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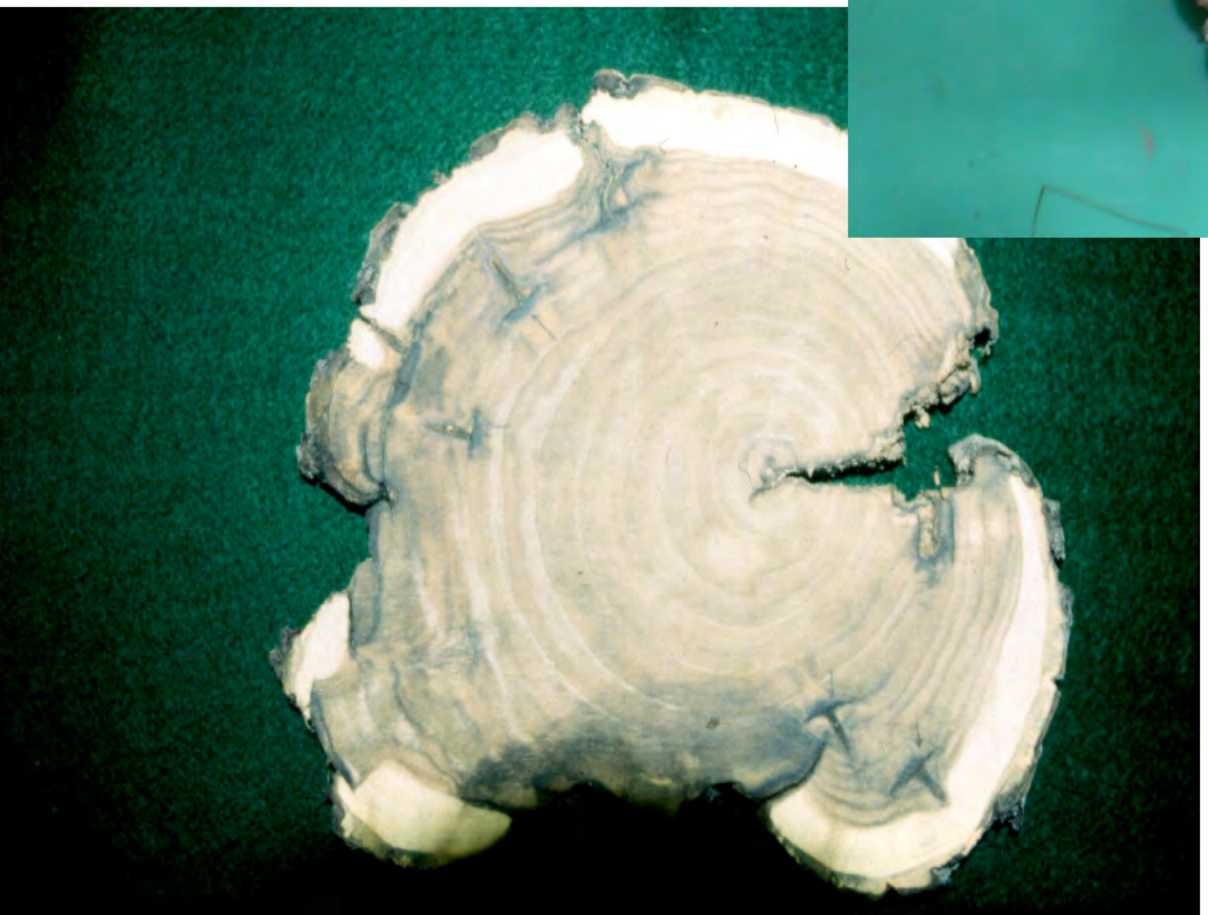
Forest Health Section

