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Bronze Birch Borer: Biology and Control  
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# Bronze Birch Borer

## Biology and Control

Gary Simmons, Depts. of Entomology & Forestry and Gary Dunn, Dept. of Entomology (originally prepared by M. Keith Kennedy)

The bronze birch borer (*Agrilus anxius*) has been a serious pest of urban ornamental birch plantings for nearly 80 years. Today, there is still no single method that will ensure complete control of this borer. If you have white birch, you should know about the borer's biology and its suggested control method.

**Symptoms:** The first sign of borer attack is usually a die-back of the uppermost branches

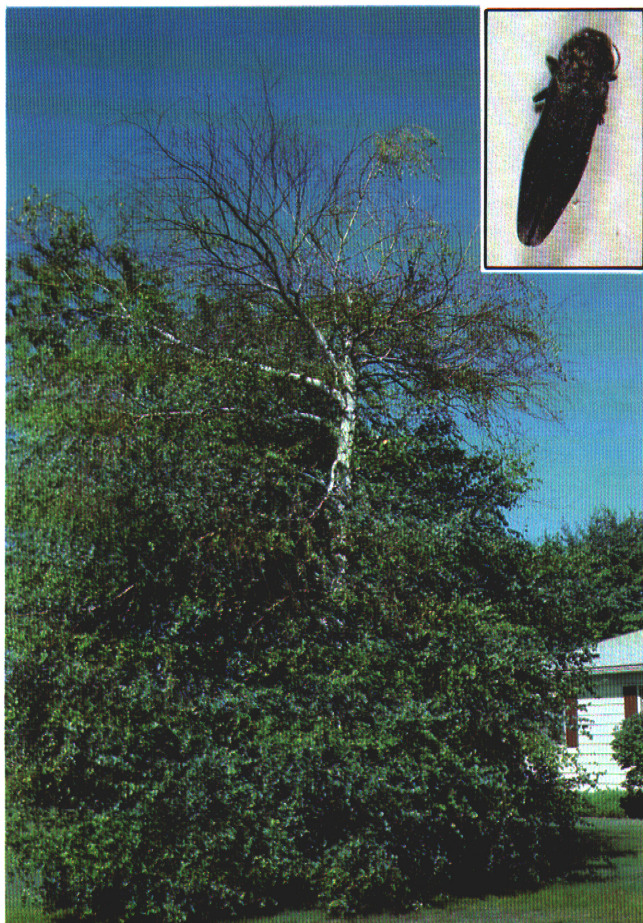


Figure 1. Dieback of upper crown due to bronze birch borer (inset). This is a class 4 tree, see Fig. 6.

followed by a gradual decline and eventual death of the entire tree in 2 to 3 years (Figs. 1 & 6). Vein-like ridges or swollen bands may occur in the bark of the trunk and branches. The presence of "D" shaped adult emergence holes (4-6 mm wide, size of pencil) in the tree trunk (Fig. 3) is a positive sign of borer activity.

**Trees attacked:** European white birch (*Betula pendula*) and its cut-leaf variety (*B. pendula dalecarlica*) are particularly susceptible to borer attack. Paper or canoe (*B. papyrifera*), yellow (*B. alleghenensis*), gray (*B. populifolia*), are also attacked but to a lesser degree. River birch (*B. nigra*) appears to be resistant (see Host Selection).

**Damage:** Tree injury is caused by excessive larval tunneling in the inner bark or sap-conducting vessels (phloem) and cambium (the region of tree diameter growth). The girdling of the trunk or branches interrupts sap flow downward to the roots and destroys the tree's cambium (growing) tissue. The interruption and subsequent accumulation of sap flow above larval tunnels often causes the characteristic swollen bands or ridges in trunks and affected branches.

**Distribution:** Bronze birch borer is a native insect which occurs throughout the range of birch in North America. It has been collected from New-

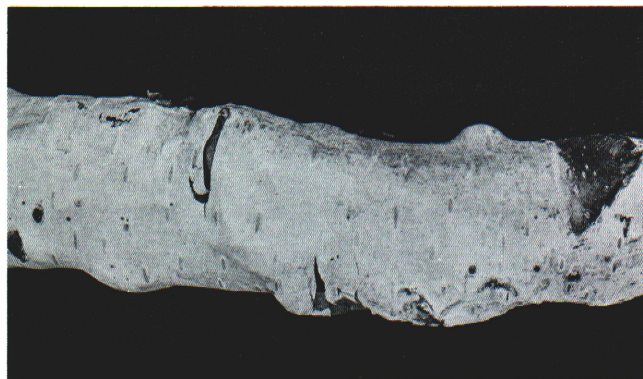


Figure 2. Vein-like swollen ridges in the bark of a branch caused by tunneling of bronze birch borer larvae.





