Biodiversity in Red Maple Forested Wetlands in the Northeast

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(*Much of the following information was synthesized from several sources, especially the study by Golet and others (1993). All photos by Roger Monthey*.)

The biodiversity of red maple forested wetlands in the Northeast is very rich on a regional scale. Red maple forested wetlands are also commonly known as red maple swamps (Golet and Larson 1974), so these two terms will be used interchangeably in this article. Their biological richness is due not only to the variety of floral zones in the Northeast (Golet and others 1993) but also to a microscale variety in topography known as microrelief. Microrelief can be seen as the conspicuous mound and pool structure in red maple swamps (figure 1). Microrelief, also known as *hummock and hollow* or *pit and mound microtopography*, often provides favorable sites for seedling germination, establishment, and recruitment (Falk and others 2006).

Figure 1. This mound and pool structure is common in red maple swamps.

In the glaciated Northeast, red maple is the dominant species in swamps where soils are saturated or seasonally flooded from late fall through early summer in most years (Golet and others 1993). However, red maple is an extremely adaptable species and grows well in drier upland sites as well. Red maple swamps, which Golet and others (1993) referred to as broad-leaved deciduous forested wetlands, are a component of the palustrine system of wetland classification. Palustrine wetlands include all inland wetlands dominated by persistent vegetation (i.e., trees, shrubs, and emergents) and all other inland wetlands not found in river channels or lake basins (Cowardin and others 1979).

Red maple swamps are most common in southern New England and northern New Jersey where they make up 60 to 77 percent of all palustrine wetlands. They are less common in northern New England; 27 percent of palustrine wetlands in Vermont and 34 percent in New York are red maple swamps (Golet and others 1993). Wetlands (including both forest and nonforest wetlands) in New England and New York range from most to least abundant by State as follows: Maine, New York, Massachusetts, Vermont, New Hampshire, Connecticut, and Rhode Island (Mitsch and Gosselink 1993).

Golet and others (1993) listed about 484 genera and species found in red maple swamps in the glaciated Northeast, which they divided into five zones that depict variation in the flora and relative abundance of red maple swamps (refer to the map on p. 47 in Golet and others 1993). The five zones include:

Zone 1: Southern New England Upland, Seaboard Lowland, and Coastal Plain
Zone 2: Great Lakes and Glaciated Allegheny Plateau
Zone 3: St. Lawrence Valley and Lake Champlain Basin
Zone 4: Northeastern Mountains
Zone 5: Northern New England Upland

Red maple swamps are most abundant in Zone 1, which roughly stretches from southern Maine through the southern half of New Hampshire, eastern edge of Vermont, most of Massachusetts and Connecticut, all of Rhode Island, the southeastern corner of New York, and the northern tip of New Jersey.

Table 1 presents a general breakdown of the 484 species that Golet and others (1993) noted growing in the red maple swamps of the Northeast. This large number of species may be daunting to woodlot owners interested in learning how to identify them (and in so doing, learning to appreciate them and perhaps utilizing some of them as nontimber forest products). However, the number of plants that one would find in a specific woodlot somewhere in New England would be much less than the total number of species provided by Golet and others (1993)—the overall richness of red maple swamps is much greater on a regional scale than at a single site where fewer species usually predominate.

Table 1. Number of species growing in red maple swamps of the Northeast by vegetation type (Golet and others 1993).

Vegetation type	Number of species
Trees	56
Erect shrubs and woody vines	99
Forbs and trailing shrubs	210
Ferns, clubmosses, and horsetails	26
Graminoids (grasses, rushes, and sedges)	57
Bryophytes (mosses and liverworts)	36

In a moderately intensive, yet incomplete, plant survey of a small woodlot in Coastal Maine near the town of Gray where red maple swamps predominated, the following number of species were found: 22 trees; 28 shrubs and vines; 72 forbs; 15 ferns, clubmosses, and horsetails; 28 bryophytes; 17 lichens; and 33 grasses and sedges (a total of 215 species) (Monthey, unpublished data). The number of species reported by Golet and others (1993) is also incomplete, especially for bryophytes.