Things that cause forest damage are broken into two Groups

1. **Abiotic**
2. **Biotic**


ABIOTIC- non-living damage

Biotic stuff broken into insects and pathogens



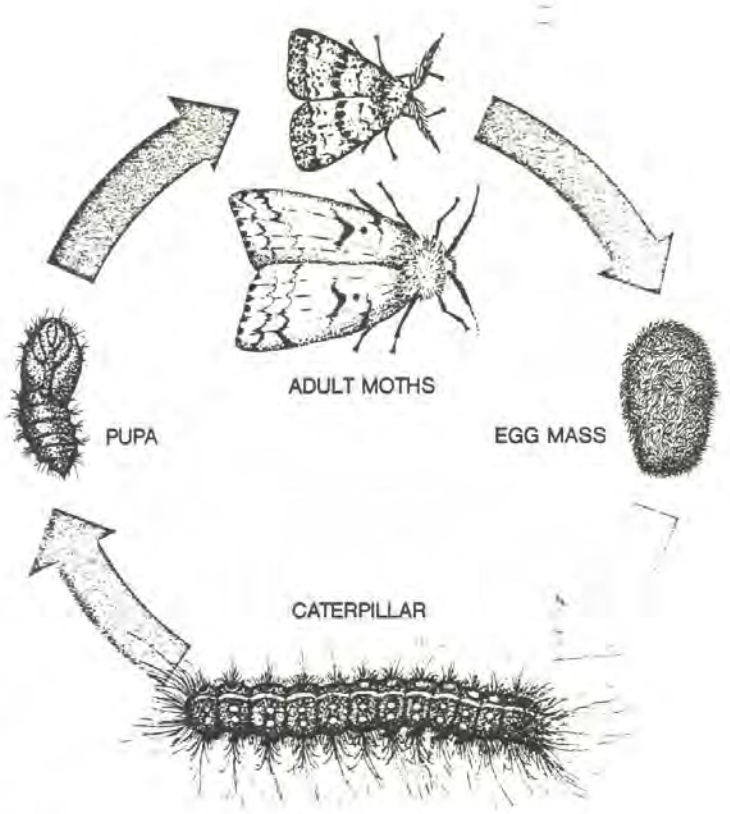
INSECT LIFE CYCLES

All insects start life as eggs, and end life as an adult (unless killed by some forester first)

Most insects only have one adult phase per year, but there are many exceptions

The life cycle can be broken into dormant periods and active stages

This is important because the damage is done during different active periods and the control opportunity may come while they are dormant. ie. Gm natural predation in winter



Most insects are <u>Oviperious</u>: lay eggs outside the body.

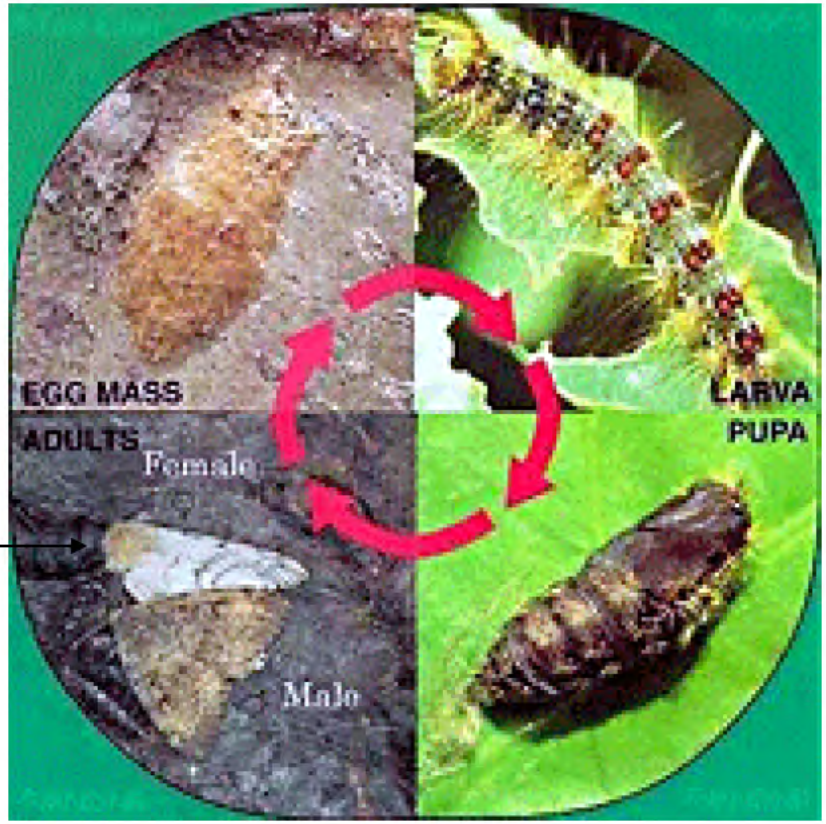
<u>Ovoviviperous</u> insects retain eggs until they hatch and birth live insects

