



BLOOD, SWEAT, AND BARK

Enthusiasts take extraordinary measures to recover the American chestnut

by Zack Metcalfe

We can't seem to let go of the American chestnut. Of all the trees to have disappeared since the Columbian Exchange, this one has maintained its grip on the human psyche – even now, a century after its reign.

And yes, “reign” is the appropriate term. As recently as 1900, American chestnuts accounted for a quarter of all trees from Mississippi to Maine, dominating the canopies of eastern North America and pressing deep into southern Ontario. They were famous, in their time, for growing head and shoulders above their competition, establishing a near monopoly over the sun – their greyish trunks wide and

sturdy, unblemished by superfluous lower branches, as straight as beams of light. They produced nuts in such abundance that 275 animal species were partially or wholly dependent on their seasonal bounty. The lumber these trees yielded ranked among the most rot-resistant, and was purportedly as strong as oak, yet much easier to work with. Their nickname – King of the Forest – was well earned.

The American chestnut was destroyed by a mail-order tree nursery in New Jersey, which, in 1876, imported and sold a dozen Japanese chestnuts, a distant cousin of our wild Americans. They were nowhere near as tall or as hardy as their native counterparts, but they had evolved

alongside *Cryphonectria parasitica*, a ferocious fungus native to east Asia, and had developed resistance. They carried this fungus to New Jersey, and it leapt to the unprepared American chestnut, manifesting one of the most lethal plagues in arboreal history – Chestnut blight.

The invasive fungus burned across North America until about 1950, leaving in its wake the wreckage of cultures, industries, and ecosystems once dependent on the American chestnut. Some four billion trees fell to the blight. Familiar mammal and bird populations collapsed for lack of food, as did smaller creatures not so easily appreciated, like the Chestnut weevil, Chestnut moth, and Chestnut sawfly.



The Ashdale tree. (Zack Metcalfe photo)

The American chestnut seemed doomed to extinction – its surviving specimens too sick or isolated to make meaningful contributions to the species' recovery. But since its collapse, a small army of swashbuckling conservationists has been picking up the pieces, breeding and planting and studying this tree across Canada and the U.S., trying to find hope. Decades later, it appears they've succeeded.

THE ASHDALE TREE

In 1905, a Nova Scotian named Clyde Dimock returned from seasonal work in the United States and brought an American chestnut seedling, which he planted

on a backroad in Ashdale, Hants County, hoping it would grow into one of the regal giants he'd admired south of the border. And grow it did. Standing in the open, with little competition for sunlight, it forsook the characteristic straightness of its species, taking on the shape of an upturned squid, tentacles flailing. To support its wayward branches, it developed a trunk of spectacular girth. This stout giant was struck by lightning in the 1950s, its leading stem obliterated, but it grew on, and survives even now, gnarled and Tolkienesque.

Known as the Ashdale Tree, it is the largest American chestnut in Canada and perhaps in North America. It's not the tallest – that honour belongs to a 115-footer in southern Maine – but in terms of sheer volume, Ashdale has no equal. Unlike its counterparts across the historic range of the species, this tree matured in the complete absence of Chestnut blight. Held back by glaciers, climate, and the width of the Bay of Fundy, chestnuts were never established in Nova Scotia prior to human intervention, so the disease had no path by which to reach the Ashdale Tree. The Maritimes, therefore, became a refugium, sheltering American chestnuts from the blight, just outside their native range.

There is a long tradition of people migrating chestnuts into the Maritimes. Sometime between 1815 and 1830, Richard John Uniacke, Nova Scotia's attorney general, planted a pair on his country estate in Hants County, where they grow to this day. Before him, the United Empire Loyalists – British citizens fleeing to Canada during the American Revolution in the late 1700s – brought a number of American chestnuts into the Maritimes and Quebec. This was the origin of a huge specimen that grew in Bridgewater, N.S., for several hundred years, until it was cut down in the 1970s.

Perhaps the most notorious importation of all came in the 1980s when the now-defunct Bowater Mersey Paper Company purchased 300 seedlings from Cascade Forestry in Iowa, and distributed them across Nova Scotia, for the sake of public relations. But American chestnuts are remarkably picky growers, requiring consistent temperatures and acidic, fluffy, moist soils. Survival also depends very much on the individual tree. Many of those planted by Bowater died or were simply forgotten.

Since 1965, when naturalist C.R.K. Allen "discovered" the Ashdale Tree in Hants County, enthusiasts have clung to the idea that American chestnut might be preserved in Atlantic Canada – but neither the Nova Scotia government nor the federal government has ever been involved in the effort, so all work to date has been carried out by volunteers, pulling this species into the uncoordinated embrace of backyard conservation.

