
CHAPTER 5

FOREST TYPES IN MICHIGAN

LEARNING OBJECTIVES

After completely studying this chapter, you should:

- Understand the present state of Michigan forests.
- Know the major pest management tools on which forest managers rely.
- Know the common forest types in Michigan and the characteristics associated with each.
- Know what the term “tolerance” means when describing various tree species.
- Understand how tolerance relates to plant succession.
- Understand how forest type affects the type of pest management technique applied.

Many disease and insect pests of Michigan forests are restricted to certain tree species, distinct types of trees or specific tree associations. By knowing about Michigan forestry, its predominant forest types, and their growth and development, you will gain a better understanding of the tree/pest relationships to be found in your area. Following is a brief historical perspective of forest health and pest management in Michigan. (Note: Later chapters in this manual will discuss specific pest problems of trees and forests and their management.)

AN OVERVIEW OF MICHIGAN FORESTRY AND FOREST PEST MANAGEMENT

Michigan is a state blessed with an abundance of healthy, productive forestlands. Half of Michigan is forested. As of 1993, there were 18.6 million acres of commercial timberland in the state. Surprisingly, the 1993 Forest Inventory of Michigan revealed that the state had gained 1.1 million acres of timberland since 1980. The survey also revealed that Michigan’s forests are generally getting older (the majority of trees are now small sawlog size) and are increasing in volume at a very productive rate. Economically, Michigan forests support 150,000 jobs and add \$9 billion to the state’s economy.

In addition, Michigan’s forests are growing 2.5 times more wood than is being harvested each year. This means that, despite all the timber harvesting that occurs to support Michigan’s forest industry, the forests of Michigan are still growing more wood than can theoretically be harvested without damaging the resource. Consequently, because of this excessive growth, a significant number of trees are lost each year to insects, disease and other natural causes. The 1993 Forest Inventory revealed that each year in Michigan approximately 202 million cubic feet of wood are lost to mortality.

Some mortality is natural and to be expected, but forest managers are concerned about insect, disease, and other pest problems that might produce significant growth loss and/or mortality. Because it is rarely economically feasible or environmentally favorable to apply pesticides to large acreage of forestland, forest managers instead concentrate on keeping forests healthy and productive. Healthy and productive trees and forests are much better at withstanding the stress of any pest problems that may occur on a periodic basis. The major pest management tools on which forest managers rely are

matching tree species to the site at planting, thinning younger stands of trees to reduce competition, and harvesting overmature forests, which are more susceptible to pests.

FOREST TYPES IN MICHIGAN

The soils, climate, and topography of Michigan are quite diverse. This diversity of site factors results in 10 types of forests (including exotics) that can be found growing in the state. A **forest type** is one or more tree species growing together because of similar environmental requirements and tolerance to light. **Tolerance** refers to the necessary amount of light reaching the forest floor for tree species to germinate or sprout, grow, and thrive. **Shade-intolerant** species such as aspen or jack pine require full sunlight to grow and survive; midtolerant species such as many oaks and white pine require partial, lightly shaded conditions, while beech and hemlock can germinate and grow in very shaded conditions. Forest managers most often manage by forest type and not by individual species (except in those cases where a forest type is composed of only one species). Common Michigan forest types are: **maple-beech**, **aspen-birch**, **oak-hickory**, **elm-ash-soft maple**, and **pine**.

The maple-beech forest type is by far the largest forest type in Michigan, covering more than 7 million acres (approximately 38 percent) of land area. The aspen-birch forest type is the next largest and covers more than 2.5 million acres (or approximately 17 percent) of land in the state. The oak-hickory forest type covers about 1.9 million acres, and the elm-ash-soft maple forest type covers another 1.7 million acres of land in Michigan. Jack, red, and white pine are the most common softwood types and together make up more than 10 percent of the timberland (approximately 1.9 million acres). Together, these five forest types account for about 85 percent of the forest cover in Michigan. The remaining 15 percent of timberland is in one of several other forest types—balsam fir/white spruce, black spruce, northern white cedar, tamarack, or exotics such as non-native Scotch pine plantations—or in timberland area without trees.

Maple-beech

Maple-beech forests (often called northern hardwoods) are those in which sugar maple and American beech predominate, but they usually contain a mixture of other species including yellow birch, basswood, white ash, northern red oak, white pine, hemlock, and others. This forest type makes its best growth and development on moist, well drained soils throughout the state. Historically, this forest type experiences regular, periodic outbreaks of forest tent caterpillar defoliation on about a 10-year cycle. Forest tent caterpillar feeds on a variety of hardwood tree species, and complete defoliation of maple-beech stands is possible. Other insect defoliators that feed on individual species within the type (e.g., linden looper or basswood thrips) are occasionally a problem but affect only the lindens or basswoods within a stand. Diseases such as *Nectria* canker (on many hardwood species), *Eutypella* canker and sapstreak disease can occasionally cause serious losses in timber value.

Aspen-birch

Aspen-birch forests are those in which a majority of the trees are quaking aspen, bigtooth aspen, and white birch. Common associates in this forest type include balsam poplar, balsam fir, red maple, white pine, and black and pin oaks. Aspen-birch forests can be found growing on a

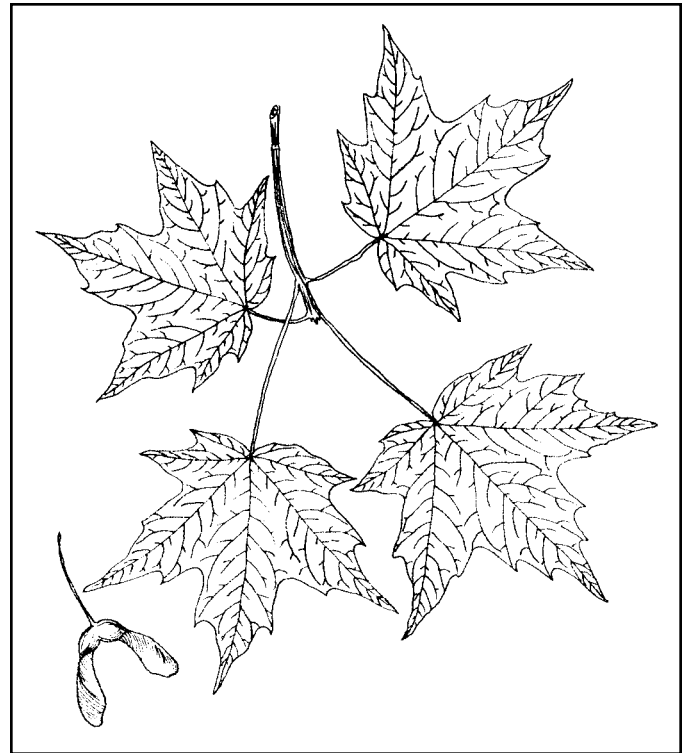


Figure 5.1. Sugar maple.

