Vermont Forest Health

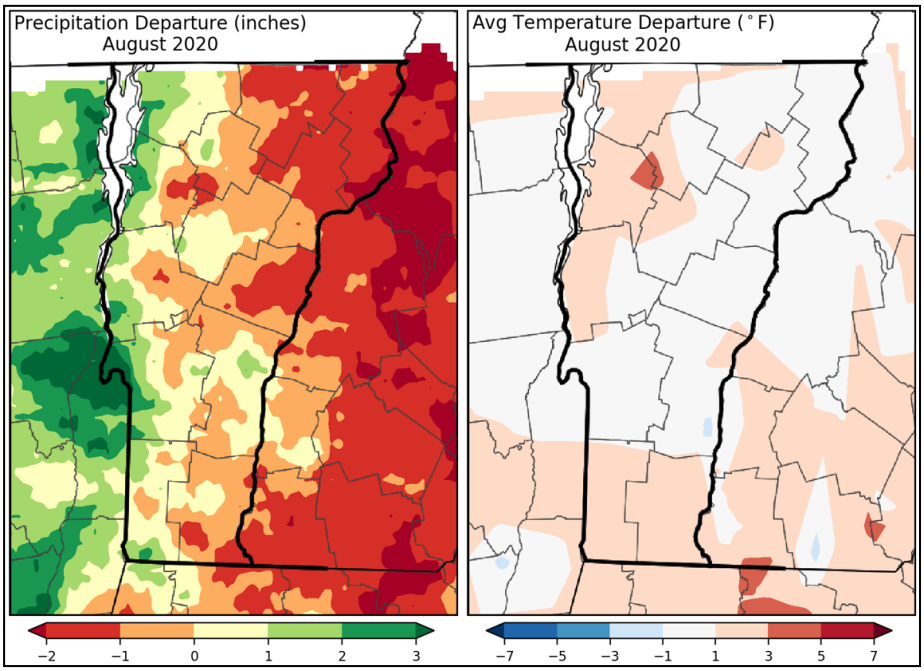
Insect and Disease Observations — August 2020

Department of Forests, Parks & Recreation
August 2020 vtforest.com

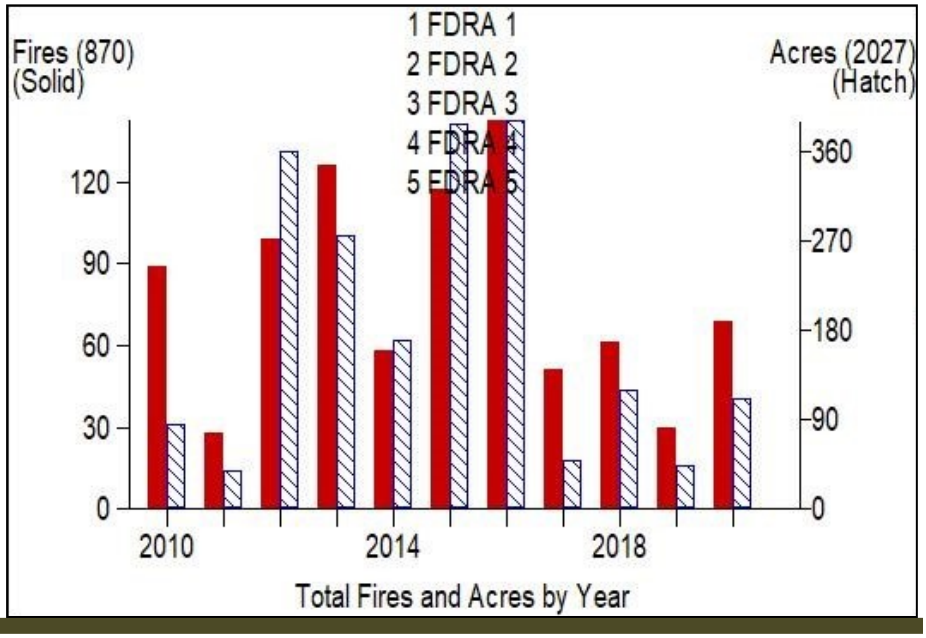
Weather Recap

August marks the last full month of the summer season, with fall colors and cooler temperatures right around the corner. On average, this month was warmer and wetter than August of 2019. Statewide temperatures averaged 65.6°F, which was 1°F warmer than last year. Statewide precipitation averaged 4.17 inches, which was 0.38 inches more than August of last year.