Ie. Aphids and scales.

FEMALE GM CANNOT FLY

Gm overwinters as eggs on the sides of trees

Larvae go through 5 instars and feed from mid June to mid July

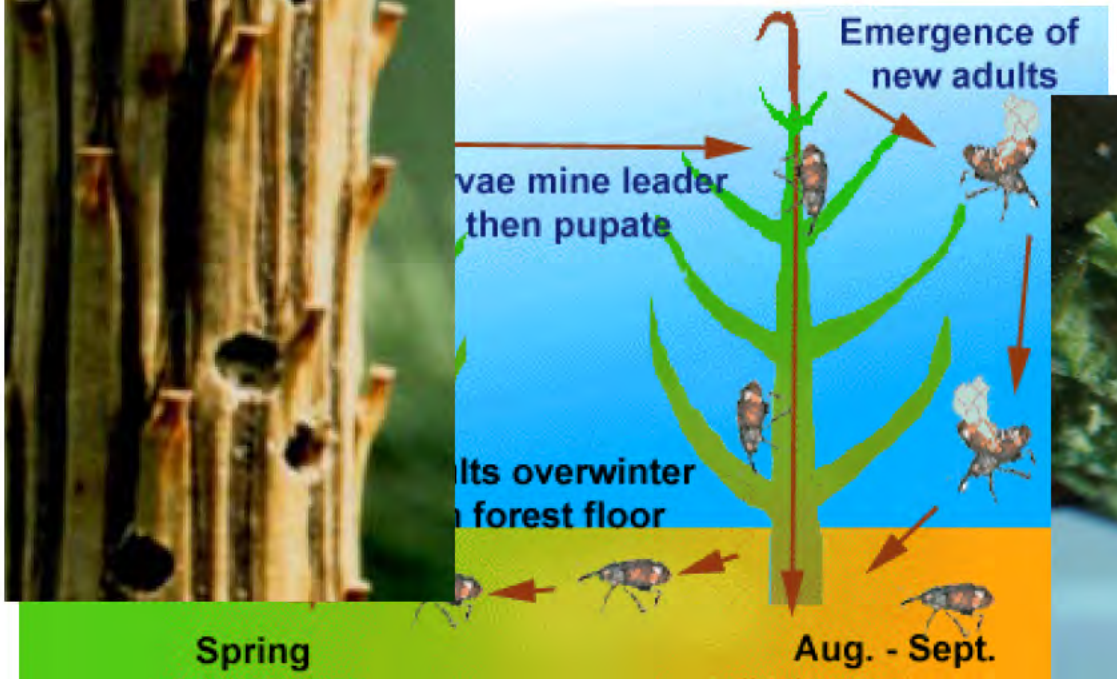


Adults mate and females lay eggs in September

Pupae rest until mid August

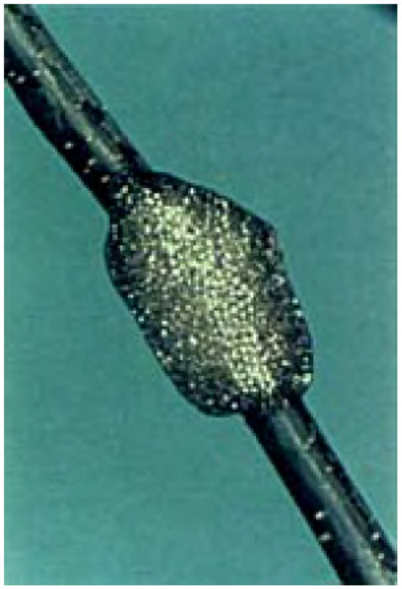
WHITE PINE WEEVIL

The white pine weevil has one generation per year. In early spring, adults emerge from overwintering in the duff, walk to nearby host trees and move up the tree trunk. Weevils also disperse by flying on warm sunny days. They feed, mate then lay eggs