

Cranberry

Cranberries are a group of evergreen dwarf shrubs or trailing vines in the subgenus *Oxycoccus* of the genus *Vaccinium*. In Britain, cranberry may refer to the native species *Vaccinium oxycoccos*,^[1] while in North America, cranberry may refer to *Vaccinium macrocarpon*.^[2] *Vaccinium oxycoccos* is cultivated in central and northern Europe, while *Vaccinium macrocarpon* is cultivated throughout the northern United States, Canada and Chile.^[3] In some methods of classification, *Oxycoccus* is regarded as a genus in its own right.^[4] They can be found in acidic bogs throughout the cooler regions of the Northern Hemisphere.

Cranberries are low, creeping shrubs or vines up to 2 meters (7 ft) long and 5 to 20 centimeters (2 to 8 in) in height;^[5] they have slender, wiry stems that are not thickly woody and have small evergreen leaves. The flowers are dark pink, with very distinct *reflexed* petals, leaving the style and stamens fully exposed and pointing forward. They are pollinated by bees. The fruit is a berry that is larger than the leaves of the plant; it is initially light green, turning red when ripe. It is edible, but with an acidic taste that usually overwhelms its sweetness.

In 2020, the United States, Canada, and Chile accounted for 97% of the world production of cranberries. Most cranberries are processed into products such as juice, sauce, jam, and sweetened dried cranberries, with the remainder sold fresh to consumers. Cranberry sauce is a traditional accompaniment to turkey at Christmas and Thanksgiving dinners in the United States and Canada, and at Christmas dinner in the United Kingdom.^[6]

Contents

Species and description

Subgenus *Oxycoccus*

Subgenus *Oxycoccus*, sect. *Oxycoccoides*

Etymology

History

Cultivation

Geography and bog method

Propagation

Ripening and harvest

Diseases

Cranberries



Cranberry bush with fruit partially submerged

Scientific classification  ✎

Kingdom:	<u>Plantae</u>
<i>Clade</i> :	<u>Tracheophytes</u>
<i>Clade</i> :	<u>Angiosperms</u>
<i>Clade</i> :	<u>Eudicots</u>
<i>Clade</i> :	<u>Asterids</u>
Order:	<u>Ericales</u>
Family:	<u>Ericaceae</u>
Genus:	<u><i>Vaccinium</i></u>
Subgenus:	<u><i>Vaccinium</i> subg. <i>Oxycoccus</i></u> (Hill) A.Gray

Species

Vaccinium erythrocarpum
Vaccinium macrocarpon
Vaccinium microcarpum
Vaccinium oxycoccos

Production

Food uses

Products

Nutrition

Research

Urinary tract infections

Phytochemicals

Extract quality

Possible safety concerns

Marketing and economics

United States

Cranberry Marketing Committee

International trade

References

External links



Approximate ranges of the cranberries in sect. *Oxycoccus*: Red: common cranberry. Orange: small cranberry. Green: American cranberry.



Raw cranberries



Cranberry harvest, Kingston Massachusetts

Species and description

Cranberries are related to [bilberries](#), [blueberries](#), and [huckleberries](#), all in *Vaccinium* subgenus *Vaccinium*. These differ in having bell-shaped flowers, the petals not being reflexed, and woodier stems, forming taller shrubs. There are 3-4 species of cranberry, classified by *subgenus*:^[7]

Subgenus *Oxycoccus*

- *Vaccinium oxycoccus* or *Oxycoccus palustris* (common cranberry, northern cranberry or cranberry) is widespread throughout the cool temperate Northern Hemisphere, including northern Europe, northern Asia, and northern North America. It has small 5–10 mm ($\frac{1}{4}$ – $\frac{3}{8}$ in) leaves, with an inrolled margin. The flowers are dark pink, with a purple central spike, produced on finely hairy stalks. The fruit is a small pale pink to red [berry](#), with a refreshing sharp acidic flavor.
- *Vaccinium microcarpum* or *Oxycoccus microcarpus* (small cranberry) occurs in northern North America,^[8] northern Europe and northern Asia. It is highly similar to *V. oxycoccus*, differing in the leaves being more triangular, and the flower stems hairless; additionally, their stems can also be smaller and produce a smaller number of flowers than *V. oxycoccus*. They also differ in the fact that their leaves can be smaller in size, even though the main difference is their triangular shape.^[9] Some botanists include it within *V. oxycoccus*.
- *Vaccinium macrocarpon* or *Oxycoccus macrocarpus* (large cranberry, American cranberry, bearberry) native to northern North America across Canada, and eastern United States, south to North Carolina at high altitudes). It differs from *V. oxycoccus* in the leaves being larger, 10–20 mm ($\frac{3}{8}$ – $\frac{3}{4}$ in) long, and flat, and in the slightly apple-like taste of the berries.

Subgenus *Oxycoccus*, sect. *Oxycoccoides*

- *Vaccinium erythrocarpum* or *Oxycoccus erythrocarpus* (southern mountain cranberry) native to southeastern North America at high altitudes in the southern Appalachian Mountains, and also in eastern Asia.^[10]

Etymology

The name *cranberry* derives from the German *kraanbere* (English translation, *craneberry*), first named as *cranberry* in English by the missionary John Eliot in 1647.^[11] Around 1694, German and Dutch colonists in New England used the word, *cranberry*, to represent the expanding flower, stem, calyx, and petals resembling the neck, head, and bill of a crane.^{[12][13]} The traditional English name for the plant more common in Europe, *Vaccinium oxycoccus*, **fenberry**, originated from plants with small red berries found growing in fen (marsh) lands of England.^[12]



