

**Fungi in Buildings: Are they  
all they can be?**

















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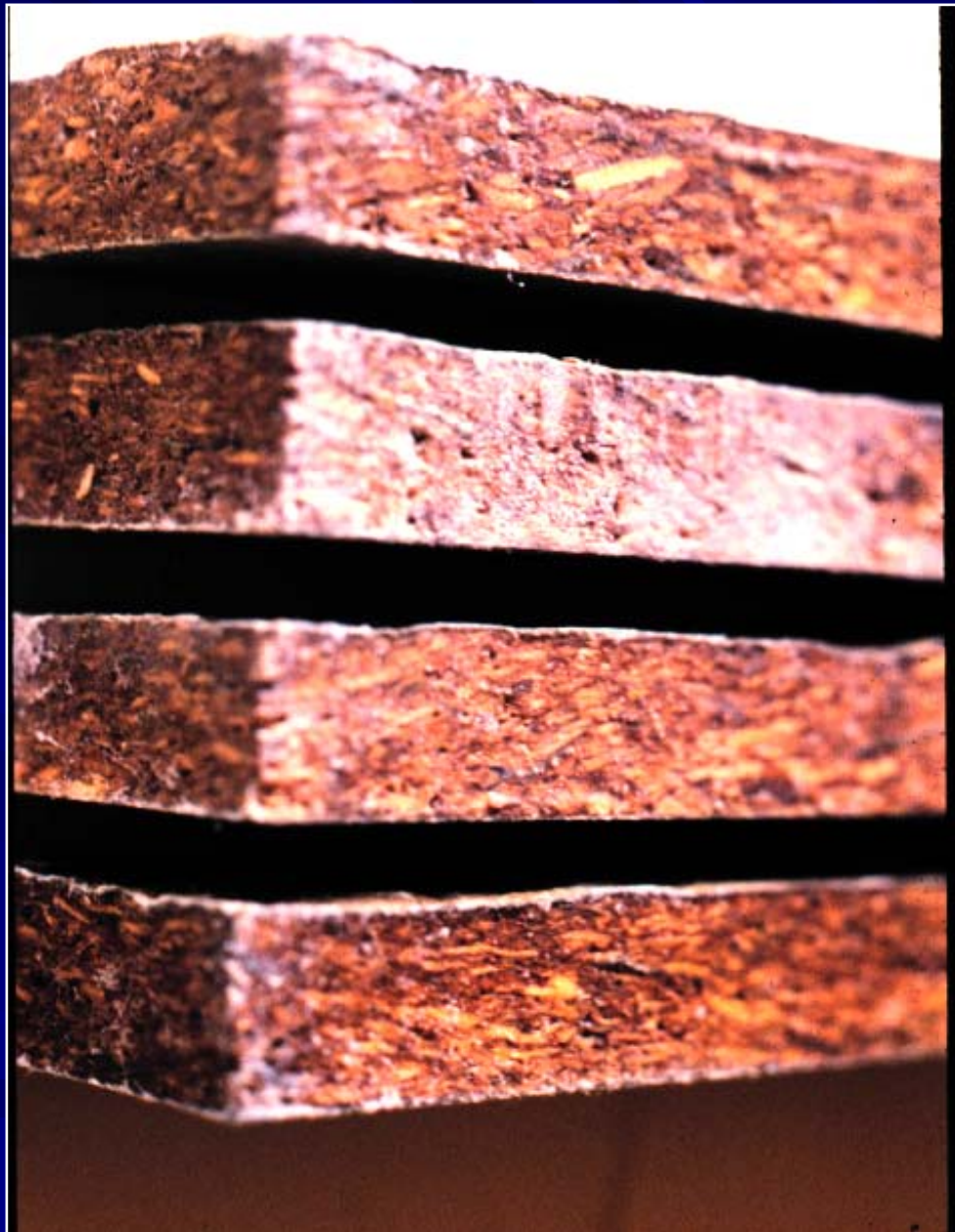
LIMIT R  
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# Sheathing Materials

- Plywood
- Oriented Strandboard
- Wood/Cement composites
- Wood/plastic composites