Despite isolated heavy rains in some locations this month, many areas have received little or no rain. Soil conditions and larger forest fuels in the Northeast Kingdom and southern areas remain very dry, increasing the potential for ground fires caused by campfires or lightning. Fire danger ratings are low to moderate. 2020 fire reports have increased from 2019 reports. To date, 69 fires have burned 111 acres this year, compared to 15 fires that burned 22 acres last year.



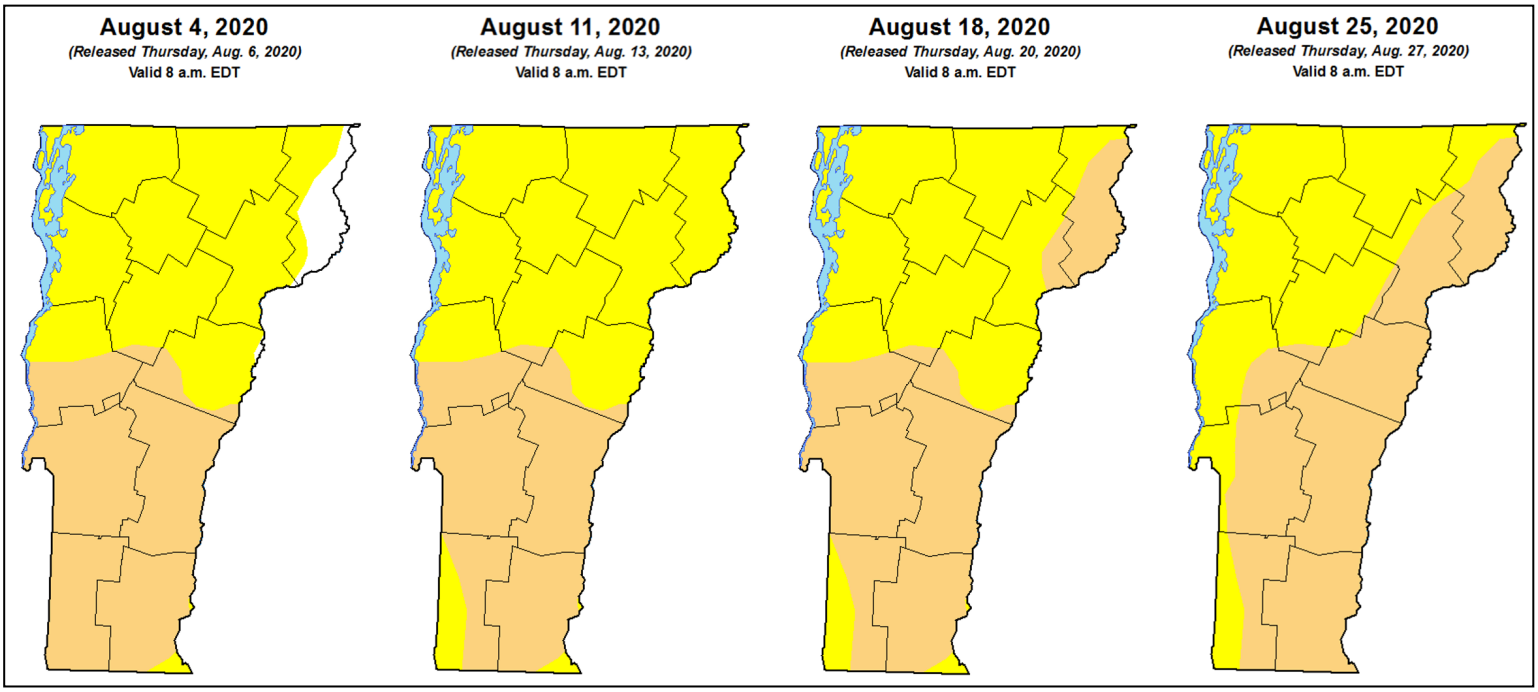
Temperature and precipitation departure from normal. Maps and data: Northeast Regional Climate Center.



Current number of fires in VT by size and year. Graph and data: Vermont Fire Danger Rating Areas, and Vermont Town Forest Fire Wardens.

