Bark Beetles and Wood Borers: Pests of Stressed-out Conifers

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WASHINGTON STATE DEPARTMENT OF
Natural Resources

Forest Entomology and Pathology

Organisms or events that:

- **Kill trees**
- **Slow tree growth**
- **Damage wood products**

***Ips* bark beetle**

Ambrosia beetle damage

Weevil killed spruce top

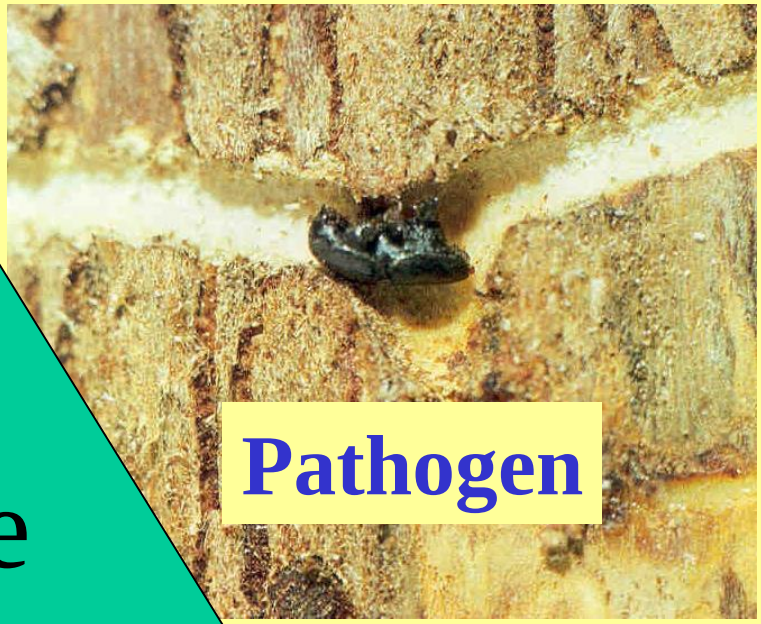
Forest Health

Greater attention to:

- **Forest ecosystem processes**
- **Forests resilient and resistant to pests**
- **Landowner objectives**

