

Identifying and Managing Common Problems of Landscape Shade Trees

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COLLEGE OF NATURAL RESOURCES AND ENVIRONMENT
**FOREST RESOURCES AND
ENVIRONMENTAL CONSERVATION**
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Source: E. Wiseman

Presentation overview

Purpose:

Improve understanding of causes of tree problems and how to manage them

Outline:

- Refresher on tree biology and environmental stress factors
- Common causes of tree problems in landscapes
- Diagnosis and management of tree problems



Source: E. Wiseman

Why bother with landscape shade trees?

When shade trees thrive:

- Properties are attractive and pleasurable
- Real estate values are increased
- Air conditioning bills are lower
- Backyard wildlife habitat is better
- Lower maintenance costs
- We're doing our part for ecosystem services

When shade trees languish:

- Properties are shabby and dreary
- Less curb appeal of property
- Trees are a nuisance or liability
- Less nearby nature
- Higher maintenance costs
- Fewer ecosystem services



What environmental factors affect tree survival?

Climate

- Temperature regime
- Precipitation and humidity
- Light quality, intensity, and duration

Essential elements

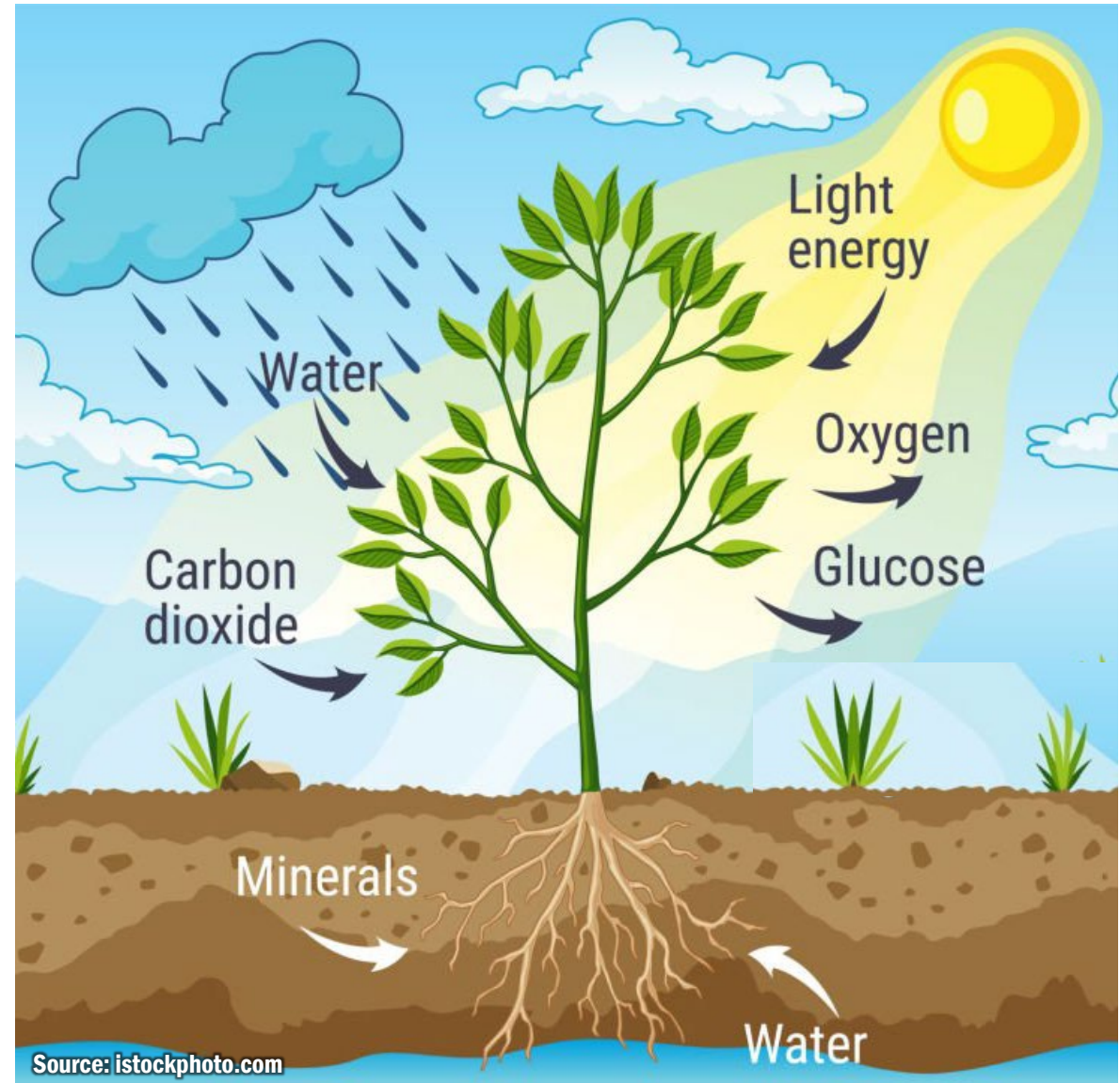
- Nutrients from soil and organic matter
- Carbon dioxide and oxygen from atmosphere

Biotic community

- Symbiotic soil fungi and bacteria
- Natural enemies of pests
- Dispersers of pollen and seeds