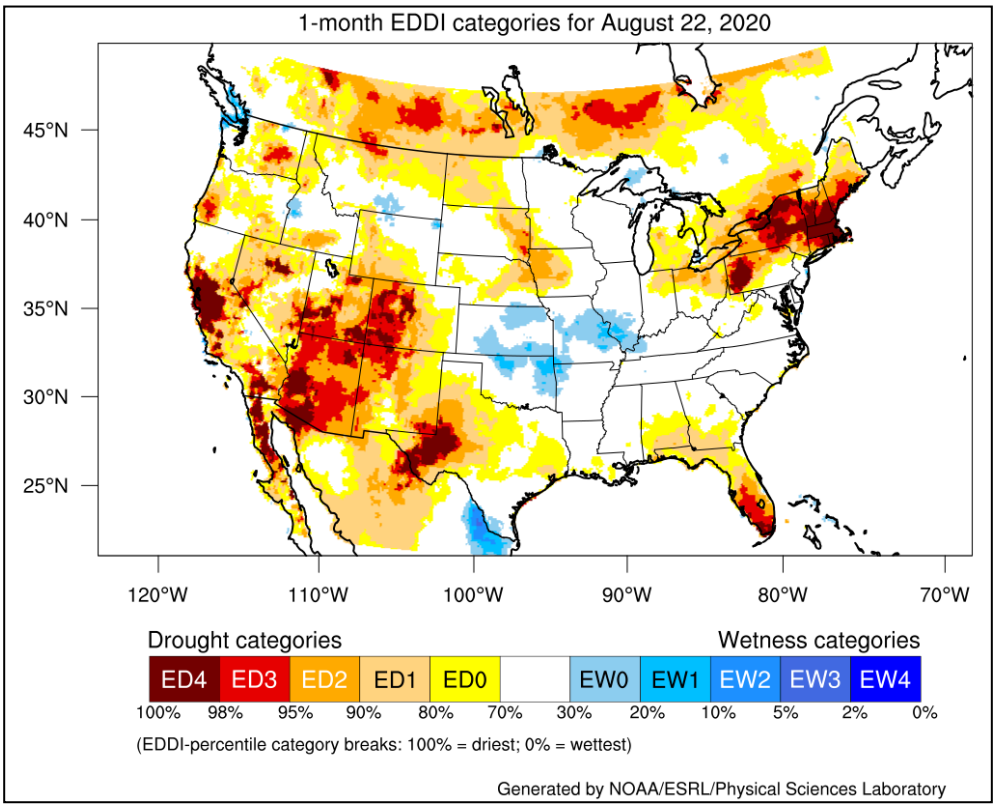
Drought Update

In the beginning of the month, the U.S. Drought Monitor listed 41.78% of the state in moderate drought. By the end of the month, this value increased to 50.69%, with the remainder listed as abnormally dry (49.31%).



August drought conditions. Maps and data: National Drought Mitigation Center.

The Evaporative Demand Drought Index (EDDI) is a tool used to examine the atmospheric evaporative demand ("atmospheric thirst") of a place over time. This unit of measure is often used as an early warning system for extreme drought conditions and fire weather predictions.



Summer drought conditions across the state have left Vermont susceptible to flash droughts. This type of drought results from a combination of drought conditions, heat waves, and low humidity. Together, these conditions lead to severe evaporation and rapidly drying soils. Even following periods of heavy rainfall, evaporation can happen so quickly that soils are unable to meet their water-holding capacity.

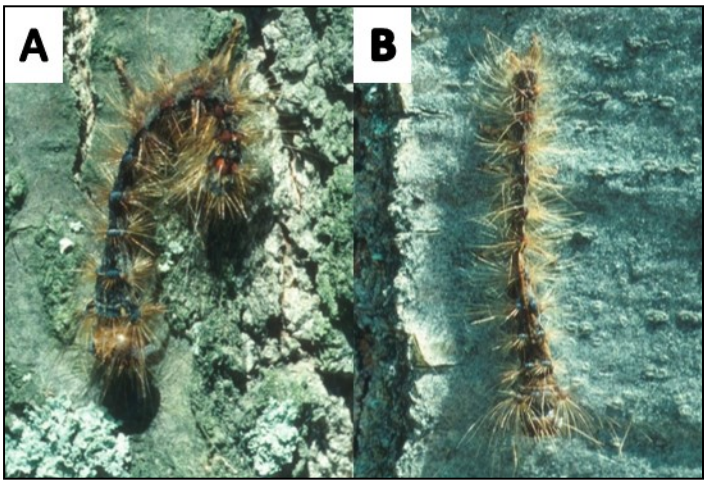
EDDI categories across the U.S. Map and data: NOAA/ESRL Physical Sciences Laboratory.

Gypsy Moth

Male (brown) and female (white) gypsy moths. Photo credit: John H. Ghent, USDA FS, Budwood.

Gypsy moths (*Lymantria dispar dispar)* are invasive moths that were introduced to the U.S. in 1869. Native to Europe and Asia, this insect is a voracious feeder and consumes foliage of more than 300 trees and shrubs in the eastern U.S. This insect has no natural predators in the U.S., however, populations can be reduced by either the fungal pathogen *Entomophaga maimaiga* and/or viral pathogen *Baculovirus*.