Fir engraver beetle (*Scolytus ventralis*) gallery in grand fir

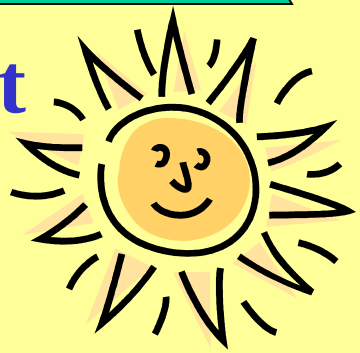
Host

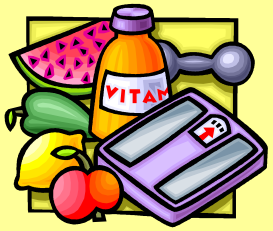


Pathogen

Disease
or Damage

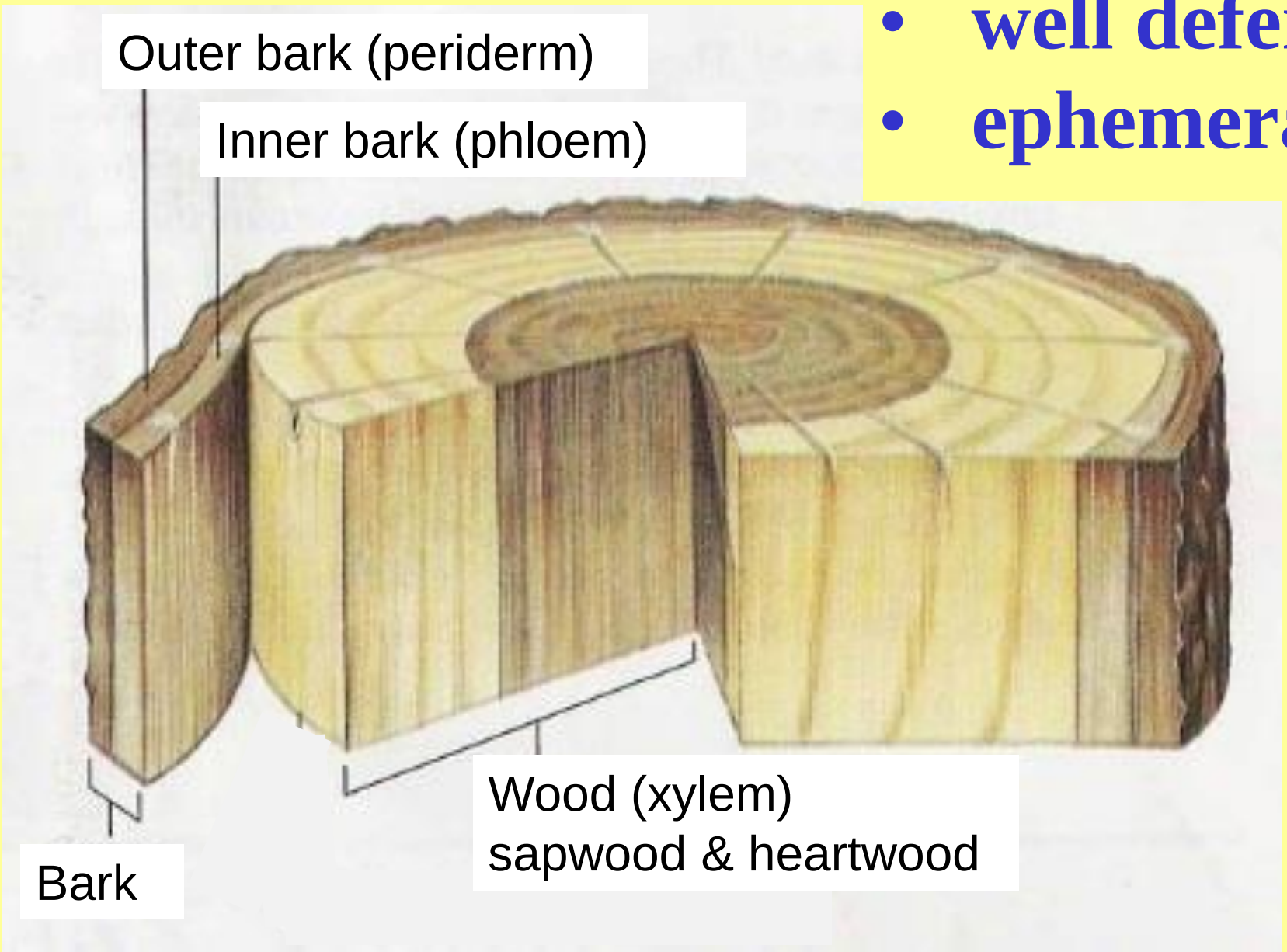
Environment





Phloem = inner bark

- nutritious,
- well defended,
