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# Management Options for Minimizing Emerald Ash Borer Impact in Ohio Woodlands

**Kathy Smith**, Ohio State University Extension Program Director, Forestry  
**Randall Heiligmann**, Ohio State University Professor Emeritus



**E**merald ash borer (EAB) is a non-native insect that is currently attacking ash trees throughout much of the northeastern United States and portions of eastern Canada. First identified in southeastern Michigan in 2002, EAB has already killed tens of millions of ash trees in the cities and forests of that state, and tens of millions more in at least 14 other states. Extensive efforts to contain and eradicate EAB have so far been disappointing. Ultimately, unless some practical means is found to eradicate it, EAB has the potential to kill all native ash in this part of the country. For that reason, rural and urban Ohio landowners have become increasingly concerned about the risk EAB poses to their ash trees and woodlands, and asking what they can do to address that risk. This fact sheet presents alternative management strategies to minimize the impact of EAB on woodlands and existing or planned forest plantings, and identifies the consequences of adopting those strategies.

Emerald ash borer is a selective pest; it attacks only ash trees, members of the genus *Fraxinus* spp. However, it attacks all of our native ashes—black, blue, green, pumpkin, and white. To learn more about EAB, including how to identify the insect and its damage; to learn to identify ash trees; or to obtain a diagnostic checklist to help determine if your trees or woodland are infested with EAB, visit Ohio State University Extension's emerald ash borer website at <http://ashalert.osu.edu>.

When this fact sheet first appeared in 2005, there was far less urgency regarding the need to implement woodland management strategies to minimize EAB impacts. At that time EAB in Ohio was limited to a few counties in northwest Ohio, and there was optimism that efforts to contain and eradicate EAB would eliminate or at least dramatically slow its spread. In most instances, woodland management activities aimed at minimizing EAB's impact were limited to northwest Ohio.

Emerald ash borer is already present in most Ohio counties containing forests and woodlands with a significant amount of ash. The risk of those infestations spreading to other woodlands is high. As discussed in this fact sheet, the woodland impact of an EAB infestation depends on a wide variety of factors. In many instances, much of the undesirable impact can be minimized by implementing appropriate management practices. The effectiveness of those practices, however, often depends on implementing them well in advance of the infestation. For that reason, it is crucial that owners of Ohio woodlands containing a significant amount of ash evaluate the potential impact EAB could have on their woodlands and develop appropriate strategies to minimize that impact where appropriate.

There are numerous places on the web where this information is available:

- OSU Extension: <http://ashalert.osu.edu>
- Ohio Division of Forestry: <http://www.ohiodnr.com/forestry/Health/Health.htm>
- Ohio Department of Agriculture: <http://www.ohioagriculture.gov/eab> or by phone at 1-888-OHIO-EAB.

Any one of these sources provides up-to-date information on current infestation areas and any quarantine that may currently be in place.

It is important for woodland owners in Ohio to evaluate the potential impact EAB could have on their woodlands and develop appropriate strategies to minimize that impact. Stand management activities initiated now could be critical in reducing the impact of EAB in the future as it moves through the state. This will be particularly true for stands with a relatively high ash composition.

### Ash in Ohio

Ashes are important tree species in the natural forests of Ohio, and have been planted extensively throughout the state for reforestation. Over the state as a whole, ash species occupy about 12% of the total forest land<sup>1</sup>. However, the species distribution and amount of ash in Ohio's forests is not at all uniform,

but varies dramatically from stands containing no ash to stands composed entirely of ash. White ash is found throughout the state, and typically grows on deep, fertile upland soils. Green ash is also found growing throughout the state, but is typically found on moist bottomland soils and along streams. However, green ash has been heavily planted on a wide variety of



sites because it adapts well to a broad range of site conditions. Black ash, less common than white or green ash, is found growing throughout the northern two-thirds of the state in low, moist areas, often on poorly drained soils. Blue ash, less common than black, is most likely to be found on dry limestone uplands in the western half of the state. Pumpkin ash, a rarely seen species, is found in swampy woodlands in western Ohio. Numerous ash trees, both native and non-native, also make up a significant portion of Ohio's urban forests, including street and landscape plantings.

