

ASH PHLOEM REDUCTION MODELS VARY AMONG SPECIES AND GROWING CONDITIONS

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ABSTRACT

The exotic insect, emerald ash borer (*Agrilus planipennis*), is responsible for the death of millions of ash trees. Removal of ash from areas in close proximity to outlier populations will reduce the potential population density of emerald ash borer (EAB). EAB larvae develop in the phloem of ash trees in stems and branches above approximately 2.5 cm (1 in.) in diameter. We can estimate the amount of phloem available to the insect in a stand containing ash and develop models of the amount of ash tree removal necessary to reduce the breeding substrate by a target percentage. Other research studies on bark and wood boring beetles indicate they may be selecting trees based on growth rate, vigor, or phloem thickness. Relationships between surface area of ash and diameter have been reported and used in estimating population potential of EAB. We have characterized significant quadratic relationships between diameter at breast height (d.b.h.) and surface area, phloem volume, and phloem basal area for white, green, and black ash in both open grown and forested settings across Michigan and northern Wisconsin.

The surface area and phloem thickness of more than 500 ash trees were measured using standing trees as well as cut trees throughout the Lower and Upper Peninsulas of Michigan and northern Wisconsin. White, green, and black ash trees in open grown and

forested settings were all represented. There are strong quadratic relationships between diameter at breast height and calculated surface area of the tree, but these quadratic relationships differ significantly between open grown and forest grown trees when the different ash species are considered. Multiple models have been developed for use in management prescriptions to reduce the amount of ash available to emerald ash borer. These models are based on ash species and crown light exposure. Information on ash species and the light exposure for most of the trees in a stand (i.e., forested or open grown trees) may allow managers to use a more specific model to fit their stands.

These models may be used with stand and stock tables to determine diameter limits for cutting to meet prescribed ash phloem reduction targets. By reducing emerald ash borer populations through phloem reduction, and decreasing the removal of the smaller trees in a stand, this model will enable the genetic diversity of ash to be optimized during ash reduction efforts. Similar models are available for use when the management goal is to retain large trees within a stand. Forest resource managers are able to access the models online at www.ashmodel.org and determine the diameter limit for removal of ash to achieve the phloem reduction target within the context of other forest management goals.