There are five life-form layers of vegetation in red maple swamps: trees, saplings, shrubs, herbs, and ground cover (Golet and others 1993). Tree heights in 30- to 100-year-old stands in Southern New England and New Jersey were about 43 to 49 ft (13 to 15 m); stand densities (number of stems per acre and basal area) varied widely across the Northeast; and canopy cover was commonly above 80 percent for mature stands (Brown and others 1979). The sapling layer (stems that are about 10 to 20 feet (3 to 6 m) tall) is generally lacking in stems. The shrub layer is typically dense, well developed, and dominated by broad-leaved deciduous shrubs; total shrub cover usually exceeds 50 percent. The herb layer is highly variable with respect to height, density, and percent cover.

Some of the broad-leaved deciduous tree species that grow in red maple swamps include red maple (*Acer rubrum*), white ash (*Fraxinus americana*), yellow birch (*Betula alleghaniensis*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), black gum (*Nyssa sylvatica*), and swamp white oak (*Quercus bicolor*). Some coniferous trees include white pine (*Pinus strobus*), northern white cedar (*Thuja occidentalis*), Atlantic white cedar (*Chamaecyparis thyoides*), eastern hemlock (*Tsuga canadensis*), eastern larch (*Larix laricina*), red spruce (*Picea rubens*), and black spruce (*Picea mariana*).

Some common shrubs include speckled alder (*Alnus rugosa*), arrowwood (*Viburnum dentatum*), nannyberry (*Viburnum lentago*), common winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), American hornbeam (*Carpinus caroliniana*), swamp azalea

(*Rhododendron viscosum*), sweet pepper bush (*Clethra alnifolia*), spicebush (*Lindera benzoin*), mountain holly (*Nemopanthus mucronata*), and poison sumac (*Toxicodendron vernix*).

The herb layer is made up of ferns, grasses, sedges, and broad-leaved herbs. This article provides photographs of some of the herb species that grow in red maple swamps based on a list from a New York study by Paratley and Fahey (1986) (see Golet and others (1993) for an extensive list of herbs). What species are encountered in any given stand varies because of differences in site conditions and plant zones, among other factors.

Golet and others (1993) discussed microrelief in red maple swamps at some length, which is briefly summarized here. Mound and pool microrelief is primarily caused by windthrow due to shallow-rooted trees. Mounds range in size from about 0.5 ft (15 cm) high to as much as 3.3 ft (1 m) high. The wettest swamps show the most pronounced microrelief. Mound and pool microrelief produces a variety of microhabitat conditions for plant growth because of the variations in soil moisture, soil acidity, and soil temperature they contain. Species that survive well in seasonally flooded depressions and at the base of mounds include mosses, liverworts, and some moisture-loving herbs. Species that grow higher up on the mounds are less tolerant of prolonged saturation. Trees, shrubs, and herbs are largely restricted to mounds in some red maple swamp sites.

Paratley and Fahey (1986) studied hollows in red maple swamps and found that their moisture levels varied. Drainage classes ranged from moderately dry to severely flooded. According to the authors, the following species prefer hollows in all drainage classes: spotted touch-me-not (*Impatiens biflora*), marsh marigold (*Caltha palustris*), mosses of the genus *Mnium*, sensitive fern (*Onoclea sensibilis*), and northern bugleweed (*Lycopus uniflorus*). Other species that were common in hollows were black ash (*Fraxinus nigra*), rough-leaved goldenrod (*Solidago patula*), marsh blue violet (*Viola cucullata*), and marsh fern (*Thelypteris palustris*).

Three species were found primarily in hollows that had moderately dry moisture levels: dwarf blackberry (*Rubus pubescens*), northern white violet (*Viola pallens*), and swamp jack-in-the-pulpit (*Arisaema triphyllum*). Species that preferred the mounds include partridgeberry (*Mitchella repens*), white pine (*Pinus strobus*), blue bead lily (*Clintonia borealis*), goldthread (*Coptis trifolia*), American yew (*Taxus canadensis*), starflower (*Trientalis borealis*), eastern hemlock (*Tsuga canadensis*), red maple (*Acer rubrum*), wild lily-of-the-valley (*Maianthemum canadense*), wintergreen (*Gaultheria procumbens*), and knight's plume moss (*Ptilium crista-castrensis*).

