STUDYING THE EFFECTS OF MANAGEMENT PRACTICES ON *AILANTHUS* POPULATIONS IN OHIO FORESTS: A RESEARCH UPDATE

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ABSTRACT

Although commonly perceived as an urban and roadside problem, *Ailanthus altissima* is a highly invasive non-native tree that is present in many forested landscapes in the eastern U.S. It has been a persistent feature of eastern U.S. landscapes since its introduction to North America as an ornamental shade tree in Philadelphia in 1784. *Ailanthus* possesses numerous characteristics often associated with highly invasive species. It is extremely fast growing, reaching heights of 25 to 30 m (80 to 100 ft). It is dioecious and is a prolific seeder, producing up to 350,000 seeds per tree in a single growing season (Pannell 2002). Seeds develop in the summer, mature in early fall, and typically persist until March. Wind-dispersed seeds can travel more than 100 m (Landenberger et al. 2007). Persistence of seeds in soil seed banks is underreported. It appears that seeds are short-lived, typically 1 to 2 years, but germination rates are very high (80 to 100 percent) in disturbed stands. In addition, *Ailanthus* is capable of aggressive clonal spread, often creating dense thickets that can outcompete native trees. While considered shade intolerant, clonal sprouts attached to a parent tree can persist in a shaded forest understory for up to 20 years (Kowarik 1995). Vigorous sprouts can develop 15 to 30 m (50 to 90 ft) from a parent tree (Illick and Brouse 1923). Although the long-term effects of *Ailanthus* on native tree regeneration are not known, it likely has a negative impact because of its highly competitive traits and production of the allelopathic compound ailanthone (Hiesey 1996).

Both natural (e.g., tornadoes, wind or ice storms, insect and disease outbreaks) and human made (e.g., prescribed fire, timber harvesting, skid trails, roads, rights-of-way) disturbances have the potential to facilitate *Ailanthus* establishment and spread within forested landscapes. These disturbances can promote *Ailanthus* populations through increases in forest-floor light levels, soil disturbance, and propagule movement by heavy equipment; as well as enhanced germination by reduced leaf litter and reduced plant competition. While studying the effects of prescribed fire and thinning on oak regeneration, we became aware of the potential increased risk of non-native invasive plant expansion. The use of prescribed fire as a viable management tool in Ohio's public forests has increased rapidly in the last decade (Bowden 2009). However, very little is known about the direct and immediate effects of fire on *Ailanthus*. Some forest managers have reported observing increases in *Ailanthus* via seed germination immediately following fires. Saplings are easily topkilled by fire, but resprouting can be prolific (Lewis 2007). It is unknown if post-burn *Ailanthus* expansion occurs when propagule pressure is high.

Our research has expanded to include the impacts of prescribed fire and timber harvesting on *Ailanthus* populations within mixed oak forests. The primary

objectives are to (1) determine how the distribution and abundance of *Ailanthus* is related to recent prescribed fires, other management activities, and landscape features; and (2) document the direct effects of prescribed fire on the demography of *Ailanthus* populations and explore the use of pre-burn herbicide application to mitigate the risk of *Ailanthus* expansion after fire. The study area is within the Tar Hollow State Forest (16,354 acres), located within the Southern Unglaciated Allegheny Plateau of southeastern Ohio. The topography is highly dissected, consisting of sharp ridges, steep slopes, and narrow valleys. The forest has active timber management and prescribed fire programs. Fourteen prescribed burns, covering more than 2,600 acres, were carried out between 2001 and 2008.

Geo-referenced digital aerial sketch mapping technology in a low-flying helicopter was used to identify seed-producing female trees and patches of *Ailanthus* in winter 2008, when persistent seeds were highly visible. During a 2-hour flight, 98 seed-bearing females and 42 patches, ranging in size from 0.18 to 13.4 ha, were identified within a 3,885-ha (9,600-acre) area. Aerially identified females were ground-truthed (95.7 percent accuracy) using hand-held GPS units. We conclude that the method is an effective and efficient way to survey for seed-producing *Ailanthus* across a forested landscape. In summer 2009, sampling of individual female trees as well as a systematic grid (N=267) was initiated to model *Ailanthus* abundance, demography, and spread in relation to landscape and stand attributes and management practices such as harvesting and prescribed fires. Research plots were also installed to study the direct effects of prescribed fire and herbicide treatments on *Ailanthus* demography and spread. Herbicide stem injections (hack-n-squirt with imazapyr) of these geo-referenced trees were completed in autumn 2009, and prescribed burns will be completed in 2010. Treatment effectiveness and subsequent woody plant regeneration will be monitored over time.

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