



Lichens and Vines on Trees

*Alan S. Windham, Professor
Entomology and Plant Pathology*

*Wayne K. Clatterbuck, Associate Professor
Forestry, Wildlife & Fisheries*

Lichens

Are lichens really responsible for branch dieback and plant death? A lichen is an autotrophic (meaning it has the ability to produce organic material from inorganic chemicals and a source of energy, the sun), symbiotic organism composed of green algae or blue-green algae (cyanobacteria) and fungal tissue. There is some debate on the nature of this relationship, but most agree the alga and the fungus both benefit from this arrangement. The alga manufactures sugar that the fungus can live from and in return the fungus provides protection to the alga. Lichens do not have roots, stems and leaves, so they absorb most of their nutrients from rainfall.

Lichens can be found almost anywhere worldwide. They grow readily on rock, soil, processed wood and trees.



Alan Windham

Foliose or leafy lichen



Alan Windham

Fructiose or shrubby lichen

They grow on constructed structures and even on organisms such as tortoises and weevils. Lichens are found in forests, the tundra, deserts, in tree canopies of tropical rain forests, on mountains and rocky shores. Lichens are able to withstand harsh conditions such as freezing, thawing, high light and intense heat. They are able to dry out for long periods, then quickly become active again when rehydrated.

Some other characteristics of lichens are that they are slow to evolve and slow to grow. Most forms grow only a few millimeters a year. Lichens are classified into three major types of communities, as well as three morphological groups. The three major communities are corticolous, which grow on tree bark; terricolous, which grow on soil; and saxicolous, which grow on rocks. The three morphological groups are fruticose (shrubby) lichens, foliose (leafy) lichens and crustose (crusty) lichens.

Lichens play very significant roles in our biological world. Lichens act as air pollution indicators. Some fruticose types are used as indicators of unpolluted areas, while others are able to withstand high levels of pollution. Since lichens lack roots, nutrients that are dissolved in water are obtained through surface absorption of rainfall. Lichens act much like sponges, absorbing everything that is dissolved in the rainwater and retaining it. Since there is no means of purging antagonistic substances, these substances accumulate in

the lichen and reach a level where they break down the chlorophyll molecules that are responsible for photosynthesis of the algae. Photosynthesis is the process green plants use to convert sunlight energy to chemical energy, which is used in the maintenance and growth of the plant. All lichens contain green chlorophyll, although other substances or pigments on the surface may make them appear gray, yellow or orange. When the photosynthetic process stops in the algae, the algae die, which eventually leads to the death of the fungus.

Research has shown that lichens are not parasitic on higher plants. However, their growth may increase due to increased light levels when branches lose leaves and die. Lichens are not the cause of branch dieback and tree death. Keep searching for other tree stressors that may be causing these problems.

Sources

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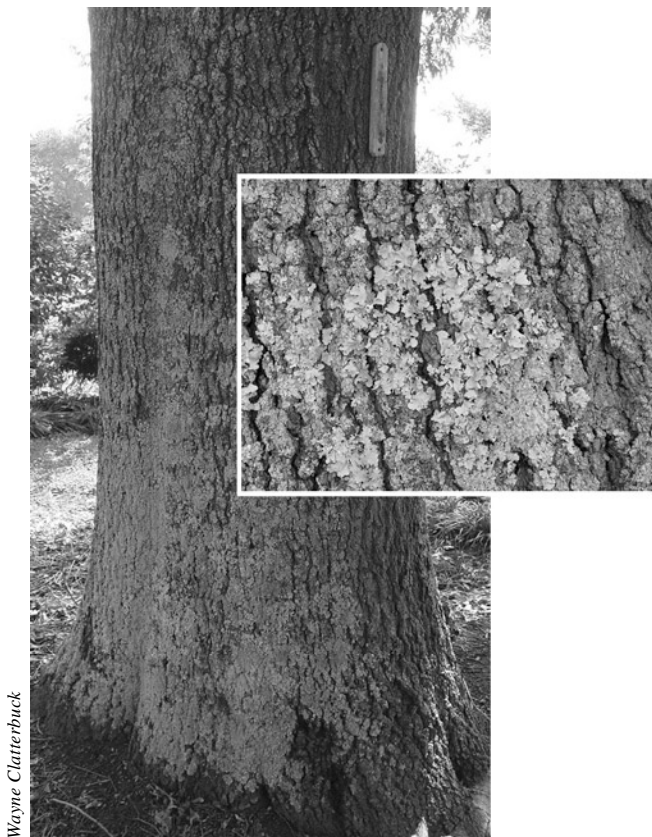
Vines

Vines are plants that cannot remain freestanding to any appreciable height. They must climb by using other plants or structures for support. Vines often use trees for support. What effect do vines have on trees?

Vines climb on trees using four mechanisms (Figure 1): twining, tendrils, tendrils with adhesive disks and aerial roots. Twining vines climb by encircling or winding around upright supports such as trees and poles. Wisteria, some honeysuckles, kudzu and bittersweets are a few vines that twine. These vines can be detrimental to growth of young trees by wrapping tightly around the tree stem. When the tree trunk grows and expands, the vine constricts the flow of water and food. Often the tree is girdled and eventually dies.