Vaccinium oxycoccus flowers

History

In North America, the Narragansett people of the Algonquian nation in the regions of New England appeared to be using cranberries in pemmican for food and for dye.^[13] Calling the red berries, *sasemineash*, the Narragansett people may have introduced cranberries to colonists in Massachusetts.^[13] In 1550, James White Norwood made reference to Native Americans using cranberries, and it was the first reference to American cranberries up until this point.^[14] In James Rosier's book *The Land of Virginia* there is an account of Europeans coming ashore and being met with Native Americans bearing bark cups full of cranberries. In Plymouth, Massachusetts, there is a 1633 account of the husband of Mary Ring auctioning her cranberry-dyed petticoat for 16 shillings. In 1643, Roger Williams's book *A Key Into the Language of America* described cranberries, referring to them as "bearberries" because bears ate them. In 1648, preacher John Elliott was quoted in Thomas Shepard's book *Clear Sunshine of the Gospel* with an account of the difficulties the Pilgrims were having in using the Indians to harvest cranberries as they preferred to hunt and fish. In 1663, the Pilgrim cookbook appears with a recipe for cranberry sauce. In 1667, New Englanders sent to King Charles ten barrels of cranberries, three barrels of codfish and some Indian corn as a means of appeasement for his anger over their local coining of the pine tree shilling minted by John Hull in the "Hull Mint" with Daniel Quincy. In 1669, Captain Richard Cobb had a banquet in his house (to celebrate both his marriage to Mary Gorham and his election to the Convention of Assistance), serving wild turkey with sauce made from wild cranberries. In the 1672 book *New England Rarities Discovered* author John Josselyn described cranberries, writing:



The Cranberry Harvest on the Island of Nantucket, Eastman Johnson, 1880.

Sauce for the Pilgrims, cranberry or bearberry, is a small trayling [*sic*] plant that grows in salt marshes that are overgrown with moss. The berries are of a pale yellow color, afterwards red, as big as a cherry, some perfectly round, others oval, all of them hollow with sower [*sic*] astringent taste; they are ripe in August and September. They are excellent against the Scurvy. They are also good to allay the fervor of hoof diseases. The Indians and English use them mush, boyling [*sic*] them with sugar for sauce to eat with their meat; and it is a delicate sauce, especially with roasted mutton. Some make tarts with them as with gooseberries.

The Compleat Cook's Guide, published in 1683, made reference to cranberry juice. In 1703, cranberries were served at the Harvard University commencement dinner. In 1787, James Madison wrote Thomas Jefferson in France for background information on constitutional government to use at the Constitutional Convention. Jefferson sent back a number of books on the subject and in return asked for a gift of apples, pecans and cranberries. William Aiton, a Scottish botanist, included an entry for the cranberry in volume II of his 1789 work *Hortus Kewensis*. He notes that *Vaccinium macrocarpon* (American cranberry) was cultivated by James Gordon in 1760. In 1796, cranberries were served at the first celebration of the landing of the Pilgrims, and Amelia Simmons (an American orphan) wrote a book entitled *American Cookery* which contained a recipe for cranberry tarts.

American Revolutionary War veteran Henry Hall first cultivated cranberries in the Cape Cod town of Dennis around 1816.^[13] In the 1820s, Hall was shipping cranberries to New York City and Boston from which shipments were also sent to Europe.^[13] In 1843, Eli Howes planted his own crop of cranberries on Cape Cod, using the "Howes" variety. In 1847, Cyrus Cahoon planted a crop of "Early Black" variety near Pleasant Lake, Harwich, Massachusetts.

By 1900, 21,500 acres (8,700 ha) were under cultivation in the New England region.^[13] In 2021, the total output of cranberries harvested in the United States was 790 million lbs (359 million kg), with Wisconsin as the largest state producer (59% of total), followed by Massachusetts and Oregon.^[15]

Cultivation

Geography and bog method

Historically, cranberry beds were constructed in wetlands. Today's cranberry beds are constructed in upland areas with a shallow water table. The topsoil is scraped off to form dykes around the bed perimeter. Clean sand is hauled in and spread to a depth of four to eight inches (10 to 20 centimeters). The surface is laser leveled flat to provide even drainage. Beds are frequently drained with socked tile in addition to the perimeter ditch. In addition to making it possible to hold water, the dykes allow equipment to service the beds without driving on the vines. Irrigation equipment is installed in the bed to provide irrigation for vine growth and for spring and autumn frost protection.



Cranberry harvest in New Jersey

A common misconception about cranberry production is that the beds remain flooded throughout the year. During the growing season cranberry beds are not flooded, but are irrigated regularly to maintain soil moisture. Beds are flooded in the autumn to facilitate harvest and again during the winter to protect against low temperatures.^[16] In cold climates like Wisconsin, New England, and eastern Canada, the winter flood typically freezes into ice, while in warmer climates the water remains liquid. When ice forms on the beds, trucks can be driven onto the ice to spread a thin layer of sand to control pests and rejuvenate the vines. Sanding is done every three to five years.

Propagation

Cranberry vines are propagated by moving vines from an established bed. The vines are spread on the surface of the sand of the new bed and pushed into the sand with a blunt disk. The vines are watered frequently during the first few weeks until roots form and new shoots grow. Beds are given frequent, light

application of nitrogen fertilizer during the first year.^[17] The cost of renovating cranberry beds is estimated to be between \$30,000 and \$50,000 per acre (\$74,000 and \$124,000 per hectare).^[18]

Ripening and harvest



Arthur Rothstein, *Child Labor, Cranberry Bog*, 1939. Brooklyn Museum

Cranberries are harvested in the fall when the fruit takes on its distinctive deep red color, and most ideally after the first frost.^[19] Berries that receive sun turn a deep red when fully ripe, while those that do not fully mature are a pale pink or white color. This is usually in September through the first part of November. To harvest cranberries, the beds are flooded with six to eight inches (15 to 20 centimeters) of water above the vines. A harvester is driven through the beds to remove the fruit from the vines. For the past 50 years, water reel type harvesters have been used. Harvested cranberries float in the water and can be corralled into a corner of the bed and conveyed or pumped from the bed. From the farm, cranberries are taken to receiving stations where they are cleaned, sorted, and stored prior to packaging or processing. While cranberries are harvested when they take



Cranberry harvest (wet-picking)

on their deep red color, they can also be harvested beforehand when they are still white, which is how white cranberry juice is made.^[20] Yields are lower on beds harvested early and the early flooding tends to damage vines, but not severely. Vines can also be trained through dry picking to help avoid damage in subsequent harvests.^[21]

Although most cranberries are wet-picked as described above, 5–10% of the US crop is still dry-picked. This entails higher labor costs and lower yield, but dry-picked berries are less bruised and can be sold as fresh fruit instead of having to be immediately frozen or processed. Originally performed with two-handed comb scoops, dry picking is today accomplished by motorized, walk-behind harvesters which must be small enough to traverse beds without damaging the vines.