### Background Considerations

As you evaluate management strategies to minimize the potential impact of EAB in your woodland, there are several important facts that should influence your decision to act or not, and what action to take.

- There are no assurances that EAB will be controlled or eradicated.
- Because EAB is a relatively new, exotic pest, our knowledge about the insect, its habits, and its management or control are constantly evolving and expanding.

<sup>1</sup>Forest Statistics for Ohio. 1991. USDA-NEFES Res. Bull. NE-128

- It would be a serious error to assume that EAB is a concern only for woodland owners near current EAB infestations. EAB is a concern for all woodland owners throughout Ohio.
- Proactive landowners will have greater control over their woodland resources in minimizing the long-term impact of EAB if it is not eradicated.
- A variety of factors enter into evaluating and selecting the management strategy appropriate for a specific woodland, and for this reason the best management decisions will always be made in consultation with a professional forester.

The remainder of this fact sheet is designed to guide woodland owners through an evaluation of alternative management strategies to address four situations:

1. A tree planting (reforestation, windbreak, etc.) where, if it were not for EAB, ash would be a species included in the planting.
2. An existing tree planting (plantation) containing ash, in which the trees are less than 2 inches dbh<sup>2</sup>.
3. An existing forest stand containing ash in which the dominant trees are less than 12 inches dbh.
4. An existing forest stand containing ash in which the dominant trees are greater than 12 inches dbh.

The information that follows is divided into the four situations identified above along with alternative management strategies for each. For the last three situations, there is a diagram where the situation is defined in a green box with the alternative management strategies being outlined in the yellow box. The diagrams are then followed up by a more detailed discussion identifying the effects on and benefits to the woodland for each strategy. Each alternative management strategy is described for the two possible outcomes: (a) EAB is allowed to naturally progress across the state and ultimately infests the woodland, and (b) EAB for whatever reason never infests the woodland.

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<sup>2</sup>dbh is an abbreviation standing for diameter breast height, the diameter of the tree measured 4.5 feet above ground level.

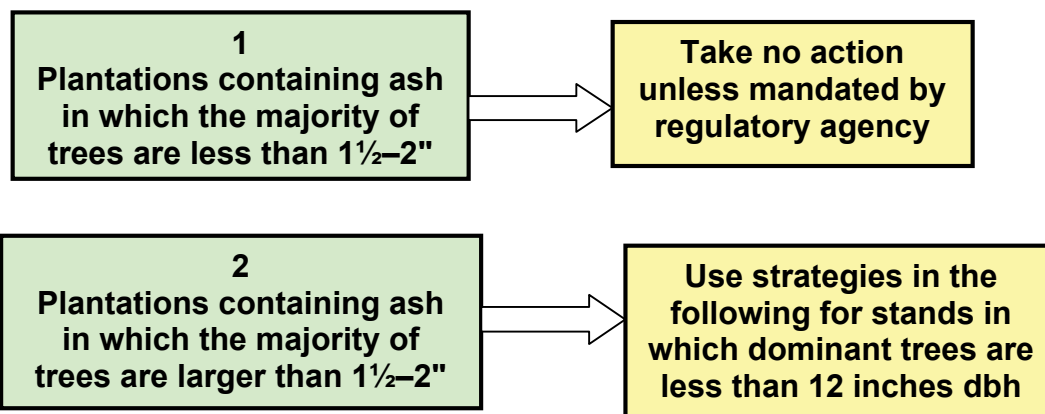
## Strategies for Tree Planting



Historically, ashes have been planted extensively throughout Ohio for reforestation, and successful plantings of pure ash or ash mixed with other hardwood species are common throughout much of the state. However, because of EAB's spread throughout Ohio and neighboring states, and because there is currently no viable method of controlling or eradicating EAB in the forest environment, native ash species cannot be recommended for tree planting in situations where the ash would be expected to survive and become all or part of the future stand.