E. maimaiga is a fungal pathogen from Japan, first released in Boston in 1910. Although considered host-specific in field conditions, in lab conditions, this fungal pathogen was able to infect other lepidopteran larvae. Spring rains release resting spores of this pathogen from the soil, where they then travel by rain splash and wind to a susceptible host. Once established, the fungal pathogen grows and consumes the insides of the caterpillar. Once fully consumed, the fungal pathogen produces fruiting bodies and ejects a shower or spores onto other gypsy moths and to the forest floor. Without an insect, resting spores from this pathogen can survive in the soil for several years. See this spore shower in action in this video.



A: Gypsy moth killed by *E. maimaiga*. **B:** Gypsy moth killed by *baculovirus*. Photo credit: R. Kelly.

Baculovirus is a host-specific virus that causes caterpillars to climb to elevated positions and die. Gypsy moths usually climb to elevated positions at night to feed to evade predators, however, when infected with this virus, they climb during the day. The virus then continues to multiply and ultimately liquefies the caterpillar. This liquid caterpillar arches and its contents rain onto leaves, and when consumed by gypsy caterpillars, they infect a new host, continuing the cycle.

Gypsy moth egg masses. Photo credit: FPR Staff.

In severe outbreaks, human intervention including mechanical and/or pesticide sprays may be needed. Caterpillars can be squished, or pruned out of the tree and submerged in soapy water. The egg masses can also be scraped and submerged, or squished until you hear a "popping" sound. The most commonly recommended pesticide treatments contain the bacteria, *Bacillus thuringiensis kurstak* (Btk). Btk is applied to foliage where gypsy moth larvae will consume it, and are then killed. This strain of bacteria is specific to moth larvae, and its toxic properties get activated when it interacts with particular enzymes in the caterpillar's digestive tract.

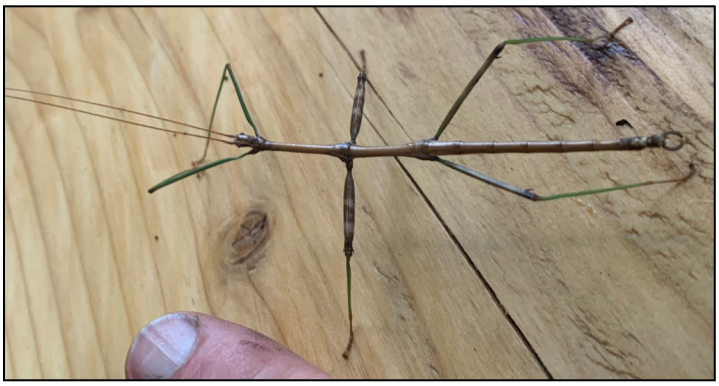
Quick Bites

Fall webworm (*Hyphantria cunea*), a native hardwood defoliator, have started to be reported across the state. Unlike eastern tent caterpillars, the nests of these caterpillars are formed in late summer/early fall and towards the tips of branches. Although the nests and feeding can be unsightly, because the defoliation is happening later in the growing season, it does not have a huge impact on overall tree health. Multiple years of heavy defoliation, can lead to dieback.

Fall webworm nest. Photo credit: FPR Staff.

Birch leafminer (*Fenusa pusilla*) are being observed on birch species across the state. The larval stage of this insect feeds inside of the leaf tissue, causing irregular blotchy mines that range from green to brown in color. The development of mines can give infested leaves a distorted and premature fall appearance. Although larvae and eggs can appear translucent, holding up a infested leaf to light will help show hollow leaf pockets filled with frass.

Leaf miner damage. Photo credit: Whitney Cranshaw, Colorado State University, Bugwood.



Northern walking sticks (*Diapheromera femorata*) are a stick insect native to North America. This insect is a generalist feeder, but can more commonly be found skeletonizing oak and hazelnut trees. When escaping predation, walking sticks camouflage into plant material, and can even sway, mimicking a twig in the wind.

Northern walking stick. Photo credit: FPR Staff.

Loopers, have been observed feeding heavily in northeastern Vermont. This group of insects are generalist feeders and typically feed throughout the growing season. In the late summer/ early fall, some species of loopers will drop to the forest floor where they will pupate and overwinter in the leaflitter.

Bruce spanworm looper. Photo credit: R. Kelly, Bugwood.

Common earth balls (*Scleroderma citrinum*) are a common sight throughout the state after periods of heavy rain. This round mycorrhizal mushroom is pale-brown to brown-yellow in color and is covered in warty scales. When cut laterally, the gleba (spore mass) is white when immature but darkens to a deep purple-black. At maturity, it ruptures and uses wind or rainfall to disperse its spores. **This is a poisonous mushroom and should not be consumed.**

Common earth balls. Photo credit: Herbert Baker, Mushroom Observer.