# Sheathing Purposes

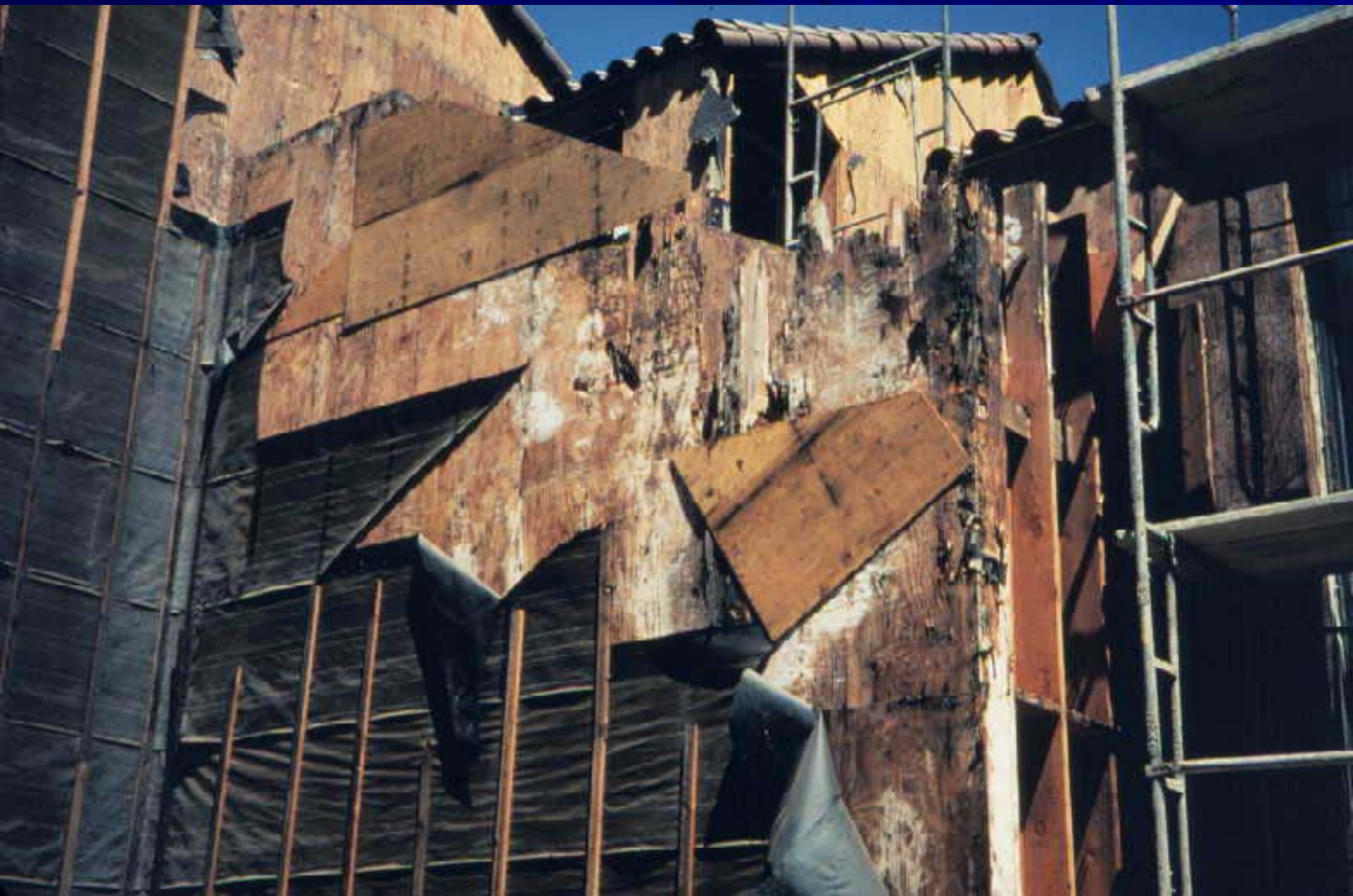
**Provide resistance to lateral loads (wind, earthquake, etc) in wood frame structures**