Cranberries for fresh market are stored in shallow bins or boxes with perforated or slatted bottoms, which deter decay by allowing air to circulate. Because harvest occurs in late autumn, cranberries for fresh market are frequently stored in thick walled barns without mechanical refrigeration. Temperatures are regulated by opening and closing vents in the barn as needed. Cranberries destined for processing are usually frozen in bulk containers shortly after arriving at a receiving station.

Diseases

Diseases of cranberry include:

- Cranberry fruit rot
- Cranberry root rot

Production

In 2020, world production of cranberry was 663,345 tonnes, mainly by the United States, Canada, and Chile, which collectively accounted for 97% of the global total (table).^[22] Wisconsin (59% of US production) and Quebec (60% of Canadian production) were the two largest regional producers of cranberries in North America.^{[15][23]} Cranberries are also a major commercial crop in Massachusetts, New Jersey, Oregon, and Washington,^{[15][24]} as well as in the Canadian province of British Columbia (33% of Canadian production).^[23]

Cranberry production – 2020

Country	Production (tonnes)
 United States	355,163
 Canada	161,903
 Chile	128,054
World	663,345
Source: FAOSTAT of the United Nations ^[22]	

Food uses

Products



Dried cranberries

As fresh cranberries are hard, sour, and bitter, about 95% of cranberries are processed and used to make cranberry juice and sauce. They are also sold dried and sweetened.^{[25][26]} Cranberry juice is usually sweetened or blended with other fruit juices to reduce its natural tartness. At one teaspoon of sugar per ounce, cranberry juice cocktail is more highly sweetened than even soda drinks that have been linked to obesity.^[27]

Usually cranberries as fruit are cooked into a compote or jelly, known as cranberry sauce. Such preparations are traditionally served with roast turkey, as a staple of Thanksgiving (both in Canada and in the United States) as well as English dinners. The berry is also used in baking (muffins, scones, cakes and breads). In baking it is often combined with orange or orange zest. Less commonly, cranberries are used to add tartness to savory dishes such as soups and stews.^[25]

Fresh cranberries can be frozen at home, and will keep up to nine months; they can be used directly in recipes without thawing.^[26]

There are several alcoholic cocktails, including the Cosmopolitan, that include cranberry juice.

Nutrition

Raw cranberries are 87% water, 12% carbohydrates, and contain negligible protein and fat (table). In a 100 gram reference amount, raw cranberries supply 46 calories and moderate levels of vitamin C, dietary fiber, and the essential dietary mineral manganese, each with more than 10% of its Daily Value. Other micronutrients have low content (table).

Cranberries, raw

Nutritional value per 100 g (3.5 oz)		
Energy	46 kcal (190 kJ)	
Carbohydrates	12 g	
Sugars	4.3 g	
Dietary fiber	3.6 g	
Fat	0.1 g	
Protein	0.5 g	
Vitamins	Quantity	%DV[†]
Thiamine (B ₁)	0.012 mg	1%
Riboflavin (B ₂)	0.02 mg	2%
Niacin (B ₃)	0.101 mg	1%

Dried cranberries are commonly processed with up to 10 times their natural sugar content.^[28] The drying process also eliminates vitamin C content.^[28]

<u>Pantothenic acid (B₅)</u>	0.295 mg	6%
<u>Vitamin B₆</u>	0.057 mg	4%
<u>Folate (B₉)</u>	1 µg	0%
<u>Vitamin C</u>	14 mg	17%
<u>Vitamin E</u>	1.3 mg	9%
<u>Vitamin K</u>	5 µg	5%

Research

Urinary tract infections

A comprehensive review in 2012 of available research concluded there is no evidence that cranberry juice or cranberry extract as tablets or capsules are effective in preventing urinary tract infections (UTIs).^[29] The European Food Safety Authority reviewed the evidence for one brand of cranberry extract and concluded a cause and effect relationship had not been established between cranberry consumption and reduced risk of UTIs.^[30]

One 2017 systematic review showed that consuming cranberry

products reduced the incidence of UTIs in women with recurrent infections.^[31] Another review of small clinical studies indicated that consuming cranberry products could reduce the risk of UTIs by 26% in otherwise healthy women, although the authors indicated that larger studies were needed to confirm such an effect.^[32]

A 2021 systematic review found that there was insufficient evidence for or against using cranberry products to treat an acute UTI.^[33]

When the quality of meta-analyses on the efficacy of consuming cranberry products for preventing or treating UTIs is examined, large variation and uncertainty of effect are seen, resulting from inconsistencies of clinical research design and inadequate numbers of subjects.^[34]

Phytochemicals

Raw cranberries, cranberry juice and cranberry extracts are a source of polyphenols – including proanthocyanidins, flavonols^[35] and quercetin.^{[36][37]} These phytochemical compounds are being studied in vivo and in vitro for possible effects on the cardiovascular system, immune system and cancer.^{[29][38][39]} However, there is no confirmation from human studies that consuming cranberry polyphenols provides anti-cancer, immune, or cardiovascular benefits.^{[29][39]} Potential is limited by poor absorption and rapid excretion.^[38]