It probably began with George Swain, a horticulturist at the Kentville Research Station, who, entirely of his own volition, began trucking pollen between the Bridgewater and Ashdale trees, overcoming their 100-kilometre divide so they might reproduce. It took him years, but eventually the Ashdale Tree bore 20 viable nuts, yielding 15 healthy seedlings. Records of their distribution are fuzzy, but four were apparently planted at the research station, and two at an unknown location in Lower Canada, while another two went to the Halifax Public Gardens in 1967, where they can still be found.

Another devotee of the American chestnut was Leslie Corkum – a Second World War veteran, forest technician, and woodlot owner who, until his death in April of 2020, dedicated much of his Falmouth estate to specimens collected from across Nova Scotia and imported from blight-free seed orchards in the United States, Ontario, and elsewhere in the Maritimes. For years, he followed up rumours of rogue chestnuts in the wilds of Nova Scotia, and spent many a fall day combing their understories for viable nuts to add to his collection or to plant in the company of isolated trees. He was also a diligent recordkeeper, compiling great stores of information about this tree species. "It's a bad one to fall in love with," he used to say.

Today, the Maritimes' most active advocate for American chestnuts is Jocelyn Clarke. On her property in Mount Steward, P.E.I., she takes a total-war approach to sheltering the species. Her yard is dominated by strong specimens collected from across the continent, and her home contains numerous nuts and seedlings in various stages of development, overwintering in freezers or sprouting in old milk jugs and margarine containers on her porch. She has but one goal: hardiness.

A tree's hardiness – specifically its ability to survive Canadian winters – ap-

pears to be correlated with its ability to fight off Chestnut blight, improving its chances of maturing and reproducing before the illness rots its trunk, says Clarke. So she propagates survivors—for the sake of the species, and for her own pleasure. She’s had good luck with chestnuts from the coastal regions of Massachusetts, the mountains of New York, a specific lake in Pennsylvania, some regions of northern Maine and southern Ontario, and especially from the Ashdale Tree, which has contributed significantly to breeding programs across North America. It is, she says, “a very good doer.”

Clarke also maintains a catalogue of all American chestnuts known in the Maritimes. “There’s more than we think,” she says—certainly thousands, but the exact number is unknown, and not everyone harbouring them is keen to share.

GENES

The Canadian Chestnut Council (CCC) was founded in 1988 to preserve the American chestnuts of southern Ontario, with a volunteer staff and scientific advisors drawn heavily from the University of Guelph. They’ve identified more than 2,000 surviving specimens in the province, and they keep a careful eye on each. From these trees they collect pollen and grafts, to establish their own nurseries, conduct research, contribute to breeding programs in the United States, or to send east, so people like Jocelyn Clarke can preserve their genes beyond the reach of the blight. The group has planted seedlings around old and isolated individuals in the wild, to foster reproduction. And volunteers also track the blight, which occasionally tears across Ontario.

“The trees are dying faster than they can recruit in the wild,” says Ron Casier, the CCC chair. “Without us assisting, the American chestnut would disappear from Canada probably within 150 years.”

And it’s not just the blight. Casier describes mature trees destroyed by development, or felled by landowners who are unconcerned or unaware. Other chestnuts are just unlucky,

like one fine specimen that succumbed to erosion, falling over a cliff into Lake Erie. A survey conducted by the CCC shows that between 2004 and 2014, 16 percent of Ontario’s remaining American chestnuts fell to one misfortune or another. During that same period, only seven new individuals took root in the wild. In southern Ontario, the species is fighting for survival, and losing.

In the year 2000, the CCC undertook its most ambitious project to date, selecting the healthiest 26 American chestnuts in Ontario, and cross-pollinating each with Chinese, Japanese, and European chestnuts at the Connecticut Agricultural Experiment Station. The objective was to produce seedlings with the characteristics of native American chestnuts, as well as the blight resistance of their foreign counterparts.

Crossbreeding like this is not uncommon in North America. Many supposedly “pure” American chestnuts growing in the wild or purchased from tree nurseries are, in fact, hybrids, leading to a great deal of confusion in efforts to preserve the native species. In order to solve the problem of purity, the CCC began putting its hybrids through a rigorous “back-breeding” program, which involved repeatedly breeding them with pure American chestnuts until their genetic profiles were between 98-99 percent American, while retaining the trace of their Chinese, Japanese, or European heritage that confers blight resistance.

The first generation of these back-bred hybrids (referred to as “F1”) were planted in 2001, in research plots on Onondaga Farms in St. George, Riverbend Farms in Calton, and on an acre of land at Casier’s home in St. Thomas, Ont. Following the principles of good science, the CCC also crossed the original 26 pure American chestnuts with each other, producing 643 pure seedlings that were planted as a control group, against which researchers could compare the 767 F1 trees.