# Sheathing Issues

- **Water intrusion**
- **Swelling/Deformation**
- **Mold**
- **Decay**





# **Fungal Decay of Sheathing Materials:**

## **Implications for Performance**

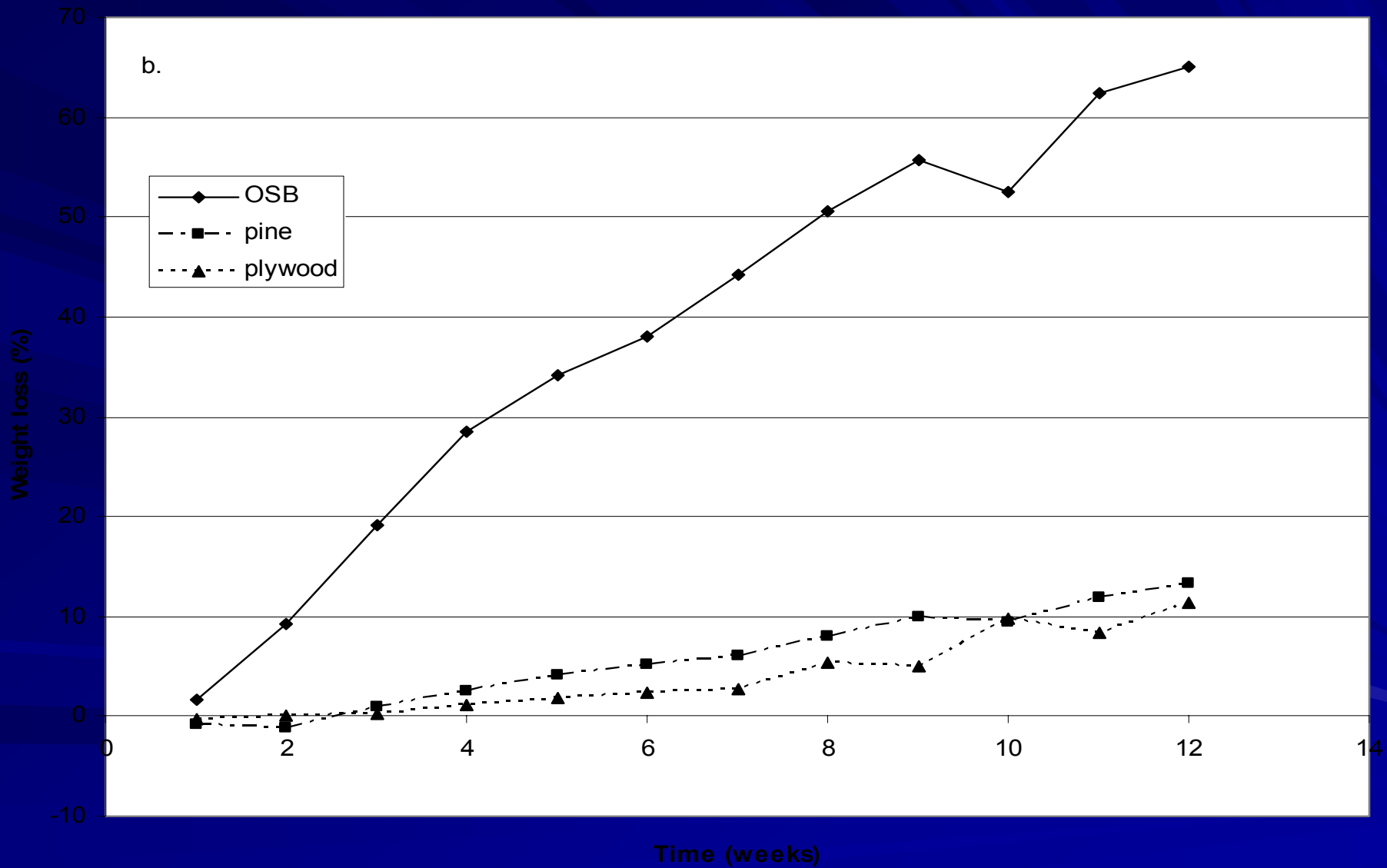
# What We Want to Know

- Sheathing material durability
- Decay effects on sheathing properties
- Decay effects on sheathing assemblies
- Can we predict wall behavior during decay?