<u>Minerals</u>	<u>Quantity</u>	<u>%DV[†]</u>
<u>Calcium</u>	8 mg	1%
<u>Iron</u>	0.2 mg	2%
<u>Magnesium</u>	6 mg	2%
<u>Manganese</u>	0.36 mg	17%
<u>Phosphorus</u>	11 mg	2%
<u>Potassium</u>	80 mg	2%
<u>Sodium</u>	2 mg	0%
<u>Zinc</u>	0.1 mg	1%

<u>Other constituents</u>	<u>Quantity</u>
<u>Water</u>	87 g

[Link to USDA Database entry \(https://fdc.nal.usda.gov/fdc-app.html#/food-details/1102706/nutrients\)](https://fdc.nal.usda.gov/fdc-app.html#/food-details/1102706/nutrients)

Units

µg = micrograms • mg = milligrams

IU = International units

[†]Percentages are roughly approximated using US recommendations for adults.

Source: USDA FoodData Central (<https://fdc.nal.usda.gov/index.html>)

Cranberry juice contains a high molecular weight non-dializable material that is under research for its potential to affect formation of plaque by Streptococcus mutans pathogens that cause tooth decay.^{[40][41]} Cranberry juice components are also being studied for possible effects on kidney stone formation.^{[39][42][43]}

Extract quality

Problems may arise with the lack of validation for quantifying of A-type proanthocyanidins (PAC) extracted from cranberries. For instance, PAC extract quality and content can be performed using different methods including the European Pharmacopoeia method, liquid chromatography–mass spectrometry,^[44] or a modified 4-dimethylaminocinnamaldehyde colorimetric method.^[45] Variations in extract analysis can lead to difficulties in assessing the quality of PAC extracts from different cranberry starting material, such as by regional origin, ripeness at time of harvest and post-harvest processing. Assessments show that quality varies greatly from one commercial PAC extract product to another.^[46]

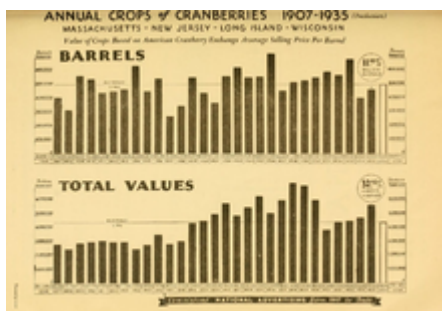
Possible safety concerns

The anticoagulant effects of warfarin may be increased by consuming cranberry juice, resulting in adverse effects such as increased incidence of bleeding and bruising.^{[39][47]} Other safety concerns from consuming large quantities of cranberry juice or using cranberry supplements include potential for nausea, and increasing stomach inflammation, sugar intake or kidney stone formation.^[39]

Marketing and economics

United States

Cranberry sales in the United States have traditionally been associated with holidays of Thanksgiving and Christmas.



Annual U.S. crops of cranberries, 1907 to 1935

In the U.S., large-scale cranberry cultivation has been developed as opposed to other countries. American cranberry growers have a long history of cooperative marketing. As early as 1904, John Gaynor, a Wisconsin grower, and A.U. Chaney, a fruit broker from Des Moines, Iowa, organized Wisconsin growers into a cooperative called the Wisconsin Cranberry Sales Company to receive a uniform price from buyers. Growers in New Jersey and Massachusetts were also organized into cooperatives, creating the National Fruit Exchange that marketed fruit under the Eatmor brand. The success of cooperative marketing almost led to its failure. With consistent and high prices, area and production doubled between 1903 and 1917 and prices fell.

With surplus cranberries and changing American households some enterprising growers began canning cranberries that were below-grade for fresh market. Competition between canners was fierce because profits were thin. The Ocean Spray cooperative was established in 1930 through a merger of three primary processing companies: Ocean Spray Preserving company, Makepeace Preserving Co, and Cranberry Products Co. The new company was called Cranberry Canners, Inc. and used the Ocean Spray label on their products. Since the new company represented over 90% of the market, it would have been illegal

under American antitrust laws had attorney John Quarles not found an exemption for agricultural cooperatives. As of 2006, about 65% of the North American industry belongs to the Ocean Spray cooperative.^[48]

In 1958, Morris April Brothers—who produced Eatmor brand cranberry sauce in Tuckahoe, New Jersey—brought an action against Ocean Spray for violation of the Sherman Antitrust Act and won \$200,000 in real damages plus triple damages, just in time for the Great Cranberry Scare: on 9 November 1959, Secretary of the United States Department of Health, Education, and Welfare Arthur S. Flemming announced that some of the 1959 cranberry crop was tainted with traces of the herbicide aminotriazole. The market for cranberries collapsed and growers lost millions of dollars.^[25] However, the scare taught the industry that they could not be completely dependent on the holiday market for their products; they had to find year-round markets for their fruit. They also had to be exceedingly careful about their use of pesticides. After the aminotriazole scare, Ocean Spray reorganized and spent substantial sums on product development. New products such as cranberry-apple juice blends were introduced, followed by other juice blends.

Prices and production increased steadily during the 1980s and 1990s. Prices peaked at about \$65.00 per barrel (\$0.65/lb or \$1.43/kg)—a cranberry barrel equals 100 pounds or 45.4 kilograms—in 1996 then fell to \$18.00 per barrel (\$0.18/lb or \$0.40/kg) in 2001. The cause for the precipitous drop was classic oversupply. Production had outpaced consumption leading to substantial inventory in freezers or as concentrate.

Cranberry handlers (processors) include Ocean Spray, Cliffstar Corporation, Northland Cranberries Inc. (Sun Northland LLC), Clement Pappas & Co., and Decas Cranberry Products as well as a number of small handlers and processors.^[49]

Cranberry Marketing Committee

The Cranberry Marketing Committee is an organization that was established in 1962 as a Federal Marketing Order to ensure a stable, orderly supply of good quality product.^[50] The order has been renewed and modified slightly over the years. The market order has been invoked during six crop years: 1962 (12%), 1963 (5%), 1970 (10%), 1971 (12%), 2000 (15%), and 2001 (35%). Even though supply still exceeds demand, there is little will to invoke the Federal Marketing Order out of the realization that any pullback in supply by U.S. growers would easily be filled by Canadian production.

