

Indirect Indicators of Juvenile Tree Survivorship in Worcester, MA



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Introduction and Methods

In response to the Asian Longhorned Beetle infestation in 2008, about 30,000 trees were cut. The Massachusetts Department of Conservation and Recreation, the newly formed Worcester Tree Initiative, and local municipalities together planted over 30,000 trees to replace those which were lost.

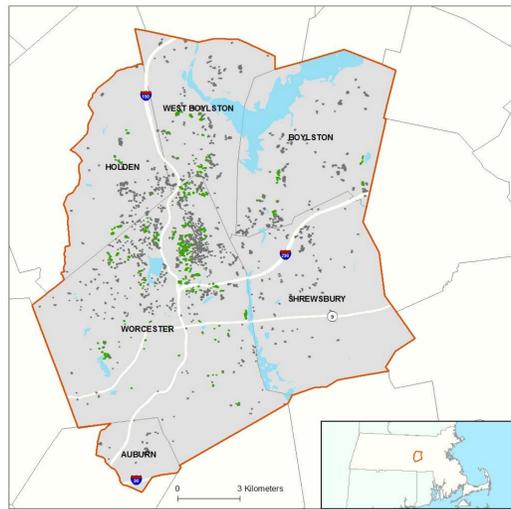


Figure 1: Location of the study area – the Asian Longhorned Beetle Regulation Zone in Central Massachusetts.

In summer 2015, fellows of the Human Environment Regional Observatory sampled 1,516 trees. Data were collected on the size metrics, health characteristics, and condition of young trees and interviewed a sample of 76 residents at some of these sites. Several patterns were observed regarding the trees' placements, their place of origin, and the benefits which they provide.

Shade vs. Ornamental

“Well I wanted to add colors so most of the trees I got were either a reddish color or would eventually flower. We wanted to add some colors to the property as we develop”
-- Interviewee

Ornamental trees had a higher rate of survivorship than shade trees and conifers/evergreens. Ornamental trees are chosen for their aesthetic value, but shade trees have several environmental benefits. “Tree shade can help cool the local environment by reducing the solar heating of some below canopy artificial surfaces” (Nowak and Dwyer, 2007). Shade trees and conifers can also block winds, reduce ultraviolet radiation, and decrease noise pollution. Because of these benefits, it is preferable that residents plant shade trees. The classifications of trees seen in the graph were based on a list provided by the Massachusetts Department of Conservation and Recreation.

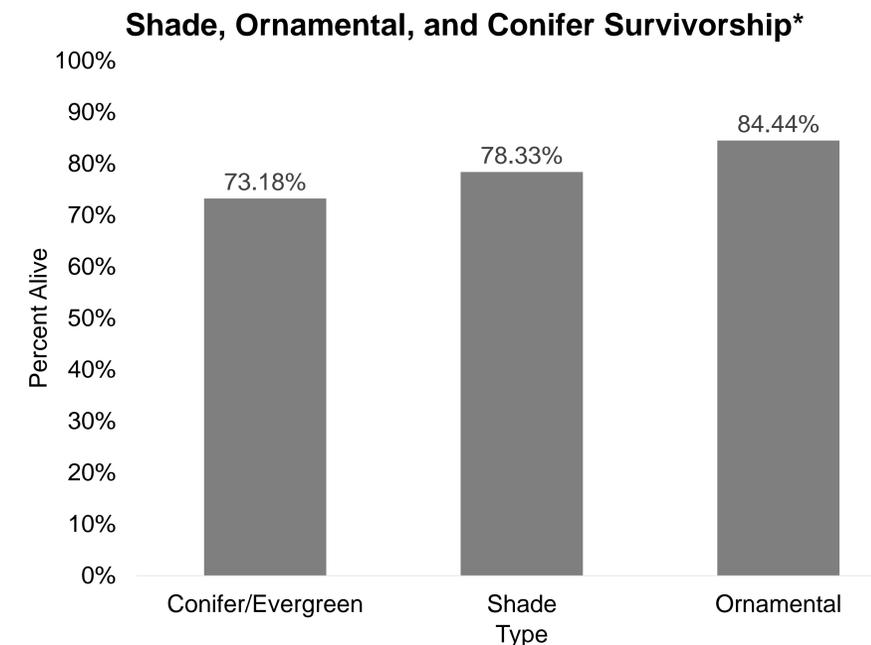


Figure 3: Percentage of survivorship based on type of tree.

*p=0.000, indicating a high level of significance between the survivorship and type of tree.

