

FES 456 - Tree Pests and Disease

Topic #1

Concepts for Studying Tree Health and Disease:

What is Disease and What Causes Disease?

Readings: Edmonds and others 2000. p. 1-20, 185-197

I. Darwinian Approach.

- A. Darwinian concepts: Evolution, adaptation, natural selection
 - 1. Trees (and other species) must capture **energy** from environment.

 - 2. Trees **evolve**.

 - 3. Trees use energy to reproduce and evolve by **Natural Selection**.

- B. **Energy, evolution, adaptation, and natural selection** are key concepts for understanding tree health and disease.
- C. Two basic reasons as to why trees die.
 - 1. Trees die because of natural selection.

2. Trees die because species did not evolve with the some component of the environment.

II. Health and disease.

A. Healthy (normal).

Persistent, normal functioning of a tree (system)

or

Responding to the environment as adapted.

1. Normal functioning in trees:
 - a) Normal functioning determined by **equilibrium** between processes that **produce energy** (photosynthesis) and **use energy** (respiration).
 - b) Level of tree functions (equilibrium) set by:

2. Can recover to normal functions after equilibrium disruption.

3. **Persistent over time.**

B. Disease (abnormal):

Persistent, detrimental disruption of tree (system) functions

or

Not responding to the environment as adapted.

- C. Disease of tissues or trees.

III. Causes of Tree Disease – Disease Complexes.

- A. Cause and effect.

- B. Disease complex name.

- C. Components of system - disease triangle.

- 1. Diseased tree - (energy equilibrium disrupted).

- 2. Stresses -

- a) A factor adversely affecting tree functions (disrupts energy utilization in tree).

- b) Types of stress agents.

- c) Signs.

d) How stress adversely affects tree functions (mechanism).

3. Environment where disease occurs.

a) Portion of tree's range where complex can be a problem (not the predisposing factors)

b) Determines how much energy available for tree and stress agent.

c) Management influences.

4. Time and evolution.

IV. Terminology.

Abiotic stress	Stress
Adaptation	Vigor
Biotic stress	Vitality
Disease	
Disease complexes	
Disease triangle	
Evolution	
Healthy	
Injury	
Natural selection	
Pests	