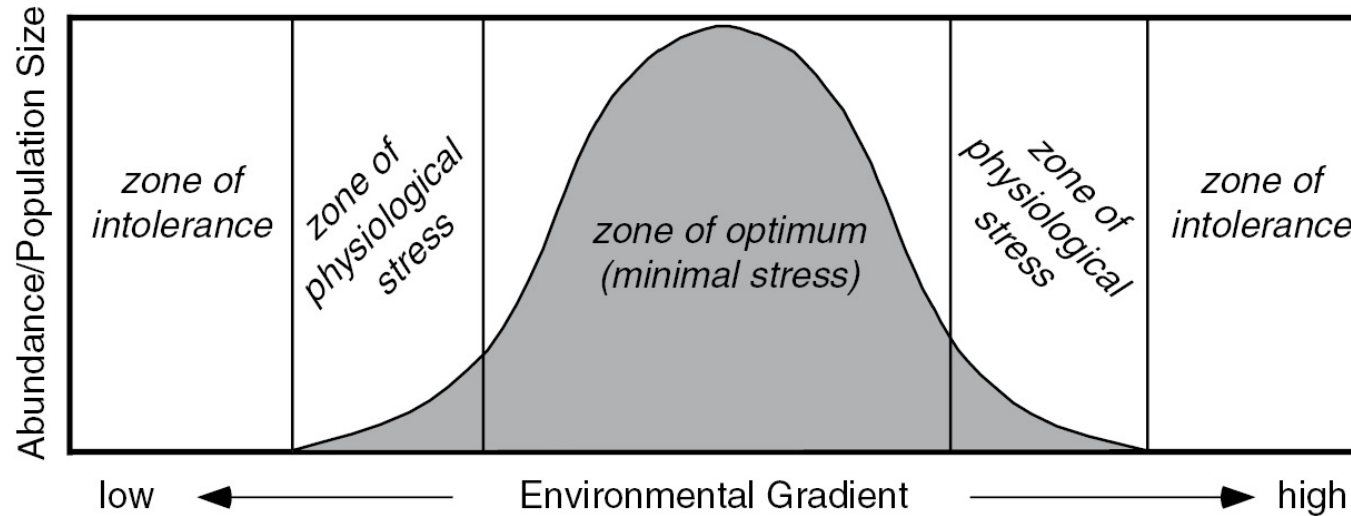
Physical Space

- For crown development
- For root system development



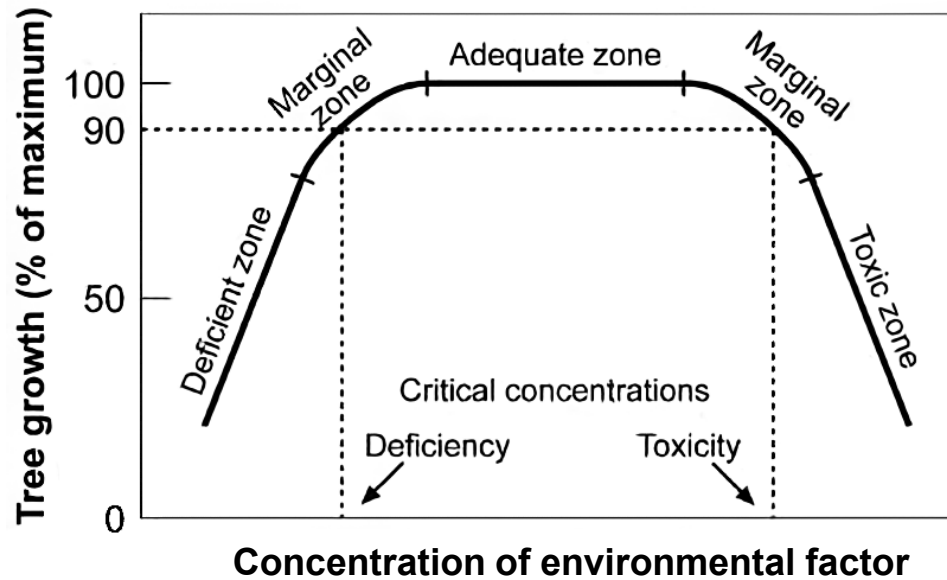
Trees vary in their resource needs for survival

At the species level



Source: Fundamentals of Ecology
doi.org/10.1017/9781108648608.002

At the tree level



Source: Planted-forest Nutrition
dx.doi.org/10.13140/RG.2.1.1773.9604

Imbalances of environmental factors cause stress

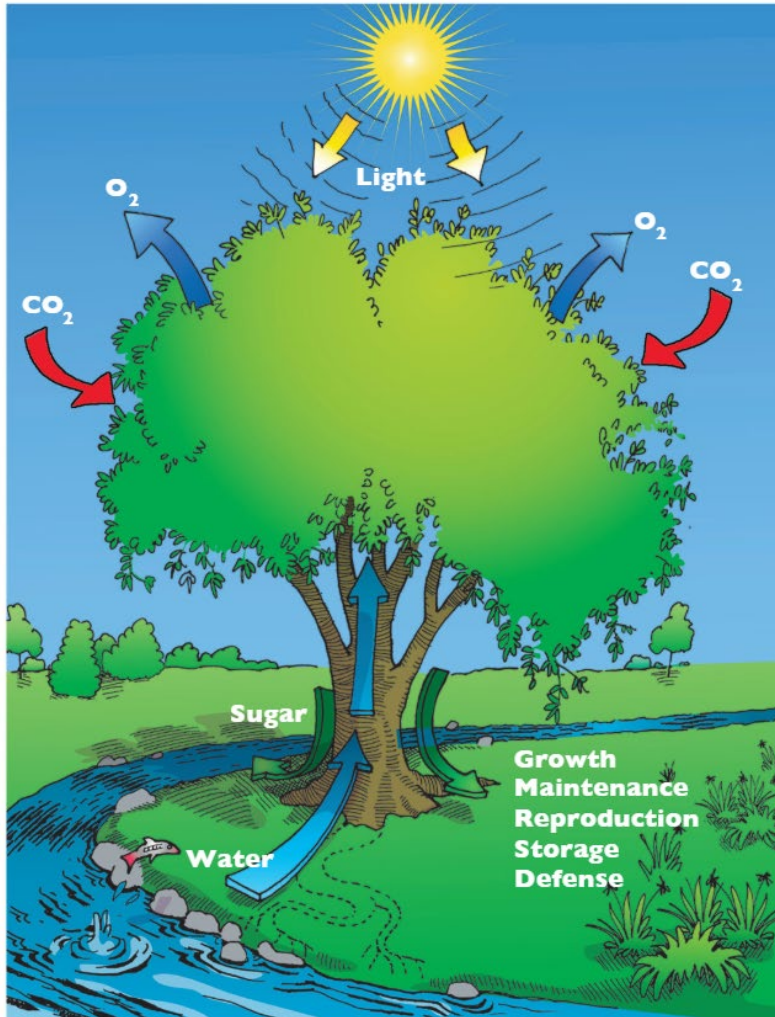


Figure 11.2 Resource allocation. Trees “budget” their limited resources among the processes that must be supported, including growth, maintenance, reproduction, storage, and defense. Not all processes can be fully supported at the same time.

