



BRAMPTON

Increasing the resilience of the tree canopy following an ice storm

By Sophie Guilbault

THE SCIENCE

Ice storms are fairly common in Canada. This type of event is experienced when specific meteorological conditions are met. For an ice storm to take place, a layer of warm air needs to form between two layers of cold air in the atmosphere. Under these circumstances, precipitation begins as snow, melts as it passes through the warm air, and becomes extremely cold when it goes through the final layer of cold air. When the cold drops of water reach a surface, they instantly freeze, forming a layer of ice on surfaces like trees, sidewalks, roads, and electricity pylons.

Ice storms have the potential to create severe damage in communities. The accumulated layers of ice can lead to dangerous driving and walking conditions, cause trees and tree branches to break, and damage electrical structures. The loss of power in the winter results in extensive losses for businesses and disruption for homeowners. One of the largest natural disasters in Canadian history was the January 1998 Ice Storm that affected the St. Lawrence Valley from Kingston to Quebec's Eastern Townships. It is estimated that the 1998 storm resulted in 35 fatalities, injured 945 people and temporarily displaced 600,000 people. At the time, this was the most costly storm in Canadian history – Canada's first billion-dollar storm.

THE TRIGGER

In December 2013, a severe ice storm left hundreds of thousands of people without power in Ontario and Quebec. The Greater Toronto Area (GTA) was particularly affected by this storm that happened just a few days before Christmas. Within the GTA, the City of Brampton was among the municipalities that suffered the most damage as a result of the storm, leaving approximately 20,000 people without power. In addition to the large number of power outages in the municipality, the event led to considerable damage to the tree canopy.

THE APPROACH

Known as the Flower City, Brampton takes pride in the abundance of vegetation that has been planted in the community. One of the main problems faced by the municipality following the 2013 ice storm was the extensive damage to the tree canopy. It was estimated that the storm resulted in the loss of approximately 50,000 trees across the community. Faced with this important loss, the City began to reflect on the best ways to replace the trees in a manner that would provide a sustainable and robust tree canopy. "We estimated that to replace a tree with a new one of a good size that would really become a component of the canopy, it would cost about \$1,000 per tree. Considering that we had lost 50,000 trees, we estimated that this effort would necessitate a 50 million dollar investment. It quickly became clear that we could not do it all at once," said Alain Normand, Emergency Manager for the City of Brampton.

The City developed a 10-year plan to replace the canopy loss. Before launching the replanting process, thoughtful consideration was put into the selection of the tree species that would be used in Brampton. Prior to the storm, trees for the community



Figure 13: *The City of Brampton was among the municipalities that suffered the most damage as a result of the 2013 ice storm, leaving approximately 20,000 people without power. The event also led to considerable damage to the tree canopy. (Source: City of Brampton)*

were selected mostly for their aesthetic features and to create a uniform appearance on city streets. This meant that in many cases, only one type of tree was planted per street. While this type of planting can contribute to a pleasing environment, it can also cause major losses when certain species are not able to withstand extreme storm conditions. "Some of the trees that were initially planted in Brampton were beautiful, however, many were not resistant to ice. Following the storm, we were faced with streets where every single tree died," said Mr. Normand.

Keeping this in mind, trees for the replanting were selected based on how well they would perform during an ice storm. "A horticultural expert from the City reviewed several studies in order to identify what species of trees are ice storm resilient," said Mr. Normand. The research revealed that the shape of a tree can help predict the way ice will accumulate on it. Some species are more prone to having ice accumulate on the entire branches, while others will only see the tip of the branches covered in ice. The second type tends to perform better during an ice storm. In addition to the careful selection of species, the City ensured that each street would be planted with a variety of trees to minimize the risk of complete loss on a single street during future storms.

THE OUTCOME

The City is currently completing the fifth year of its replanting strategy, with five more years to go until the tree canopy is equivalent to what it was before the ice storm. In addition to the replanting of trees that were lost during the storm, the municipality is ensuring that a strong tree canopy is being incorporated in areas of new development. More specifically, for a developer to be given a permit to develop, tree-planting requirements have to be respected. For every family unit that is being built, one new tree needs to be planted.

The effort led by the City of Brampton has contributed to build a more resilient tree canopy. While the trees have been carefully chosen to perform better during ice storms, it is important that a rich tree canopy also offers significant co-benefits to reduce heat-health risks during extremely hot days in the summer.

A WORD FROM BRAMPTON

When asked about his thoughts on the recovery process that took place in Brampton following the December 2013 ice storm, Alain Normand mentioned that one of the biggest challenges faced by the City in the immediate aftermath of the storm was related to the cleanup process. Since the storm affected several municipalities around Brampton, it was challenging to recruit enough crews to remove all the debris left by the storm. The City faced a similar challenge on the landscaping side. "We had limited resources to call upon and ended up having to rely on landscapers from other areas, including Algonquin Park, Ottawa, and the United States," said Mr. Normand.

When discussing the tree planting strategy pursued by the City of Brampton in recent years, Mr. Normand emphasized the importance of building a more resilient tree canopy. "It is nice to have exotic trees, but they may not have the best resistance. The species planted in Brampton following the storm are naturally present in the Canadian forest and possess some of the characteristics that will make them perform better during an ice storm. When aiming to plant a more resilient urban forest, it is also important to have a variety of trees across the City to avoid losing all of them if one species doesn't perform as well," added Mr. Normand.