Mosses are an important group of plants that grow in red maple swamps. In addition to the abundant peat mosses (*Sphagnum* spp.), there are also broom mosses (*Dicranum* spp.), delicate-fern moss (*Thuidium delicatulum*), and *Mnium* spp., which are usually abundant in hollows and at the bases of mounds.

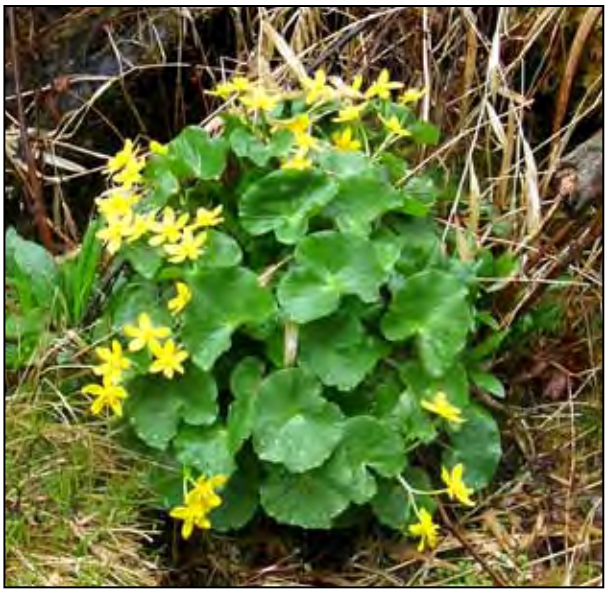
Other Functions and Values

Although this article focuses on the biodiversity values that red maple forested wetlands provide, they also provide other important functions and values related to flood abatement, groundwater, water quality improvement, wildlife habitat, wood products, and sociocultural values (Golet and others 1993).

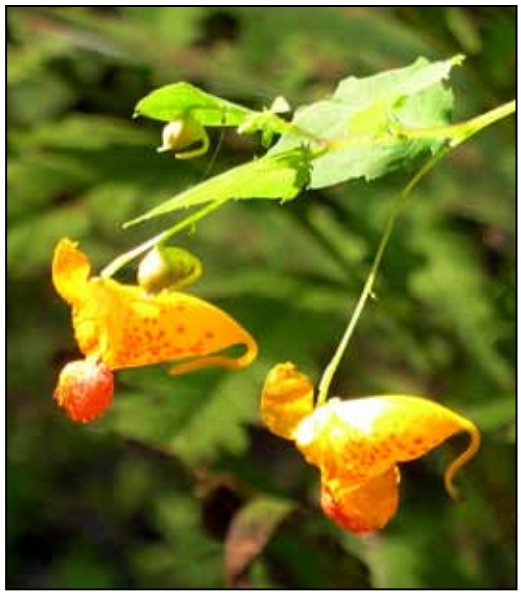
The photographs on the following pages illustrate some of the species that grow in red maple forested swamps in the Northeast.

Some Common Plants in Hollows (Pits/Pools)

These species grow in a variety of moisture regimes ranging from moderately dry to flooded (after Paratley and Fahey 1986).



Marsh Marigold (*Caltha palustris*)



Spotted Jewelweed (*Impatiens capensis*)