- ephemeral

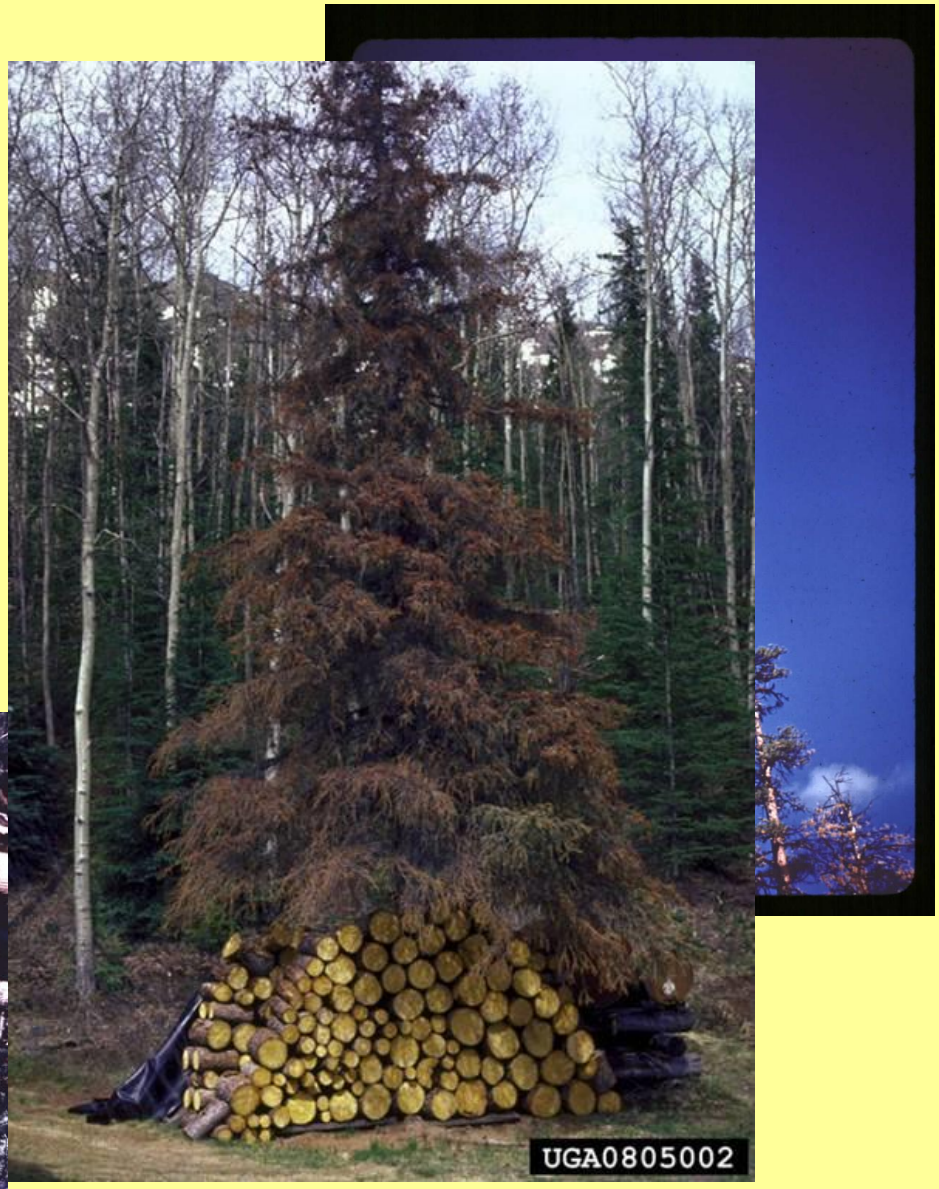


Sources of FRESH phloem

- **Windthrow**
- **Freshly cut trees**
- **Weak or dying trees**

Sources of FRESH phloem

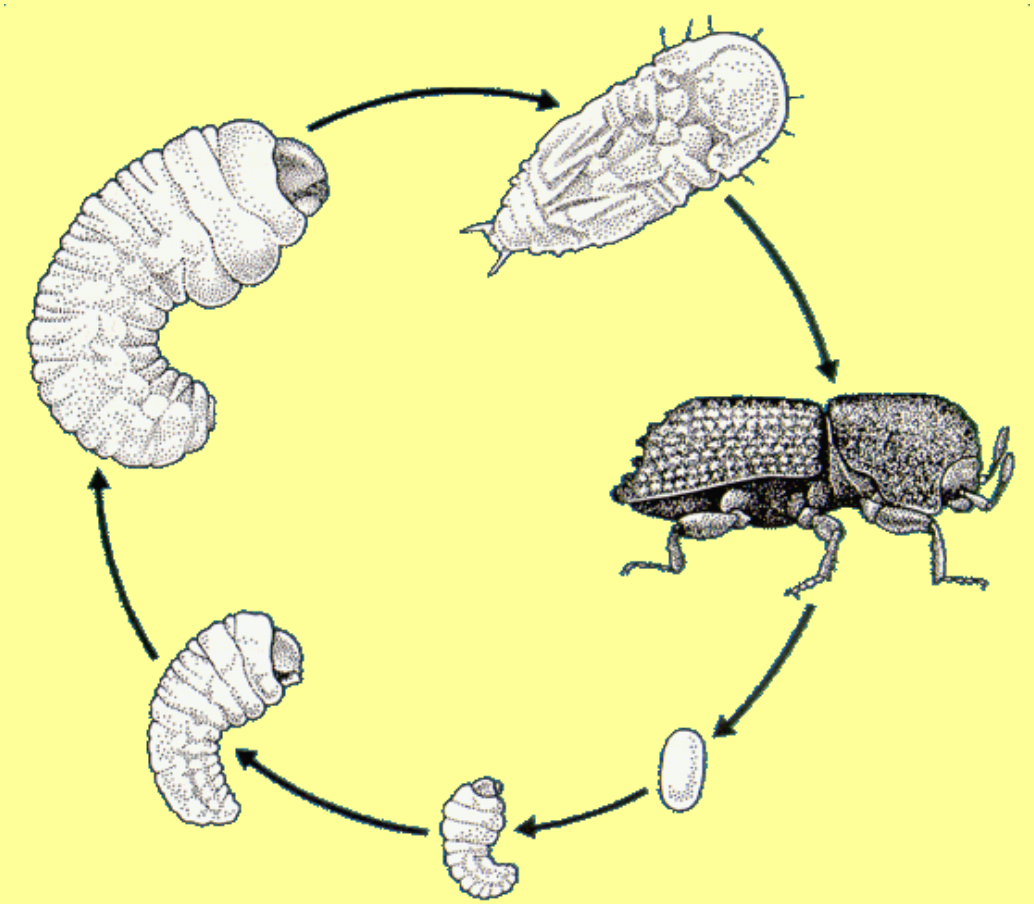
- Windthrow
- Freshly cut trees
- Weak or dying trees
- **Healthy trees**



