

NORWAY MAPLE

story & photos by
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A Threat to North

American Forests

Who doesn't love maple trees? These are trees of symmetrical beauty, rich green canopies, and glorious fall color. However, one maple poses an insidious threat to ecological integrity and diversity: the exotic Norway maple *Acer platanoides*.

The maple genus, *Acer*, includes almost 150 species worldwide. Many native maples adorn North American forests, from sugar *Acer saccharum* and red maple trees *Acer rubrum* in eastern forests to bigleaf maple *Acer macrophyllum* in the west, from silver maple *Acer saccharinum* on floodplains to striped maple *Acer pensylvanicum* in the understory to mountain maple *Acer spicatum*, a gangly northern shrub. Elsewhere across the northern hemisphere, more maples have evolved, thanks to continental drift. When the northern supercontinent of Laurasia split apart, the habitat of the ancestral maple was fragmented. Over 60 million years, the isolated pockets of maples diverged and evolved into separate species, creating, for example, the beautiful Japanese maples of Asia and Europe's sycamore maple *Acer pseudoplatanoides* and Norway maple *Acer platanoides*. Now many of the world's maples have made their way back into North American gardens, thanks to human sponsorship of what Stephen Spongberg calls, in his book by this title, "a reunion of trees." And this turns out to be a problem.

The problem: Norway maple, a species native to the European continent, is spreading into nature preserves from plantings in gardens and along roadways. This top-selling nursery tree is taking over woodlands throughout eastern North America. Even the British Isles have been invaded; Norway maple is not native there.

I found Norway maple naturalizing in the Drew University Forest Preserve when I moved to New Jersey for a faculty post in 1986. Norway maple so closely resembles the native sugar maple that I was fooled at first. However, the Norway maple is distinguishable from sugar maple by its milky sap, glossy lower leaf surface, flowers in upright clusters rather than dangling catkins, and retention of foliage long into the autumn. While sugar maple leaves turn red or some-



times gold, Norway maple leaves turn yellow without a hint of scarlet.

What's so bad about Norway maple? This question comes up wherever I speak about my studies of Norway maple. Some people feel that a tree is a tree is a tree. Others wonder why Norway maple is not interchangeable with its cousins, the sugar and red maples. However, my research with students has shown that Norway maple poses a real ecological threat to forests, far beyond its failure to contribute those red hues to the autumn landscape.

The first threat comes from Norway maple's sheer numbers. It takes only a few Norway maple trees to blanket the forest floor with seedlings. Like sugar maple, Norway maple grows a "seedling bank" that thrives in deep shade, poised to capture new openings in the canopy. In the Drew Forest, Norway maple is abundant in all age classes, and its age structure promises a growing role in the future. The Norway maple trees of the next generation are lurking beneath trees of all species today in this forest, outnumbering other tree seedlings throughout the forest.

Each piece of ground that Norway maple occupies is a piece of ground lost to native trees such as sugar maple, American beech *Fagus grandifolia* and black oak *Quercus velutina*. This threat is particularly acute in landscapes where each forest preserve is a small island floating in a sea of

agriculture or suburban development. As the Norway maple population expands, the native tree populations contract and lose genetic diversity.

Beyond impacts on tree populations, Norway maple poses a second threat: to diversity in the lower layers of the forest. When we compared the vascular plants beneath Norway maple with those beneath sugar maple and American beech, **we found species richness to be significantly lower beneath Norway maple than beneath the native trees.** Plenty of plants grow under a Norway maple tree; the trouble is that 85% of all plants are additional Norway maples. **Native wildflowers, shrubs, and tree seedlings aren't doing well.**

No one is yet sure of the mechanism by which Norway maple suppresses the diversity of native plants in the forest understory: deep shade? allelopathic chemicals? below-ground competition for water or nutrients? One study, by Brian Kloeppel and Marc Abrams at Penn State, showed Norway maple to be more efficient than sugar maple at photosynthesizing and utilizing water. New research by doctoral students Wei Fang at SUNY-Stony Brook and Betsy Rich at Drexel University should help answer the question of how Norway maple exerts such disruptive influence on the forest community.

Meanwhile, I have joined the ranks of land stewards who are removing Norway maple from woodlands. Since I began publishing my findings about Norway maple, I've heard from people striving to eliminate Norway maple from New York's Central Park, Philadelphia's Fairmount Parks, and many other natural areas from New Jersey to Massachusetts to Ontario.

The geographic extent of the Norway maple invasion has yet to be mapped, but I see little to prevent it from becoming invasive wherever it is introduced. This tree thrives in shade, grows well on Long Island soils too sandy for sugar maple, and tolerates cold conditions in the north. Even where it is not yet spreading from landscape plantings, I predict the Norway maple will follow a pattern, commonly seen in many biotic invasions, whereby a few indi-



Norway maple stays green after the sugar maple (yellow) changes color and stops synthesizing. Note that all Norway maple leaves (below) are broader in width than tall.



viduals naturalize at first, followed by a lag period and then a burst of reproduction and expansion. My own restoration project in the Drew University

Forest Preserve, begun in 1997, is a controlled experiment designed to test the efficacy of two approaches: tree removal and seedling removal. So far it appears that native sugar maple will benefit from removal of Norway maple trees but not from removal of Norway maple seedlings. Apparently when we pull up small seedlings, we disturb the soil in a way that initiates more seed germination by Norway than by sugar maple. The tree removals were done with a chainsaw and thus did not disturb the soil. By depleting seed sources of Norway maple, we facilitated either new recruitment or greater survival of sugar maple seedlings.

However, the new canopy openings where Norway maples were cut down have introduced other exotic plants such as Japanese honeysuckle and black locust. It is a challenge to ensure that removal of one invasive species will not create new problems but will fully restore the natural woodland community.

One key lesson from the Norway maple invasion is that our forests are not resilient;

they are not endowed with resistance to invasions by exotic species. **The common generalization that invaders need disturbance does not hold water in this case, nor in many other cases of invasions by plants, such as bush honeysuckles and barberry, and by pathogens, such as Dutch elm disease and the chestnut blight.**

In conclusion, Norway maple is at the heart of a tug of war. Some landscapers plant the tree with enthusiasm while land stewards labor to purge it from parks and other natural areas across North America. Unlike many exotic plants, Norway maple is capable of reproducing and spreading into many habitats, without reliance on edges or disturbance. Research now shows that Norway maple is like an ecological sink hole when it grows in a natural area. It suppresses the diversity of wildflowers and shrubs, it usurps space previously held by native tree populations, and it reproduces and spreads prolifically.

Isn't it time to stop planting Norway maples? By choosing native trees instead, our landscaping endeavors will help to restore rather than deplete biodiversity. The case of the Norway maple is a cautionary tale: by rearranging the world's plants for the sake of aesthetics, we are risking serious damage to our beleaguered natural places. More broadly, perhaps it is time to leave the Earth's species on the continents where they evolved and where they fit into the natural ecosystems. ❁



TOP: Norway maple sapling groundcover. BELOW: Cut logs in the restoration project.



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