

# Natural History of the American Cranberry, *Vaccinium macrocarpon* Ait.

The cranberry is a native American fruit. Its native range extends in temperate climate zones from the East Coast to the Central U. S. and Canada and from Southern Canada in the north to the Appalachians in the south.

The plant is a low-growing, trailing, woody vine with a perennial habit. Cranberries produce stems or runners from one to six feet long. During the growing season, the leaves are dark green and glossy, turning reddish-brown during the dormant season. The vines form a thick mat over the surface of a cultivated bed.

Short vertical upright branches, known as uprights, form from the buds along the runners. The uprights have a vertical (non-trailing) growth habit and form the terminal buds that contain the flower buds. Most of the fruit is formed from the flowers on the uprights, with some berries arising from flowers on the runner ends.



*Native distribution of cranberry in North America.*



*Mature 'Stevens' berries. Photo by Meredith Albright.*

The plants thrive on the special combination of soils and hydrology found in wetlands. Natural Massachusetts bogs evolved from glacial deposits that left kettle holes lined with impermeable materials. These kettles became filled with water and decaying matter, creating the ideal environment for cranberries. Growing cranberries commercially also requires a surrounding network of support acres — the fields, forests, streams, and ponds that make up the cranberry wetlands system.

Many Massachusetts cranberry bogs, particularly those in Plymouth County, are built on bogs that had been mined for iron ore, while most of those on Cape Cod were developed in natural peat bogs.

Cranberry bog soil is unique in that it consists of alternating layers of sand and organic matter. Dead leaves accumulate over the course of time and sand is added to the bed surface every 2-5 years to encourage upright production and maintain productivity. In contrast to normal agricultural soils, cranberry soil requires no tilling, remains undisturbed over time, and little mixing of sand and organic matter occurs.



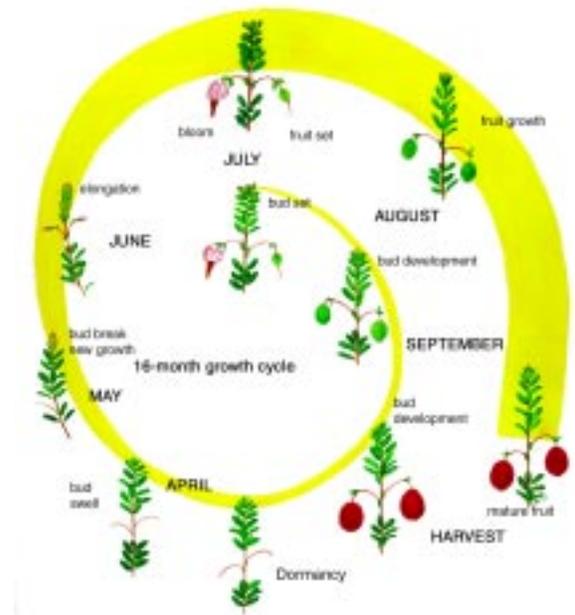
*Soil core showing the 'alternating layers' of sand and organic matter typical of cranberry soils. Photo by Carolyn DeMoranville.*

As a wetland-adapted plant, cranberries are tolerant of flooded soils. However, during the active growing season (generally from March through October), good drainage in the soil is essential to proper root growth and function. During that part of the season, commercial cranberry bogs are managed with drained soil and are not flooded for extended periods as a rule. Flooding is mainly confined to winter protection, harvest, and several specialized pest-control floods.

In addition to Massachusetts, cranberries are grown commercially in Wisconsin, New Jersey, Washington, Oregon, and Maine, with some acres in Michigan, Connecticut, Rhode Island, New Hampshire, and New York. Cranberries are also grown in several Canadian provinces (British Columbia, Quebec, and the Maritimes) and Chile.

The figure to the right shows the 16-month production cycle of cranberry from the initiation of the flower bud (bud set) to the harvest of the fruit (mature fruit).

Cranberry terminal buds are initiated in the year before the crop, beginning in July. The trigger for this process is changing daylength. The buds continue to develop throughout the rest of the summer and fall, with floral buds being formed within the terminal bud. By August, the initial stages of the flower bud can be found and visible changes in the buds continue until at least some time in October. Bud development almost certainly continues later into the year in milder growing areas. Eventually the flower buds become dormant until the following spring. The signal to enter dormancy is most likely a combination of low temperatures and short days.



Art work by Meredith Albright, scientific illustrator.



*Cranberry upright showing blossoms and early developing fruit (pinheads). Photo by Carolyn DeMoranville.*

The dormant state lasts until the plant has been exposed to sufficient ‘chilling hours’ — hours of temperatures between 32°F and 45°F to complete the dormant cycle. In common with other perennial fruit crops, the cranberry plants must accumulate a critical number of chilling units in order to break dormancy in the spring and initiate flowering for the new season.

During the dormant season, growers protect the cranberry bogs with a winter flood, which often freezes. If ice conditions permit, growers may apply sand to the ice. This sand filters into the vines after the thaw and acts to encourage new growth, and may also provide some degree of pest control.

At the end of the period during which chilling units accumulate, events leading to bud break and flowering may begin. Once dormancy has broken in response to increased temperature and daylength, completion of the developmental cycle (vegetative growth, flowering, and fruiting) occurs. In Massachusetts, the terminal bud begins to lose dormant color and swell during April. By late in May, buds have begun to grow and new leaves and flower buds are visible, growing from the terminal end of the uprights. Once the terminal bud begins to grow, it must be protected from sub-freezing temperatures. This is accomplished by running the sprinkler irrigation system to provide protection on cold nights.

During June, the uprights continue to increase in length (new leaves formed) and the first flowers open. By late June, most flowers are open and the cranberry bogs resemble a pink carpet. From late June to early July, bees pollinate the cranberry flowers and tiny fruit form (fruit set). From this point until harvest, the growth cycle overlaps the beginning of a new cycle for the following year.

During the first three weeks following fruit set, the fruit acquire most of their mineral components. From that point through harvest, fruit grow by the accumulation of carbohydrates (sugars and starch produced through photosynthesis) and water. Irrigation is often necessary during this period. By September, the fruit begin to develop their characteristic red color through the production of anthocyanin pigments. Full fruit maturity occurs approximately 80 days after full bloom. Cranberry harvest in Massachusetts extends from mid-September through October and is at its height in mid-October.



*Harvesting cranberries in water. Photo by Bruce Lampinen.*

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