Bark beetle adults

- Hard-bodied, cylindrical beetles
- Brown to black
- 1-9 mm in length
- Elbowed, clubbed antennae

Bark beetle life cycle



Bark Beetles

Feed on phloem, so …

- **Are generally tree host and size specific**
- **Have evolved effective means of locating and quickly mass-attacking susceptible trees**

Bark Beetles

Generally focus their initial attack on weak or injured trees

Bark Beetles

Occupation, girdling, death of target area (branch, top, trunk) occurs rapidly

Bark Beetles

Can then switch a coordinated attack to nearby vigorous trees

Bark Beetles

Crowded forests are excellent habitat for bark beetles!

Early Symptom:

Reddish “Frass” =

Boring dust and feces

Early Symptom: pitch streams

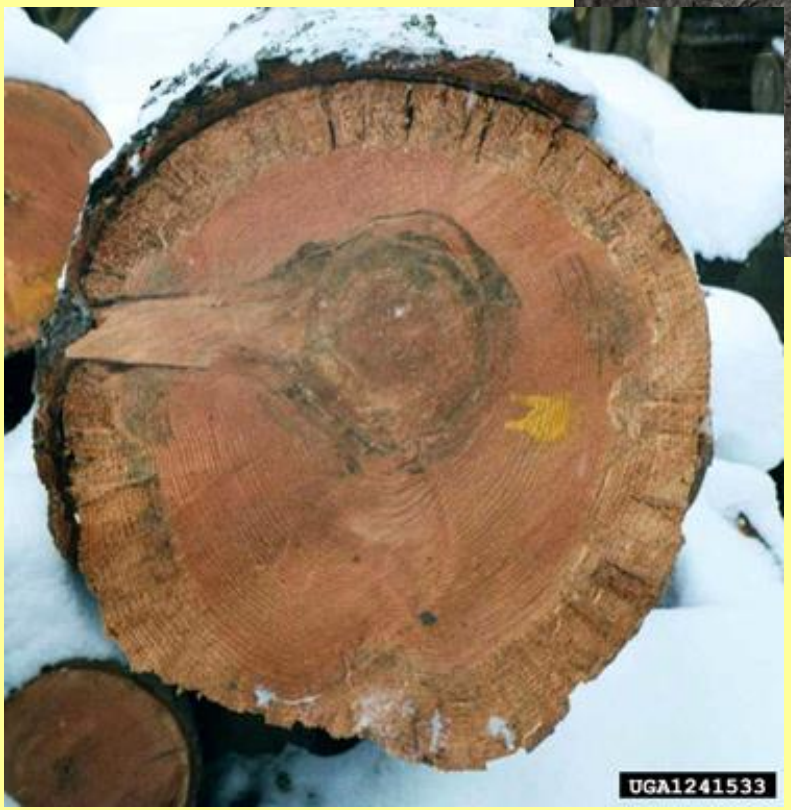
Early Symptom: pitch tubes

Mid-term Symptom: Fading foliage

Mid-term Symptom: Bird activity

Late Symptom: Red foliage, needle drop

Late Symptom: pouch fungus, decay



Pesticides

- **Preventative –**

  …. yes (ish)

- **Suppression – NO!**

Registered Products include:

- (carbaryl)
- (permethrin)
- (bifenthrin)

Note: Pesticide registrations change. Must check with state Dept of Agriculture for current registrations. Must follow label.

AVOID:

- **Diesel**
- **Lindane**

CAUTION:

- **Injectable products**

Pheromones

- Attractants
- Anti-aggregant "MCH" is available for Douglas-fir and spruce beetles
- Pine beetle anti-aggregant "Verbenone" is uncertain.