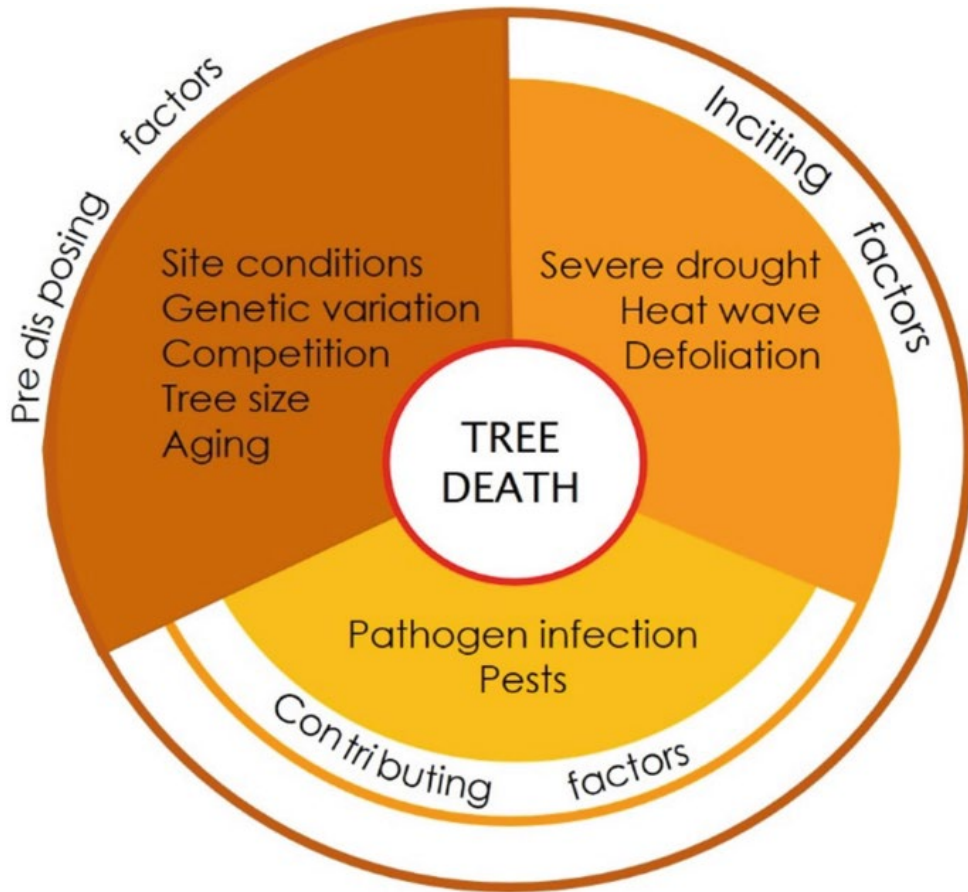
Stressed trees are less able to make sugars and metabolites needed for survival

- Reduced growth and development
- Lower quality foliage, flowers, fruits
- Vulnerability to pests and diseases
- Lower tolerance of further stress, disturbance, and injuries

Source:

Lily, S. et al. (2022). *Arborists' Certification Study Guide (4th ed.)*. International Society of Arboriculture.

Chronic stress leads to tree decline and mortality



Predisposing Factors

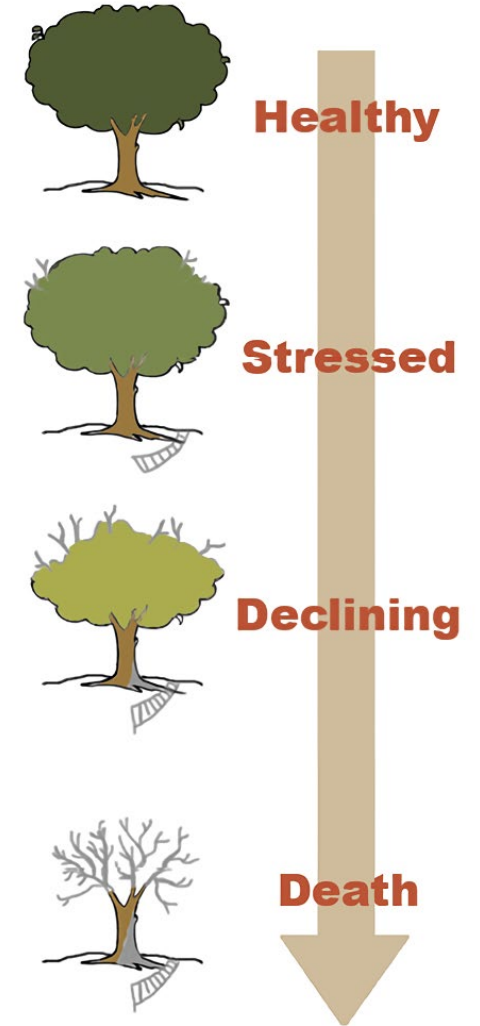
- Chronic stress of poor site quality
- Tree characteristics

Inciting Factors

- Acute stress of injuries or weather
- Mismanagement

Contributing Factors

- Pests and pathogens



Source: Rubio-Cuadrado, A. et al. (2021). Stress and Tree Mortality in Pine Forests. link.springer.com/chapter/10.1007/978-3-030-63625-8_9

Source: Self, B. (2022). Preserving Trees in Construction Sites. Mississippi State University Extension.