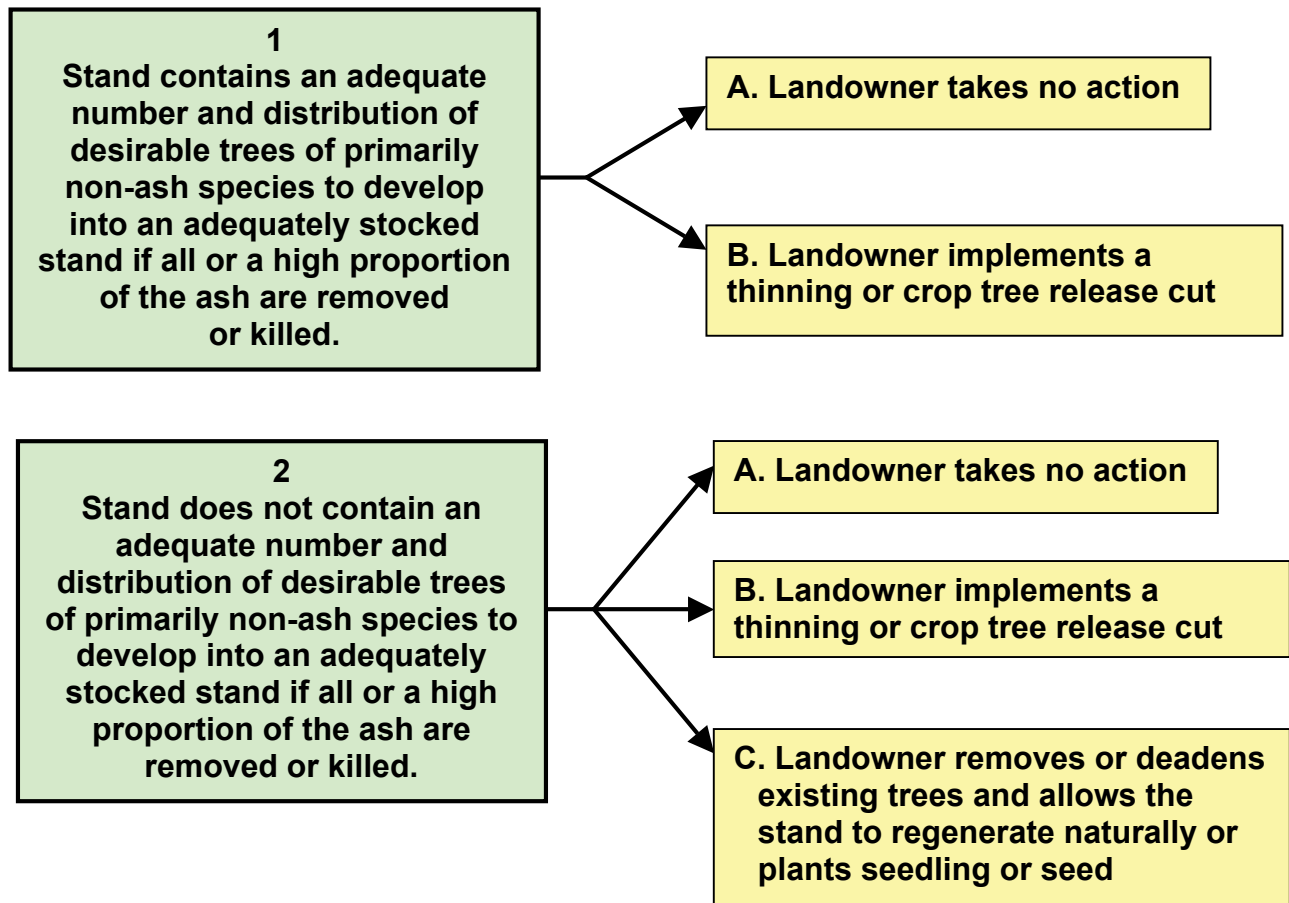
Traditionally, ash, particularly green ash, has often been used as a nurse tree in plantings of high quality hardwoods. In such plantings, a minor component of ash (usually less than 20 percent) is inter-planted among the other hardwood seedlings to improve the survival and/or form of the more desirable tree species. In such plantings the ashes fulfill their role early in the life of the stand. The expectation is that most, if not all of the ash will die or be removed from the planting as it matures in favor of the more desired species. Thus, the long-term survival of the ash is not essential to the success of the planting. There may still be areas in Ohio not yet infested with EAB where an experienced, knowledgeable tree planter might choose to use a native ash species as a nurse tree in a planting. In general, however, this cannot be recommended. Rather, if a nurse tree is desired, another species should be chosen.

