Abiotic (Non-infectious) Tree Problems
Chemical Injury

- Salt
- Swimming pool chemicals
- Misapplied pesticides, fertilizers
- Gas fumes, ethylene, natural gas
- Allelopathic substances
Trees and Salt Problems
Damage from salt

- 2 types:
  - Spray films – direct contact with tissues
    - Can be from de-icing and sea salt
  - Salt in soil – builds up over time and is translocated into tissues

- Trees vary in tolerance
- Trees can recover
- Salt can cause stress in trees
Symptoms of salt damage

- Marginal chlorosis, then necrosis – shows up in summer on deciduous trees
- Foliage is thinner on side facing highway
- Needles turning red from the tips down, healthy foliage under the snow
- Witches’ brooms
Prevention of Salt Damage

• Use alternative de-icing agents
• Plant tolerant species
  – Sensitive: white pine, maples, lindens
  – Moderately sensitive: red cedar, oaks, red pine
  – Tolerant: ginkgo, honey locust, aspen
• Good planning
  – 40’ buffer strip along highways
Misapplied Pesticides

• Herbicides, insecticides, growth regulators etc.
• Damage can be acute or chronic depending on application
  – 2-4D can persist in soils for years
• Symptoms include:
  – Distortion, stunting, bleached/burned foliage
• Proper application or avoidance to prevent damage
• Tolerance / Susceptible plants
Allelopathic Substances

Black walnut (*Juglans nigra*) produces juglone

Trees that tolerate these substances-
- Red maple, red oak, linden, spruce, dogwood, Aborvitae

Trees that are susceptible-
- Silver maple, red pine, birch, apple
Mechanical Damage

- Construction damage
- Stem girdling roots – poor planting
- Lawn mower “blight”
- Lightning
- Vandals etc.
Construction Damage

• Results from:
  – Soil compaction
  – Changes in grade, drainage
  – Injury to stems from equipment
  – Changes in exposure
  – Predisposition to insect attack, other diseases

• Symptoms are often delayed several years
• Symptoms include: stunting, thin foliage, dieback
• Prevention is key
Stem Girdling Roots

- Roots develop abnormally and cross each other, compressing the stem resulting in
  - Stunting, thin foliage, dieback
  - Stem failure
- Losses can be large in urban settings
- Due to poor planting – or planting too deep
- Some differences in susceptibility – i.e. Norway maple and littleleaf linden are very susceptible
- Can be prevented
Extreme Weather

- Drought / flood
- Hail, ice
- Extreme Temperatures
  - Sunscald
  - Winter Injury
    - Winter burn/dieback
    - Frost cracks
  - Late/early frost injury
Drought/Flood Symptoms

• Drought
  – Stunting, drying leaves, early leaf color and senescence, mortality; predisposition to other pests/diseases

• Flood
  – Leaf yellowing, early coloring/senescence
  – Mortality near lakes, low areas
Hail / Ice

• Hail causes wounds, breaks branches, leaf damage
  – Wounds can serve as sites for fungal infections
• Ice accumulations can break branches, cause stem failures, even cause trees to uproot
Winter Injury

- Desiccation – especially of conifers
- Occurs in nature (red belt) and in cultivated settings
- Predisposition factors include:
  - Fall planting, summer / fall drought
- Wrapping susceptible conifers with burlap, using anti-desiccant sprays and watering well in autumn are effective
- Proper site selection should be considered
- Cold Temperatures
Winter Sunscald

- Is caused by rapid temperature exposure (especially on south side)
- Rapidly warming or cooling temperatures cause death to the cambium in thin bark species
- The following season, the bark falls off the damaged portion of stem, wound starts to close
- Wounds become entry points for decay fungi
- Protection from winter sunscald
Winter Sunscald
Frost Cracks

• Caused by expansion and contraction due to sudden temperature changes
• Longitudinal crack forms in stems – often beginning at wound site, crotch or branch stub
• Callus forms the following season
• Damage over successive years leads to wood defect
• Prevention is difficult
Iron Chlorosis

Cause of the problem?

Trees affected?

Possible treatments to control the problem?
Nutrient Deficiencies

• **Plants need many nutrients for proper health**
  – Non-native or poorly adapted species often suffer the most
  – pH can influence nutrient availability
• Nitrogen – can be unavailable, especially in low pH soils
• Iron – is unavailable to certain plants (river birch, oaks) in alkaline soils
• Other common deficiencies include:
  – Potassium
  – Phosphorous
  – Magnesium
  – Boron
  – Copper
  – Manganese
Symptoms of deficiencies

- Nitrogen – stunted growth, chlorosis
- Iron – severe chlorosis, stunting
- Phosphorous – stunting, chlorosis, purple coloration to leaves
- Potassium - stunting, chlorosis, purple coloration to leaves
- Lab testing is often needed to be sure