Douglas-fir Beetle Management

MCH can temporarily protect especially valuable trees

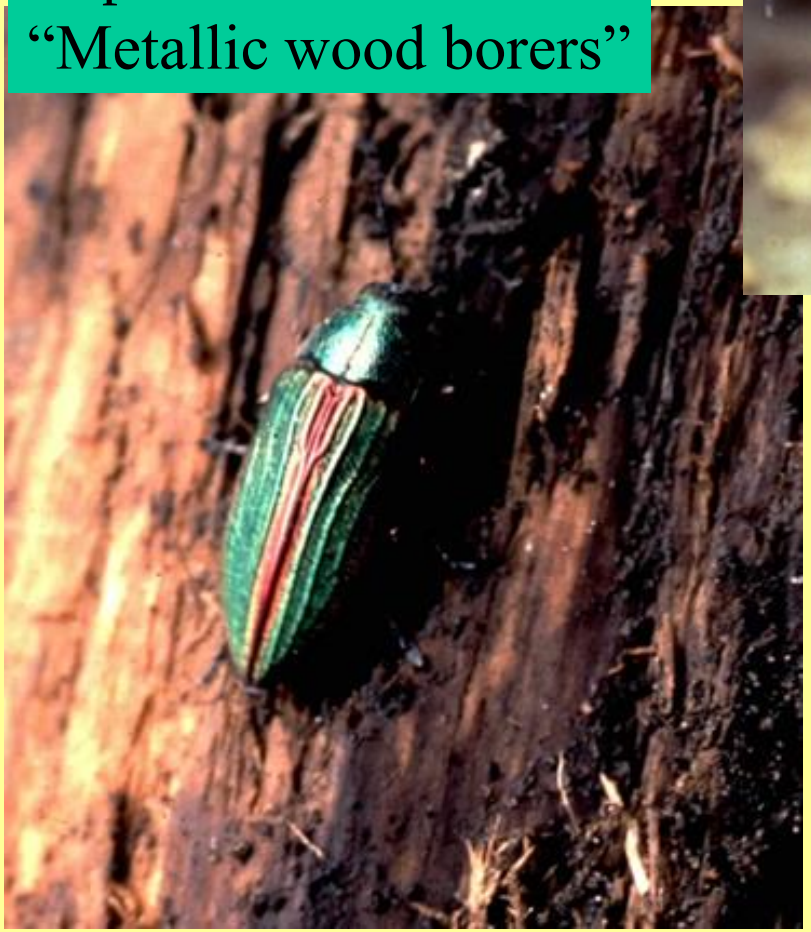
3-methylcyclohex-2-en-1-one

Ambrosia Beetles

White frass
Black stained tunnels

Wood Borers

Buprestid Beetles
"Metallic wood borers"



Cerambycid Beetles
"Long-horned wood borers"

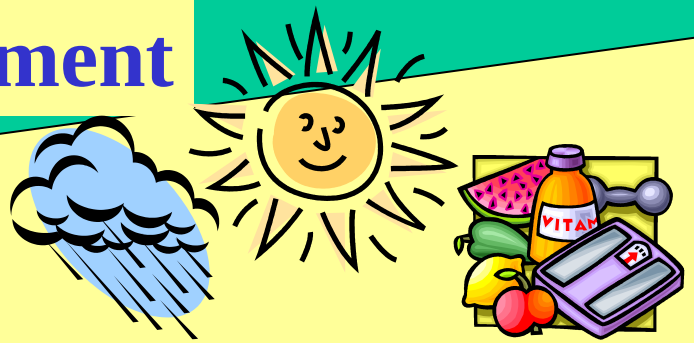
Wood Borers

Host

Exotic Pathogen

Disease or Damage

Environment



Exotic Wood Boring Beetles

citrus long-horned beetle

emerald ash borer

Asian long-horned beetle

Citrus Long-horned Beetle

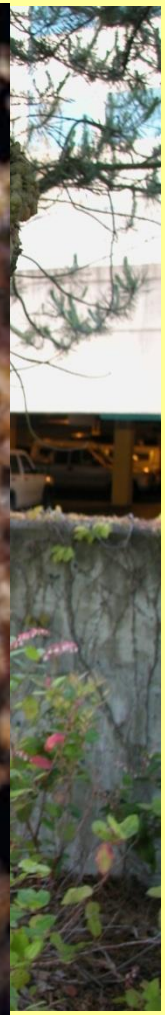
Banded Alder Borer

Pine Sawyer Beetles

Pitch moths

- **Hosts: Pine, spruce, Douglas-fir**
- **Golf-ball-size pitch globs**
- **Impact:**
  - **Slows the closure of wounds**
  - **Can contribute to a line of weakness**

