



2012 Maple Cultivar Winter Damage Assessment

An assessment was carried out in July 2012 to estimate the extent of damage to Autumn Blaze® Maple (*Acer x freemanii* 'Jeffersfred') and Sienna Glen® Maple (*Acer x freemanii* 'Sienna') cultivars resulting from weather events adverse to tree health during the fall of 2011 and spring of 2012. The purpose of the survey was to evaluate the overall and comparative performance of these cultivars in the urban environment and uncover possible underlying reasons for findings.

NDSU

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Tree Resource Assessment Survey

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Background

Tree resource managers across North Dakota voiced concern regarding large-scale dieback and mortality of Freeman maple cultivars in the spring of 2012. This concern led to the design and implementation of this assessment.

Questions arose regarding the reason for this tree health phenomenon because newer Freeman maple cultivar plantings, especially the newest plantings installed in the past few years, showed various levels of dieback from the top down and, in many cases, 100 percent mortality. This dieback and mortality was not accompanied by any signs of insect or pathogen attack.

The cause for this dieback was determined to be weather-related: either unusually warm weather in the fall that may have interfered with the process of hardening off, or unusual early warming events in the spring that may have activated growth, followed by cold snaps that could have resulted in frost injury to vulnerable tissues.

Although the cause of dieback may never be known exactly, questions began to arise about the suitability of Freeman maple cultivars for our region. Also, which of the most commonly planted maple cultivars, Sienna Glen® or Autumn Blaze®, performed better in these challenging environmental situations? What factors, aside from the cultivar, may have had an effect on damage severity? This assessment of newer plantings of maples in south Fargo was planned to attempt to address these questions.

Maple cultivars have become very popular across the northern Plains in recent years due to their positive characteristics, such as fast growth rate and vibrant fall color. Maple cultivars are derived from selective propagation of individual trees that exhibit desirable characteristics. Autumn Blaze® and Sienna Glen® maple cultivars are selections from the hybridization of red maple (*Acer rubrum*) and silver maple (*Acer saccharinum*) species. These often are referred to collectively as Freeman maples.

Freeman maple cultivars have been planted widely across North Dakota in the past decade and have done quite well in the region initially, despite North Dakota's often harsh climate and challenging soil characteristics.

The fall of 2011 and early spring 2012 brought unusual, short-term warming trends accompanied by historically low precipitation throughout much of North Dakota. This is partly seen as a significant increase in the departure from the average temperature and rainfall from September 2011 through December 2011 and a significant increase in the departure from the average temperature in March 2012 (see Appendix).

Some trees also died entirely and were taken out of the surveyed area prior to the start of the survey, a fact that may have caused the findings from this assessment to understate the actual level of severity of this tree health phenomenon.



Methods of Assessment

The assessment was carried out during the last week of August 2012 by the NDSU-North Dakota Forest Service's forest health specialist. Maple plantings in two specific work units in newer developments in the southern part of the Fargo metro area were selected for assessment. Work units were selected in areas where the Fargo Forestry Department had not pruned injured branches or removed dead trees.

The Fargo Forestry Department supplied a detailed list of maples in the two work units, including the physical addresses of the maple trees. Streets were chosen arbitrarily from the work unit list and an effort was made to assess all Autumn Blaze® and Sienna Glen® maple trees on each selected street. In all, 99 trees were included in the assessment.

The diameter at breast height (DBH) was taken for each tree using a standard DBH tape. The following information was noted: presence/absence (and type) of mulch, presence/absence of weed barrier material, presence of grass, mechanical damage at the base (weed-whip/mower damage), planting depth (surveyors noted if the tree was planted too shallowly/deeply), evidence of pruning, evidence of insect or pathogen activity and symptoms of other abiotic health factors such as iron chlorosis or environmental leaf scorch. Crown dieback was evaluated as the percent of the crown that was dead or missing from what would be considered the original full, healthy crown. The crown damage estimation included portions of the tree that had been pruned recently (Figure 1).



Figure 1: A healthy maple tree with zero percent dieback (left) and a maple tree with approximately 25 percent dieback (right).

Results

Autumn Blaze® showed less damage overall than Sienna Glen® (Figure 2), despite having an overall smaller average diameter than Sienna Glen®; the smaller diameter was associated with higher damage ratings in the overall assessment (Figure 3). According to this assessment and under the environmental conditions in the fall of 2011 and spring of 2012, Autumn Blaze® Maple performed better than Sienna Glen® Maple in the assessment area.

However, this is not necessarily supported by anecdotal information and visual surveys from other locals in Fargo and across North Dakota, where both cultivars were reported to sustain similar levels of damage. This information was gathered through personal communication with city foresters from Bismarck, Williston, Minot and Grand Forks, as well as through extensive travel throughout North Dakota during the 2012 field season. This anecdotal information was given support after examining some of the more general details in the results of this assessment.