Mnium hornum

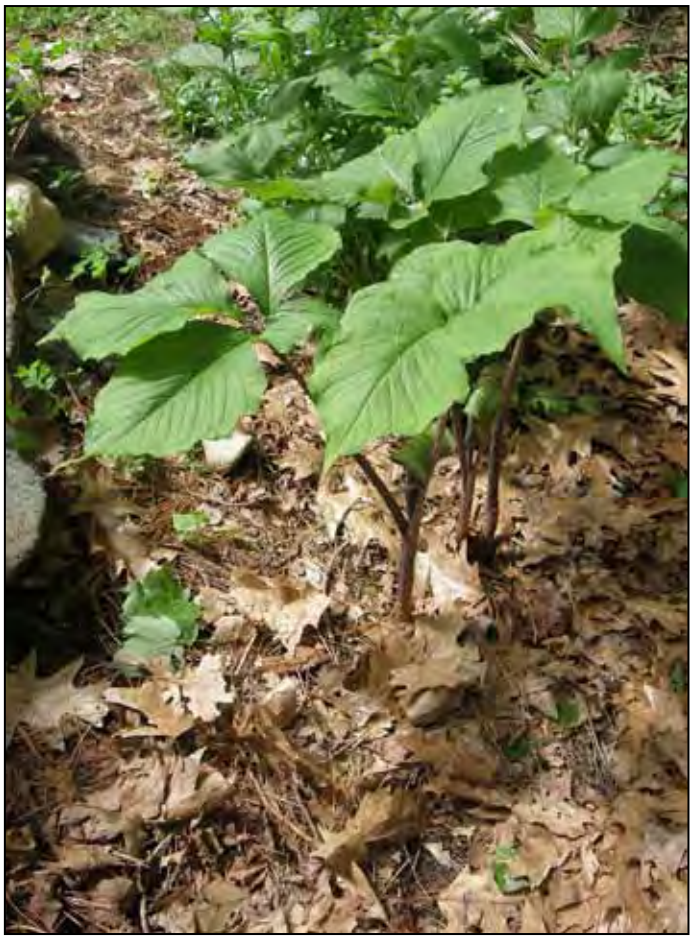
Marsh Fern (*Thelypteris palustris*)

Sensitive Fern (*Onoclea sensibilis*)

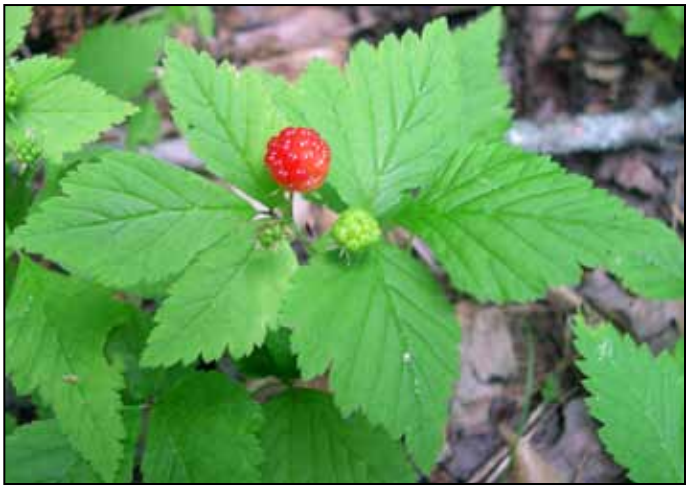
Broom Moss (*Dicranum scoparium*)[1] – leaves appear as if swept by a broom

Delicate Fern Moss (*Thuidium delicatulum*)[1]

Plants Commonly Found in Moderately Dry Depressions (after Paratley and Fahey 1986)



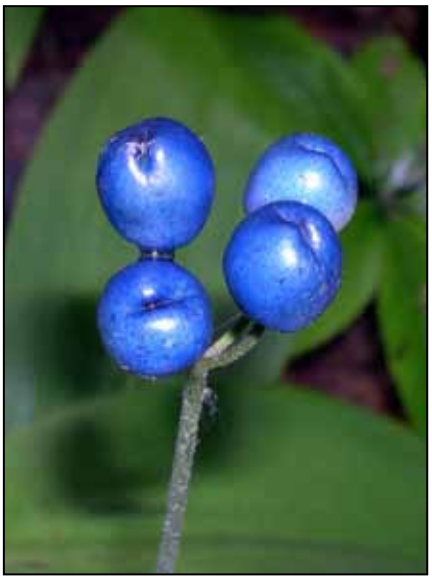
Jack-in-the-Pulpit (*Arisaema triphyllum*)



Dwarf blackberry (*Rubus pubescens*)