in the bark of the previous year's leader. Oviposition occurs from late April to mid-July, but mostly in May and early June. Depending on weather conditions, eggs hatch in about 10 days and the larvae feed on the cortex and phloem, moving downwards girdling and killing the leader. Pupation occurs in the leader and new adults emerge in August and September. Adults feed then move to their overwintering sites.



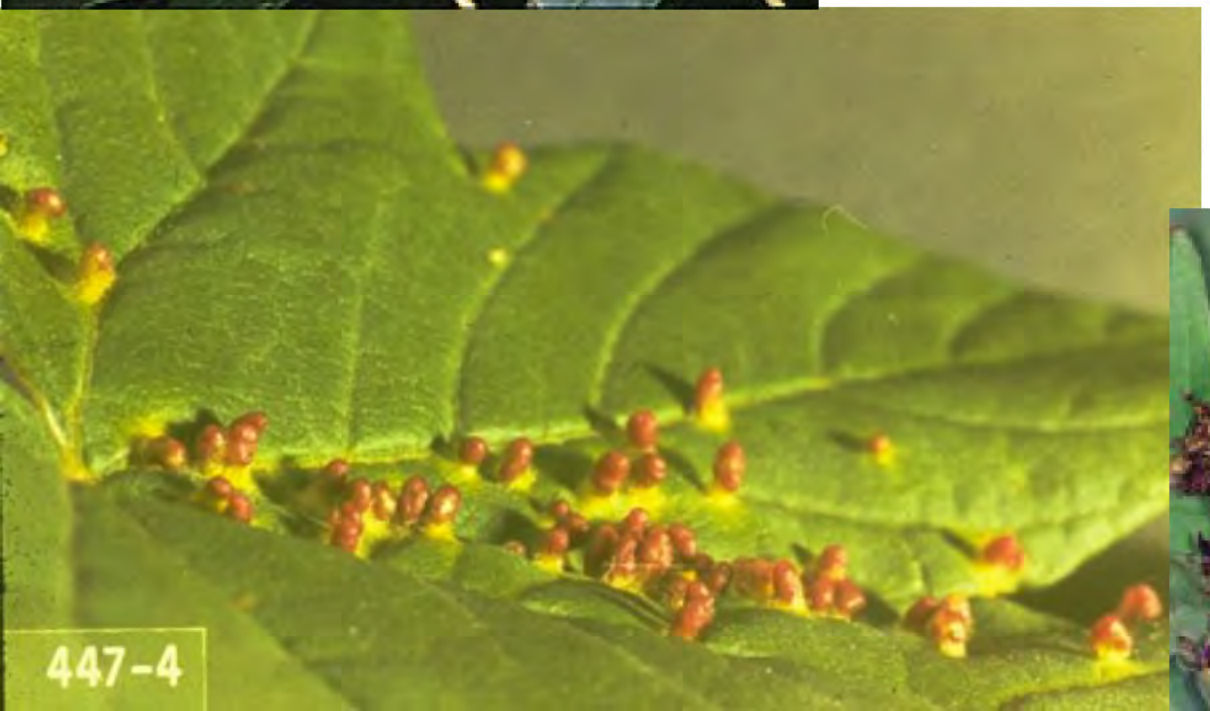
FOREST TENT

EASTERN TENT



Foliar Galls

Foliar galls approx. 4 mm in diameter, protruding from the ventral side of a leaf.