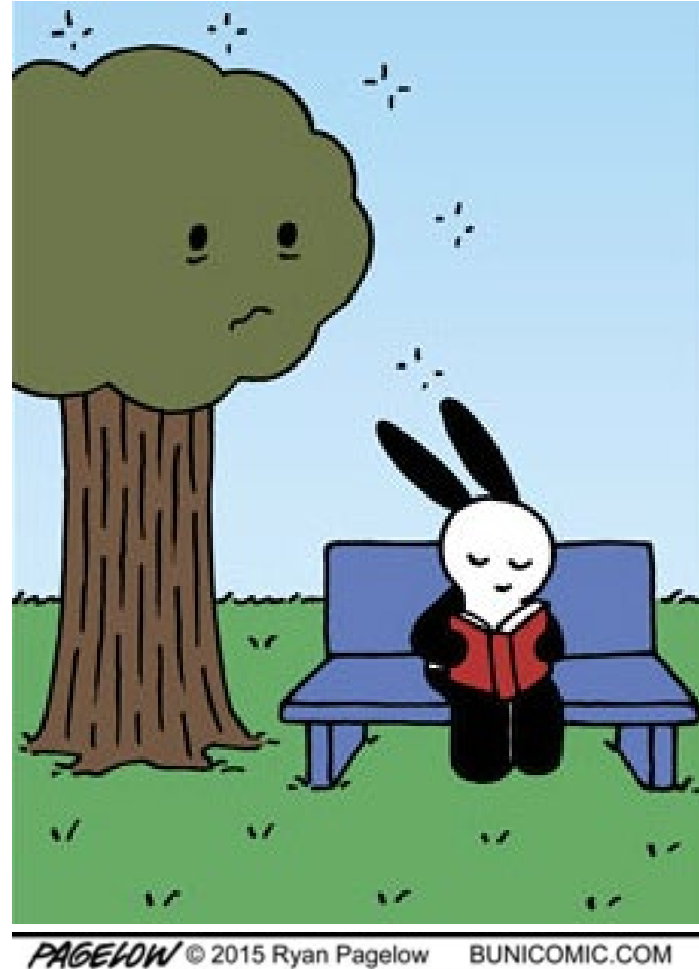
Types of tree problems (a.k.a. disorders)

Abiotic Disorders

Tree disorders caused by an environmental condition or human activity

Biotic Disorders

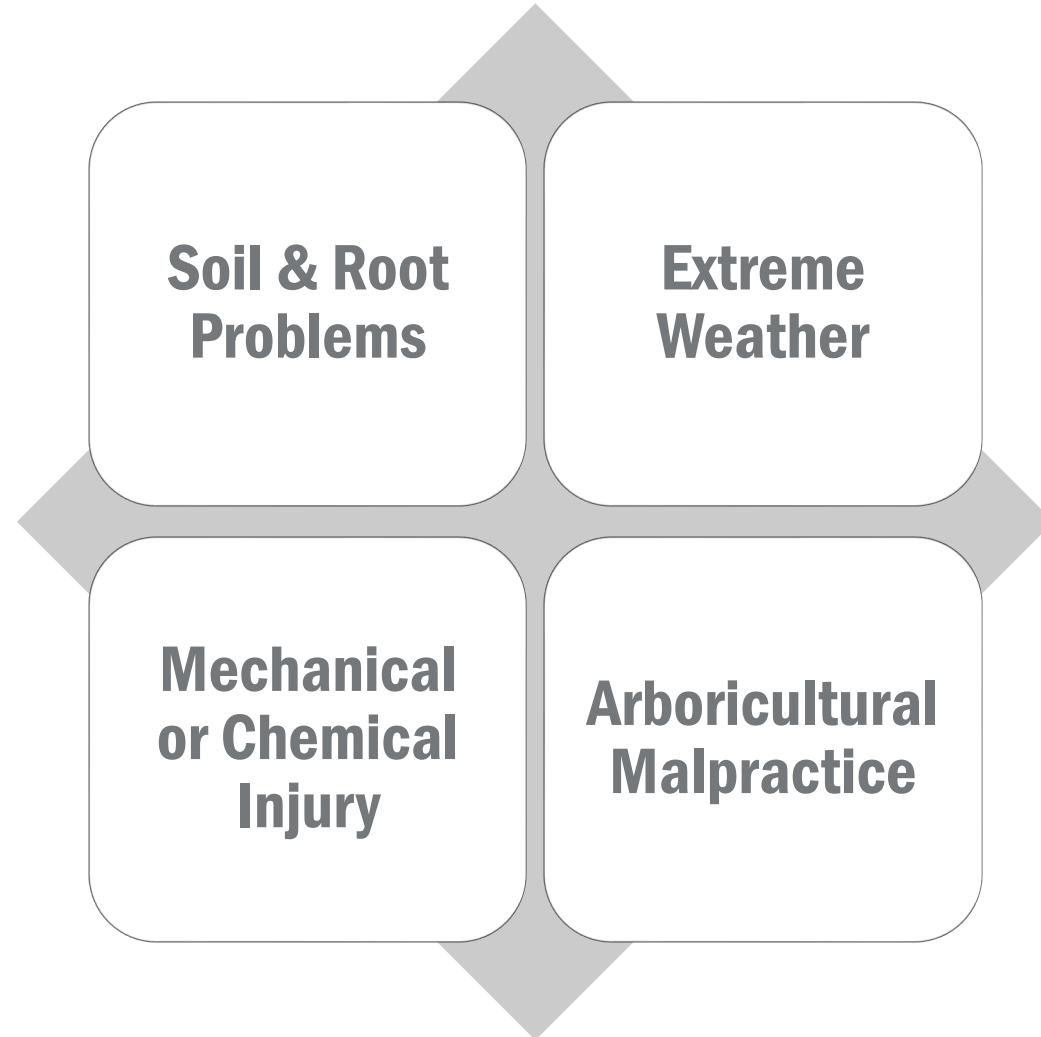
Tree disorders caused by another organism:
referred to as a **pest**