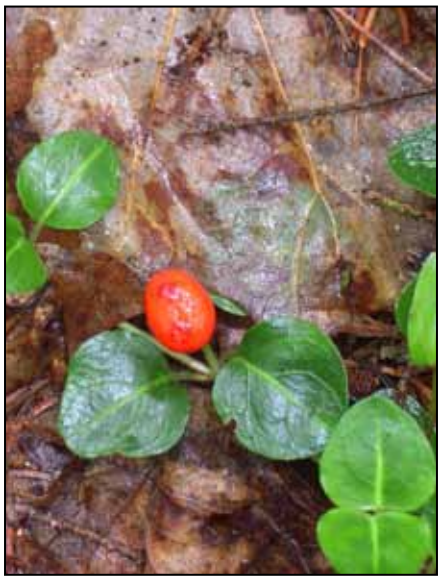
[1] Also grows at the base of mounds

Some Plants Commonly Found on Mounds (after Paratley and Fahey 1986)



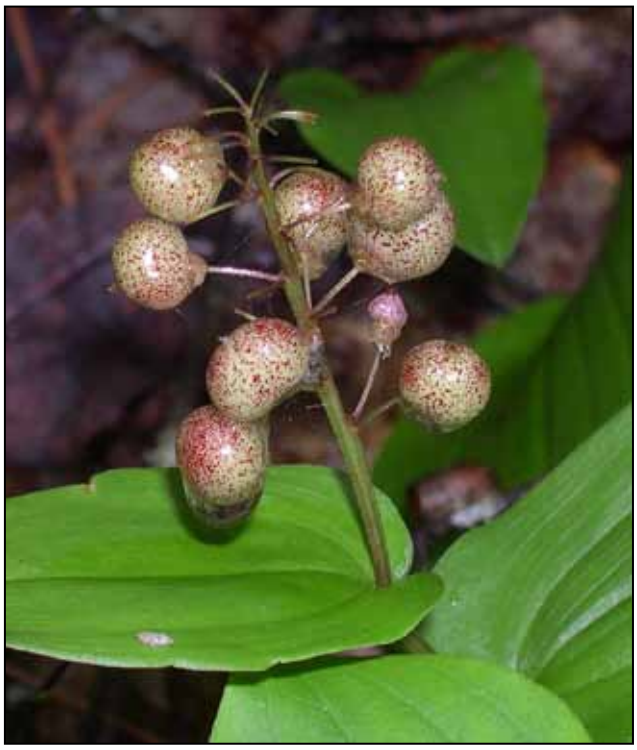
Blue Bead Lily (*Clintonia borealis*)[2]

Wintergreen (*Gaultheria procumbens*)[2]



Partridge Berry (*Mitchella repens*)

Goldthread (*Coptis trifolia*) growing on a mound with broom moss (*Dicranum scoparium*)



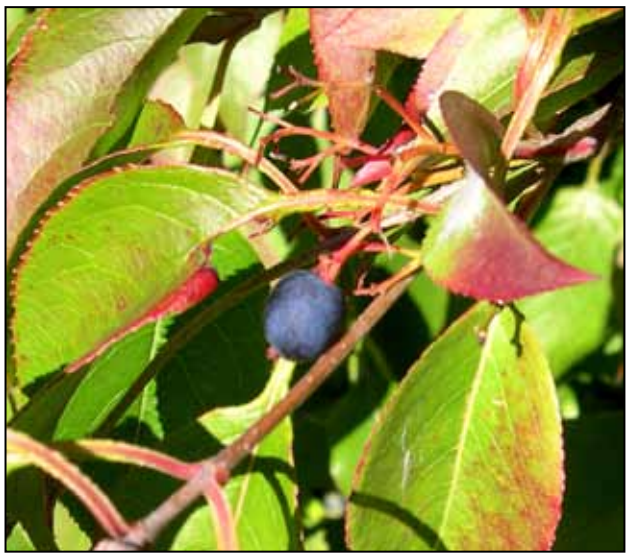
Wild lily-of-the-valley (*Maianthemum canadense*)