The Cranberry Marketing Committee, based in Wareham, Massachusetts, represents more than 1,100 cranberry growers and 60 cranberry handlers across Massachusetts, Rhode Island, Connecticut, New Jersey, Wisconsin, Michigan, Minnesota, Oregon, Washington and New York (Long Island). The authority for the actions taken by the Cranberry Marketing Committee is provided in Chapter IX, Title 7, Code of Federal Regulations which is called the Federal Cranberry Marketing Order. The Order is part of the Agricultural Marketing Agreement Act of 1937, identifying cranberries as a commodity good that can be regulated by Congress. The Federal Cranberry Marketing Order has been altered over the years to expand the Cranberry Marketing Committee's ability to develop projects in the United States and around the world. The Cranberry Marketing Committee currently runs promotional programs in the United States, China, India, Mexico, Pan-Europe, and South Korea.

International trade

As of 2016, the European Union was the largest importer of American cranberries, followed individually by Canada, China, Mexico, and South Korea.^[51] From 2013 to 2017, U.S. cranberry exports to China grew exponentially, making China the second largest country importer, reaching \$36 million in cranberry

products.^[52] The China–United States trade war resulted in many Chinese businesses cutting off ties with their U.S. cranberry suppliers.^[53]

References

Notes

1. Stace, Clive (2010), *New Flora of the British Isles* (3rd ed.), Cambridge, UK: Cambridge University Press, p. 512, ISBN 978-0-521-70772-5
2. USDA, NRCS (n.d.). "*Vaccinium macrocarpon*" (<https://plants.sc.egov.usda.gov/home/plantProfile?symbol=VAMA>). *The PLANTS Database* (plants.usda.gov). Greensboro, North Carolina: National Plant Data Team. Retrieved 11 November 2014.
3. "How Cranberries Grow: "Cranberries 101" - An Introduction" (http://www.cranberries.org/cranberries/grow_intro.html). Cape Cod Cranberry Growers' Association. 2014. Retrieved 11 November 2014.
4. Steven Clemants. "*Vaccinium oxycoccos*: Small Cranberry, Technical Page" (https://web.archive.org/web/20110823125439/http://nymf.bbg.org/profile_species_tech.asp?id=412). Brooklyn Botanic Garden. Archived from the original (https://nymf.bbg.org/profile_species_tech.asp?id=412) on 23 August 2011. Retrieved 26 March 2011.
5. "About Cranberries" (https://web.archive.org/web/20100109050831/http://www.cranberryinstitute.org/about_cranberry.htm). Cranberry Institute. Archived from the original (http://www.cranberryinstitute.org/about_cranberry.htm) on 9 January 2010. Retrieved 13 November 2009.
6. Carol Cloud Bailey (19 November 2009). "Garden Tips: Give thanks for cranberries, grown with a taste of Florida" (<http://www.tcpalm.com/news/2009/nov/19/give-thanks-for-cranberries-grown-with-a-taste>). *TCPalm.com*. Scripps Interactive Newspapers Group. Retrieved 20 November 2009.
7. "Encyclopaedia Britannica: Cranberry" (<https://www.britannica.com/plant/cranberry>).
8. Faculty of Natural Resources Management. "*Oxycoccus microcarpus* Small Cranberry" (<http://www.borealforest.org/shrubs/shrub29.htm>). *borealforest.org*. Lakehead University.
9. Jacquemart, Anne-Laure (1997). "*Vaccinium Oxycoccos* L. (*Oxycoccus Palustris* Pers.) and *Vaccinium Microcarpum* (Turcz. ex Rupr.) Schmalh. (*Oxycoccus Microcarpus* Turcz. ex Rupr.)" (<https://www.researchgate.net/publication/235743745>). *Journal of Ecology*. **85** (3): 381–396. doi:10.2307/2960511 (<https://doi.org/10.2307%2F2960511>). JSTOR 2960511 (<https://www.jstor.org/stable/2960511>).
10. "The Genus *Vaccinium* North America" (https://www.npss.sk.ca/docs/2_pdf/The_Genus_Vaccinium_in_North_America.pdf) (PDF).
11. "American Cranberry (*Vaccinium macrocarpon*) : FAQ" (<https://researchguides.library.wisc.edu/c.php?g=177896&p=1169823>). Research Guides, University of Wisconsin Libraries, Madison, WI. 2017. Retrieved 7 December 2017.
12. "Cranberry" (<https://www.etymonline.com/word/cranberry>). Online Etymology Dictionary, Douglas Harper. 2017. Retrieved 7 December 2017.
13. Caruso FL; Bristow PR; Oudemans PV (2000). "Cranberries: The Most Intriguing Native North American Fruit" (<https://web.archive.org/web/20171208003544/http://www.apsnet.org/publications/apsnetfeatures/Pages/Cranberries.aspx>). *Apsnet Feature Articles*. doi:10.1094/APSnetFeature-2000-1100 (<https://doi.org/10.1094%2FAPSnetFeature-2000-1100>). Archived from the original (<http://www.apsnet.org/publications/apsnetfeatures/Pages/Cranberries.aspx>) on 8 December 2017. Retrieved 7 December 2017.

