

Historic trees get a second shot at life with cloning efforts

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The majestic oak that sits on the corner of Cedar Lane and Palisade Avenue in Teaneck, N.J., is headed for the chopping block, but the historic tree may live on, if experts can manage the tricky feat of cloning it.

The practice of cloning plants and trees - producing genetically identical copies - is nothing new. From impatiens at the local nursery to cherry blossoms in Washington, plants and trees have been cloned to replicate desirable traits.

"It's been done for thousands and thousands of years," said David L. Kidwell-Slak, a horticulturist in the floral and [nursery plants](#) research unit at the U.S. National Arboretum. "It's really the primary way people have domesticated any plant."

But matching the 250-plus-year-old red oak might be more challenging, according to tree experts. That's because oaks are among the most difficult plants to clone. Callery pear, American holly, Atlantic white cedar, yellowwood and birches are easier to clone through cuttings, said Mike D'Errico, the executive director of the state's Society of Certified Tree Experts.

Typically, about 6 inches of the branch tip, called soft wood growth, is cut, dipped into a rooting hormone to stimulate root growth, then put into a moist, warm environment.

Depending on the plant, the stem cuttings will form roots and be ready for replanting within weeks or months, said David Slaymaker, a professor of molecular plant biology at William Paterson University.

"The new plant is genetically identical to the plant the cutting came from, since it was actually part of that plant," Slaymaker said.

The cuttings also can be grafted onto another plant. The results will be genetically similar, although the roots will belong to another tree.

A second, slightly more expensive and modern method of plant cloning is through tissue culture. In this process, young tissue is cultured in a sterile environment and treated with [plant hormone](#) to stimulate [root growth](#).

If the Teaneck oak is saved through cloning, it would not be the first time that a tree of historical and emotional significance has been propagated for future generations.

Some of the cherry blossom trees around the Tidal Basin in Washington are clones of the original gifts from Japan in 1912. The Archangel Ancient Tree Archive has been cloning and archiving the genetic material of the world's oldest species, studying their genetic makeup to discover the secret to their endurance, and replanting some of them.

In 2009 the township of West Caldwell, N.J., took 122 cuttings from what was then the state's largest cucumber magnolia to make genetic copies.

The tree's image had become the town's symbol, engraved onto its official stationary and police cars, said Clay Allison of the Beaver Brook Nursery in Wantage, N.J., who handled the process.

Of the 122 cuttings, only about 25 to 30 of the offspring were successful, Allison said.

Bergen County is planning to cut down the northern red oak following a report that concluded that extensive decay, termite damage, the aftereffects of a lightning strike five years ago and the loss of 40 percent of its root system all weakened the tree, increasing the likelihood that it or its limbs will fall and hurt - or kill - someone.

The tree has special significance in some corners of the township. Over the years, many have fought to save it from developers. An ordinance this year gave it official historic status.

The ordinance explained, "The tree was standing before the birth of our nation and before George Washington's retreat over the Hackensack River at Historic New Bridge Landing."

The Puffin Foundation, which made a donation to Bergen County to take care of the tree in perpetuity, is working with tree experts to keep the oak's lineage alive.

"Nobody wants this tree to go down," said Todd Mastrobuoni, a certified tree expert, master arborist and tree risk assessor, who suggested cloning it. "And, at least, if we can come up with a way to give people something - that it's not a total end to it - it will be worth the time and effort."

The Puffin Foundation's tree experts contacted Jason Grabosky, an associate professor of ecology, evolution and natural resources at the New Jersey Agricultural Experiment Station at Rutgers University. Grabosky says the group is considering three methods to increase the chances of success.

They will try taking terminal cuttings from the tree and using growth

hormones to initiate rooting; try taking small branches and storing them in an environment with adequate humidity, a process that would induce the branches to use their stored carbohydrates and force them to grow shoots; and try using the sprouts that will be generated once the tree is cut down.

"There will be three different opportunities to try to make this work," Grabosky said. "Red oak, as a group, is not very easy to do by cuttings. Younger ones are better. Older ones are hard. ... With a 300-year-old large red oak, the odds are that this will not be highly successful."

Nina Bassuk, a professor of urban horticulture at Cornell University who has been researching oak cloning since the late 1980s, said she has had measurable success with basal sprouts, the third method Grabosky plans to use.

In her method, the tree stump would be left about three or four inches off the ground. Once the sprouts appear, they will be put in the dark - a process called etiolation - by building a structure over them or covering them with dark cloth. The basal part of the sprouts will be treated with a rooting hormone and the roots allowed to grow. When the shoots are a few inches long, the dark covering will be removed and the bases painted with more rooting hormone.

After several months they can be planted, she said.

"It's a difficult thing to do," Bassuk said. "So if they can wait until October, they can get acorns, but if not, it's possible that they can try this other method we have been working on. But with a 250-year-old tree, it's not going to be a sure thing, but it's a possibility."

Cost is not likely to be a factor, she said, but the process is time-consuming.

If they were not looking for identical genetic material, the group could use the tree's acorns, experts said. The acorns are not likely to be exact replicas, and could contain genetic material from any other tree in the area besides the famous oak.

Even if the [cloning](#) is successful, however, there is no guarantee that the offspring will live as long as its parent.

Sometimes, it's just the luck of the draw, said Dirk Vanderklein, who teaches plant physiology at Montclair State University.

"All trees potentially can live quite long," he said. "In fact, in theory, they can live forever. ... The fact that that tree is the lone survivor of probably a couple thousand seeds that sprouted - it was just the luck of the lottery that that tree happened to make it through all the various things that have happened to all the other [trees](#)."

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