Looking at the bigger picture, it was noticed that other factors may show a clearer picture of tree characteristics and health factors that led to increased dieback in Autumn Blaze® and Sienna Glen® Maple cultivars. Although the assessment was done just in a few neighborhoods in south Fargo, indications of the importance of basic cultural practices are apparent in the assessment results and apply to trees wherever they are planted.



Figure 2: Average winter damage rating, shown as percent of crown affected for all Autumn Blaze® and Sienna Glen® trees evaluated.

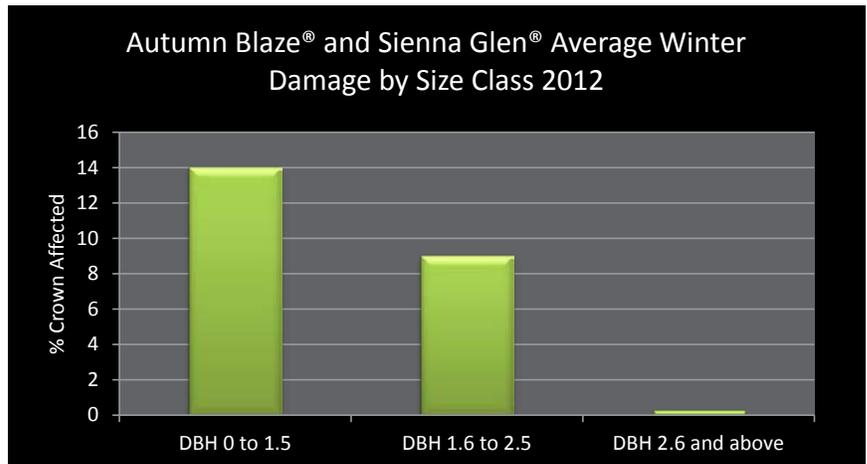
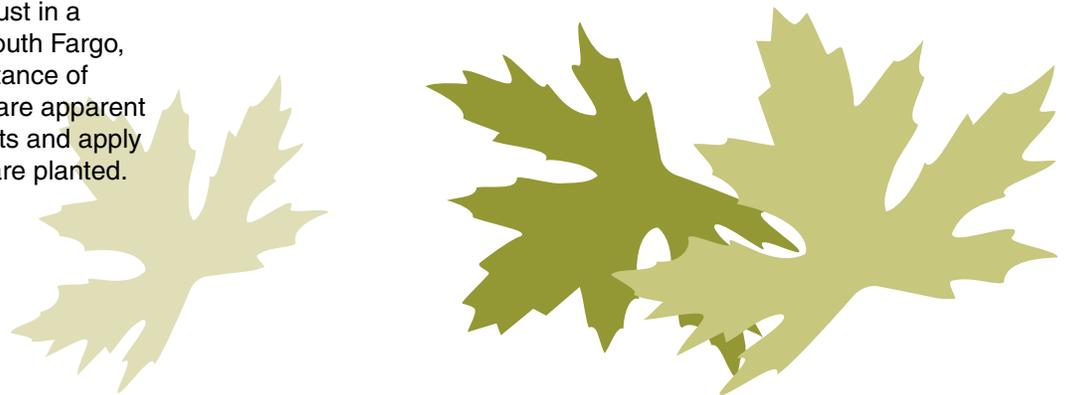


Figure 3: Winter damage to Autumn Blaze® and Sienna Glen® maples by size class.



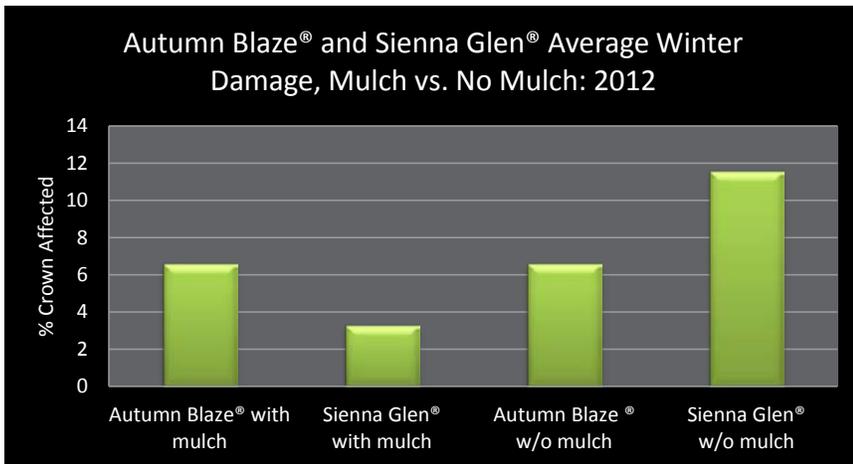


Figure 4: Effect of mulch on Autumn Blaze® and Sienna Glen® maple cultivars.