14. Broussard, Melissa; Rao, Sujaya; Stephen, William P.; White, Linda (June 2011). "Native Bees, Honeybees, and Pollination in Oregon Cranberries" (<https://doi.org/10.21273%2Fhortsci.46.6.885>). *HortScience*. **46** (6): 885–888. doi:10.21273/hortsci.46.6.885 (<https://doi.org/10.21273%2Fhortsci.46.6.885>). ISSN 0018-5345 (<https://www.worldcat.org/issn/0018-5345>).
15. "Cranberry production in top-producing States to increase modestly in 2021" (<https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=102649>). Economic Research Service, US Department of Agriculture. 24 November 2021. Retrieved 28 May 2022.
16. "The Cranberry" (<https://ag.umass.edu/cranberry/about/cranberry>). *Center for Agriculture, Food and the Environment*. 7 August 2015. Retrieved 7 May 2019.
17. Carolyn J. DeMoranville; Hilary A. Sandler & Frank L. Caruso (June 2001). "Planting New Cranberry Beds: Recommendations and management" (<http://www.umass.edu/cranberry/downloads/Planting%20New%20Cranberry%20Beds.pdf>) (PDF). University of Massachusetts, Cranberry Experiment Station. Retrieved 5 May 2018.
18. "Alternative 4 – Bog Renovation for Cranberry Growing" (https://web.archive.org/web/20180506173614/http://www.carlislema.gov/pages/carlislema_concomm/Alternatives%20for%20the%20Future%20of%20Carlisle%27s%20Cranberry%20Bog%202017/Reports%20on%20the%20Ten%20Alternatives/11%20-%20Alternative%204%20-%20Bog%20Renovation.pdf) (PDF). *Town of Carlisle, Massachusetts*. Archived from the original (http://www.carlislema.gov/pages/carlislema_concomm/Alternatives%20for%20the%20Future%20of%20Carlisle%27s%20Cranberry%20Bog%202017/Reports%20on%20the%20Ten%20Alternatives/11%20-%20Alternative%204%20-%20Bog%20Renovation.pdf) (PDF) on 6 May 2018. Retrieved 5 May 2018.
19. Angier, Bradford (1974). *Field Guide to Edible Wild Plants* (<https://archive.org/details/fieldguidetoedib00angi/page/66/mode/2up>). Harrisburg, PA: Stackpole Books. p. 66. ISBN 0-8117-0616-8. OCLC 799792 (<https://www.worldcat.org/oclc/799792>).
20. "Wet Picking" (<https://stonebridgefarmevents.com/wet-picking/>). *Stone Bridge Farm*. Retrieved 7 May 2019.
21. "Fresh Fruit Production BMP: Publications UMass Cranberry Station" (http://www.umass.edu/cranberry/pubs/bmp_fruit.html). *www.umass.edu*. Retrieved 7 May 2019.
22. "Cranberry production in 2020, Crops/Regions/World list/Production Quantity (pick lists)" (<http://www.fao.org/faostat/en/#data/QC>). UN Food and Agriculture Organization, Corporate Statistical Database (FAOSTAT). 2022. Retrieved 28 May 2022.
23. Ronda Payne (2 July 2019). "Crazy for cranberries in Canada" (<https://www.fruitandveggie.com/crazy-for-cranberries-in-canada-20713/>). Fruit & Vegetable, Annex Business Media. Retrieved 28 May 2022.
24. "Cranberry cultivation" (<http://www.uscranberries.com/about-cranberries/cultivation/>). US Cranberries. 2018. Retrieved 18 October 2018.
25. Zeldes, Leah A. (25 November 2009). "Eat this! Cranberries more than a thanksgiving condiment" (<https://web.archive.org/web/20100201233420/http://blog.diningchicago.com/2009/11/25/eat-this-cranberries-more-than-a-thanksgiving-condiment/>). *Dining Chicago*. Chicago's Restaurant & Entertainment Guide, Inc. Archived from the original (<http://blog.diningchicago.com/2009/11/25/eat-this-cranberries-more-than-a-thanksgiving-condiment/>) on 1 February 2010. Retrieved 25 November 2009.
26. "The American Cranberry-Basic Information on Cranberries" (<http://researchguides.library.wisc.edu/content.php?pid=87646&sid=652165>). Library.wisc.edu. Retrieved 4 October 2010.
27. Calvin, Bobby Caina. "Cranberry industry seeks to avoid school ban." (<http://bostonglobe.com/news/nation/2012/06/24/under-siege-war-against-sugary-drinks-cranberry-industry-hopes-battle-back/4Ki1sEpAMI4cms9ZdgS9CK/story.html>) *Boston Globe*, 25 June 2012.