Front Yard vs. Back Yard

Front Yard and Back Yard Survivorship*

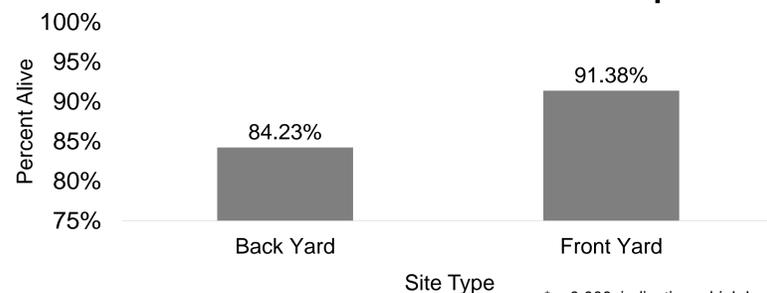


Figure 2: Percentage of survivorship based on site type.

*p=0.000, indicating a high level of significance between the survivorship and site type.

Trees planted in front yards were more likely to survive than those planted in back yards. These trees tend to be non-native and ornamental and in interviews, people often said they were chosen for their aesthetic value. Ko et al. (2015) also found that front or back yard tree placement was an indirect indicator of tree survivorship.

“This one [in the front yard] we kinda chose cause we wanted a prettier tree in the front and the ones in back we wanted ones that would grow tall and provide shade”
-- Interviewee

Native vs. Non-Native

Of the trees surveyed in 2015, non-native trees were slightly more likely to survive. This was surprising because native trees should be more adapted to the climate and surrounding environment. It is important to the regional ecosystem to have a balanced mix of native and non-native trees, which are essential to supporting biodiversity. In the past, Worcester has planted monocultures of trees, which lowered the trees' capacity to survive disturbances.

Native and Non-Native Survivorship*

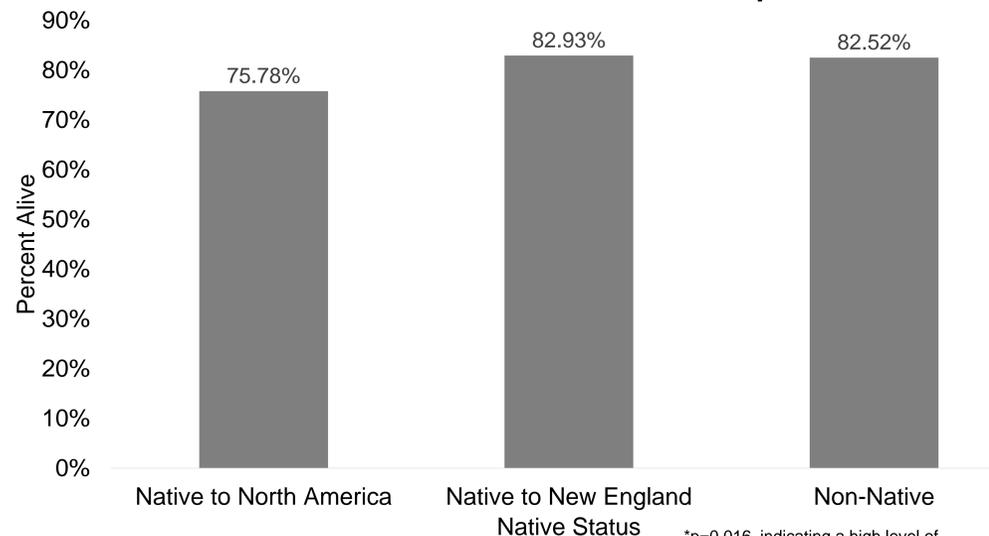


Figure 4: Percentage of survivorship based on native status.

*p=0.016, indicating a high level of significance between the survivorship and native status of the trees.

Implications



The HERO 2015 team hypothesizes that residents take greater care of their front yard, non-native, and ornamental trees, rather than their back yard, native, shade, and conifer/evergreen trees. Generally, ornamental and non-native trees are perceived to be prettier than their shade and conifer counterparts.

Therefore it is possible that caretakers are more inclined to maintain these trees. Ornamental trees provide aesthetic value; however, shade and coniferous provide greater ecosystem services. Larger trees lower energy costs, increase wildlife, retain greater amounts of storm water, block winds, reduce solar radiation, decrease noise pollution, and improve air quality. This information provides an opportunity for the various tree planting organizations to increase communications regarding the importance of caring for all trees equally.