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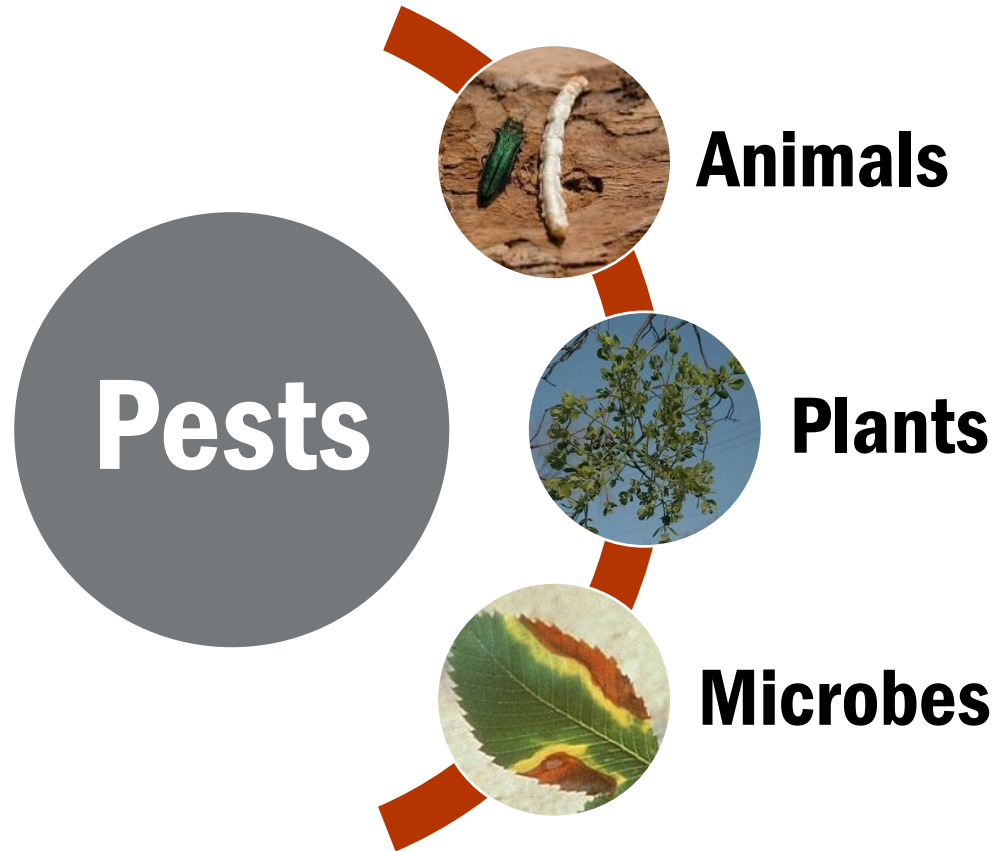
Types of tree problems (a.k.a. disorders)

Abiotic Disorders



Types of tree problems (a.k.a. disorders)

A pest is an organism harmful to human concerns



Types of tree problems (a.k.a. disorders)

Animals That Are Pests

**Invertebrate
Pests**

**May damage trees
by feeding or by
habitat use**



**Vertebrate
Pests**

**Some are a nuisance
to people, not a harm
to trees**



Types of tree problems (a.k.a. disorders)

Plants That Are Pests

**Competition
Allelopathy
Parasitism**

**Turf &
Invasives**



**Parasitic
Plants**

**Vines &
Epiphytes**



Types of tree problems (a.k.a. disorders)

Microbes That Are Pests

**Organisms
typically invisible
to the naked eye**

**Pathogens cause
disease or decay**

**Fungi & bacteria
are most common
causes of tree
diseases**

**Viruses &
Phytoplasmas
cause a few major
diseases**



**FOLIAR
DISEASES**



**VASCULAR
DISEASES**



**ROOT
DISEASES**

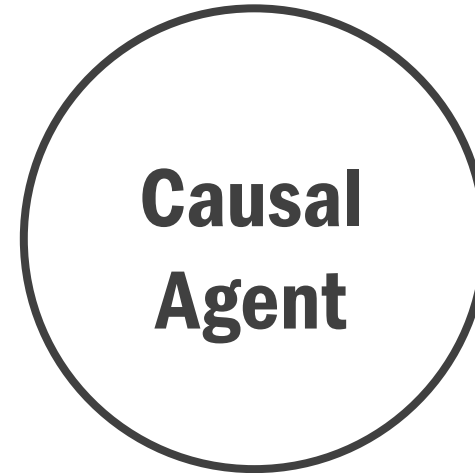
Diagnosing tree problems

First gotta know what is normal versus abnormal for the tree



Diagnosing tree problems

What are the clues that point to the cause of a disorder?



Direct evidence of the presence or activity of a disorder-causing agent

Tree physiological response to a disorder-causing agent

DETECTIVE DENDRO
THE DIAGNOSTIC SLEUTH

Diagnosing tree problems

Where to get help with diagnostics?



Identifying Tree Problems

Trees provide shelter and shade, help prevent erosion, and add beauty and monetary value to our property. Unfortunately, many factors can cause trees to become unhealthy and lose their aesthetic value or die. Some of those factors include: environmental stresses, site problems, animal injury, infectious diseases, and insect infestations. In many cases, more than one factor may be involved.

A correct diagnosis of the problem is the important first step in trying to manage an unhealthy tree. This publication contains guidelines for identifying tree problems. It will help you examine your tree systematically, collect important background information, and find expert assistance, when necessary. As you read and encounter words used in plant diagnostics that may be new to you, use the "Terms Used to Describe Tree Problems" definitions on page 6 of this publication.