28. "Cranberries, dried (survey)" (<https://fdc.nal.usda.gov/fdc-app.html#/food-details/1102630/nutrients>). FoodData Central, US Department of Agriculture. 2018. Retrieved 25 April 2021.
29. Jepson, RG; Williams, G; Craig, JC (2012). "Cranberries for preventing urinary tract infections" (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7027998>). *Cochrane Database of Systematic Reviews*. **10** (10): CD001321. doi:10.1002/14651858.CD001321.pub5 (<https://doi.org/10.1002%2F14651858.CD001321.pub5>). PMC 7027998 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7027998>). PMID 23076891 (<https://pubmed.ncbi.nlm.nih.gov/23076891>). CD001321.
30. EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA) (May 2014). "Scientific Opinion on the substantiation of a health claim related to CranMax® and reduction of the risk of urinary tract infection by inhibiting the adhesion of certain bacteria in the urinary tract pursuant to Article 14 of Regulation (EC) No 1924/2006" (<https://doi.org/10.2903%2Fj.efsa.2014.3657>). *EFSA Journal*. **12** (5). doi:10.2903/j.efsa.2014.3657 (<https://doi.org/10.2903%2Fj.efsa.2014.3657>). 3657.
31. Luís, Â; Domingues, F; Pereira, L (10 March 2017). "Can Cranberries Contribute to Reduce the Incidence of Urinary Tract Infections? A Systematic Review with Meta-Analysis and Trial Sequential Analysis of Clinical Trials". *Journal of Urology*. **198** (3): 614–621. doi:10.1016/j.juro.2017.03.078 (<https://doi.org/10.1016%2Fj.juro.2017.03.078>). PMID 28288837 (<https://pubmed.ncbi.nlm.nih.gov/28288837>). S2CID 206632675 (<https://api.semanticscholar.org/CorpusID:206632675>).
32. Fu, Zhuxuan; Liska, DeAnn; Talan, David; Chung, Mei (18 October 2017). "Cranberry Reduces the Risk of Urinary Tract Infection Recurrence in Otherwise Healthy Women: A Systematic Review and Meta-Analysis" (<https://doi.org/10.3945%2Fjn.117.254961>). *The Journal of Nutrition*. **147** (12): 2282–2288. doi:10.3945/jn.117.254961 (<https://doi.org/10.3945%2Fjn.117.254961>). ISSN 0022-3166 (<https://www.worldcat.org/issn/0022-3166>). PMID 29046404 (<https://pubmed.ncbi.nlm.nih.gov/29046404>).
33. Gbinigie, Oghenekome A.; Spencer, Elizabeth A.; Heneghan, Carl J.; Lee, Joseph J.; Butler, Christopher C. (25 December 2020). "Cranberry Extract for Symptoms of Acute, Uncomplicated Urinary Tract Infection: A Systematic Review" (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7824375>). *Antibiotics*. **10** (1): 12. doi:10.3390/antibiotics10010012 (<https://doi.org/10.3390%2Fantibiotics10010012>). ISSN 2079-6382 (<https://www.worldcat.org/issn/2079-6382>). PMC 7824375 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7824375>). PMID 33375566 (<https://pubmed.ncbi.nlm.nih.gov/33375566>).
34. Liska, D. J.; Kern, H. J.; Maki, K. C. (2016). "Cranberries and Urinary Tract Infections: How Can the Same Evidence Lead to Conflicting Advice?" (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4863270>). *Advances in Nutrition*. **7** (3): 498–506. doi:10.3945/an.115.011197 (<https://doi.org/10.3945%2Fan.115.011197>). PMC 4863270 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4863270>). PMID 27184277 (<https://pubmed.ncbi.nlm.nih.gov/27184277>).
35. Vvedenskaya, Irina O; Vorsa, Nicholi (2004). "Flavonoid composition over fruit development and maturation in American cranberry, *Vaccinium macrocarpon* Ait". *Plant Science*. **167** (5): 1043. doi:10.1016/j.plantsci.2004.06.001 (<https://doi.org/10.1016%2Fj.plantsci.2004.06.001>).
36. Duthie SJ, Jenkinson AM, Crozier A, et al. (March 2006). "The effects of cranberry juice consumption on antioxidant status and biomarkers relating to heart disease and cancer in healthy human volunteers". *Eur J Nutr*. **45** (2): 113–22. doi:10.1007/s00394-005-0572-9 (<https://doi.org/10.1007%2Fs00394-005-0572-9>). PMID 16032375 (<https://pubmed.ncbi.nlm.nih.gov/16032375>). S2CID 46727119 (<https://api.semanticscholar.org/CorpusID:46727119>).
37. Zheng W, Wang SY (January 2003). "Oxygen radical absorbing capacity of phenolics in blueberries, cranberries, chokeberries, and lingonberries". *J Agric Food Chem*. **51** (2): 502–9. doi:10.1021/jf020728u (<https://doi.org/10.1021%2Fjf020728u>). PMID 12517117 (<https://pubmed.ncbi.nlm.nih.gov/12517117>).

