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# *Cydonia oblonga:* The Unappreciated Quince

*Joseph Postman*

**The quince of Persia attains a weight of 1.5 kilos (more than 3 pounds), ripens on the tree or in the store, and can be eaten like a soft ripe pear, according to a report in *The Horticulturist, and Journal of Rural Art and Rural Taste* of 1849 (Meech 1908).**

That description hardly fits the quince known in America today, or rather the quince which is hardly known today. During Colonial times a quince tree was a rarity in the gardens of wealthy Americans, but was found in nearly every middle class homestead (Roach 1985). The fruit—always cooked—was an important source of pectin for food preservation, and a fragrant addition to jams, juices, pies, and candies. However, by the early twentieth century quince production declined as the value of apples and pears increased. Today's consumers prefer the immediate gratification provided by sweet, ready-to-eat fruits. After Charles Knox introduced powdered gelatin in the 1890s the use of quince pectin for making jams and jellies declined. U.P. Hedrick lamented in 1922 that "the quince, the 'Golden Apple' of the ancients, once dedicated to deities and looked upon as the emblem of love and happiness, for centuries the favorite pome, is now neglected and the least esteemed of commonly cultivated tree fruits." (Hedrick 1922)

Luther Burbank took credit for transforming this neglected fruit from a commodity that was "altogether inedible before cooking" into a crop he likened to the best apple. He half-jokingly cited a formula to make quince fruits edible prior to his breeding efforts: "Take one quince, one barrel of sugar, and sufficient water…" (Whitson et al. 1914). Burbank released several improved cultivars in the 1890s that he hoped would raise the status of the fruit. Two Burbank cultivars, 'Van Deman' and 'Pineapple', are important commercially in California today, but overall quince fruit production in the United States is so small that it is not even tracked by the USDA National Agricultural Statistics Service (McCabe 1996; USDA 2009b). While underappreciated here, these Burbank quinces have found their way to other parts of the world where they are among the handful of cultivars considered worthy of production (Campbell 2008).

**Burbank's 'Pineapple' quince as seen in a photograph from the 1914 multi-volume publication *Luther Burbank, His Methods and Discoveries and Their Practical Application.***

In 1908, Meech described 12 quince varieties important in the United States at the time, although some

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**The attractive flowers and foliage of quince.**

like 'Orange' (syn. = 'Apple') were as often as not grown from seed rather than propagated as clones. Quince is easily grown from either hardwood or softwood cuttings, and is readily grafted onto another quince rootstock. Although it is an important dwarfing rootstock for pear, quince should not be grafted onto pear roots because this reverse graft is not reliable.

Quince has a very extensive history in the Middle East, and may have even been the fruit of temptation in the story of the Garden of Eden. The ancient Biblical name for quince translates as "Golden Apple" and cultivation of *Cydonia* predates cultivation of *Malus* (apple) in the region once known as Mesopotamia, now Iraq. Juniper and Mabberly (2006) explain how this region is well adapted to cultivation of quince, pomegranate, and other fruits, but Mesopotamia was much too hot and dry for the cultivation of all but the most recently developed low-chilling-requirement apples. Quince was revered in ancient Greece, where a fruit was presented to brides on their wedding day as a symbol of fertility. It was mentioned as an important garden plant in Homer's *Odyssey,* and Pliny the Elder extolled its medicinal properties.

## Botany and Intergeneric Liaisons

*Cydonia oblonga* is a monotypic genus belonging to family Rosaceae, subfamily Spiraeoideae, tribe Pyreae, and subtribe Pyrinae (USDA 2009a). It grows as a multi-stemmed shrub or small tree and has pubescent to tomentose buds, petioles, leaves, and fruit. Leaves are ovate to oblong, about 2 inches (5 centimeters) across and 4 inches (10 centimeters) long. The solitary white flowers are 1½ to 2 inches (4 to 5 centimeters) across, have 5 petals, 20 or more stamens, 5 styles, an inferior ovary with many ovules, and are borne on current season growth. Bloom time overlaps with that of apples, usually beginning mid April in the central latitudes of the northern hemisphere. The fruit is a fragrant, many-seeded pome about 3 inches (8 centimeters) in diameter. Shape ranges from round to pear-like, flesh is yellow, and the Baileys refer to it as "hard and rather unpalatable" (Bailey and Bailey 1976; Rehder 1986). Fruit size