Examine the Tree

Take a systematic approach when examining a tree for possible problems. Look at the entire tree (foliage, trunk, branches), not just areas that seem to show a problem. Consider root problems as a possible source of above-ground symptoms. Yellow leaves, for instance, might be caused by root injury or high soil pH. Also, keep in mind that different agents (infectious or biotic organisms vs. no infectious or abiotic factors) may produce similar symptoms.

Step 1. What type of tree is it?

Each species has its own characteristic insect or disease problems. If possible, find out the specific variety or cultivar of the tree (e.g., common name: sugar maple, scientific name: *Acer saccharum*, cultivar 'Legacy'). This will help determine if the tree is adaptable to Iowa and the site conditions. Trees planted out of their hardiness range and optimum growing conditions often show poor growth and vigor. Stressed trees are less able to resist insect and disease attack. A good resource to identify common trees of Iowa is available at the [forestry extension interactive key](http://www.extension.iastate.edu/forestry/iowa_trees/tree_id.html) (available at http://www.extension.iastate.edu/forestry/iowa_trees/tree_id.html)

The typical characteristics of a healthy tree must be known in order to determine if it is showing abnormal symptoms.

Step 2. Examine the foliage (leaves or needles) for symptoms and signs.

- Are the leaves looking droopy, wilted or water deprived? (See Figure 29, vascular pathogens may be the cause)
- Do the leaves have holes or ragged edges?
- Are the leaf margins brown or scorched (See Figure 1)?
- Are leaves abnormally discolored (yellow, light green, brown, black) yellowing and chlorosis? (See examples of yellowing and chlorosis in Figures 2 and 20.)
- Are spots or bumps evident on the foliage, or blighting areas (See Figures 3, 4 and 5)?



Figure 1. Red oak with leaf scorch



Figure 2. Abnormal leaf color on pin oak

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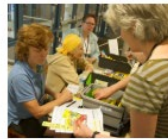
SUL 3 Revised February 2018

Extension Master Gardener Plant Clinics



Plant clinics sponsored by Virginia Cooperative Extension are located at local farmers markets from May to September/October. The Extension Master Gardener Help Desk is open year round. All are staffed by VCE Master Gardeners, who answer general gardening questions as well as questions about pests and diseases and plant identification. They also provide free soil test kits on request.

Locations of the Extension Master Gardener Plant Clinics



Library Plant Clinic

Arlington Central Library Plant Clinic

Located in the East Lobby of Arlington Central Library, 1015 N. Quincy Street, Arlington, VA ([Directions/Map](#))
The clinic is open Wednesdays from 6:15 - 7:45 p.m.



Farmers Market Plant Clinics



Arlington Farmers Market Plant Clinic

Located at N. 14th St. and N. Courthouse Rd. Arlington, VA ([Directions/Map](#))
The clinic is open Saturdays from 8:00 - 11:00 a.m.



Del Ray Farmers' Market Plant Clinic

Located at East Oxford and Mt. Vernon Avenues, Alexandria, VA. ([Directions/Map](#))

The clinic is open Saturdays from 8:30 - 11:10 a.m.

Fairlington Farmers Market Plant Clinic

Located behind the Fairlington Community Center at 3308 S. Stafford St, Arlington, VA ([Directions/Map](#))

The clinic is open Sundays from 9:00 - 11:00 a.m.



Old Town Alexandria Farmers' Market Plant Clinic

Located at Market Square, 301 King Street, Alexandria VA ([Directions/Map](#))

The clinic is open Saturdays from 7:00 - 9:30 a.m.



Extension Master Gardener Help Desk

9 a.m. to noon Monday through Friday year round

Located at the VCE office at the Fairlington Community Center, 3308 S. Stafford Street, Arlington. ([Directions/Map](#))

The Help Desk can be reached by phone at 703-228-6414 or by email at mgartalex@gmail.com.



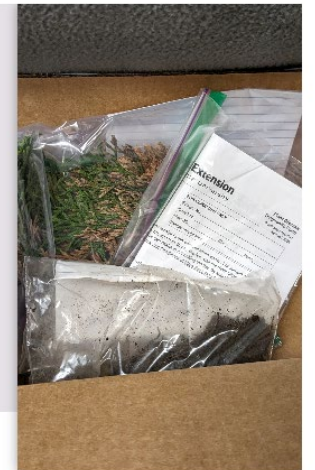
Plant Disease Clinic

Due to staff shortage, we will have delays in our delivery times. We appreciate your patience and cooperation.

Our services

What to know before collecting and submitting samples

Submitting samples



Managing tree problems

An ounce of prevention is worth a pound of cure because we have limited ability to cure!