38. Blumberg, JB; Camesano, TA; Cassidy, A; Kris-Etherton, P; Howell, A; Manach, C; Ostertag, LM; Sies, H; Skulas-Ray, A; Vita, JA (2013). "Cranberries and their bioactive constituents in human health" (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3823508>). *Advances in Nutrition*. **4** (6): 618–32. doi:10.3945/an.113.004473 (<https://doi.org/10.3945%2Fan.113.004473>). PMC 3823508 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3823508>). PMID 24228191 (<https://pubmed.ncbi.nlm.nih.gov/24228191>).
39. "Cranberry" (<https://www.mskcc.org/cancer-care/integrative-medicine/herbs/cranberry>). New York: Gerstner Sloan Kettering Graduate School of Biomedical Sciences, Memorial Sloan Kettering Cancer Center. 2016.
40. Miranda Hill (23 November 2005). "Blocking tooth decay" (<http://www.webmd.com/content/article/115/111780>). Webmd.com. Retrieved 13 November 2009.
41. Koo, H.; Nino de Guzman, P.; Schobel, B.D.; Vacca Smith, A.V. & Bowen W.H. (January 2006). "Influence of Cranberry Juice on Glucan-Mediated Processes Involved in *Streptococcus mutans* Biofilm Development". *Caries Research*. **40** (1): 20–27. doi:10.1159/000088901 (<https://doi.org/10.1159%2F000088901>). PMID 16352876 (<https://pubmed.ncbi.nlm.nih.gov/16352876>). S2CID 22205175 (<https://api.semanticscholar.org/CorpusID:22205175>).
42. McHarg T, Rodgers A, Charlton K (November 2003). "Influence of cranberry juice on the urinary risk factors for calcium oxalate kidney stone formation" (<https://doi.org/10.1046%2Fj.1464-410X.2003.04472.x>). *BJU Int*. **92** (7): 765–8. doi:10.1046/j.1464-410X.2003.04472.x (<https://doi.org/10.1046%2Fj.1464-410X.2003.04472.x>). PMID 14616463 (<https://pubmed.ncbi.nlm.nih.gov/14616463>). S2CID 39898498 (<https://api.semanticscholar.org/CorpusID:39898498>).
43. Kessler T, Jansen B, Hesse A (October 2002). "Effect of blackcurrant-, cranberry- and plum juice consumption on risk factors associated with kidney stone formation" (<https://doi.org/10.1038%2Fsj.ejcn.1601442>). *Eur J Clin Nutr*. **56** (10): 1020–3. doi:10.1038/sj.ejcn.1601442 (<https://doi.org/10.1038%2Fsj.ejcn.1601442>). PMID 12373623 (<https://pubmed.ncbi.nlm.nih.gov/12373623>).
44. Tarascou, Isabelle; Mazauric, Jean-Paul; Meudec, Emmanuelle; Souquet, Jean-Marc; Cunningham, David; Nojeim, Steve; Cheynier, Véronique; Fulcrand, Hélène (2011). "Characterisation of genuine and derived cranberry proanthocyanidins by LC–ESI-MS". *Food Chemistry*. **128** (3): 802. doi:10.1016/j.foodchem.2011.03.062 (<https://doi.org/10.1016%2Fj.foodchem.2011.03.062>).
45. Prior, Ronald L; Fan, Ellen; Ji, Hongping; Howell, Amy; Nio, Christian; Payne, Mark J; Reed, Jess (2010). "Multi-laboratory validation of a standard method for quantifying proanthocyanidins in cranberry powders". *Journal of the Science of Food and Agriculture*. **90** (9): 1473–8. doi:10.1002/jsfa.3966 (<https://doi.org/10.1002%2Fjsfa.3966>). PMID 20549799 (<https://pubmed.ncbi.nlm.nih.gov/20549799>).
46. Sánchez-Patán, Fernando; Bartolomé, Begoña; Martín-Alvarez, Pedro J.; Anderson, Mark; Howell, Amy; Monagas, María (2012). "Comprehensive Assessment of the Quality of Commercial Cranberry Products. Phenolic Characterization and in Vitro Bioactivity". *Journal of Agricultural and Food Chemistry*. **60** (13): 3396–408. doi:10.1021/jf204912u (<https://doi.org/10.1021%2Fjf204912u>). hdl:10261/101264 (<https://hdl.handle.net/10261%2F101264>). PMID 22439747 (<https://pubmed.ncbi.nlm.nih.gov/22439747>).
47. Pham DQ, Pham AQ (March 2007). "Interaction potential between cranberry juice and warfarin". *Am J Health Syst Pharm*. **64** (5): 490–4. doi:10.2146/ajhp060370 (<https://doi.org/10.2146%2Fajhp060370>). PMID 17322161 (<https://pubmed.ncbi.nlm.nih.gov/17322161>).
48. *The Cranberry Industry and Ocean Spray Cooperative: Lessons in Cooperative Governance* (https://www.umass.edu/resec/sites/default/files/19cranberryjan06_0.pdf) (PDF).

49. Roper TR, Vorsa N (1997). "Cranberry: Botany and Horticulture" (http://www.pubhort.org/hr/hr21/HR_21_07_00000000.pdf) (PDF). In Janick J (ed.). *Horticultural Reviews*. New York: Wiley. pp. 215–6. ISBN 978-0-471-18907-7.
50. "About CMC » Cranberry Marketing Committee" (<https://www.uscranberries.com/about-cmc/>). *Cranberry Marketing Committee*. Retrieved 25 December 2021.
51. "Cranberries: No Longer Just an American Tradition" (<https://www.fas.usda.gov/data/cranberries-no-longer-just-american-tradition>). Foreign Agricultural Service, US Department of Agriculture. 22 November 2016. Retrieved 4 November 2017.
52. Jennifer Levitz (4 November 2017). "Beyond Thanksgiving: The Humble Cranberry Takes Root in China" (<https://www.wsj.com/articles/beyond-thanksgiving-the-humble-cranberry-takes-root-in-china-1509793203>). New York: The Wall Street Journal. Retrieved 4 November 2017.
53. Ma, Adrian (6 October 2019). "How The Trade War Crushed A Growing Chinese Market For U.S. Cranberries" (<https://www.npr.org/sections/thesalt/2019/10/06/763463639/how-the-trade-war-crushed-a-growing-chinese-market-for-u-s-cranberries>). *NPR News*. Retrieved 7 October 2019.

Further reading

- Cole, S. & Gifford, L. (2009). *The Cranberry: Hard Work and Holiday Sauce*. Tilbury House Publishers. ISBN 978-0-88448-316-8
- Trehane, J. (2009). *Blueberries, Cranberries and Other Vacciniums*. Timber Press. ISBN 978-1-60469-072-9

External links

 Media related to Cranberries at Wikimedia Commons

- Germplasm Resources Information Network: *Sect. Oxycoccus* (<https://web.archive.org/web/20151102182245/http://www.ars-grin.gov/cgi-bin/npgs/html/splist.pl?18661>) and *Sect. Oxycoccoides* (<https://web.archive.org/web/20151102182246/http://www.ars-grin.gov/cgi-bin/npgs/html/splist.pl?18658>)
- University of Massachusetts Amherst Cranberry Station (<http://www.umass.edu/cranberry>) for information on cranberry research
- Cranberry Library Page (<https://web.archive.org/web/20121029070614/http://www.library.wisc.edu/guides/agnic/cranberry/cranhome.html>) Hosted by the University of Wisconsin-Madison
- Wikimapia (<http://www.wikimapia.org/#y=44426885&x=-89758258&z=15&l=0&m=s>) An overhead view of a cranberry farm near Wisconsin Rapids, Wisconsin
- Cranberry research at Rutgers, The State University of New Jersey (<http://pemaruccicenter.rutgers.edu/>)
- University of Massachusetts Cranberry Station (<http://scholarworks.umass.edu/cranberry/>) Hosted by the University of Massachusetts - Amherst
- "Harvest-Time in a Cranberry Bog" (<https://archive.org/stream/appletonsmagazin04newy#page/748/mode/2up>), *The Booklovers Magazine*, December 1904. Internet Archive.

Retrieved from "<https://en.wikipedia.org/w/index.php?title=Cranberry&oldid=1102519486>"

Text is available under the Creative Commons Attribution-ShareAlike License 3.0; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.