Mulching seemed to have a noticeable impact on the level of damage sustained by the two cultivars. Absence of mulch seemed to be predictive of a greater negative impact on the average damage rating of the Sienna Glen® cultivar, while lack of mulching seemed to be less predictive of winter damage in Autumn Blaze® Maple (Figure 4). The reason for this trend is not immediately clear. One would have expected to see a decrease in dieback rating with mulching as seen with Sienna Glen® Maple.

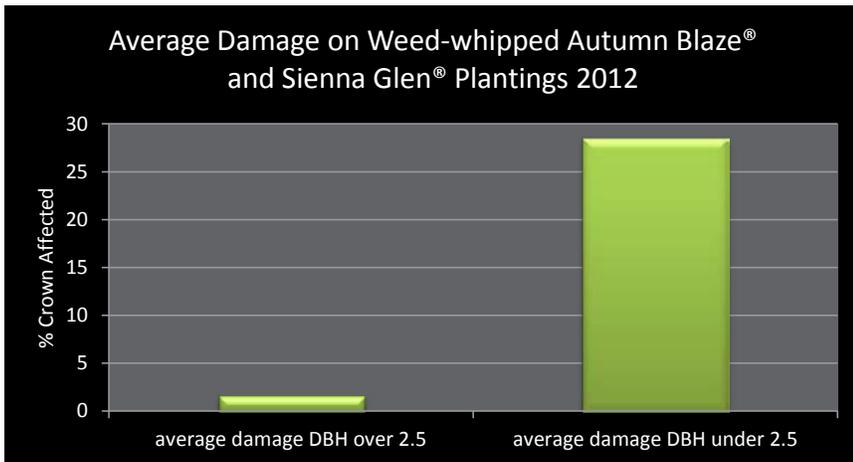


Figure 5: Weed-whip damage to trees above or below 2.5 DBH.

Other observations made based on the assessment results suggest that weed-whip injury was a significant predictor of increased crown dieback, as can be seen in Figure 5. The cultural practice of mulching essentially eliminates the need to use a weed whip close to the main stem of a tree, limiting the occurrence of damage to the main stem. This assessment shows a correlation between the presence of mulch and, therefore, the absence of weed-whip injury. While the connection shown here is logical and elementary, it reinforces the importance of sound cultural practices when installing and establishing new plantings.



Conclusions

The initial purpose of this assessment was to determine if one of the evaluated maple cultivars performed better than the other following a combination of challenging environmental conditions. This question was not answered clearly. Rather, proper cultural practices for establishing new tree plantings were shown to be key in mitigating environmental stress. Mulching trees not only helps maintain soil moisture in a tree's root zone, it also creates a spatial buffer that often prevents weed-whip and mower damage to the main stem.

The late summer of 2011 was very dry. The early winter of 2011 and early spring of 2012 presented unusual warming periods. These occurrences undoubtedly exposed trees to significant stress, which was seen as widespread dieback among Freeman maple cultivars. However, observations made in this assessment indicate that poor cultural practices exacerbate negative tree health effects that result from environmental fluctuations.

The following observations highlight the importance of sound cultural practices when establishing new plantings in a stress-prone environment:

Half (50 percent) of maple trees growing in sod, without mulch, showed weed-whip or mower damage.

The average crown damage rating for weed-whipped trees under the DBH of 2.5 was just under 30 percent, the highest of any category.

The added benefits of mulching also include creating a zone that reduces sod competition for water and nutrients, and preserves soil moisture in the tree root zone.

Further, when wounds to the main stem or roots are fresh, unintentional direct exposure of herbicide to these wounds can occur when broad-leaf weed control products are applied nearby. Direct herbicide exposure has severe impacts on tree health and will lead to stress, dieback and potential mortality, especially for trees of smaller diameter classes and newer plantings.

If nothing else, this assessment highlights the importance of basic tree care: planting, mulching, watering and taking care not to damage plantings.