## Strategies for Existing Tree Plantings (Plantations) That Contain Ash Trees



1. Take no action in plantations containing ash in which the majority of trees are less than 1½–2 inches dbh unless mandated to remove the ash by a regulatory agency. At commonly used planting spacings, competition among trees would not yet be excessive, and non-ash species would benefit little if at all from the removal of the ash (which would essentially be an early thinning).
  - a. If **EAB infests**, the ash in the plantation will be killed, including any volunteers. The impact on the plantation will depend on the species composition of the plantation—the greater the proportion of ash, the greater the potential impact.
  - b. If **EAB doesn't infest** the plantation, ash remains a viable component of the plantation unless removed in the future for non-EAB reasons.
2. For plantations containing ash in which the majority of trees are larger than 1½–2 inches dbh, use the strategies outlined in the following section for stands in which the dominant trees are less than 12 inches in diameter at breast height.

### Strategies for Stands in Which the Dominant Trees Are Less Than 12 Inches Dbh and That Contain Ash Trees



## Strategies for Stands in Which the Dominant Trees Are Less Than 12 Inches Dbh and That Contain Ash Trees (continued)

1. Stand contains an adequate number and distribution of non-ash species to develop into an adequately stocked stand if all or a high proportion of the ash are removed or killed.
  - A. Landowner decides to take no action.
    - a. If **EAB infests**, all ash trees are killed and the opportunity has been lost to reduce the potential impact of EAB by reducing the proportion of ash in the stand and shifting some or all of the stand growth to non-ash species through thinning or a crop tree release cut.
    - b. If **EAB doesn't infest**, the stand composition is unaltered by EAB.
  - B. Landowner decides to implement a thinning or crop tree release cut in the stand<sup>3</sup>.
    - a. If **EAB infests**, many or most of the ash trees that were in the stand will have been removed, those remaining will be killed; some or all of the stand growth will have been shifted to non-ash species, and the impact of EAB will have been reduced.
    - b. If **EAB doesn't infest**, some or all of the ash trees in the stand will have been removed and some or all of the growing capacity of the stand shifted to non-ash species.
2. Stand does not contain an adequate number and distribution of non-ash species to develop into an adequately stocked stand if all or a high proportion of the ash are removed or killed.

This type of stand is particularly difficult to address because by definition there are insufficient non-ash trees to develop into a desirable woodland. A thinning or crop tree release cut, therefore, would accomplish the less-than-desirable objective of shifting the species composition and growth to undesirable species. Landowners with such stands must very carefully examine (and perhaps reaffirm) their ownership goals and objectives for each stand and which species will satisfy those goals before choosing any management strategy.



*Hack and squirt method of deadening trees*

A. Landowner decides to take no action.

- a. If **EAB infests**, the ash trees in the stand will be killed and there will be too few trees of desirable species left to develop the area into a stand satisfying the ownership objectives.