Pitch moths

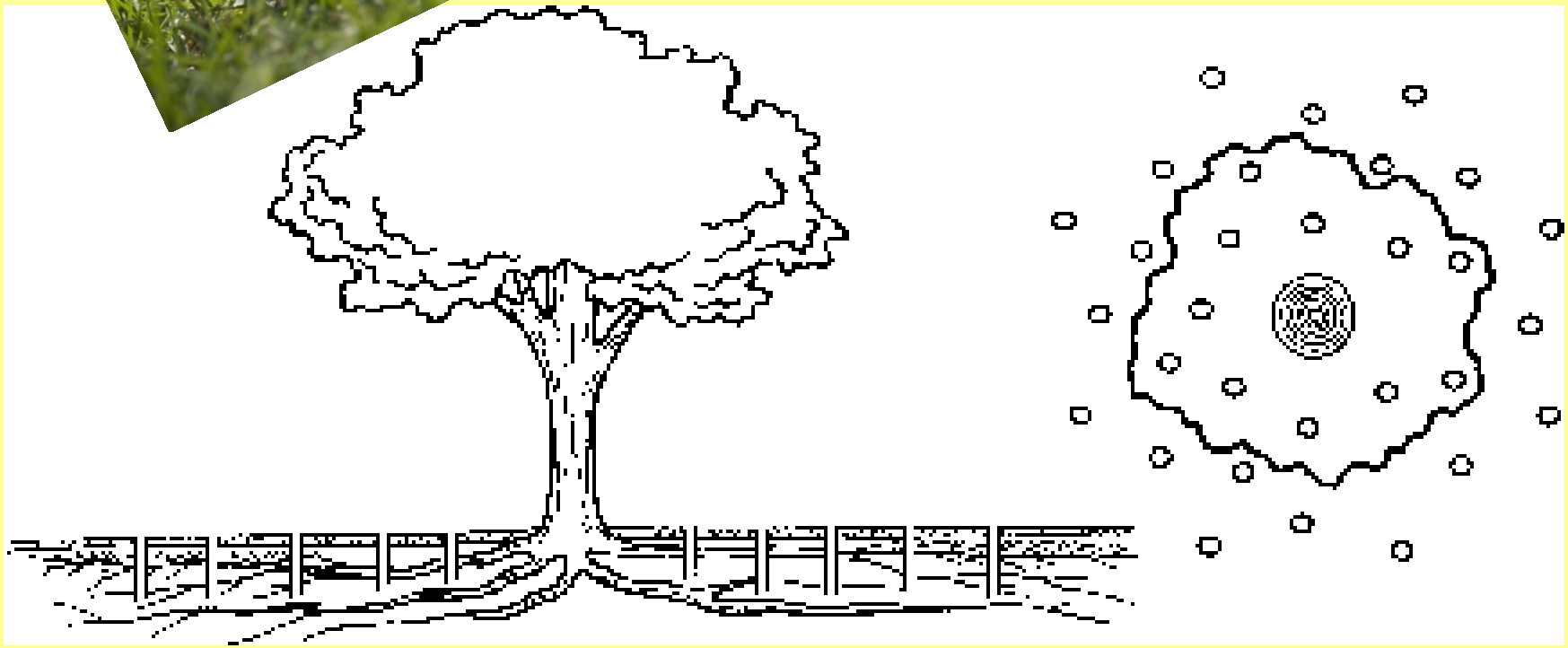


Beetle and Borer Prevention

- Maintain general tree vigor
- Don’t injure stems or roots
- Avoid dramatic changes in water supply

Tree Protection:

- Supplemental (deep) watering
- Preventive application of surface insecticide before beetles attack (?)