Figure 3. An emerging bronze birch borer adult (left) and the characteristic "D" shaped exit hole (1/4") of a previously emerged adult.

foundland to British Columbia, throughout the Lake States and as far south as Virginia and west to Arizona and New Mexico.

**How to identify:** Bronze birch borer adults are small, slender, olive-to-copper bronze-colored beetles nearly 1/2 inch in length (7.5 - 11.5 mm) (Fig. 1). Females are slightly larger than males. All larval stages are white, slender and legless (Figs. 4 & 5). The light brown head capsule is retracted somewhat into the wide but flattened 1st thoracic segment while the remaining body segments are smaller and ribbon-like in appearance. Located at the tip of the abdomen are two brown-hardened, pincer-like parts. Mature larvae may be up to 1 1/2 inches (20 mm) long.

**Life Cycle:** Adults begin to emerge through semi-circular or "D" shaped holes (Fig. 3) in the bark of infested trees in early to mid June and may continue to emerge for 5 to 6 weeks. They feed on the foliage of alder, aspen, birch, willow or poplar for at least a week before the first eggs are laid in bark crevices or beneath loose bark flakes. Like other flatheaded (buprestid) borers, the beetles are attracted to the sunny side of trees for feeding and egg laying (oviposition). However, areas of recent mechanical or other injury appear to be the most attractive egg laying sites. As many as 76 eggs may be deposited by a single female. Egg hatch occurs approximately two weeks later and the young larvae bore into the tree to begin feeding in the inner bark (phloem) and cambium.

The tunnels behind active feeding larvae become packed with excrement and wood particles which turn dark brown with age (Fig. 4). Most larvae mature by fall and construct oblong cells in the xylem just beneath the cambium or in thick bark. Pupation occurs in late April or early May of the

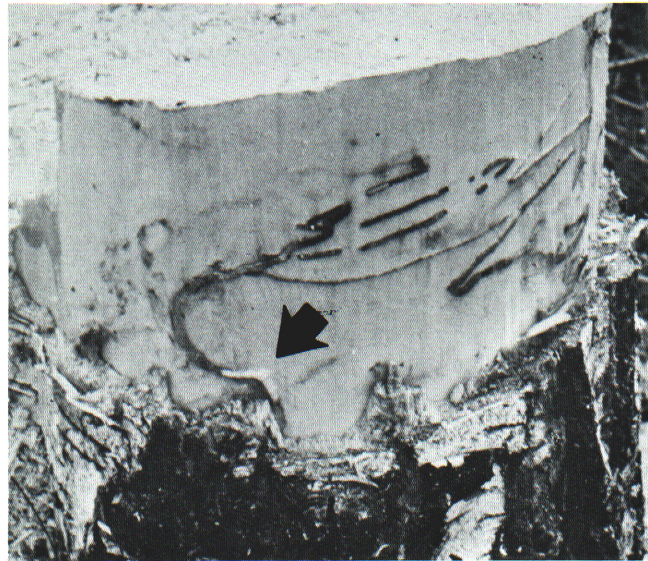


Figure 4. Bark removed from birch stump to reveal tunneling of birch borer larva (arrow).



Figure 5. Close-up of bronze birch borer larva.

following spring. There is only one generation a year in Michigan.

## CONTROL

### Host Selection

One of the most effective methods of bronze birch borer control is to avoid planting susceptible trees. A recent survey of a Michigan suburban community showed that most of the bronze birch borer attacks were concentrated on a single variety of birch. Of the trees surveyed, 50% of the European white birch and its cutleaf varieties were infested with borer while only 30% of the gray birch and 5% of the paper birch showed signs of borer activity. European white birch is extremely susceptible to bronze birch borer attack and should be avoided in new plantings. Gray birch, a native species with white bark, also appears to be susceptible to borer attack and is therefore not recommended for urban/suburban plantings.