Anthracnose diseases of hardwoods have started to be observed in southern Vermont following tropical storm Isaias. These fungal diseases cause the appearance of irregularly spread necrotic (dead) areas on the leaf, shoot dieback and/or branch dieback. Wet weather and humid conditions help to perpetuate this disease in infected hosts, making symptoms more severe. Although it can be active in tree decline, it is not an inciting factor of tree mortality.

Anthracnose on maple. Photo credit: FPR Staff.

Ash plant bug (*Tropidosteptes amoenus*) have been observed in central and southern Vermont, affecting ash regeneration. This insect feeds by piercing leaf tissue, leaving behind discolored spotting, known as leaf stippling. If populations are high, this pest can cause leaf curling, distortion and premature leaf loss.

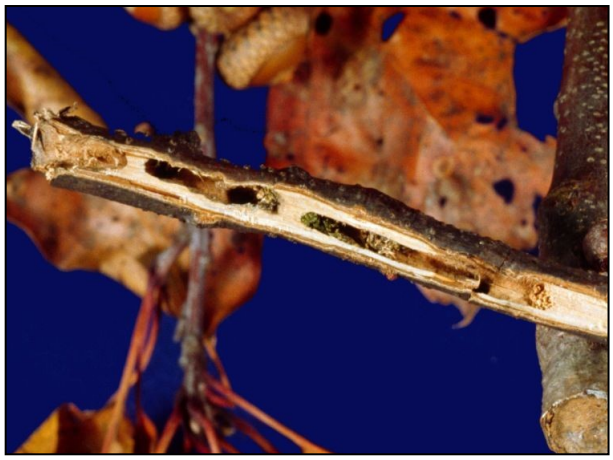
Leaf stippling from ash plant bug. Photo credit: FPR Staff.

Oak shothole leafminer damage**.** Photo credit: Joe Boggs, OSU Extension.

Oak shothole leafminer (*Japanagromyza viridula*) is being observed on red oaks in northeastern Vermont. Although considered native to the eastern U.S., little is known about this tiny fly. This insect starts to feed during bud break, but damage may not be apparent until mid-summer. Partly do to its size, their mouthparts aren't strong enough to break through the leaf, so they waggle their ovipositor around aggressively and lap up fluids from the leaf injury they create. Once the injury dries out, it turns brown and falls out leaving behind a tiny circle. As the leaves grow, these tiny injuries (approx. .7mm) grow, to shothole size damages.

Arborvitae leafminer (*Argyresthia thuiella*) have recently been observed in the northeast kingdom. This pest causes browning and dieback, symptoms similar to an abiotic stressor, but hollowed out mines in the leaf tissue can be apparent when the foliage is held up to the light. Although this damage can be unsightly, this pest is not known for causing severe dieback or mortality.

Arborvitae leafminer damage held to a light. Photo credit: R. Kelly.

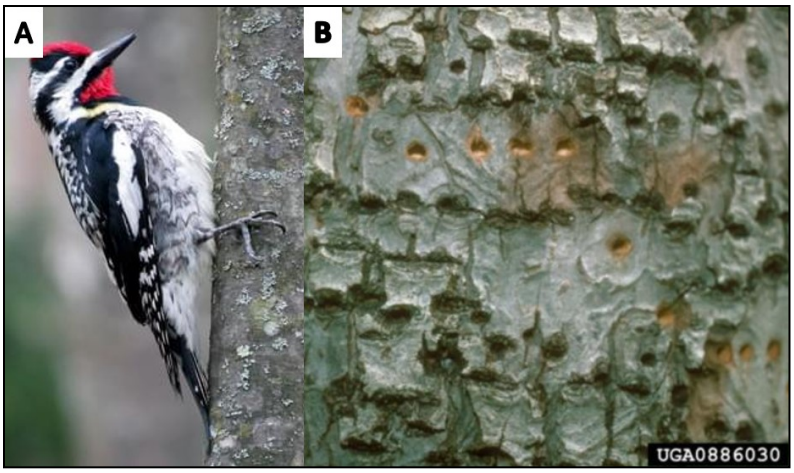


Oak twig pruner (*Anelaphus parallelus*) have been observed causing damage to red oaks in southern Vermont. The larval stage of this insect burrows down the pith of oak twigs, causing twigs to either hang in trees, or litter the ground. Infested branches can exhibit leaf browning, dieback and may lead to distorted growth in heavy infestations. This insect is not known to cause severe dieback or mortality.