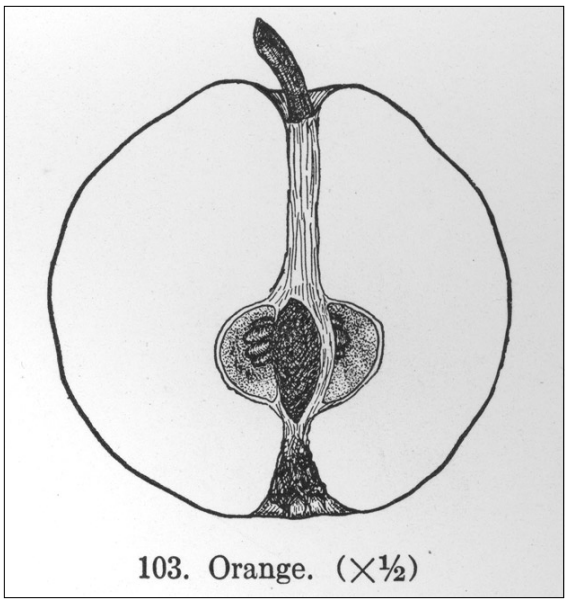


**Illustration of 'Orange' quince from U.P. Hedricks 1922 *Cyclopedia of Hardy Fruits.***

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**A *Pyronia* fruit—from a cross of *Pyrus pyrifolia* (Japanese pear) and *Cydonia oblonga*—growing in the USDA genebank orchard.**

and leaf size of cultivated varieties can be many times larger than the wild type described above. All varieties are self-pollinating.

Intergeneric crossing is fairly rare in plants, but has occurred naturally on occasion in the Rosaceae. While not as promiscuous as its cousins *Sorbus* and *Mespilus, Cydonia* has had a number of encounters with related genera that resulted in intergeneric offspring. In 1913 a Mr. Veitch in London sent scions of a quince-pear hybrid to Louis Trabut, the Algerian botanist. Trabut proposed the name *Pyronia veitchii* for this curious seedless-fruited hybrid (Trabut 1916). *Pyronia* is little known today, except by fruit tree pathologists who use the virus-sensitive clone as a graft-inoculated indicator to detect virus diseases in pome fruits. Another more recent hybrid generated in Japan between *Cydonia* and the Japanese pear, *Pyrus pyrifolia,* was probably the product of embryo rescue, a controlled tissue culture technique. In Italy and the Czech Republic, a purported hybrid between quince and apple (*Cydomalus*) has been touted as a possible rootstock for both apples and pears (Wertheim 2002).

## Center of Origin

*Cydonia* is native to western Asia, and the center of origin is considered to be the Trans-Caucasus region including Armenia, Azerbaijan, Iran, southwestern Russia, and Turkmenistan (USDA 2009a). During ancient times, quince spread from its wild center of origin to the countries bordering the Himalaya Mountains to the east, and throughout Europe to the west. It has many uses and traditions associated with it throughout this broad range. Several recent USDA funded plant collecting expeditions to Armenia, Georgia, and Azerbaijan returned with quince seeds and cuttings from these countries. The availability of *Cydonia* germplasm in the United States increased significantly from 2002 to 2006 as a result of these collections (McGinnis 2007).

## Cultivation for Fruit and Rootstock Production

Worldwide, there are about 106,000 acres (43,000 hectares) of quince in production with a total crop of 335,000 metric tons. Turkey is the largest producer with about 25% of world production. China, Iran, Argentina, and Morocco each produce less than 10%. The United States is a very minor player in quince fruit production with only about 250 acres (about 100 hectares) planted, mainly in California's San Joaquin Valley. Burbank's 'Pineapple' is the most widely grown cultivar in that state and is said to be more flavorful than 'Smyrna' (McCabe 1996).

Quince fruit has a number of culinary uses. *Dulce de membrillo,* or quince paste, is popular in several European countries, particularly Spain. It is also much appreciated in parts of

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**Dr. Vagharshak Hayrapetyan, head of the Scientific Center for Viticulture, Fruit Growing, and Winemaking in Yerevan, Armenia, poses with the winter quince variety 'Chartar Gyugh' in September, 2006. Scions of this heirloom quince cultivar were recently brought to the United States.**

Latin America. This sweet, fragrant, jellylike confection is cut into slices and often served with a heady cheese. Quince is also served poached in either water or wine, and when so prepared develops a rich aroma and deep caramel-red color. In Armenia, quince is used in many savory as well as sweet dishes, and is often cooked with lamb (Ghazarian 2009). Quince fruit is also used by some home brewers to make very fine hard ciders.