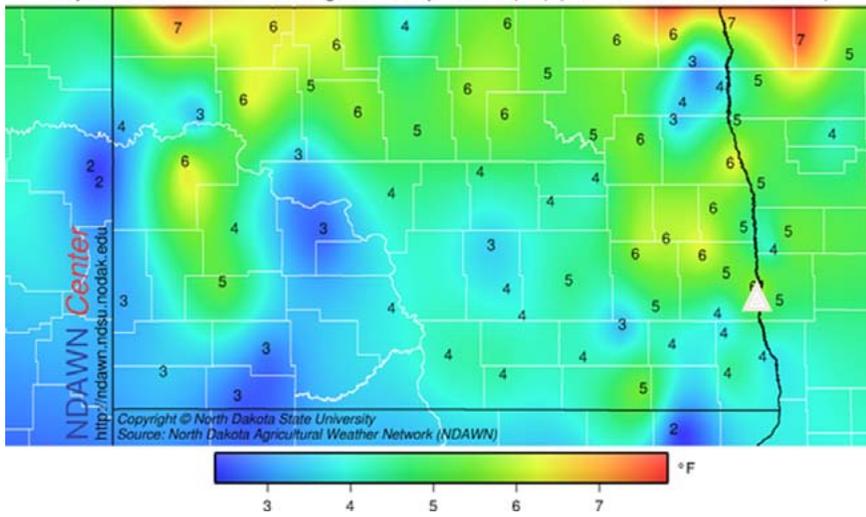


Figure 6: Typical pattern of dieback seen statewide on more recently planted Freeman maple cultivars. This photo was taken in a new development.



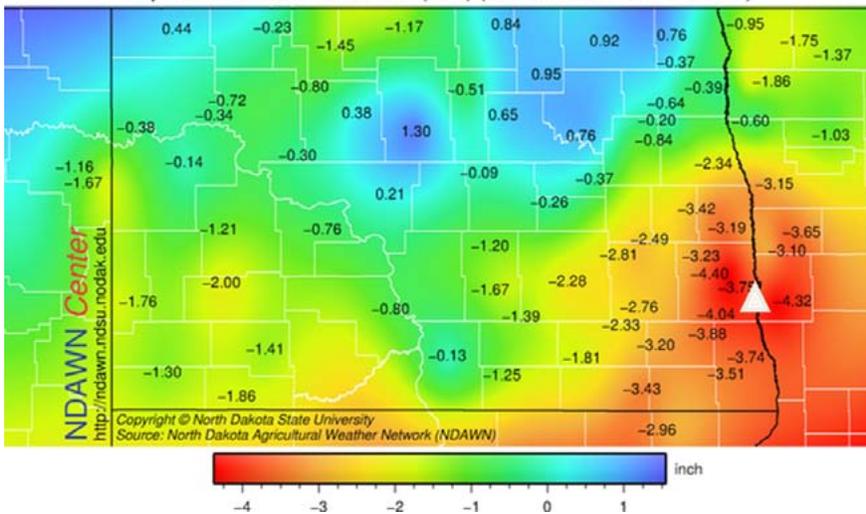
Appendix

Departure from Normal Average Air Temperature (°F) (2011-09-01 – 2011-12-31)



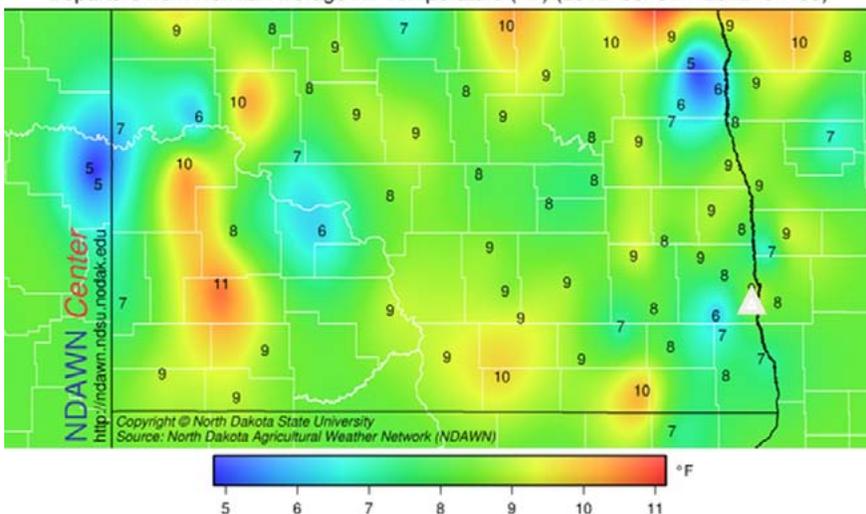
September to December 2011 departure from normal average temperature for North Dakota. The triangle indicates the location of the survey, Fargo, N.D.

Departure from Normal Rainfall (inch) (2011-09-01 – 2011-12-31)



September to December 2011 departure from normal rainfall for North Dakota. Note the values for the southeastern quarter of the state. The triangle indicates the location of the survey, Fargo, N.D.

Departure from Normal Average Air Temperature (°F) (2012-03-01 – 2012-04-30)



March 2012 departure from normal average temperature for North Dakota. The triangle indicates the location of the survey, Fargo, N.D.



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Any inquiries about the NDSU-North Dakota Forest Service Forest Health Program may be directed to Aaron.D.Bergdahl@ndsu.edu or (701) 231-5138.

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