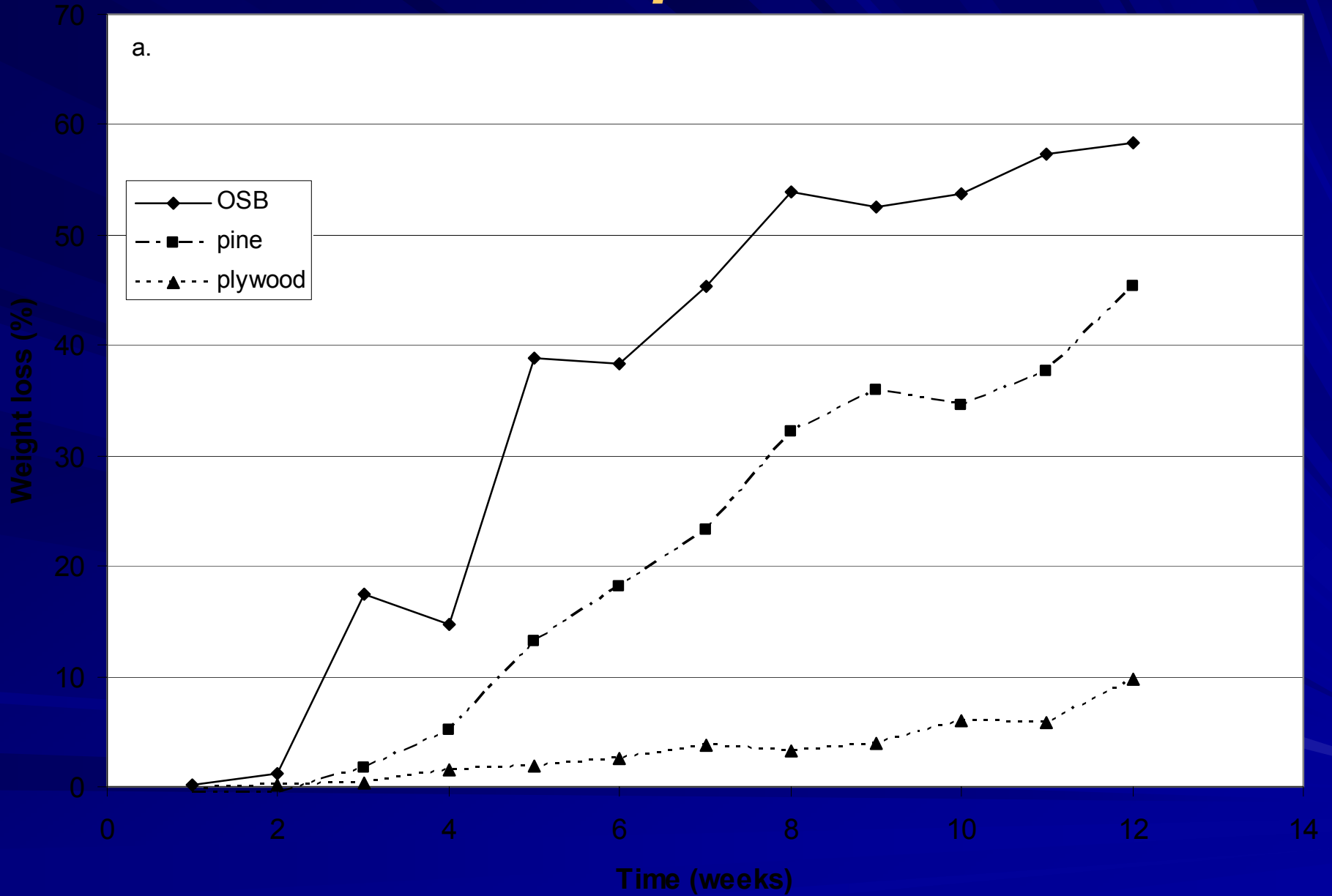
# Durability of Sheathing Materials

- Douglas-fir plywood, aspen OSB, pine sapwood
- AWPA Soil block tests for 12 weeks
- *Postia placenta* & *Trametes versicolor*
- Weight loss used as measure of decay resistance