While quince is still grown for its fruit in some parts of the world, in England, France, and the United States it is primarily grown for use as a dwarfing pear rootstock. In the region around Angers, France, quince has been used as a pear rootstock since before 1500. The French were growing quince plants from cuttings and layering in stool beds by the early 1600s and France became an important source of rootstocks around the world. Quince rootstocks grown near Angers were known as 'Angers Quince' and those propagated near Fontenay were known as 'Fontenay Quince' (Roach 1985; Tukey 1964). Confusion arose about the identities of various quince rootstocks, and in the early 1900s researchers at East Malling in England collected rootstocks from a number of nurseries and designated clones with letters of the alphabet. Quince rootstock clones now available in the United States include Quince A and Quince C, which came from East Malling–Long Ashton (EMLA); and Provence Quince (= Quince BA 29-C) from France. A pear tree grafted onto Quince A will be about half the size of a tree grafted onto pear seedling rootstock. The tree will also be more precocious and fruit size will be larger. Quince C produces a tree slightly smaller and more precocious still. Provence Quince rootstock produces a pear tree slightly larger than Quince A or C. Some pear varieties are not graft compatible with quince and require a compatible interstem pear variety such as 'Comice', 'Old Home', or 'Beurre Hardy' as a bridge.

### Landscape Use

Few small trees rival the quince in becoming interestingly gnarled and twisted with age. Nonetheless, renowned Arnold Arboretum horticul-

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**These bowls of quince show the diversity of shapes found in quince fruit.**

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**This young quince tree, growing in the genebank orchard at USDA-ARS, Corvallis, Oregon, has been pruned to open up the crown and remove basal suckers.**

turist Donald Wyman (Wyman 1965) did not consider *Cydonia* worthy of his list of recommended landscape trees. He relegated it to his secondary list because of inferior flower interest, poor growth habit, and pest problems. However, *Cydonia* is an essential component of many historic gardens, and Frederic Olmstead included the common quince as a valuable plant in some of his landscapes (Deitz 1995).

As a young tree, *Cydonia* may sucker profusely, and it takes some pruning effort during the first few years to establish an open-crowned specimen tree rather than a small thicket. Quince is such an interesting plant that it's worth the pruning effort, and germplasm recently imported from other parts of the world may provide some relief from pest and climate challenges that limited its use in the past.

### Potential for Genetic Improvement

Quince is adapted to hot, dry climates and to acid soils. Under favorable conditions, ripe fruit can become quite fragrant, juicy, and flavorful. When grown in high pH soils, however, trees can become stunted and suffer iron chlorosis. In northern latitudes or colder climates the fruit of many cultivars does not fully ripen prior to the onset of winter, and in places where it rains during the ripening season, fruit cracking can be a big problem. Although most commercial quince production today is located in very warm areas, one of the largest quince orchards in 1895 was a 60 acre (24 hectare) planting in upstate New York near Waterport (Brown's Berry Patch 2007).

Whether grown for fruit production or for use as a pear rootstock, quince is impacted by several disease problems. Fire blight caused by the bacterium *Erwinia amylovora* limits the cultivation of quince either for its fruit or as a pear rootstock, especially in regions with warm, humid summers. The genus *Cydonia* is one of the most susceptible to fire blight in Rosaceae, the plant family which includes many susceptible hosts (Postman 2008). Leaf and fruit spot caused by *Fabraea maculata* (anamorph = *Entomosporium mespili*) can result in tree defoliation and production of disfigured, unmarketable fruit if not controlled. Powdery mildew and rust diseases also impact quince production.

Genetic improvements needed for expanding the use of quince as a dwarfing pear rootstock include increased resistance to fire blight for warm and humid summer climates, and increased winter cold-hardiness for northern climates. Adaptation to alkaline soils will allow quince production to expand to more diverse

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**The Turkish cultivar 'Harron' has the largest fruit size of the hundred or so quince clones growing at the USDA genebank, but the fruit may crack badly when exposed to rain just before it is ripe.**

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**A young boy in Georgia's northeast province of Kakheti displays quince fruit from a tree in the village of Shilda. Scions of the Shilda quince were collected by ARS genebank curators Joseph Postman and Ed Stover during a 2006 expedition to the Caucasus region. A tree is growing in quarantine at Beltsville, Maryland, and will be sent to the USDA-ARS genebank in Oregon upon release**

soil conditions both as a rootstock for pear or for production of quince fruit. Very slight progress in soil adaptation was achieved by selecting somoclonal variants of rootstock clone Quince A following multiple generations of in vitro culture on high pH media (Bunnag et al. 1996). Quince for fruit production will benefit from earlier ripening, and elimination of summer "rat-tail" blooms, which predispose a tree to attack by fire blight. Fruits that are picked too green will never ripen properly (McCabe 1996). Resistance to the fungal rusts and mildews will allow quince to be produced with fewer pesticide applications.