[2] Common on mounds in wetter swamps but also in depressions in drier swamps

Some Other Common Plants in Red Maple Swamps

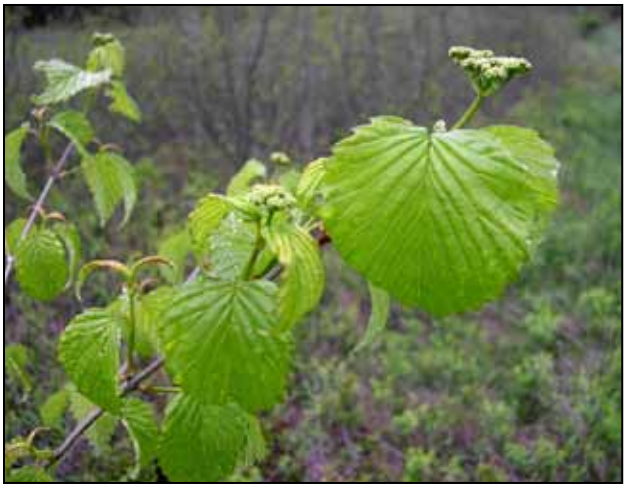
Cinnamon Fern (*Osmunda cinnamomea*) – most common fern in red maple swamps

Water Pennywort (*Hydrocotyle americana*)



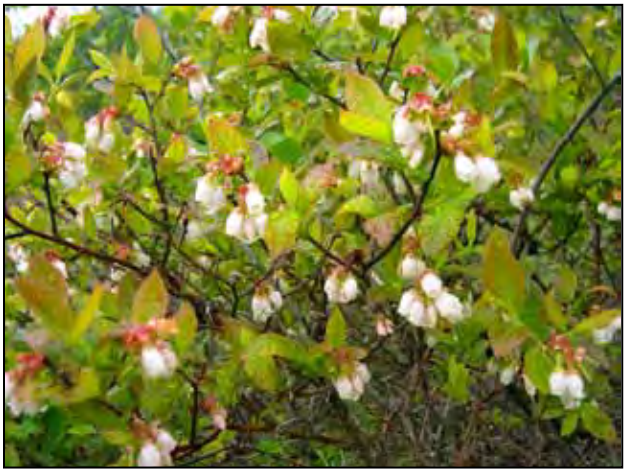
Nannyberry (*Viburnum lentago*)

Mountain Holly (*Nemopanthus mucronata*) – note purplish leaf petioles

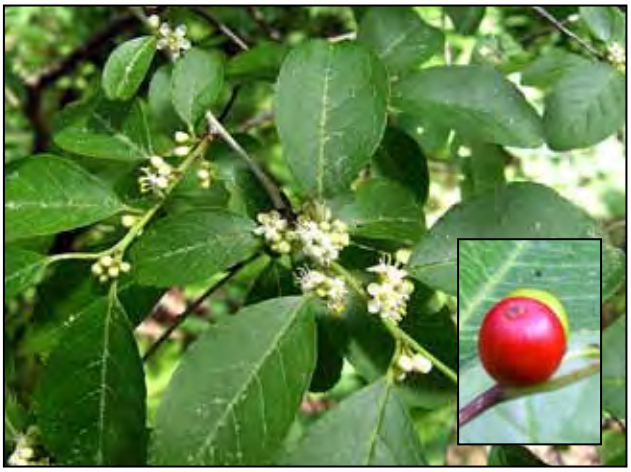


Arrowwood (*Viburnum recognitum*)

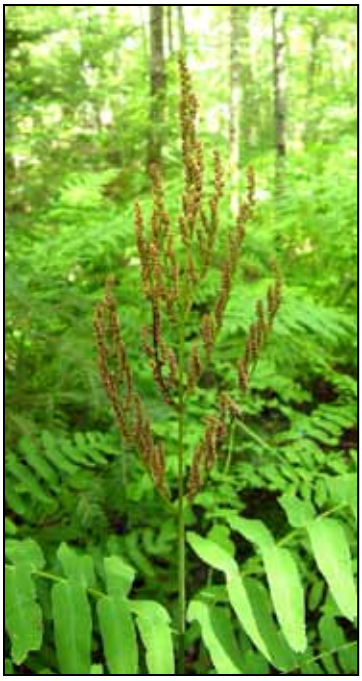
Spicebush (*Lindera benzoin*)