Oak twig pruner damage. Photo credit: R. Kelly.

Splendid dagger moth caterpillars (*Acronicta superans*) can be observed feeding in mixed hardwood forests throughout the state this month. These larvae are active through October, and overwinter as pupae. Due to late-season defoliation, this insect does not greatly contribute to dieback or decline in infested hosts.

Splendid dagger moth caterpilar. Photo credit: FPR Staff.



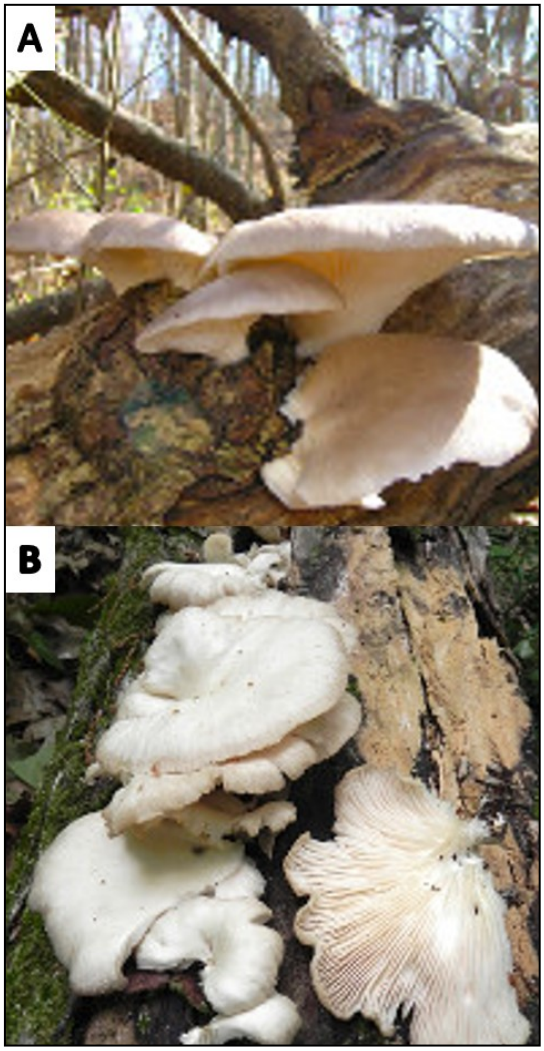
Yellow bellied sap sucker (*Sphyrapicus varius*) is a native woodpecker, that causes damage to both hard and softwood species. This bird excavates holes in a linear fashion on trees, consuming both the sap that is secreted as well as other arthropods that are attracted to the wounds. These birds can cause extensive damage to trees, often girdling them when feeding is vigorous.

A: Male yellow bellied sap sucker. Photo credit: Margaret Dunson, Macaulay Library. **B:** Yellow bellied sap sucker damage. Photo credit: Tim Tigner, Virginia Department of Forestry, Bugwood.

Foraging for Fungi

Lobster mushrooms (*Hypomyces lactifluorum*) have started to be observed in central Vermont this month. Unlike most edible fungi that belong to the phylum Basidiomycota, lobster mushrooms are parasitic fungi in the phylum Ascomycota. This parasite covers its host entirely, causing the host to be a bright orange-red color that resembles a cooked lobster tail. Lobster mushrooms commonly parasitize *Lactarius piperatus* and *Russula brevipes* but have the potential to parasitize other mushrooms that could be toxic. Due to lack of host specificity, the size and shape of lobster tails can vary. In addition to being foraged as an edible, lobster mushrooms can also be used for making pink-red dyes for fabrics and paper.

Lobster mushrooms. Photo credit: Herbert Baker, Mushroom Observer.