## Available Germplasm

A quince germplasm collection was established in Izmir, Turkey, beginning in 1964 that includes many regionally developed fruit cultivars and landraces (Sykes 1972). In Karaj, Iran, a collection of more than 50 *Cydonia* accessions are maintained, including both cultivated and wild types (Amiri 2008). Smaller quince collections are growing in Italy, Greece, Spain, and other European countries (Bellini and Giordani 1999). There are also significant collections in Ukraine and southwest Russia. A large fruit tree collection in Kara Kala, Turkmenistan, was once a part of the Vavilov Institutes during Soviet times. Many fruit tree accessions, including quince, were rescued from that station in the late 1990s and brought to other genebanks for safekeeping.

More than a dozen quince accessions from Kara Kala, representing both wild types and fruiting cultivars, are growing at the USDA genebank in Oregon. The Oregon facility is one of several ex situ genebanks housing temperate fruit and nut collections for the USDA National Plant Germplasm System (NPGS) (Postman et al. 2006). The NPGS *Cydonia* collection includes more than 100 clones with origins from 15 countries maintained as self-rooted trees in a field collection (Postman 2008). About half of this collection represents cultivars for fruit production, and the other half are pear rootstock selections, wild types, and seedlings. Observations made at the genebank have revealed a wide diversity of genotypes, some with resistance to *Fabraea* leaf and fruit spot, and a range of ripening seasons that may make it possible to produce quince fruit in short-season production areas. Quince selections made in Bulgaria following a fire blight epidemic in that country have shown good field resistance to the disease, and some of this Bulgarian germplasm was recently introduced into the United States by the NPGS genebank.

For nearly a century, the quince has been almost ignored for fruit production in North America, while many improvements have been made in the Middle East and central Asia. Germplasm is now available in the United States for expanding the use of *Cydonia* both as a rootstock for pear and as a fruit producing tree in its own right. As Luther Burbank concluded a hundred years ago, "The quince of today is, indeed, a half wild product that has waited long for its opportunity. It remains for the fruit growers of tomorrow … to see that the possibilities of this unique fruit are realized" (Wickson et al. 1914).

## The Chinese Quince: *Pseudocydonia sinensis*

This Chinese relative of *Cydonia* presently belongs to the genus *Pseudocydonia,* but has previously been assigned to both *Chaenomeles* (*Chaenomeles sinensis*) and *Cydonia* (*Cydonia sinensis*). Chinese quince has attractive single pink flowers that appear earlier than those of *Cydonia* but not as early as most *Chaenomeles.* The fruit is a large, oval, aromatic yellow pome that ripens in the fall. The shiny, leathery leaves develop nice red-orange fall color. But its most interesting characteristic is the exfoliating bark that reveals brown, green, orange, and gray patches. Chinese quince's attractive bark rivals that of many stewartias. The trunk often becomes fluted with age, adding even more textural appeal.

Luther Burbank devoted some attention to the Asian quinces and was probably responsible for a large-fruited clone of *Pseudocydonia.* Michael Dirr (1997) notes that Chinese quince is reliably hardy in USDA Zones 6 to 7 (average annual minimum temperatures -10 to 10°F [-23 to -12°C]), and possibly hardy in Zone 5 (-20 to -10°F [-29 to -23°C]). Fire blight is said to seriously impact its cultivation. However, the presence of very nice specimens of Chinese quince at the National Arboretum in Washington, D.C., and in gardens in the Carolinas—locations where *Cydonia* is readily killed by fire blight—indicate that it can be grown even in regions where the disease is present.

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COURTESY OF KENPEI

**Chinese quince's pink flowers, attractive patchwork bark, and fluted trunk are highly ornamental.**

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Information about quince genetic resources in the USDA National Plant Germplasm System, as well as a field day on October 10, 2009 featuring the Corvallis genebank's quince orchard, is available at http://www.ars.usda.gov/pwa/corvallis/ncgr. A one day symposium on underutilized pome fruits will be held in August, 2010 during the 28th International Horticulture Conference in Lisboa, Portugal. For more information visit the 'Symposia' link at http://www.ihc2010.org/