# *Trametes versicolor*



# *Postia placenta*





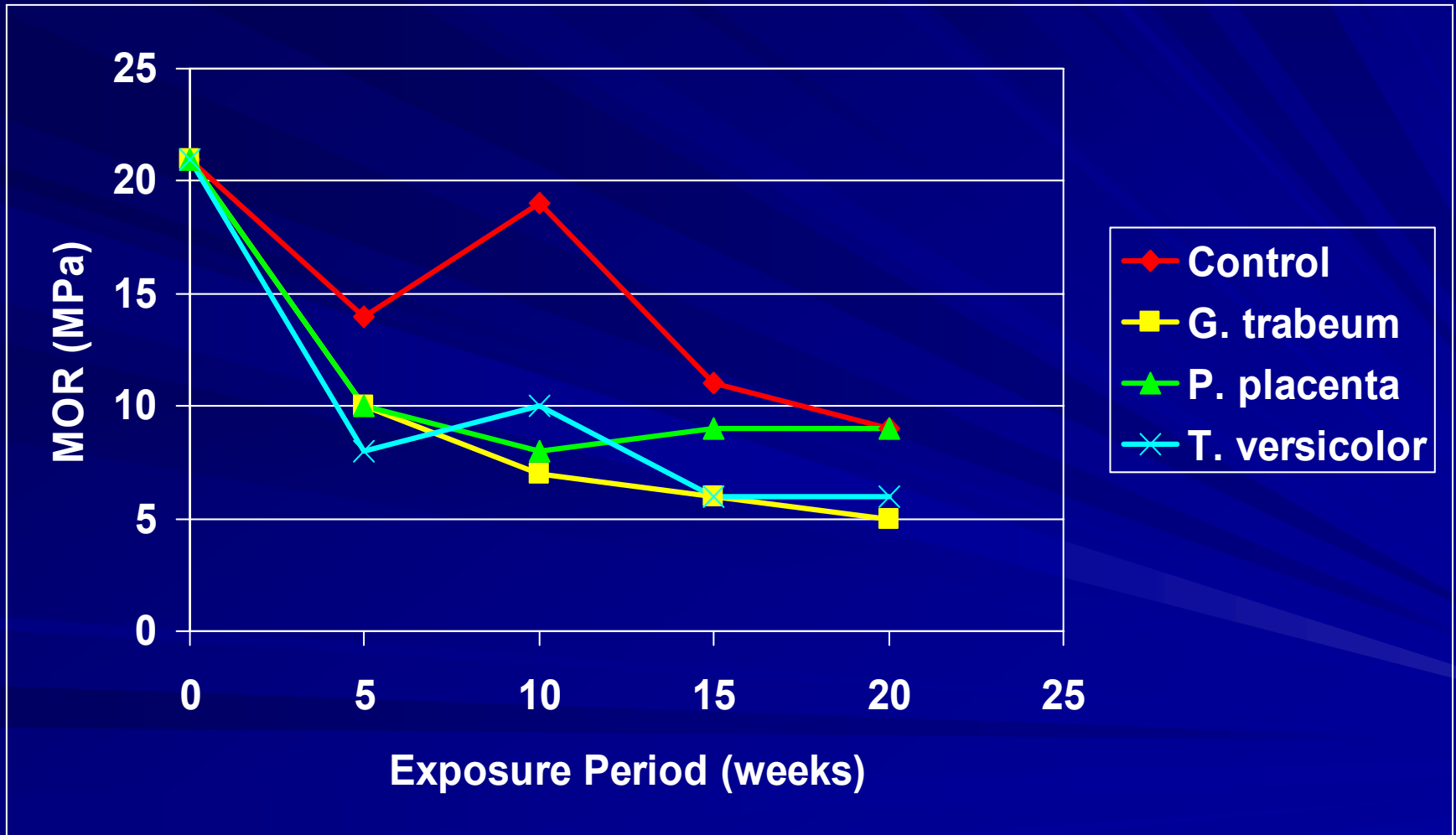
# Conclusions

- OSB had no resistance to fungal attack
- Douglas-fir plywood experienced minimal weight loss