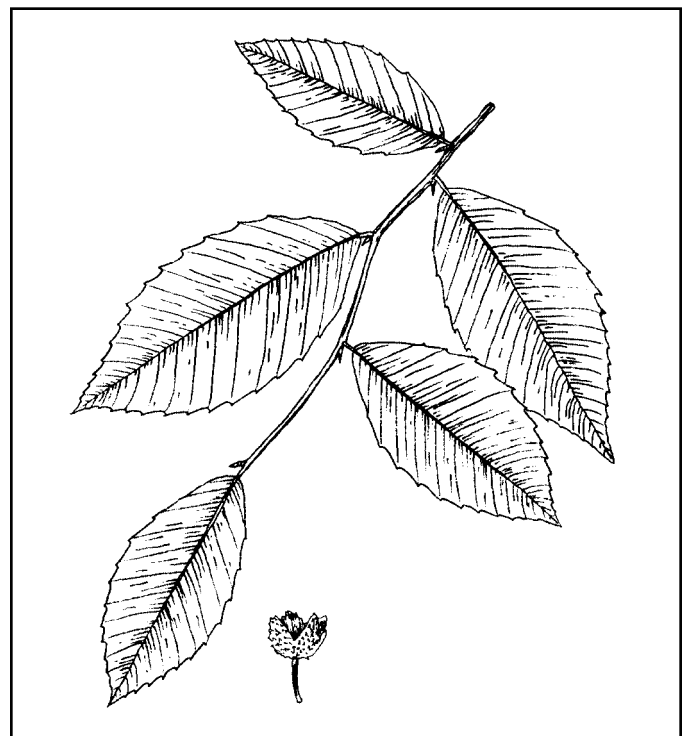


Figure 5.2. Beech.

wide range of sites, from wet clay loam to dry, sandy soils. This type is considered a short-lived forest species that is often replaced via succession with other tree species if the site is not harvested or disturbed in any way. **Plant succession** is the replacement of one plant community by another. It is closely linked with shade tolerance, which

plays a role in species replacement during succession. Historically in Michigan, aspen-birch forests experienced periodic outbreaks of aspen tortrix and other similar defoliators as well as gypsy moth defoliation in more recent years. *Hypoxylon* canker is probably the most serious of the disease problems, especially in overmature stands.

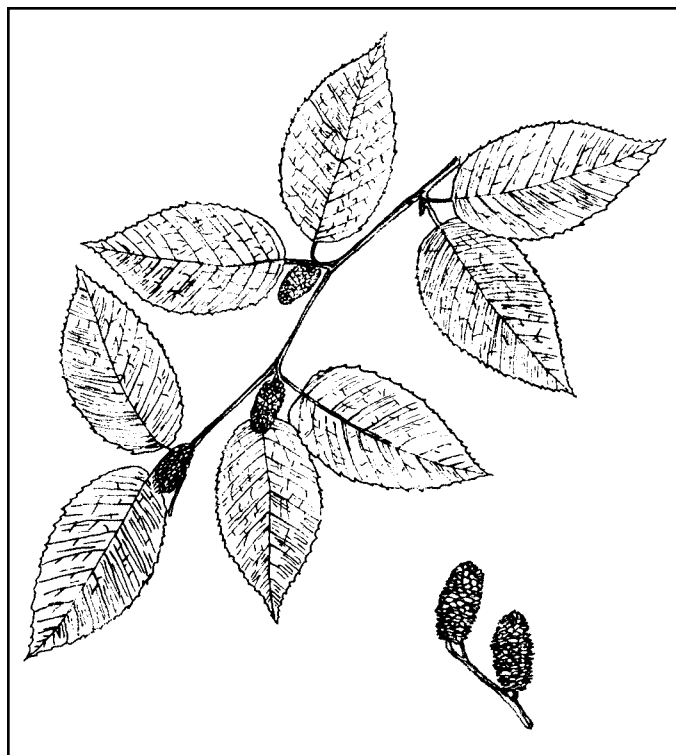


Figure 5.3. Yellow birch.

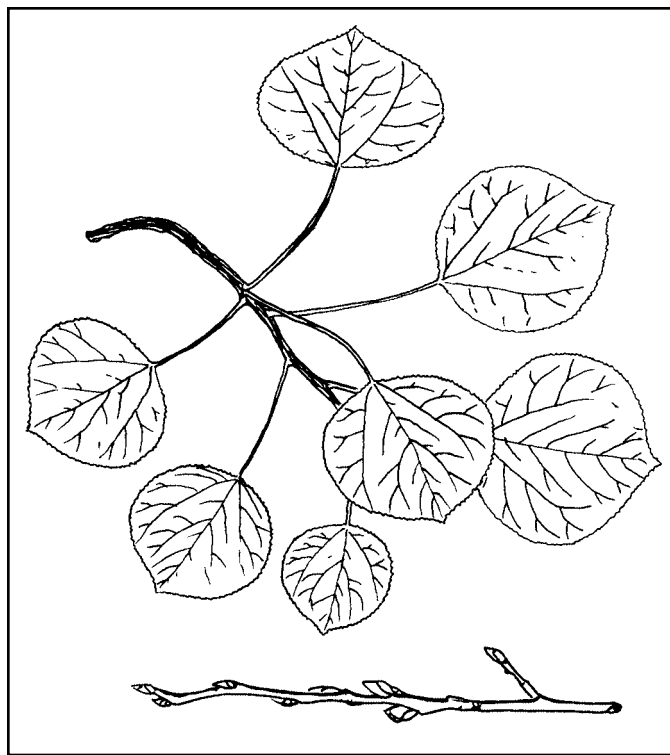


Figure 5.5. Quaking aspen.