Protect trees and site quality during construction



Source: www.independenttree.com/how-to-protect-trees-during-construction

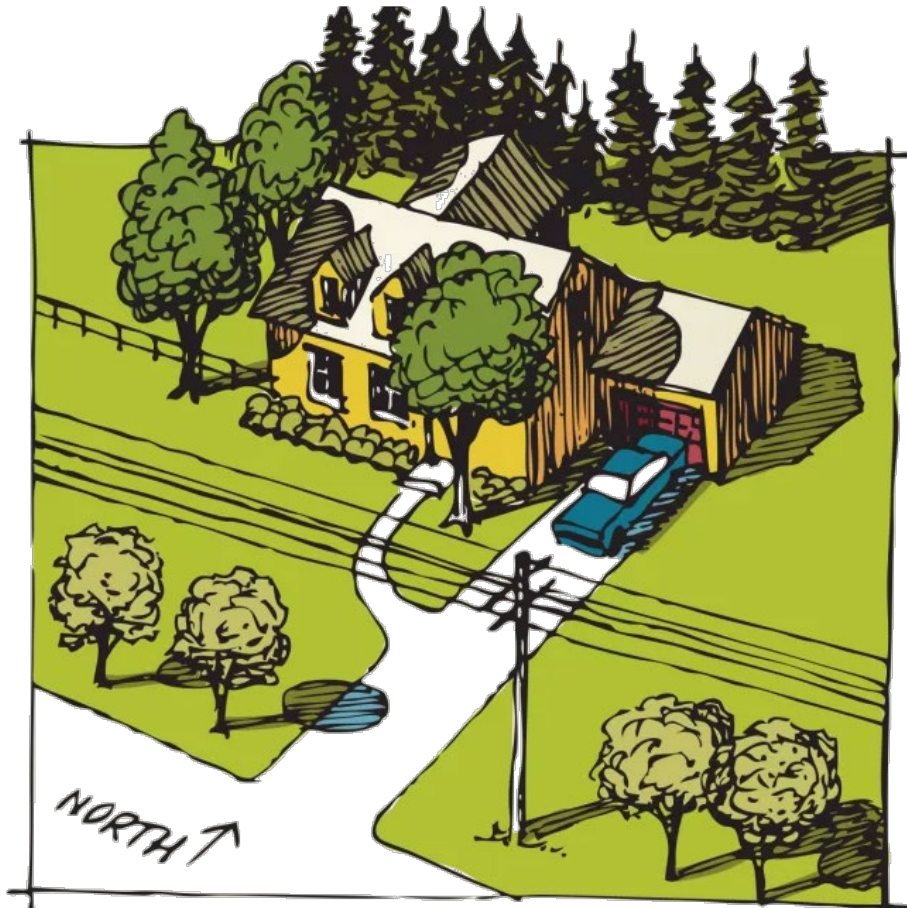


Source: www.ncufc.org/event.php?id=36

Managing tree problems

An ounce of prevention is worth a pound of cure because we have limited ability to cure!

Put the right tree in the right place



Source: www.arboday.org/planning-selection-location

Managing tree problems

An ounce of prevention is worth a pound of cure because we have limited ability to cure!

Purchase high-quality nursery stock

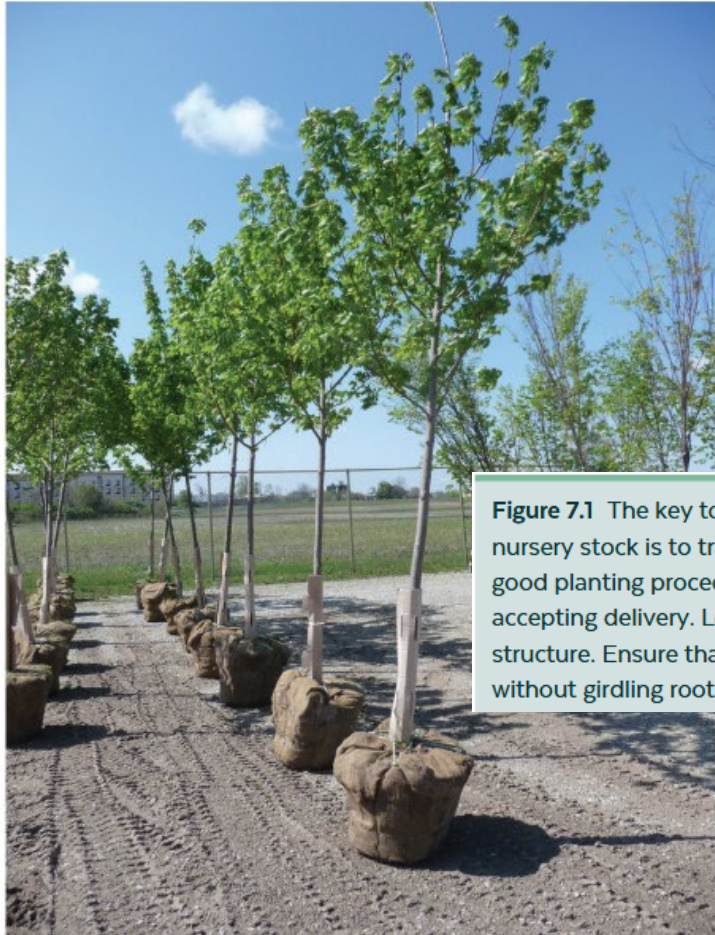


Figure 7.1 The key to successful establishment of nursery stock is to transplant high-quality plants using good planting procedures. Inspect all trees before accepting delivery. Look for damage, pests, and poor structure. Ensure that there is a good root system without girdling roots and locate the trunk flare.



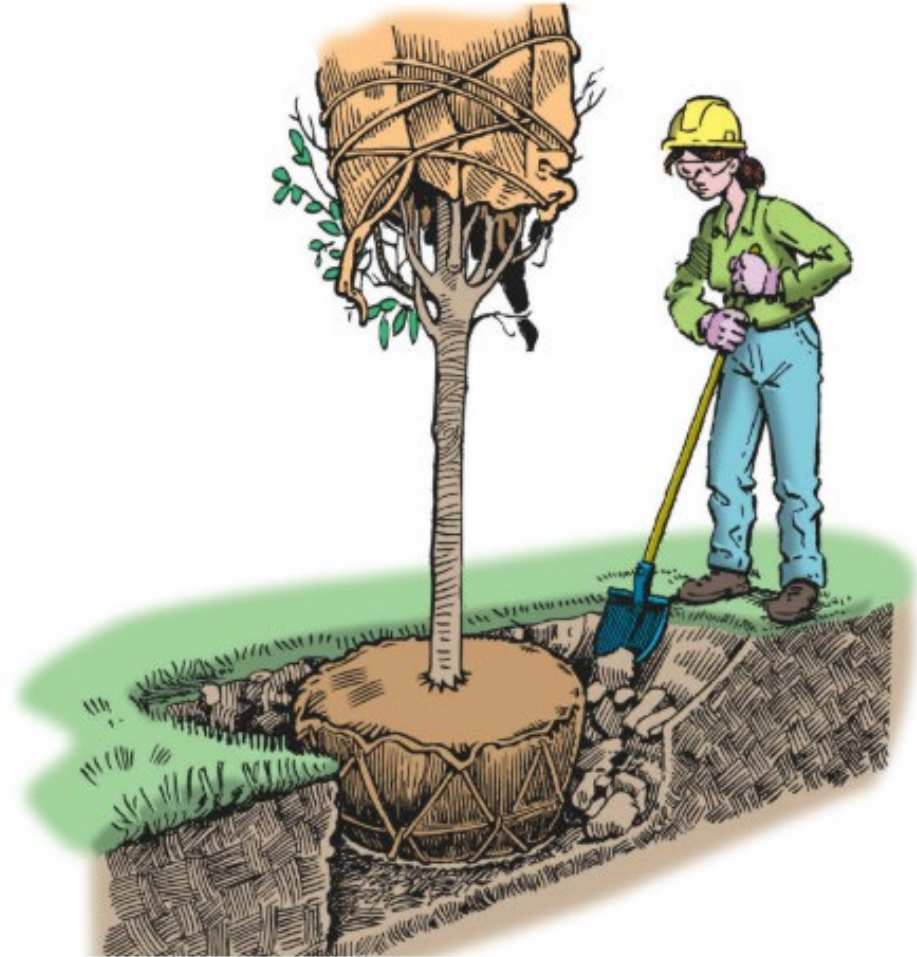
Source: texastreeplanting.tamu.edu/PickTreeAtNursery.html