Dragan Galic, a researcher at Guelph, has managed the CCC’s breeding program since its inception, dutifully infecting both groups of chestnuts with heavy doses of blight, and selecting those that show the greatest resistance, for breeding the next



Nuts undergoing sterilization and drying before storage (left), and seedlings (right) ready to leave the greenhouse for “hardening” before being planted at an American chestnut research site. (Contributed photos)

generation. The F1 hybrids, as predicted, proved partially resistant, and resistance intensified in the next generation (F2). But to the amazement of Galic and the wider chestnut conservation community, the control group showed the same degree of blight resistance. Galic and his CCC colleagues concluded that the 26 pure American chestnuts must possess a natural resistance that was concentrated by the breeding program.

“They’ve got something,” he says. “There’s no doubt in my mind.”

The mechanisms of resistance thus far identified fall into three general categories: the integrity of a tree’s bark, which prevents blight from infecting it in the first place; the ability of the tree to callus, isolating the infection into a canker so it cannot spread; and phytoalexins, a class of antimicrobial compounds that trees produce to fight infection. The first two traits have been observed in the F1 and F2 generations of pure American chestnut, while the third mechanism, the phytoalexins, is so far only inferred.

Some of Galic’s pure American chestnuts have lived for 20 years now despite receiving doses of Chestnut blight that would kill a wild tree significantly faster. Enchanted by the notion of propagating purely Ontarian blight-resistant American chestnuts without the need for hybridization, the CCC has converted its control group into a full-fledged breeding program. (The back-bred hybrid group has not been abandoned, but those trees are no longer a primary focus.) This program’s third generation (F3), produced from the healthiest and hardiest F2s, went in the ground in 2020. Casier hopes the F3s possess enough resistance to live with Chestnut blight for as long as 150 years. Since chestnuts reach sexual maturity after just 15 years, and can produce good lumber at 50, this would allow the species to survive and reproduce without human intervention, and contribute to the forest industry.

“We’re looking for a cultural restoration, an ecological restoration, and an economic restoration,” says Casier.

Once the strongest F3 trees have been identified, the Canadian Chestnut Council intends to produce yet another generation, F4, and begin planting them in the wild throughout Ontario, Quebec, and likely beyond. The objective is to make Chestnut blight just a common disease that the tree population, as a whole, can withstand.

“It will be our third generation that tells the story,” says Galic. “We hope, down the road, there will be millions.”

DIVERSITY

To say the Maritime provinces are entirely free of blight may be misleading. In 2013 there was an isolated outbreak in Melvern Square, N.S., where 60 trees planted by Bowater Mersey were found to be infected, and were subsequently torched. Neither before nor since has blight been confirmed in the region.

So the American chestnuts of the Maritimes are still relatively safe. They rank among the most genetically diverse populations in North America. There is stock from several distinct groups across the United States and from various regions in southern Ontario, some of which predate the blight and all of which have proven tolerant of Maritime winters. Recent work by Dr. Brian Husband and PhD student Sophia Stoltz, from the University of Guelph, has shown that several Maritime chestnuts are hybrids of Chinese, Japanese, or European descent, but the region’s keystone trees – such as Ashdale, Bridgewater, Uniacke, and at



Dragan Galic (on ladder) and Emily Sloat at work on the American chestnut research site at Riverbend Farms in Aylmer, Ont.

least several of those planted by Bowater – are pure Americans.

Some enthusiasts suggest these trees should be propagated throughout the Maritimes, to fill the ecological niche left vacant by the American beech (another nut tree devastated by invasive species). Others warn that such extensive propagation would open the Maritimes to an outbreak of Chestnut blight, and ultimately destroy what has been preserved here.

Some view Maritime chestnuts as a mere curiosity, their value to breeding programs limited by the fact that most of them are of unknown provenance. But Ron Casier reasons that more genetic diversity will ultimately result in a more resilient population, as will the region’s unique survival pressures, which favour stronger chestnuts and kill weaker ones. “For all we know, you could be growing a resistant tree right now,” he says.

Dragan Galic is of much the same mind. When his breeding program runs its course, he hopes to have millions of trees from only 26 parents, which makes inbreeding an ever-present danger. The solution will be to plant his F4 generation in the presence of wild American chestnuts that have a diverse genetic palette, including some in the Maritimes. The only way to save the species, he says, is “to cross the best with the best, to accumulate as many of those genes as possible.”

Ultimately, the fate of American chestnuts in the Maritimes will depend upon Maritimers themselves – the people who brought them here, who bred them here, who own the land on which they grow, and who are willing to plant and protect and propagate them now. They may do so for the sake of the species, for the future of commercial forestry, or just to grow their own chestnuts. Wherever these Maritime trees may have come from, it seems clear they are now home.

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