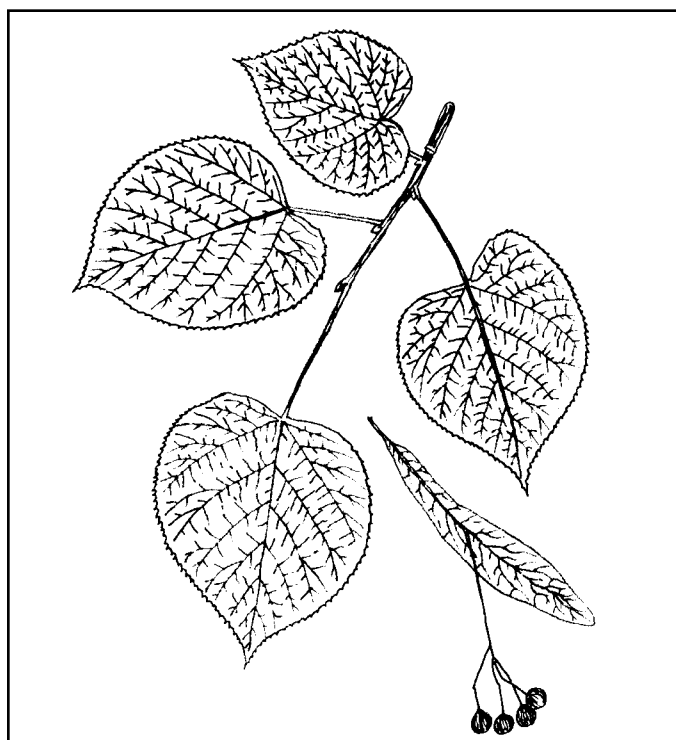


Figure 5.4. American basswood.

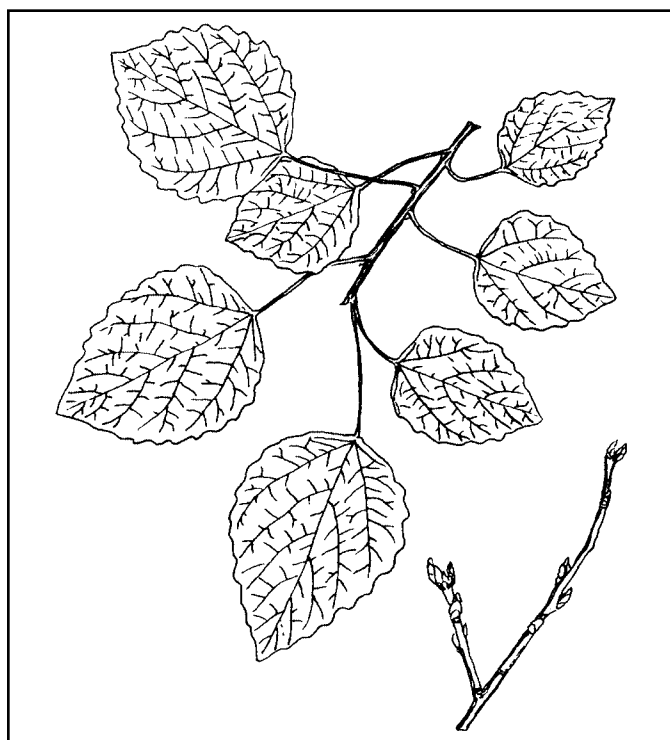


Figure 5.6. Bigtooth aspen.

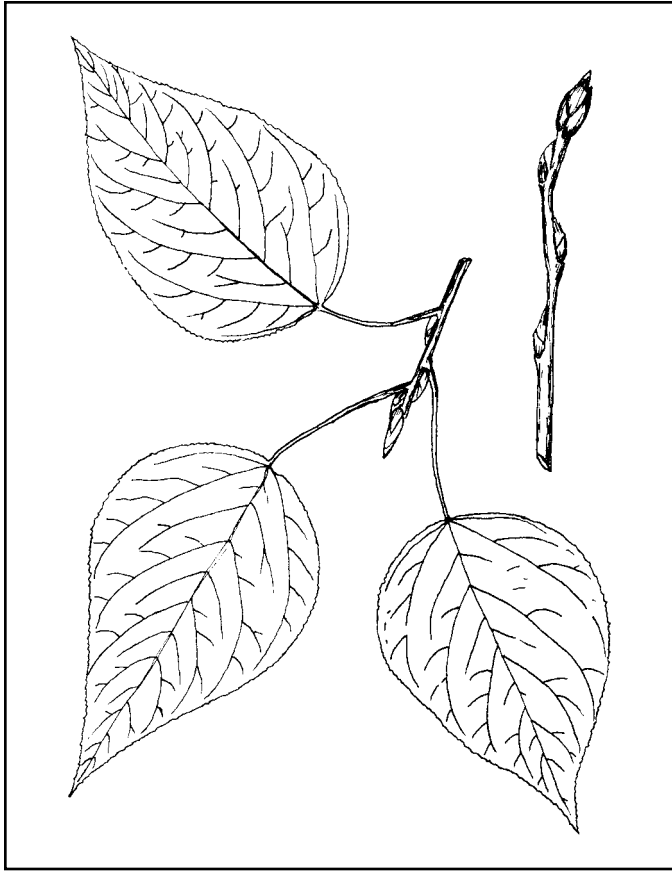


Figure 5.7. Balsam poplar.

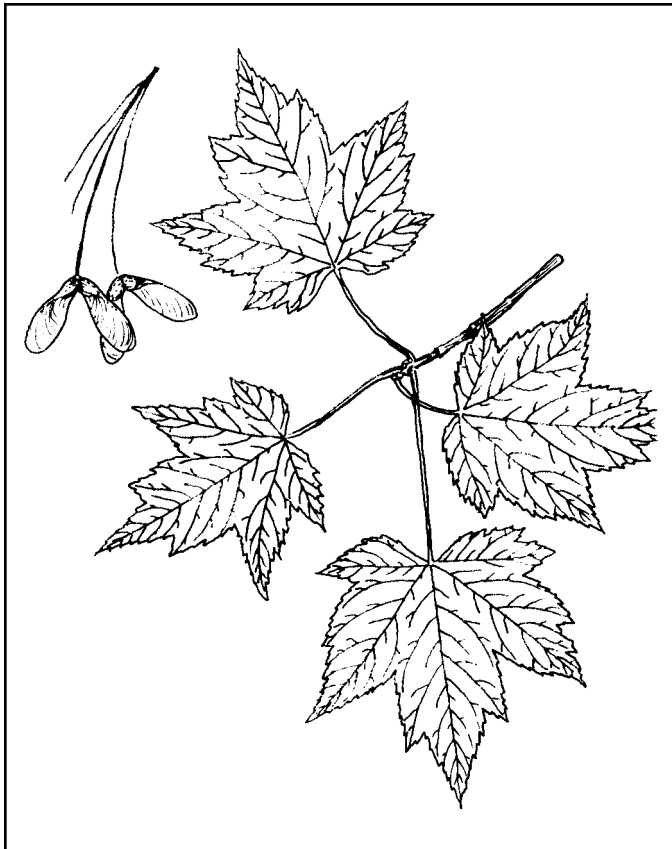


Figure 5.8. Red maple.