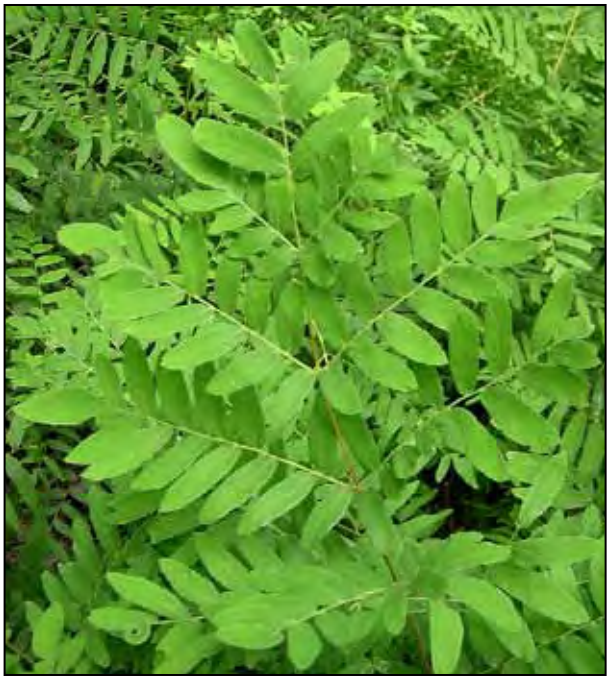


Highbush Blueberry (*Vaccinium corymbosum*)

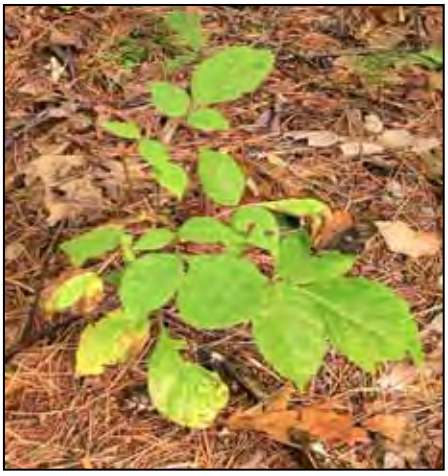


Common Winterberry (*Ilex verticillata*) – fruit (inset)

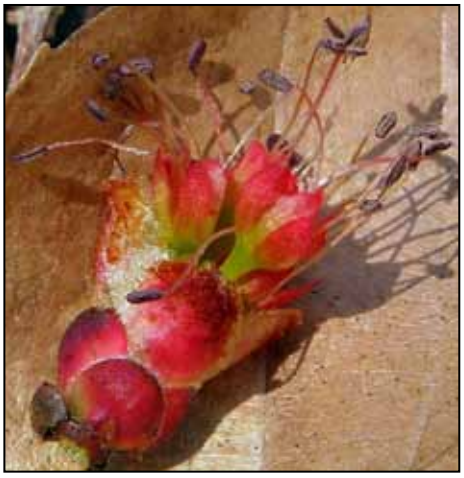


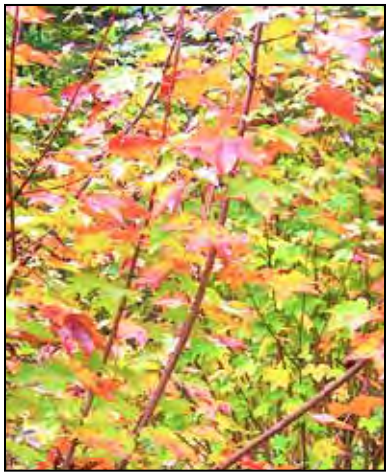


Royal Fern (*Osmunda regalis*) – sori (left), fronds (right)

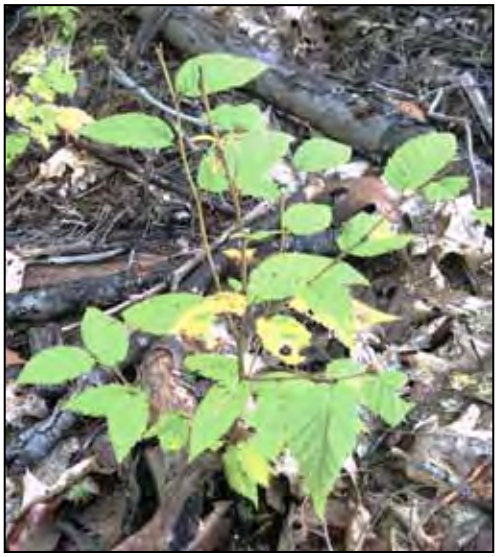


White Ash (*Fraxinus americana*)