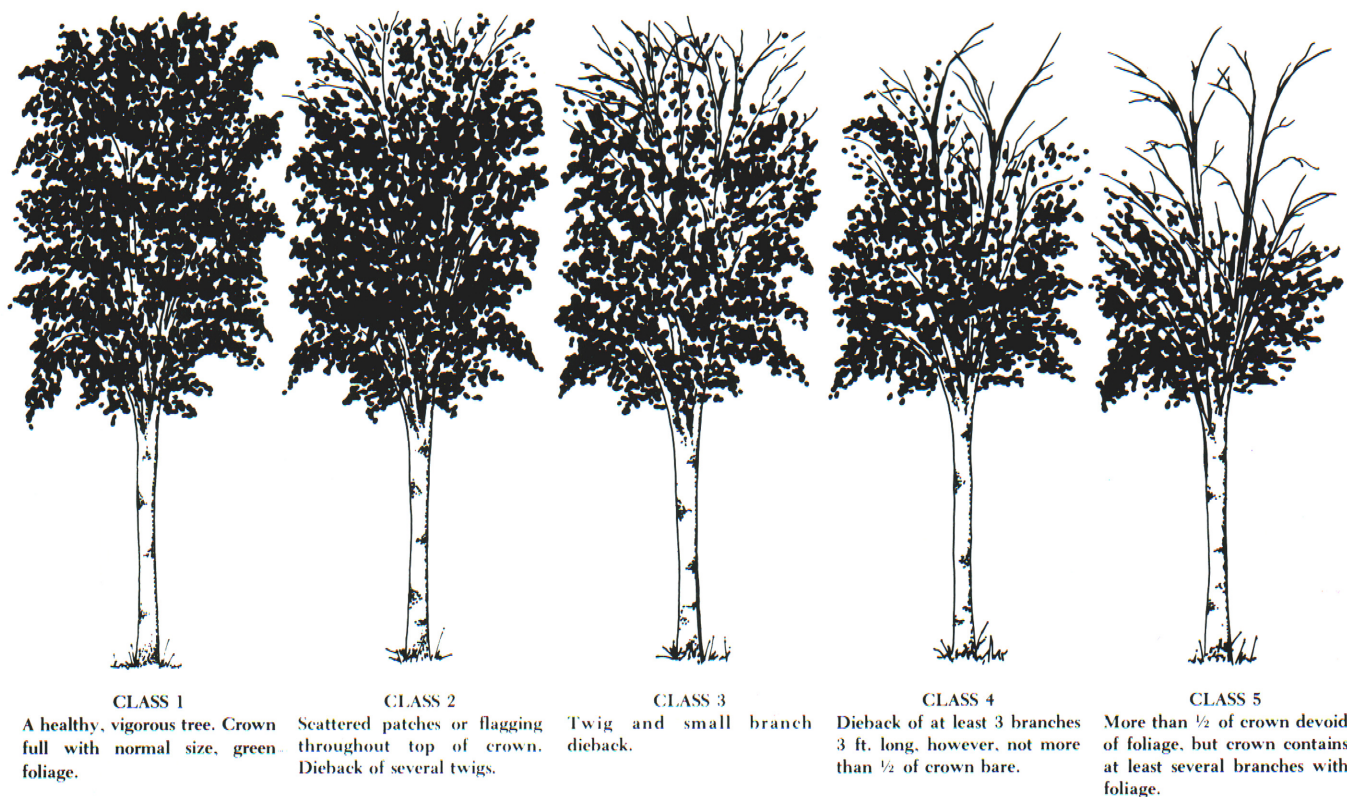


Figure 6. European white birch crown vigor classification and bronze birch borer attack. Trees in classes 2 and 3 may be treated for bronze birch borer with a moderate degree of success. Trees in classes 4 and 5 are generally beyond recovery and removal is suggested.

Paper birch, also native to Michigan, lacks the graceful pendulous branches of European white birch but does have a creamy white bark that peels readily. More importantly, it seems to have substantially fewer problems with bronze birch borer and should be given stronger consideration for use in yard planting in lieu of or as a replacement for European white birch.

River birch, a native North American species with salmon-pink papery bark is currently considered resistant to bronze birch borer attack. This species is a good selection if white bark is not of prime importance. The Heritage birch, a recent cultivar of the river birch, combines the borer resistance of the river birch with the bark characteristics of the paper birch. The bark is white and peels in long strips, unlike most river birch. The tree was first offered for sale in 1979 and should be available to most nurseries by 1981. Monarch birch (*B. maximowicziana*) is also considered resistant to the borer but has not been tested extensively in the northcentral region. Although considered by some to be resistant, Japanese white birch (*B. platyphylla japonica*) is susceptible to attack in Michigan.