Oak-hickory

Oak-hickory forests are those in which northern red oak, white oak, bur oak, and hickories (southern Michigan only) make up a majority of the trees. Common associates include yellow poplar, elm, maple, beech, and jack pine (especially in northern Michigan). In the southern Lower Peninsula, this forest type can be found growing on a variety of sites and is primarily composed of oak, hickory, and related species. In the northern Lower Peninsula and a few areas in the Upper Peninsula, it is found growing on very well drained, sandy soils, where pine species such as jack and red pine are major associates. Historically, this forest type has experienced a number of pest problems, singly or in combination, that have periodically (perhaps every 15 to 20 years) caused localized areas of mortality throughout the state. Leafrollers, defoliating insects, drought, late spring frosts, and, more recently, gypsy moth are pest problems found within the oak-hickory forest type. When several pest problems occur within a few months of one another, the effects of the combination of stresses is generally referred to as **oak decline**. Other pests that can be found in the oak-hickory forest type include oak skeletonizer, orange-striped oak-worm, fall webworm, and several other leaf-feeding insects as well as anthracnose and oak wilt diseases.

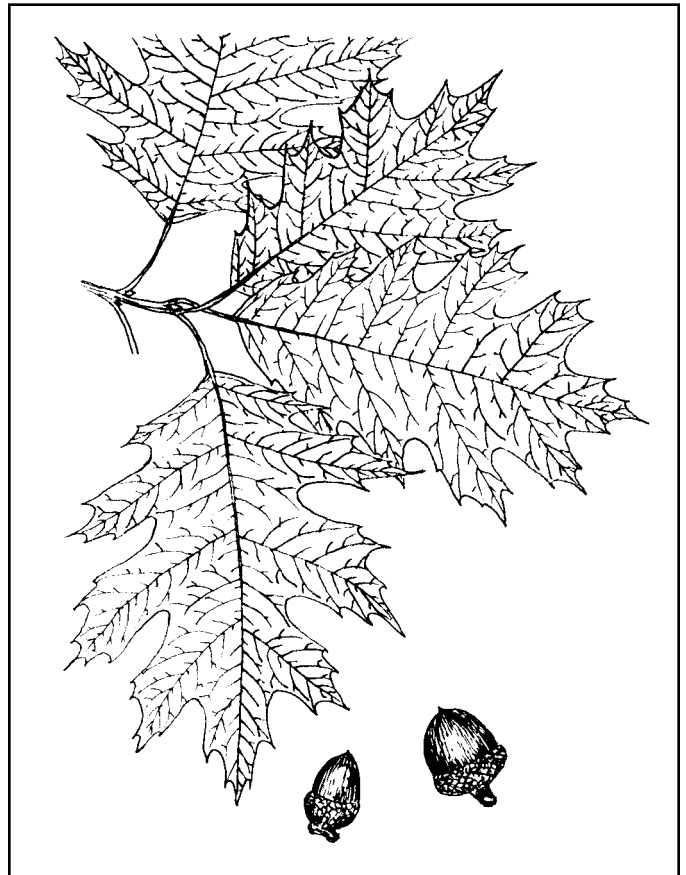


Figure 5.9. Northern red oak.

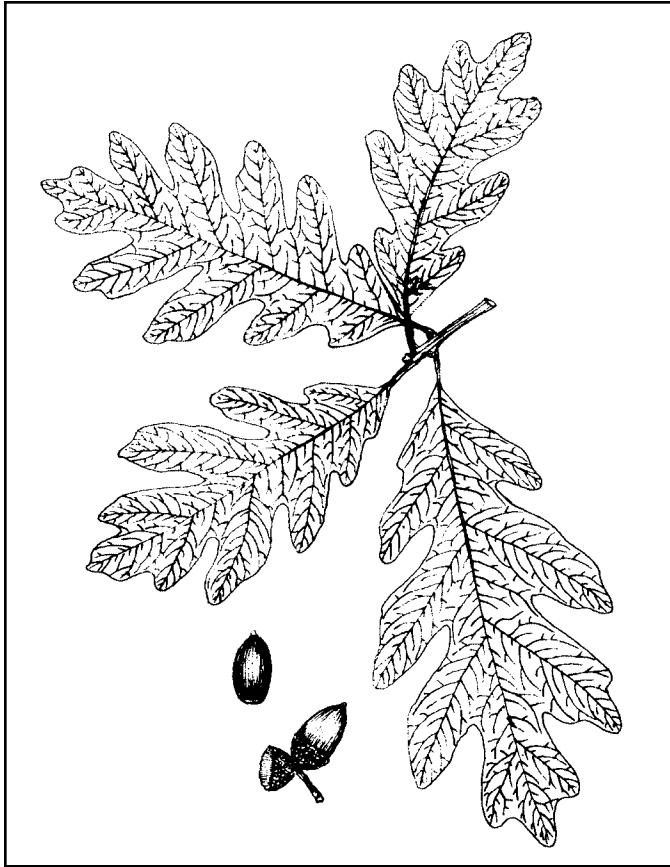


Figure 5.10. White oak.

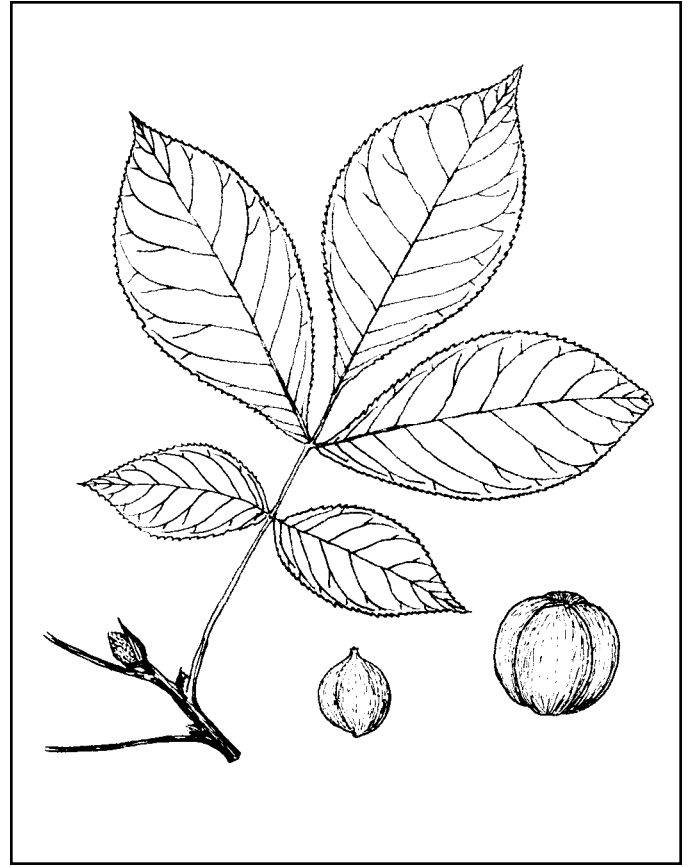


Figure 5.12. Shagbark hickory.

