold. Maine Organic Farmers and Gardeners Association. August 2017.

²² [C. Thomas Chao.](#) USDA ARS.

²³ [Clonal Propagated Crops.](#) USDA ARS. November 2013.

²⁴ [Travels to gather, improve apples start to bear fruit.](#) USDA ARS. January 2006.