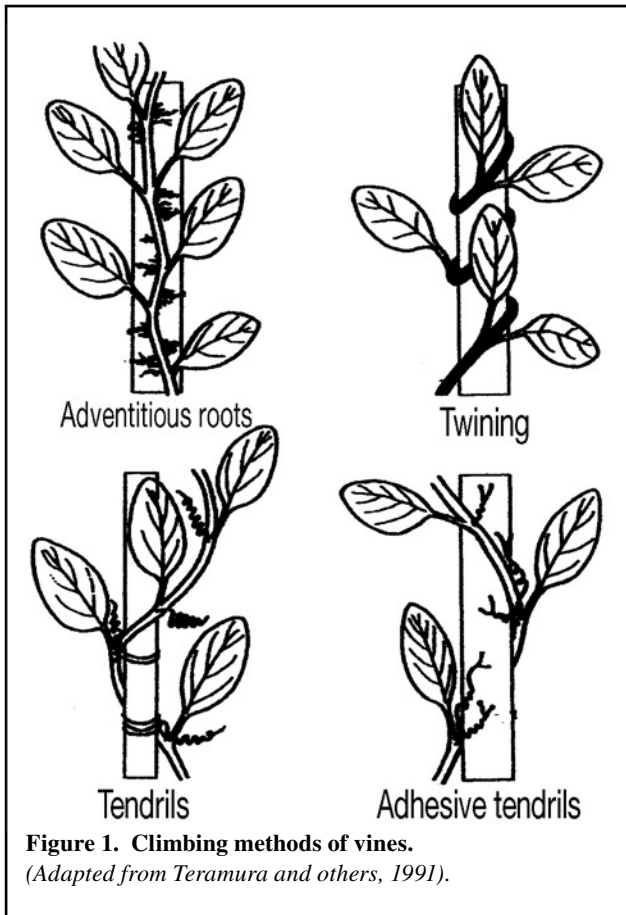
Winding vines climb by means of tendrils. The tendrils are slim, flexible and leafless stems that wrap around most anything they contact, such as small branches and twigs. The tendrils are relatively short-lived before withering and losing their grip, but by then the vine is higher in the tree and growing new tendrils for support. Grapes are an example of a climbing vine with tendrils.

Virginia creeper and crossvine also produce tendrils, but their branched tips form flat disks with a sticky sub-



Wayne Clatterback

Lichens are common on tree trunks.



stance that adheres to the tree. Once the substance dries and anchors the disk, the tendril coil contracts and draws the vine closer to the tree.

Vines such as trumpet creeper, English ivy and poison ivy produce aerial roots that attach to the tree. These aerial roots do not absorb water or nutrients (all vines have root systems in the ground) and thus do not harm the tree or supporting surface. However, the vine and its aerial roots may cause discoloration of the supporting surface (bricks, mortar and non-living wood) by preventing air circulation, which results in altered temperature and moisture conditions. Wood decay might be promoted on non-living wood surfaces. The aerial roots are difficult to remove from the supporting surface once they have been anchored.

The fastest growing vines are stem twiners and tendril climbers and the slowest are the root climbers. Most twiners and tendril climbers must have support surfaces at different canopy levels (either lower branches or different strata of trees) to reach the top of the tree canopy. These climbers cannot reach the upper canopy on isolated stems with high branches without some lower support surface. Thus, most twiners and tendril climbers grow with the tree as the tree increases in height.



Wayne Clatterbuck

Virginia creeper vine attached to a tree.



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Honeysuckle vines encircling and girdling a small tree.

Most vines do not affect tree growth unless they grow into the upper crown and canopy where their leaves displace the leaves of the tree. The tree with fewer leaves and less ability to photosynthesize will begin to decline as the vines become more dominant. Vines that tend to be troublesome in Tennessee include poison ivy, kudzu, wild grape, bittersweet and honeysuckle. Vines should be severed at the ground level and sprayed with a recommended herbicide when cut or when they resprout.

Several vines are invasive exotics that colonize disturbed areas and have the ability to climb to upper tree canopies: Japanese honeysuckle, kudzu, English ivy and Oriental bittersweet. These aggressive vines should be controlled when encountered because they tend to spread across the landscape unchecked and supplant native species.

Sources

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Vines of English ivy beginning to dominate a tree crown. Notice that just a few branches of the upper crown are not covered by the crown.

Native, exotic and invasive vines common in Tennessee that use trees for support and their climbing method (shaded blocks).

Species	Common Name	Origin	Climbing Methods			
			Twining	Tendrils	Tendrils with Disks	Aerial Roots
<i>Bignonia capreolata</i>	Crossvine	Native				
<i>Campsis radicans</i>	Trumpet Creeper	Native				
<i>Celastrus orbiculatis</i>	Oriental Bittersweet	Exotic, Invasive				
<i>Celastrus scandens</i>	American Bittersweet	Native				
<i>Decumaria barbara</i>	Climbing Hydrangea	Native				
<i>Euonymus fortunei</i>	Wintercreeper	Exotic, Invasive				
<i>Hedera helix</i>	English Ivy	Exotic, Invasive				
<i>Lonicera japonica</i>	Japanese Honeysuckle	Exotic, Invasive				
<i>Lonicera</i> spp.	Honeysuckle	Native & Exotic, Invasive Species				
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	Native				
<i>Parthenocissus tricuspidata</i>	Boston Ivy	Exotic				
<i>Pueraria lobata</i>	Kudzu	Exotic, Invasive				
<i>Toxicodendron radicans</i>	Poison Ivy	Native				
<i>Vitis</i> spp.	Grape	Native				
<i>Wisteria</i> spp.	Wisteria	Native & Exotic, Invasive Species				

Adapted from: Teramura and others, 1991



Tendrils of a grapevine wrapping around each other.

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Kudzu vines in trees.

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Poison ivy vines with their aerial roots can be quite large.

Mike Williams



English ivy vines, when used as a ground cover, often climb tree trunks.

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Kudzu is a twining vine that supports itself by wrapping around small branches. These vines cannot reach the upper canopy unless there is a “vertical ladder” of different canopy levels that allows the vine to climb.



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Purple flowers of wisteria, a twining vine.



Robin Bible

Flowers of the trumpet creeper vine.



Chuck Barger

Flowers of Japanese honeysuckle, an invasive vine.

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