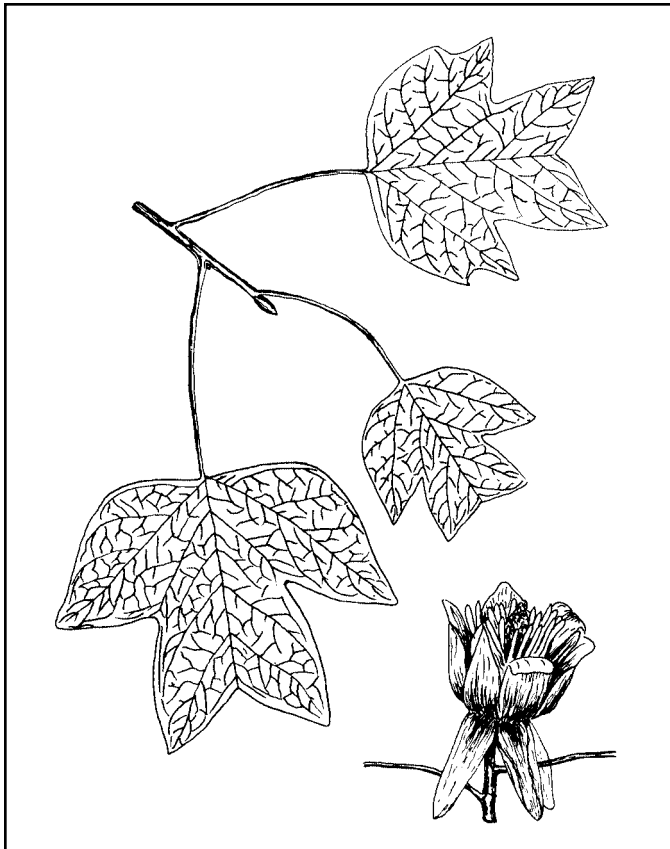


Figure 5.11. Yellow poplar.

Elm-ash-soft maple

Elm-ash-soft maple forests (also referred to as lowland hardwoods) are those in which a majority of the trees are elm, black and green ash, red and silver maple, and cottonwood. Lowland hardwoods are often found growing on wet, poorly drained sites such as river floodplains. These sites can be very productive for timber growth because of the consistent moisture and silt loads from periodic floods. However, windthrow and a high amount of defect in the wood quality can occasionally be problems because of shallow root systems and the fast growing, low density, easily rotted wood associated with tree species such as soft maples and cottonwoods. Pest problems such as Dutch elm disease have had a serious impact on this forest type and have virtually eliminated American elm from this type. Other pest problems include forest tent caterpillar, spring and fall cankerworms, and other defoliating insects as well as heartwood decay disease.

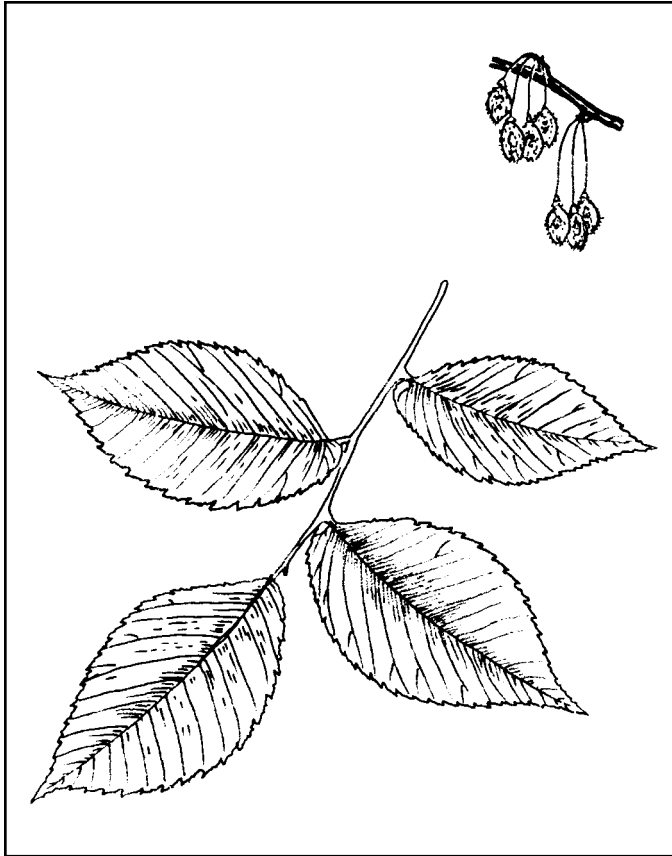


Figure 5.13. American elm.

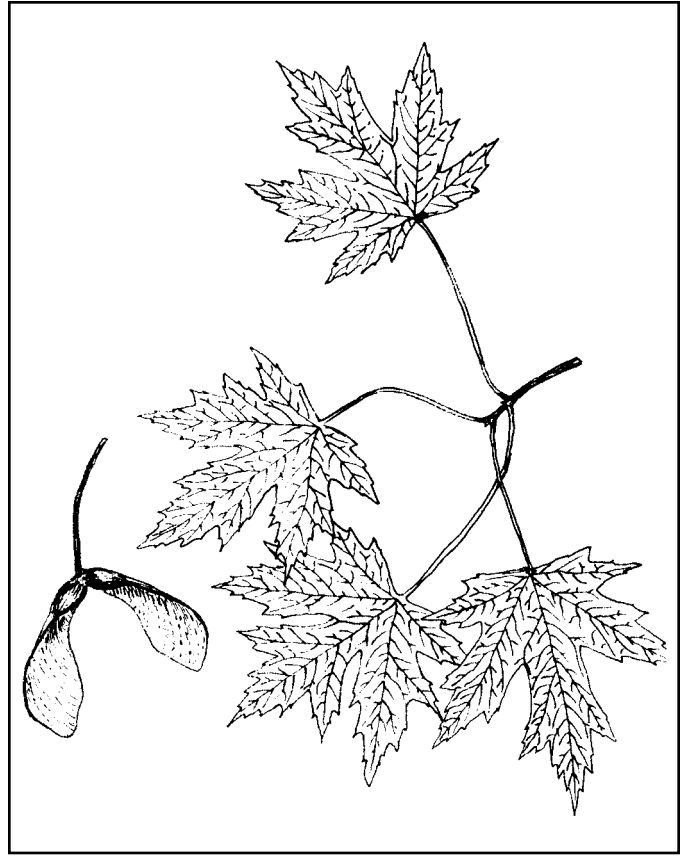


Figure 5.15. Silver maple.