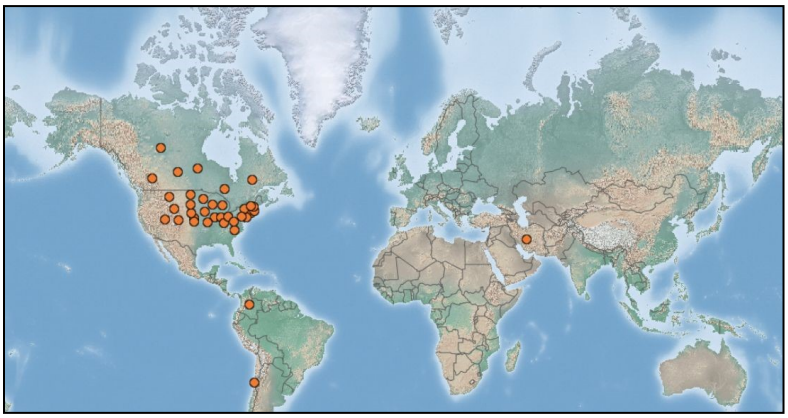
Pearl oyster mushrooms (*Pleurotus ostreatus*) are a native edible fungus that have also started to make an appearance in southern and central Vermont this month. This fungus is a saprotroph and can be found growing in clumps out of dead or decaying hardwood trees during the fall and winter months. Its cap is large and wide, often resembling a fan or oyster shell shape, and ranges from white to yellow-brown in color. Gills are decurrent (gills are attached to and run down the stalk) and give off a grey to light purple-grey spore print. Pearl oyster mushrooms have several edible look-alikes, including the phoenix oyster mushroom (*Pleurotus pulmonarius*). This is also a native saprotroph but has a smaller and often paler cap than the pearl oyster mushroom. Unlike pearl oysters, this mushroom gives off a white spore print and sometimes has a longer stalk. Although they also have a long fruiting period, they are more commonly observed during the spring and fall. As with all wild mushrooms, there are risks to eating and misidentifying them which can be both dangerous and fatal. Always ensure you have the correct identification before consuming any wild edible. ***The State of Vermont accepts no liability or responsibility for the consumption and/or misidentification of these mushrooms.***

A: Pearl oyster mushrooms. **B:** Phoenix oyster mushrooms. Photo credit: Michael Kuo, Mushroomexpert.

Pests in the Spotlight: Ash Yellows

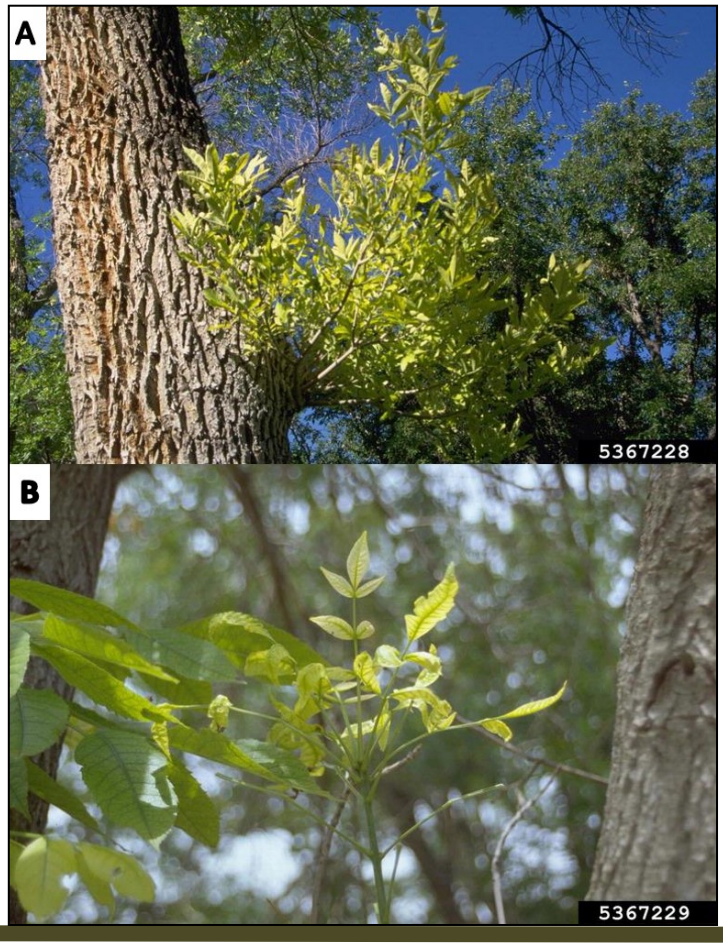
Ash yellows, (*Candidatus Phytoplasma fraxini*) is a phytoplasma (bacteria) that affects a wide range of native and ornamental ash trees and lilacs. This pest is thought to be native, and is present at low levels in localized areas in Vermont. No vector has currently been identified, but some studies show evidence for an insect vector such as a leafhopper.

Green ash with ash yellows. Photo credit: William Jacobi, Colorado State University, Bugwood.



This pest has currently been reported in central and eastern U.S. and Canada, Chile, Colombia and Iran. Map and data are from CABI Invasive Species Compendium.

This phytoplasma targets phloem tissue, disrupting photosynthate transport within the tree. All sizes and ages of ash are vulnerable to disease, and can experience symptoms including reduced growth and vigor, subnormal growth, development of one or several witches' brooms, small leaves, chlorotic leaves, branch dieback, bark cracks, and mortality. Many of these symptoms overlap with other abiotic and biotic factors, making it difficult to confirm and research this pathogen. In Vermont, ash species are susceptible to abiotic factors including but not limited to, drought conditions, poor soil, plow pans, and late frost. For more information on ash yellows, or to report a sighting, visit VTinvasives.