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<sup>3</sup>The amount of ash retained will be strongly influenced by the location of the stand relative to the EAB infestation and the amount of ash in the stand. In high-risk areas near the infestation it may be desirable to substantially reduce or eliminate ash from many stands. In other parts of the state, in stands with more than one-third the stocking in ash, the percentage of ash stocking should be reduced to one-third or less as if possible. Only ash trees with good form and vigor should be retained.

- b. If **EAB doesn't infest**, the stand composition is unaltered by EAB, with ash remaining as a potentially important component of the stands future composition.
- B. Landowner decides to implement a thinning or crop tree release cut on the existing stand.
  - a. If **EAB infests**, the remaining ash trees in the stand will be killed and there will be too few trees of desirable species left to develop the area into a stand satisfying the ownership objectives.
  - b. If **EAB doesn't infest**, the stand composition will shift in response to the selection criteria used in determining which trees are retained, and the growth rate of the released trees will increase. Stand growth will be shifted to the desirable ash and non-ash species retained, and ash remains as an important species component of the future stand.
- C. Landowner removes (harvests if there is a market) or deadens the existing stand and allows it to regenerate naturally or plants seedlings or seed.

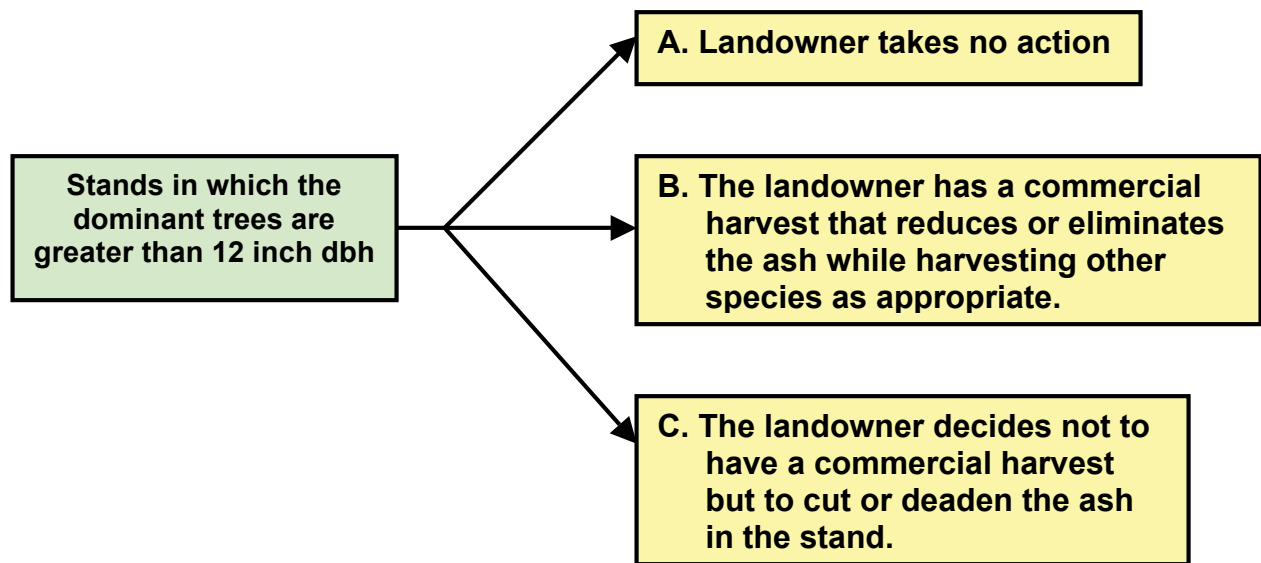
This alternative will be viewed as extreme by most landowners, increasingly so the older the stand. It is a land management option, particularly for young stands, when the species composition or stocking of the stand does not meet and cannot effectively be altered to meet ownership objectives. It is obviously an extreme and initially disruptive strategy, and for that reason it is critically important that ownership objectives for the stand be carefully reviewed and confirmed. When faced with this alternative, many woodland owners will decide that it is more desirable to alter the management objectives for a particular stand than undertake such a disruptive strategy; others with less flexible management goals will pursue the strategy. If reducing the potential impact of EAB on the stand is an objective, some effort will be needed in most stands to reduce or eliminate ash sprouting and natural regeneration.