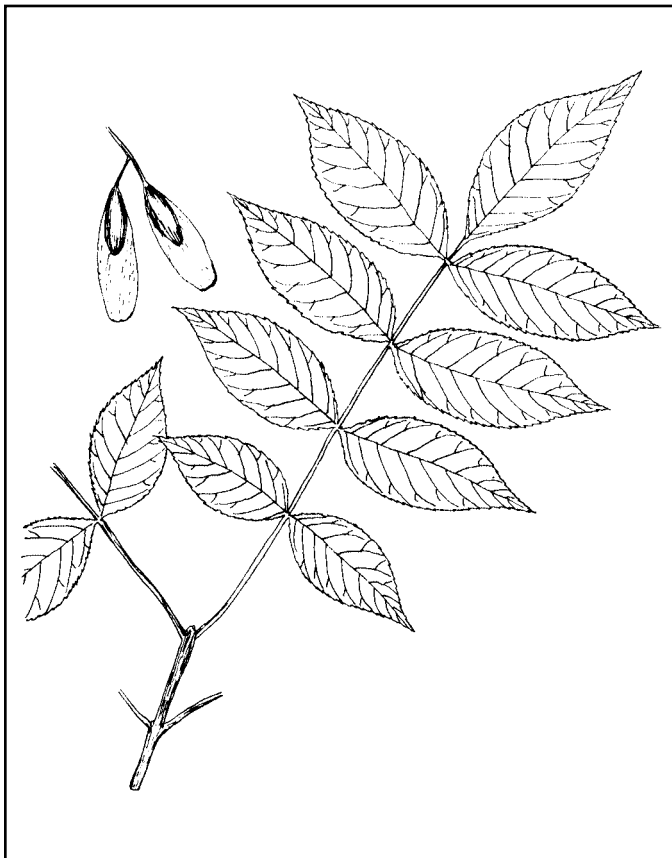


Figure 5.14. Black ash.

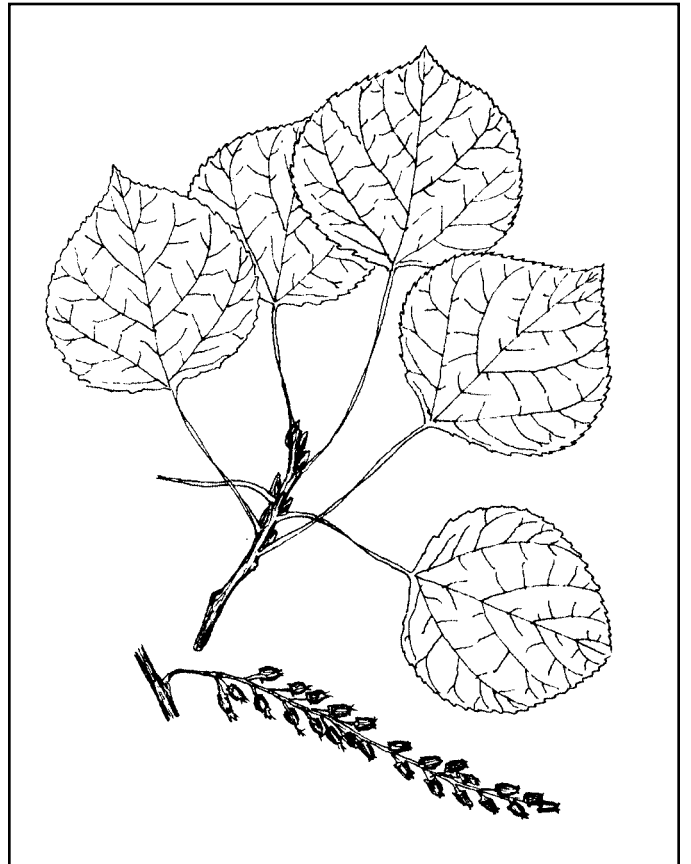


Figure 5.16. Eastern cottonwood.

Pine

The pine forest type is generally dominated by one of three native species of pine. Though all may be found primarily growing on upland, well drained sandy soils throughout Michigan, there is some variability. Jack pine is generally found on the driest of sites on deep, well drained sands. Jack pine is often found growing by itself in pure stands or with common associates including northern pin and black oak, quaking aspen, red maple, and red and white pine. Red pine makes its best growth and development on well drained sandy loam soils. Though there are some native red pine stands, the majority of the red pine in Michigan is growing in man-made plantations, especially in the northern Lower Peninsula. Eastern white pine can be found growing on a wide range of sites, from dry sands to poorly drained soils, in a number of forest types, from jack pine to northern hardwoods to swamp conifers. Occasionally, white pine does grow in fairly pure native stands, but this species has also been widely planted. Because of its midtolerance to shade (i.e., its preference to grow under lightly shaded conditions), white pine is increasingly becoming a major understory species beneath aspen-birch or oak-hickory forests in some parts of the state. If left undisturbed, these sites may eventually convert entirely to white pine.

Historically, pine stands have periodically experienced a number of pest problems. Jack pine (especially overmature stands) is attacked by jack pine budworm, which causes serious defoliation and mortality. Wildfire is also a major threat to this forest type. Several sawfly defoliators such as redheaded or introduced pine sawfly can occasionally attack red and white pine. Pine and Saratoga spittlebugs, pine root collar weevil, Zimmerman and European pine shoot moth, and other insects can occasionally cause significant damage and mortality to red and white pine stands. Several disease problems ranging from needlecast foliage diseases and white pine blister rust to drought and other environmental problems have occasionally caused damage to red and white pine stands.