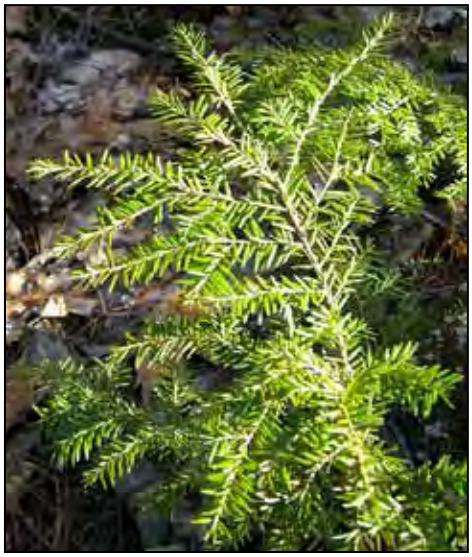




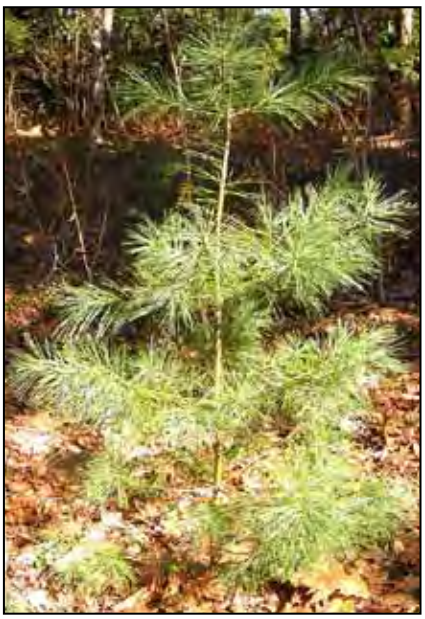
Red Maple (*Acer rubrum*) – flower (left), foliage (right)



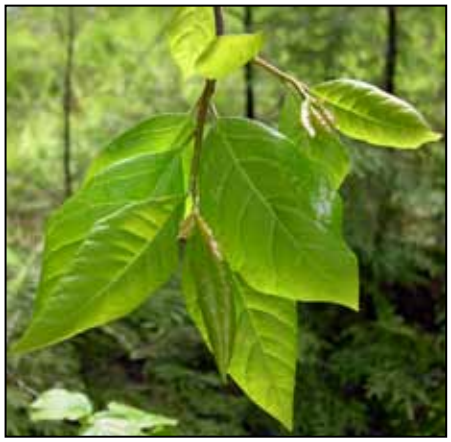
Yellow Birch (*Betula alleghaniensis*)



Eastern Hemlock (*Tsuga canadensis*)

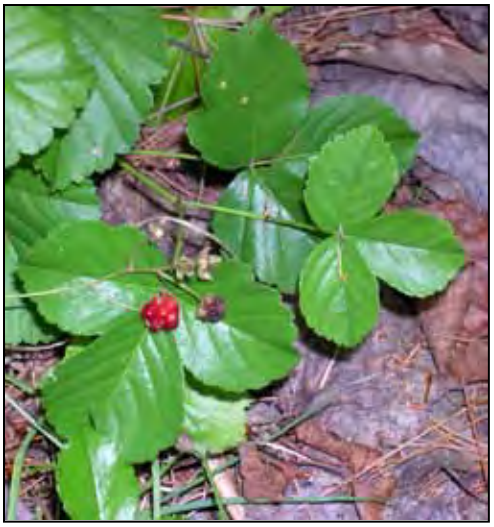


White Pine (*Pinus strobus*)



Black Gum (*Nyssa sylvatica*) in coastal Maine near Gray - crown (left), leaves (right)

Sphagnum sp.



Swamp Dewberry (*Rubus hispidus*)

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