A: Whiches' broom. **A-B:** Chlorotic leaves. Photo credit: William Jacobi, Colorado State University, Bugwood.

Species Spotlight: European Spindle-Tree (*Euonymus europaeus*)

European spindle-tree. Photo credit: Photo: Robert Videki, Doronicum Kft., Bugwood.

Late-season plants offer beautiful natural hues that guide us from the greens of summer into the autumnal reds, yellows, and browns. Perhaps most striking, are some of the vibrant colors of landscaping plants like Asiatic bittersweet (*Celastrus orbiculatus*) and burning bush (*Euonymus alatus*), both ***highly invasive***. One lesser-known, but still invasive plant of a similar vibrance (and same family - *Celastraceae*), is European spindle-tree (*Euonymus europaeus*).

Species within the *Celastraceae* family are woody shrubs or woody vines, all of which have brightly colored flesh around the seeds (arils – like pomegranate seeds), which range from reds to oranges. For spindle-tree, these fleshy seeds are housed in capsules that start pale green in the late summer and turn color when ripe in the fall. To distinguish spindle-tree from other euonymus species, look at the fruits – white seeds coated in orange flesh and pink capsules are distinctly spindle-tree.

European spindle tree's orange arils with pink capsules. Photo credit: FPR Staff.

Spindle-tree originates from Asia and Europe and is thought to have been brought to North America for industrial use, where the hardwood was used to create spindles for wool. In later years, it has become an ornamental landscaping plant. It is commonly found in floodplains, forest edges, early successional habitat, and disturbed areas. This invasive is known to grow in zones 4-7, and has been reported in the provinces of Ontario, Quebec, New Brunswick, and from the U.S., from states of Maine to Wisconsin, and down to Mississippi. It is present in Vermont, but the extent of the population is undocumented.

European spindle tree, leaves and flowers. Photo credit: Robert Vidéki, Doronicum Kft., Bugwood.

This deciduous shrub has leaves that are oppositely arranged, simple, and oval, with small serrations along the edge. Mature plants tend towards a rounded branching habit. It has been documented to escape cultivation and spread in the Northeast, can grow in almost full shade, can tolerate a variety of soils (except wet, poorly drained soils), and reaches heights over 20'. These invasive tendencies have led to its listing on the unofficial Vermont watchlist. The easiest time to spot spindle-tree is after fruiting occurs, in the late summer and early fall, though these fruits have been documented to persist well into winter.

European spindle tree's "pinstriped" bark. Photo credit: Jan Samanek, Phytosanitary Administration, Bugwood.

To learn more about spindle-tree, check out VTinvasives and these additional resources:

Center for Invasive Species and Ecosystem Health

Missouri Botanical Garden

New York Invasiveness Ranking

August Invasive Plant Phenology

Wild parsnip (*Pastinaca sativa*) gone to seed in August, 2020. Photo credit: FPR Staff.

Volunteers are keeping track of invasive plant phenology in order to time management treatments most effectively. Below are observations made from August 10th-14th, 2020.

Chittenden County—Full Flower: purple loosestrife; Fruit Ripening: goutweed, Japanese barberry, wild parsnip; Fully Seeded: common buckthorn, honeysuckle, wild parsnip.

Essex County— Fully Fruited: honeysuckle.

If you are interested in volunteering, please contact: elizabeth.spinney@vermont.gov.

FORESTS, PARKS & RECREATION VERMONT AGENCY OF NATURAL RESOURCES

For more information, contact the Forest Biology Laboratory at 802-565-1585 or:

Windsor & Windham Counties	Springfield (802) 289-0613
Bennington & Rutland Counties	Rutland (802) 786-0060
Addison, Chittenden, Franklin & Grand Isle Counties	Essex Junction (802) 879-6565
Lamoille, Orange & Washington Counties	Barre (802) 476-0170
Caledonia, Orleans & Essex Counties	St. Johnsbury (802) 751-0110

Forest health programs in the Vermont Department of Forests, Parks, and Recreation are supported, in part, by the US Forest Service, State and Private Forestry, and conducted in partnership with the Vermont Agency of Agriculture, Food, and Markets, USDA-APHIS, the University of Vermont, cooperating landowners, resource managers, and citizen volunteers. In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discrimination on the basis of race, color, national origin, sex, age, or disability.

2020-06