Living pathogens broken into groups: Insects- parasitic plants- nematodes- **Viruses- Bacteria- Fungi**

Viruses- made up of nucleic acids and protein. **There is NO KNOWN CURES**

Bacteria- one celled organism. NO nucleus and NO reproductive structures. They multiply by fission and spread through soil and air.

Fungi- the majority of what we'll be studying as tree diseases

Disease Signs and Symptoms

SIGNS: (actual evidence of the DCA)

Conks—perennial fruiting structures

Mycelium (groups of hyphae)

Mushrooms (basidiocarps)—annual fruiting bodies

Mildew

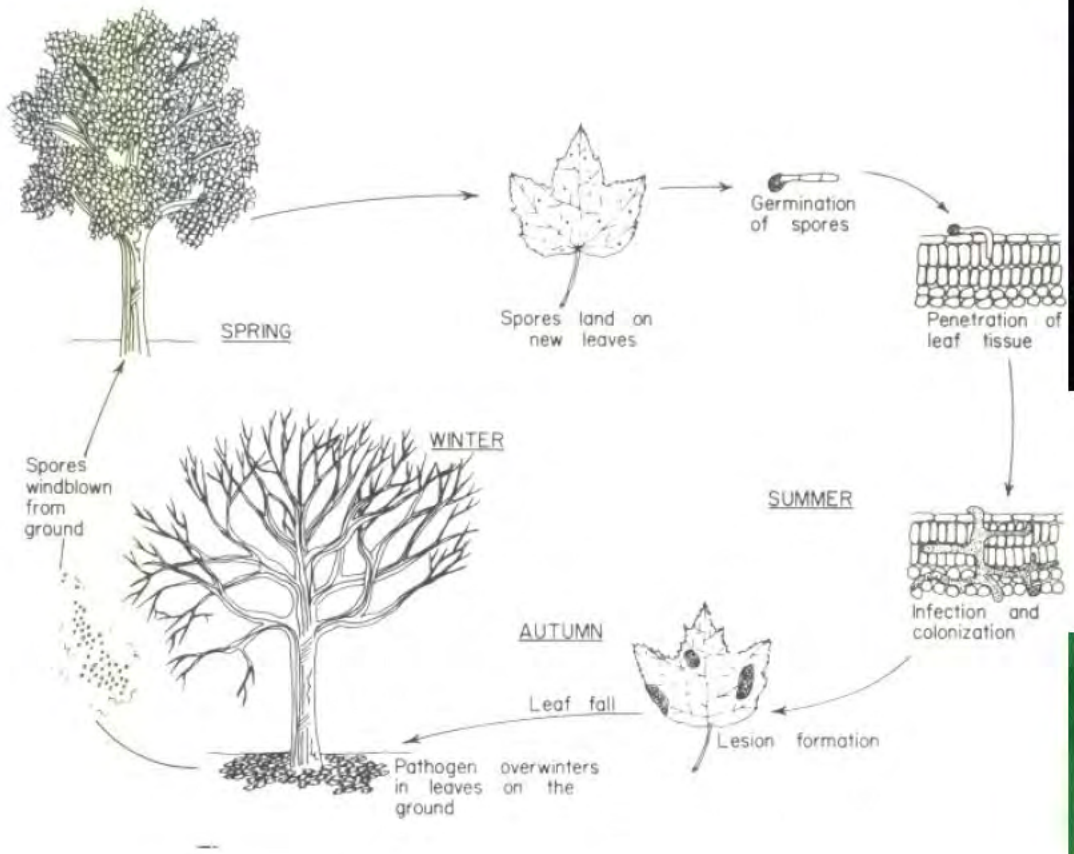
Mold

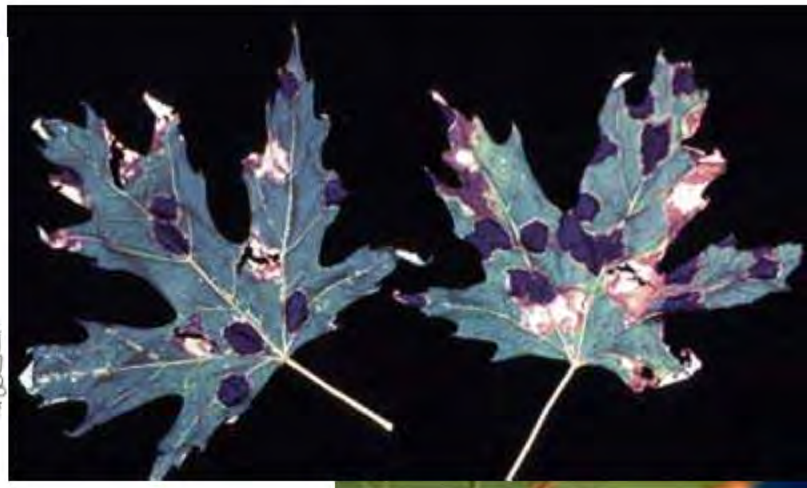
Ooze

odor

FOLIAGE DISEASES

Most are caused by fungi and few do serious tree health damage. The majority of the time the leaf fungus's are aesthetic problems





ANTHRACNOSE

The symptoms caused by *anthracnose* appear following infection during cool, wet weather throughout the spring and summer. Infected young leaves and shoots may shrivel and turn black. On more mature leaves, red, brown, tan, or black lesions develop that may or may not be associated with leaf veins. Leaves may become crinkled or otherwise deformed. Lesions often coalesce and kill large areas of leaf tissue. In severe cases defoliation may occur.

Disease Cycle

Anthracnose fungi overwinter in infected leaves on the ground. Some canker-causing anthracnose fungi, such as the sycamore anthracnose fungus, also overwinter in twigs on the ground or in cankered twigs that remain on the tree. Microscopic spores of most anthracnose fungi are produced in infected tissues during April and May. The spores are blown and splashed to the buds and young leaves and, with favorable moisture conditions, penetrate and infect the swelling buds and unfolding leaves. Long rainy periods help the fungus to spread rapidly.

Perennial cankers-- these fungi attack during the dormant season, kill tissue and in response the tree grows callus wood around the infection spot. The fungi then lives saprophytically on the dead wood until the next dormant season when it again attacks the host tree at the margins on the previous years infection. This balanced attack and response over a period of years creates a large growth and weak spot in the tree.

Necria canker

Eutypella canker

Strumella canker

White pine blister rust

- Generally infects lower bole
- infects through a branch
- pitch exudes from the margins and is usually localized
- known as terminal disease
- cause major tree deformity
- rarely found on more than 20% of mature trees in a stand
- dead branch stub in center of canker
- usually one stem canker per tree