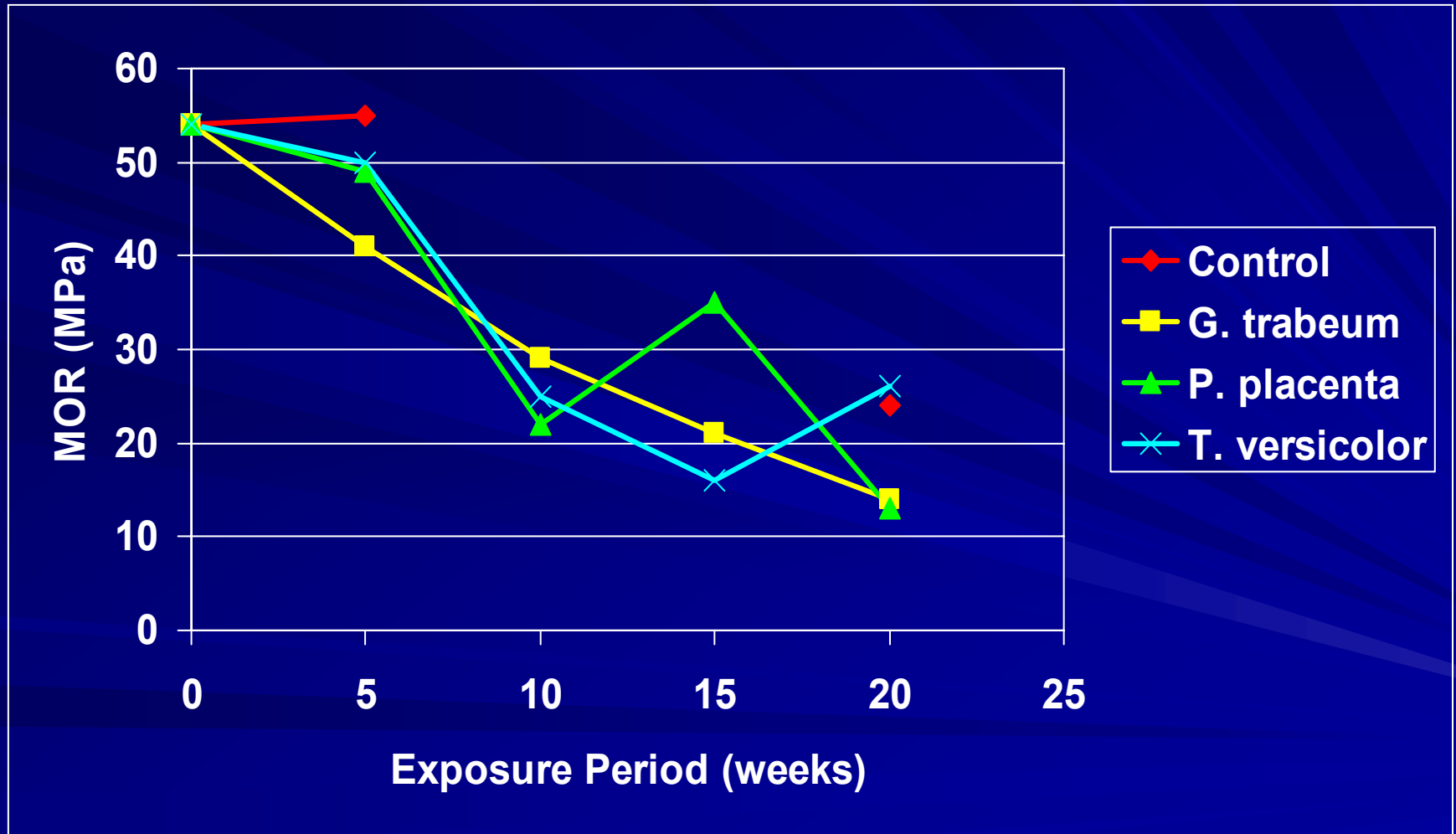
# Decay Effects On Sheathing Properties

- OSB, hem-fir plywood & s. pine plywood
- *P. placenta*/*G. trabeum*/*T. versicolor*
- Exposed 0-20 weeks @ 30 C
- Determine mass loss, MOR/MOE