Source:
Lily, S. et al. (2022). *Arborists' Certification Study Guide* (4th ed.). International Society of Arboriculture.

Managing tree problems

An ounce of prevention is worth a pound of cure because we have limited ability to cure!

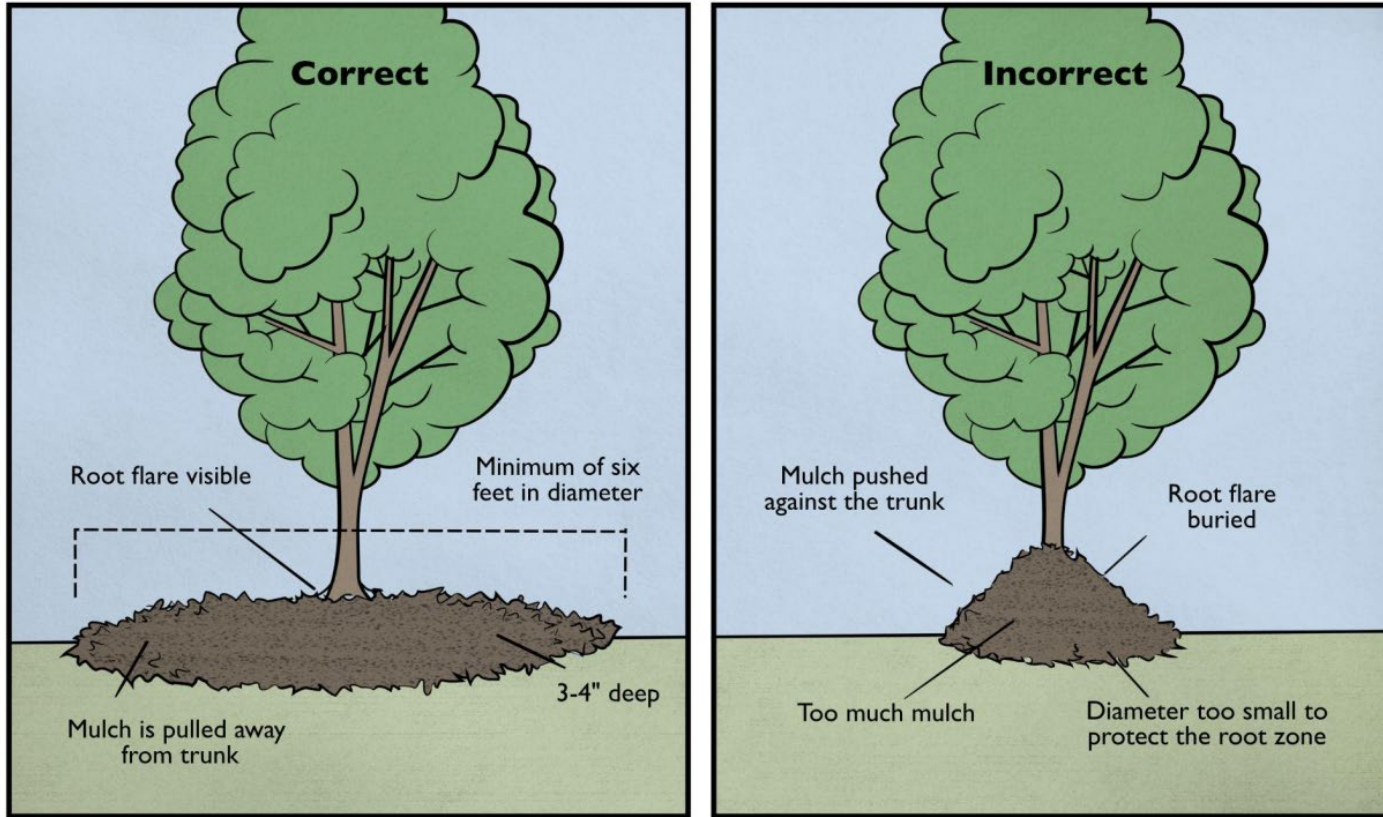
Use proper planting techniques



Managing tree problems

An ounce of prevention is worth a pound of cure because we have limited ability to cure!

Practice good tree health care



Source: Proper Mulching. www.lagrangepark.org



Source: U.S. Forest Service. Watering Mature Trees. youtu.be/IrirPBMTYi0

Managing tree problems

An ounce of prevention is worth a pound of cure because we have limited ability to cure!

Hire a qualified arborist



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Take home messages

- **Tree problems arise when landscape conditions are not suitable for trees**
- **Adverse landscape conditions disrupt normal tree biology and cause stress**
- **Stress factors can compound each other and lead to tree decline if left untreated**
- **Although pests and diseases are considered common culprits, they are often secondary to abiotic stress factors**
- **Stress prevention and early intervention are key to keeping trees healthy and attractive**



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