Pine Canker

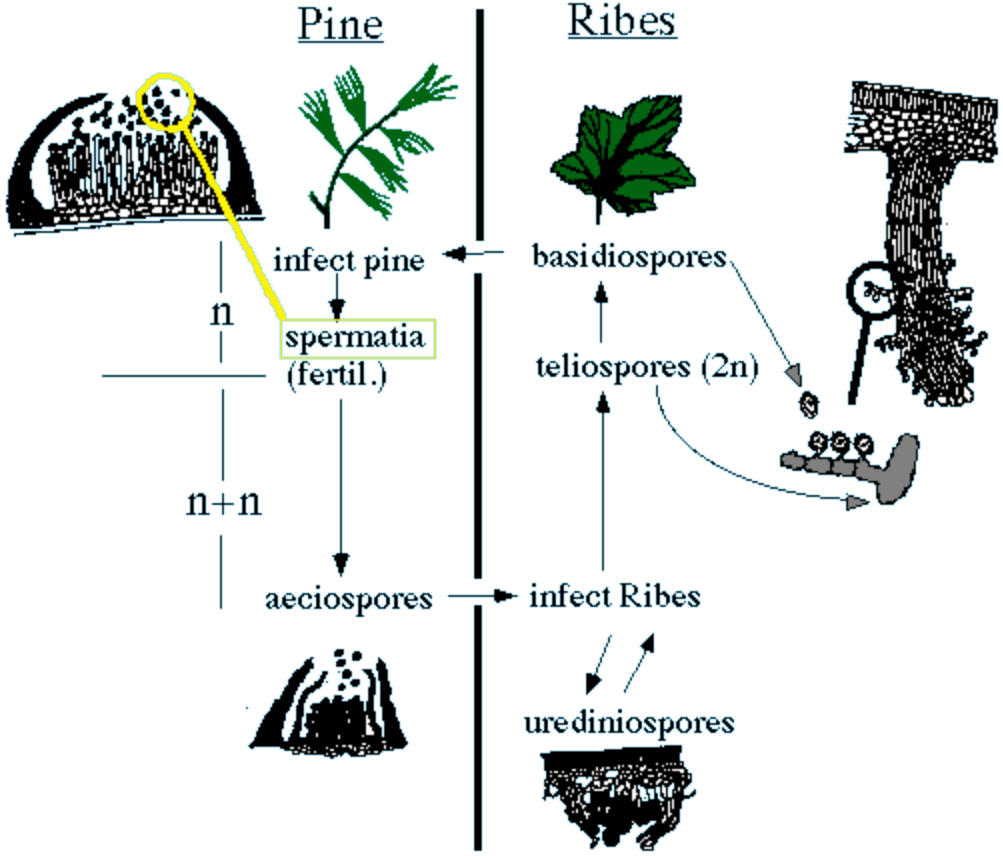
- Generally infects thin barked area of upper bole
- infects bark directly
- pitch streaks are longer, thin, and exude from center
- not previously known to kill trees
- rarely kills cambium, thus causes little tree deformity
- having 75% of trees affected is common
- infects between whorls
- many cankers scattered over the upper stem

RUST DISEASES

“rust diseases” by definition require an alternate host. Meaning to complete the life cycle the disease must spend some time on two separate host species in close proximity to each other.

Rust diseases are either canker rusts, gall rusts or leaf rusts.

Far and away the most important rust we deal with in NH is white pine blister rust.



Pest Suppression Projects

Other serious forest pathogens found in NH

White pine blister rust- from Europe 1906, at a time in NH history when we were reforesting hundreds of thousands of acres with planted white pine this disease caused annual mortality rates over 30% in seedling sapling sized stands. The lost growth and mortality in today's market place would exceed one billion dollars. The Division of Forests and Lands employed hundreds of town and local officials to eradicate Ribes plants throughout the state from 1930 through the 1970's.

Beech bark Disease, from Europe in 1890, All of our beech stands are infected and beech in not a viable managed timber product at this point.

Dutch Elm Disease- from Europe in 1930, has completely eliminated elm as a viable shade tree along city streets and removed elm as a major component of our ecosytem.

Chestnut Blight- brought into the Bronx Zoo in 1904, completely eradicated chestnut from the eastern forest ecosystem. Wherever you see oak today there used to be chestnut.

Butternut Canker, from asia in the 1960's. Has completely wiped out butternut in NH over 98% of all trees are now infected

Sirex Woodwasp

Beech Bark Disease

White Pine Blister Rust

Exotic Invasive Forest Pests

Gypsy Moth

Butternut Canker

Pear Thrips

Sudden Oak Death

Dutch Elm Disease

Chestnut Blight

Balsam Woolly Adelgid

Elongate hemlock scale

Birch Leafminer

IN THIS ISSUE:

FIELD SURVEYS: HWA, EAB, ALB	Page 1
AERIAL SURVEY HIGHLIGHTS	Page 6
FEATURE ARTICLE: Monitoring Forest Pests by the Pool	Page 8
FEATURE CREATURE: Brown Marmorated Stink Bug	Page 10
OFFICE NOTES	Page 11

Click on the HYPERLINKS throughout for more information on topics!

FIELD SURVEYS