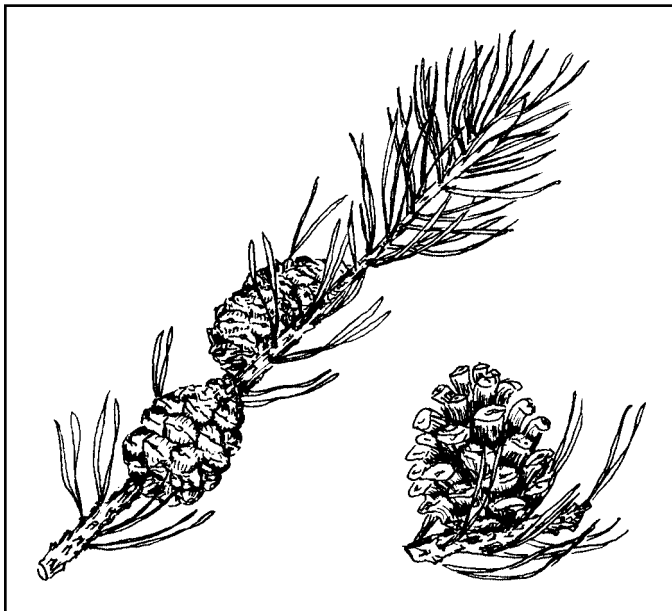


Figure 5.17. Jack pine.

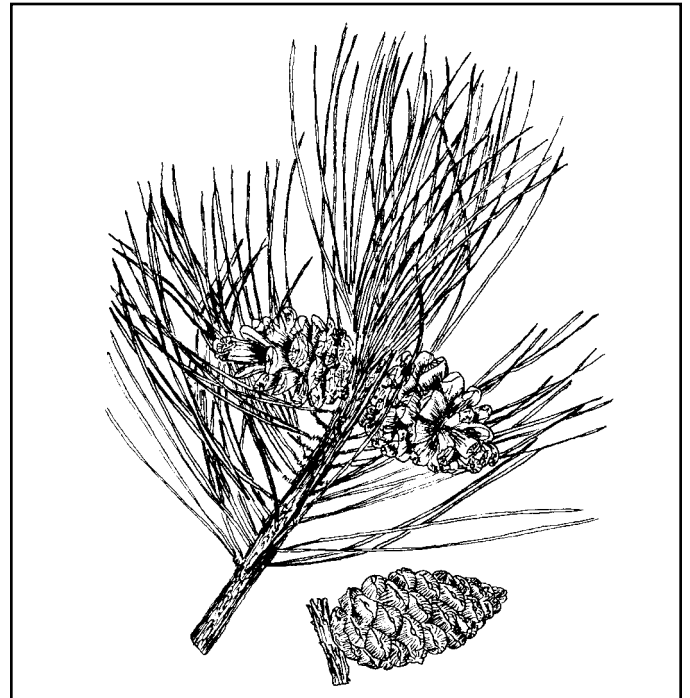


Figure 5.18. Red pine.

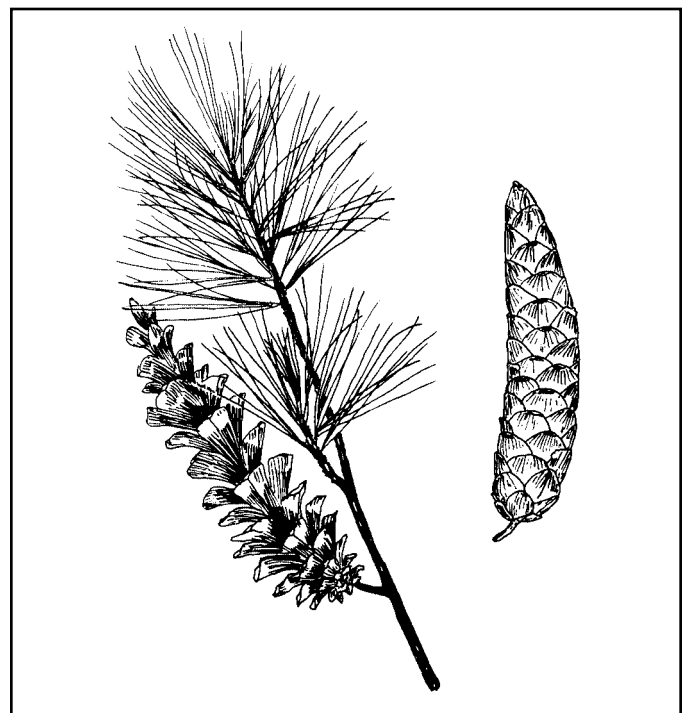


Figure 5.19. Eastern white pine.

The remainder of the forest types that can be found growing in Michigan are balsam fir/white spruce, black spruce, northern white cedar, tamarack and exotic species such as the non-native Scotch pine. On occasion, all of these forest types can experience some type of major insect or disease problem. Some examples (in order of forest type listed above) include spruce budworm, arborvitae leaf miner, larch casebearer, and several needlecast diseases of non-native species such as Scotch pine and Douglas-fir.

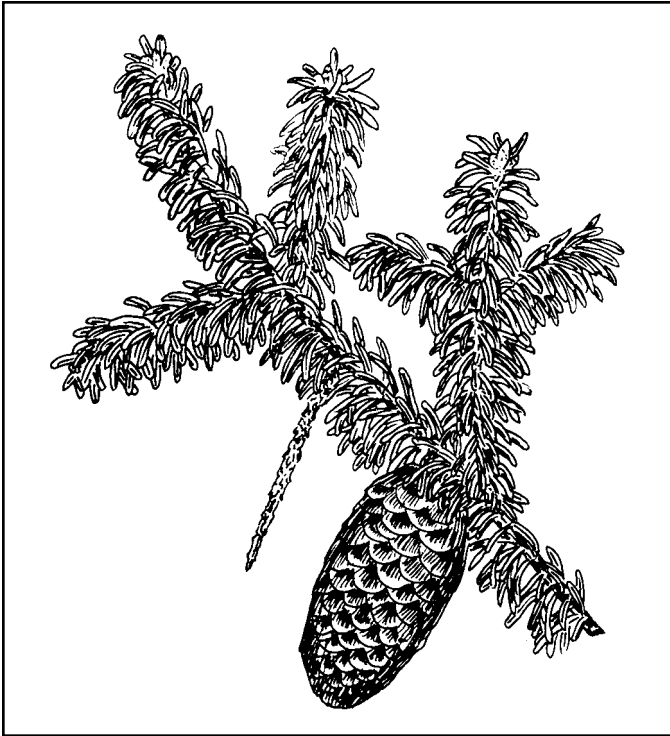


Figure 5.20. Balsam fir.