*Underplanting seedlings*

- a. If **EAB infests**, the impact on the stand will be minimized to the extent that the strategy was successful in producing an adequate number of non-ash trees to develop into a stand that satisfies the ownership objectives. Any ash trees present in the stand will be killed.
- b. If **EAB doesn't infest**, to the extent that the strategy was successful, the landowner will have a young stand that more effectively satisfies ownership goals and objectives than the one that previously occupied the site. While the percentage of ash in the stand may have been substantially reduced, the ash present may be retained as part of the future stand.

### Strategies for Stands in Which the Dominant Trees Are Greater Than 12 Inches Dbh and That Contain Ash Trees



- A. The landowner decides to take no action.
  - a. If **EAB** infests, all of the ash trees will be killed, any monetary value of the ash will be lost unless salvaged, future management options for the stand may be reduced, and there will be standing dead trees that can provide important wildlife habitat needs, but which will be a safety hazard.
  - b. If **EAB doesn't infest**, the stand composition will be unaltered by EAB.
- B. The landowner decides to have a commercial harvest that reduces or eliminates the ash component of the woodland while harvesting other species as appropriate. Irrespective of EAB activity, as a result of the commercial harvest:



- the landowner will have received income from the harvest,
  - the character of the woodland will be altered,
  - the landowner will have the opportunity to establish long-range goals for the stand and implement a management plan to accomplish those goals.
- a. If **EAB infests**, the impact of emerald ash borer will be reduced or completely eliminated, depending on how completely ash was removed from the stand (some ash may be intentionally retained and some natural ash reproduction may have occurred). Any remaining ash will be killed by EAB.
  - b. If **EAB doesn't infest**, the composition of the stand will be unaltered by EAB. However, as a result of the harvest, ash will make up a substantially smaller proportion of the trees in the stand or will be absent entirely.
- C. The landowner decides not to have a commercial harvest but cuts or deadens the ash in the stand. Irrespective of EAB activity, as a result of this activity:
- ash in the stand will have either been removed or will be standing dead,
  - unless the ash is cut and sold or utilized (e.g. firewood), any monetary value of the ash will be lost,
  - the growing capacity of the stand will be shifted to non-ash species.
- a. If **EAB infests**, the impact of emerald ash borer will be reduced or completely eliminated, depending on how completely ash was removed from the stand (some ash may be intentionally retained and some natural ash reproduction may have occurred). Any remaining ash will be killed by EAB.
  - b. If **EAB doesn't infest**, the composition of the stand will be unaltered by EAB. However, as a result of the selective reduction or elimination of ash, it will make up a substantially smaller proportion of the trees in the stand or will be absent entirely.

## A Final Thought

There is no single “right” management strategy for minimizing the potential impact of EAB that is appropriate for all stands. Selecting the appropriate strategy for a particular stand involves carefully evaluating a variety of factors including ownership objectives, stand characteristics, proximity to active EAB infestations, and location in the state. It is highly recommended that woodland owners seek the assistance of a professional forester in evaluating their options. Direct assistance is available from Ohio Department of Natural Resources Division of Forestry Service Foresters or consulting foresters (for a list of Ohio consulting foresters go to <http://www.osafdirectory.com>). Contact the OSU Extension County Extension Office for individuals responsible in a particular county, or consult the ODNR Division of Forestry's Landowners Assistance website for a complete directory of service and consulting foresters. That website address is <http://www.ohiodnr.com/Home/landowner/ServiceForesterDirectoryandMap/tabid/5280/Default.aspx>

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Keith L. Smith, Ph.D., Associate Vice President for Agricultural Administration and Director, Ohio State University Extension  
TDD No. 800-589-8292 (Ohio only) or 614-292-1868