## Cultural Practices

**Water and Fertilizer.** Trees under stress are more susceptible to borer attack than trees in a vigorous state of growth. It is imperative that susceptible trees receive yearly fertilization and frequent deep watering during dry periods to reduce stress and promote growth (see Extension Bulletin E-786, Fertilizing Trees and Shrubs, free).

**Mulch.** Trunk damage by lawn mowers or other yard equipment may weaken the tree and provide an attractive oviposition site for adults. Mulching around the tree base can help eliminate the need for close mowing and potential trunk injury. The mulch also helps to retain soil moisture and cools the environment around the tree base which helps moderate root temperatures.

### Tree Recovery or Removal: How to Judge

The gradual decline of birch can be divided into five classes of vigor (Fig. 6). This classification can help the homeowner assess the extent of damage and recovery potential of his birch. Trees in class 1 are apparently healthy. Trees in class 2 and 3 can be saved by pruning all dead branches 1-2 ft.



below the point where they have died to minimize the number of borers emerging from the tree. The tree should then be returned to a more vigorous condition through a program of proper watering and fertilization and initiate a pest control program (steps 3 and 4 under "Control Summary"). Trees in class 4 and 5 are generally beyond recovery and should be removed.

Wood from trees which have died during the summer or fall should be destroyed or used as firewood before the following May to prevent adult borers from emerging and infesting new trees in the area.

## Chemical Treatment

**Bark and Foliar Sprays.** Chemical control is difficult once larvae have bored into the trunk. The current strategy is to use foliar and bark insecticide sprays to control egg laying adults or newly hatched larvae before they enter the bark. Apply the first spray thoroughly to the bark and foliage the first week of June when adults usually emerge. Since the adult flight period may last for 6 weeks or more, 2 additional sprays at 3 week intervals are suggested. At the current time, Lindane (20% EC) is the recommended chemical for bronze birch borer treatment and is available at most garden stores as a general "borer spray."<sup>1</sup> If problems arise in obtaining this material, consult your local Cooperative Extension Service.

**Soil Treatment.** Systemic granules of Di-syston 15% G (disulfoton) and Temik 10% G (aldicarb) incorporated into the soil within the tree's dripline will control the birch leaf miner. However, the effectiveness of these chemicals for borer control has not been evaluated nor are they specifically registered for this pest. Additionally, these particular formulations are restricted use pesticides (RUP) and are not available to consumers. Di-syston can be purchased by consumers in 1 & 2% granular formulations but effects on the borers at such low concentrations are negligible. Systemic granules are recommended only for control of birch leaf miner.

**Control of other birch pests.** Extensive foliar

## CONTROL SUMMARY

*Bronze birch borer control consists of a series of steps which constitute an overall program. These are outlined below for quick reference.*

1. *Fertilize in spring or fall. Water regularly, especially during dry periods. Mulch around tree base.*
2. *Avoid mechanical injury to trunk.*
3. *Control birch leaf miner—spray foliage May 5-15 or use systemic granules April 25 - May 1. Apply controls for second generation miner in early July.*
4. *Apply bark and foliar sprays for emerging adult borers June 1-7. Repeat twice at 3 week intervals.*

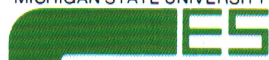
damage from the *birch leaf miner* imposes a severe stress on the tree and increases the likelihood of subsequent borer injury. Leaf miner control is thus an important step in the prevention or reduction of borer attack. See Extension Bulletin E-1455, "Birch Leaf Miner—Biology and Control" for more information.

*Aphids* often increase to excessive levels on birch during periods of hot, dry weather. These insects secrete large amounts of a sugary liquid called honeydew. A black, sooty mold usually develops on the honeydew-coated leaves and reduces the amount of light available to the leaves for photosynthesis. To control aphids, apply foliar sprays of Orthene, Sevin, diazinon or malathion whenever the problem is noted and repeat every two weeks as needed.

## Footnotes

1. Sold in Michigan under several brand names including B. G. Pratt, Black Leaf, Bonide, and Ortho. Registration of this material for homeowner use may be cancelled in 1981 or 1982. Most likely, chemical companies and retail stores will be allowed to sell current shelf supplies of Lindane to consumers for use until their existing inventory is depleted. This information is included to assist the consumer in locating the chemical and does not constitute an endorsement of a particular company or product.

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