Images: Soaker hose; “vertical mulching” allows deep water penetration

Forest Management:

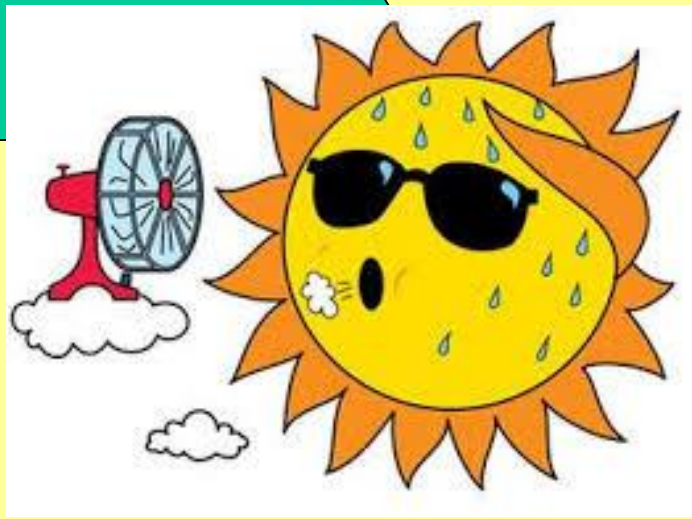
- Maintain general tree vigor by thinning the stand “from below”
- Maintain mosaic of stands on landscape
- Slash management
- Pheromone trapping, ‘attract and kill’ systems, or repellants

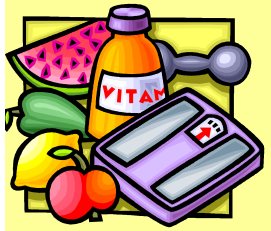
Host

Pathogen

Disease or Damage !!!

Environment





Weather consequences

Drought and heat injury increase attractiveness and reduce pitch

Weather consequences

Storm damage increases host material

“Secondary” pests could become more aggressive: (Wood borers)

Example: The black locust borer infests and re-infests what seem to be otherwise healthy trees until they break. Other borers could develop this trait too.

“Secondary” pests could become more aggressive: (Wood borers)

Example: Bronze birch borer

“Secondary” pests could become more aggressive

Native ambrosia beetles only infest dead trees or dead parts of trees. There are exotic ambrosia beetles that successfully infest live trees. Several cause the white frass that comes out to be stuck together into these dust sticks.

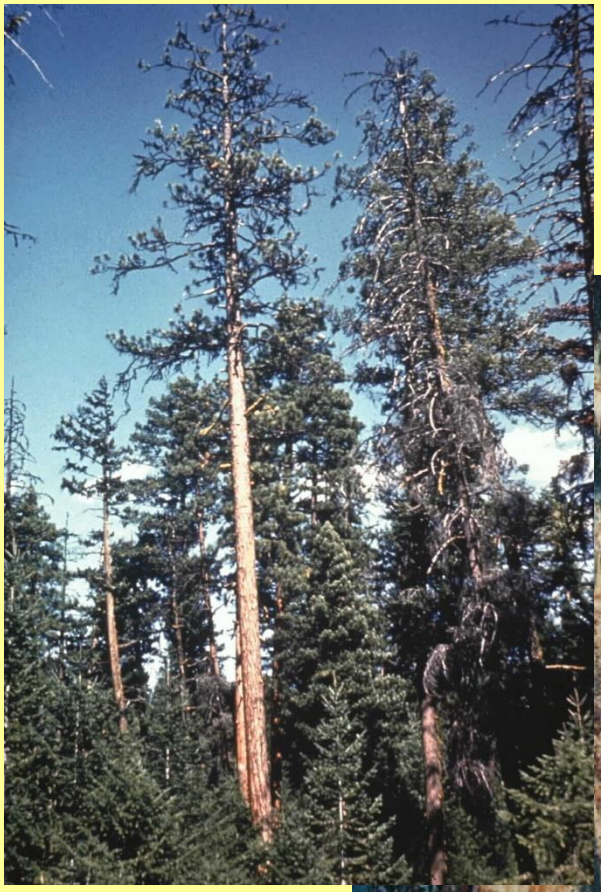
What if our ambrosia beetles started to carry their fungi into live trees? Would it kill them?

Mountain Pine Beetle

Climate barrier (cold winters, short growing seasons) fell, exposing naïve hosts

Western Pine Beetle

One generation per year or 2 generations per year?



Pine Bark Beetles

Synchrony of development remains critical

Conclusions:

- **Vigorous trees are GOOD**
- **PREVENT bark beetle activity**
- **Be ready for the unexpected**