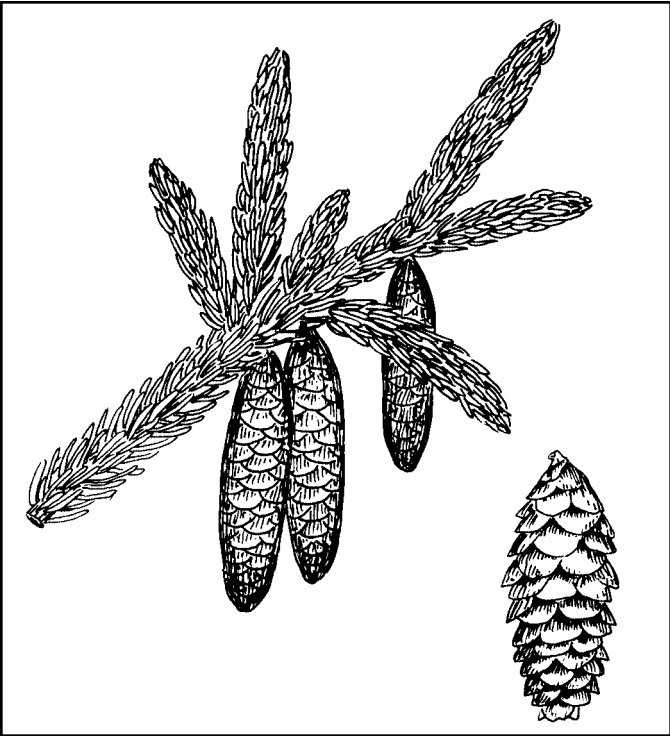


Figure 5.22. White spruce.

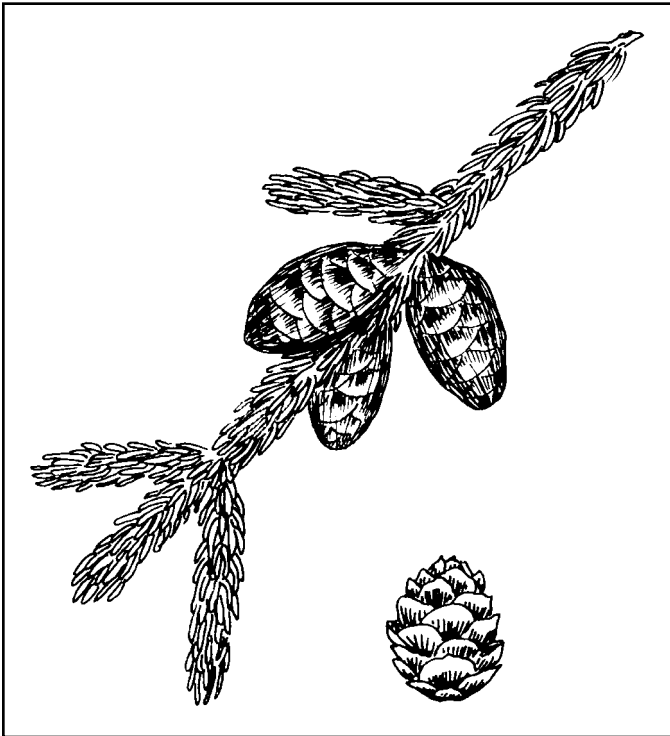


Figure 5.21. Black spruce.



Figure 5.23. Northern white cedar.

CHAPTER
5

Review Questions

Chapter 5: Forest Types in Michigan

Write the answers to the following questions and then check your answers with those in the back of the manual.

- Understanding tree/pest relationships is easier if you have basic knowledge of the habitats and associations of the tree types in your area.
 - True
 - False.
- What percentage of Michigan land is forested?
 - 15 percent
 - 25 percent
 - 50 percent
 - 75 percent
- Pests destroy a large amount of timber in Michigan each year because forest growth is:
 - Declining.
 - Stable—neither increasing nor declining.
 - Increasing slightly.
 - Excessive.
- IPM in forest situations depends heavily on pesticide use.
 - True
 - False
- One or more tree species growing together because of similar environmental requirements and similar tolerance to light is called a:
 - Forest type.
 - Timberland.
 - Park.
 - Bog.
- The most common forest type in Michigan is:
 - Pine.
 - Oak-hickory.
 - Aspen-birch.
 - Maple-beech.
- Eighty-five percent of forested land in Michigan is made up of:
 - Three forest types.
 - Four forest types.
 - Five forest types.
 - Six forest types.
- Hypoxylon* canker is a major disease problem in maple-beech forest types.
 - True
 - False
- Maple-beech forests are often called:
 - Northern hardwoods
 - Northern softwoods.
 - Eastern softwoods.
 - Coniferous.
- Aspen-birch forest type is restricted to:
 - Low sites.
 - Dry sites.
 - Wet sites.
 - Both wet and dry sites.
- The replacement of one plant community with another is called:
 - Evolution.
 - Plant succession.
 - Adaptation.
 - Resistance.
- Aspen-birch forest type is considered:
 - Long-lived.
 - Short-lived.
 - Both long- and short-lived.
 - All of the above.

13. When several pest problems occur in quick succession in the oak-hickory forest type, the effect of the combination of stresses is called:
- A. Oak decline.
 - B. Oak decay.
 - C. Oak wilt.
 - D. Oak mortality.
14. Oak-hickory is considered a pest-free forest type.
- A. True
 - B. False
15. Elm-ash-soft maple forest type prefers:
- A. Lowlands.
 - B. High, open sites.
 - C. Dry, sandy soils.
 - D. Slopes.
16. Dutch elm disease has had what type of impact on the elm-ash-soft maple forest type?
- A. High impact
 - B. Low impact
 - C. Moderate impact
 - D. No impact
17. What characteristics are common to the elm-ash-soft maple forest type?
- A. Subject to flooding
 - B. Shallow rooted
 - C. High amount of defect
 - D. All of the above
18. The native pine best adapted to both wet and dry soils in Michigan is:
- A. Red pine.
 - B. Eastern white pine.
 - C. Jack pine.
 - D. Pitch pine.
19. Eastern white pine is often found growing as an understory tree because of its tolerance for:
- A. Light.
 - B. Shade.
 - C. Dry soil.
 - D. Wet soil.