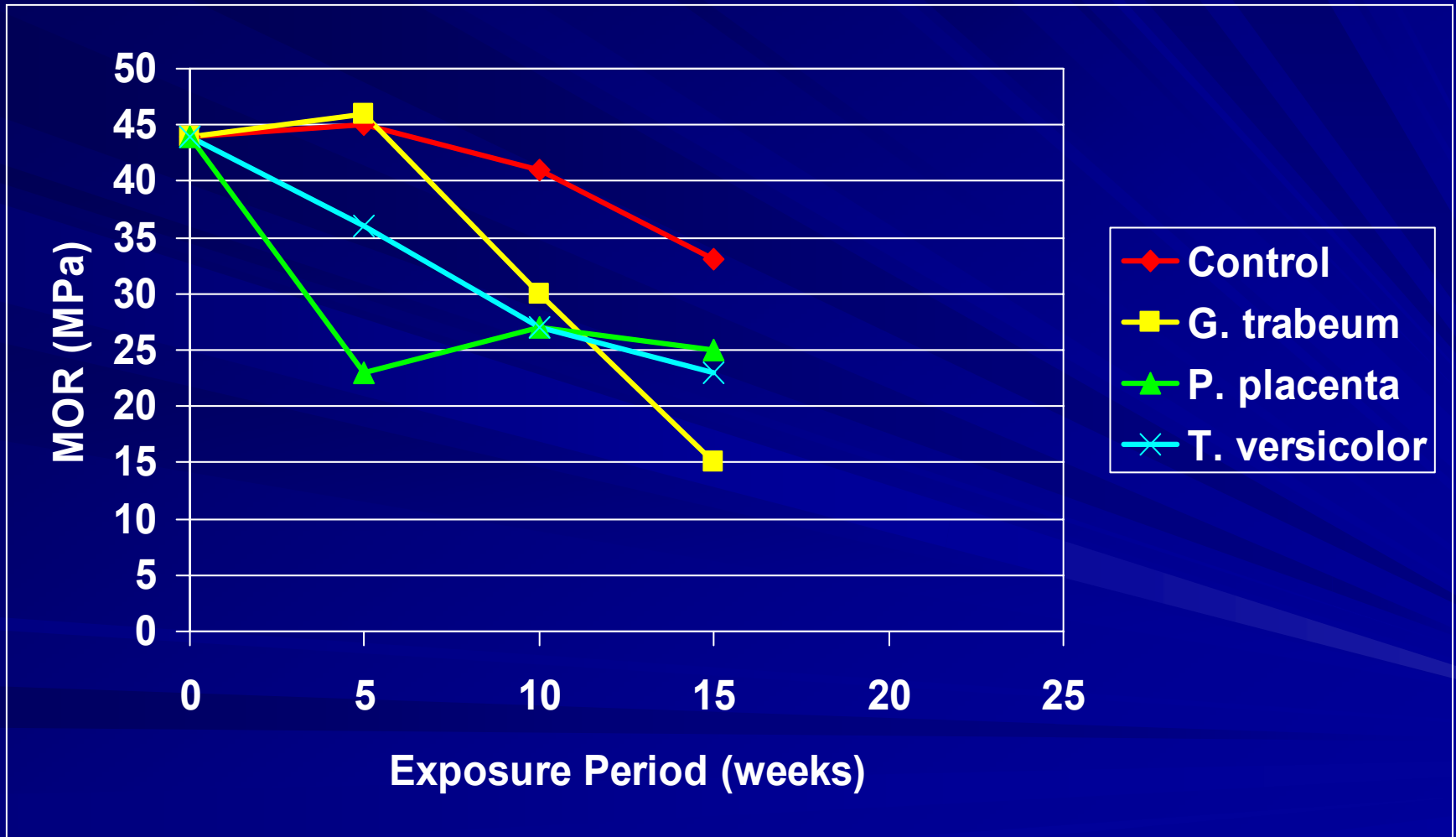
# OSB Durability



# Southern pine Plywood Durability



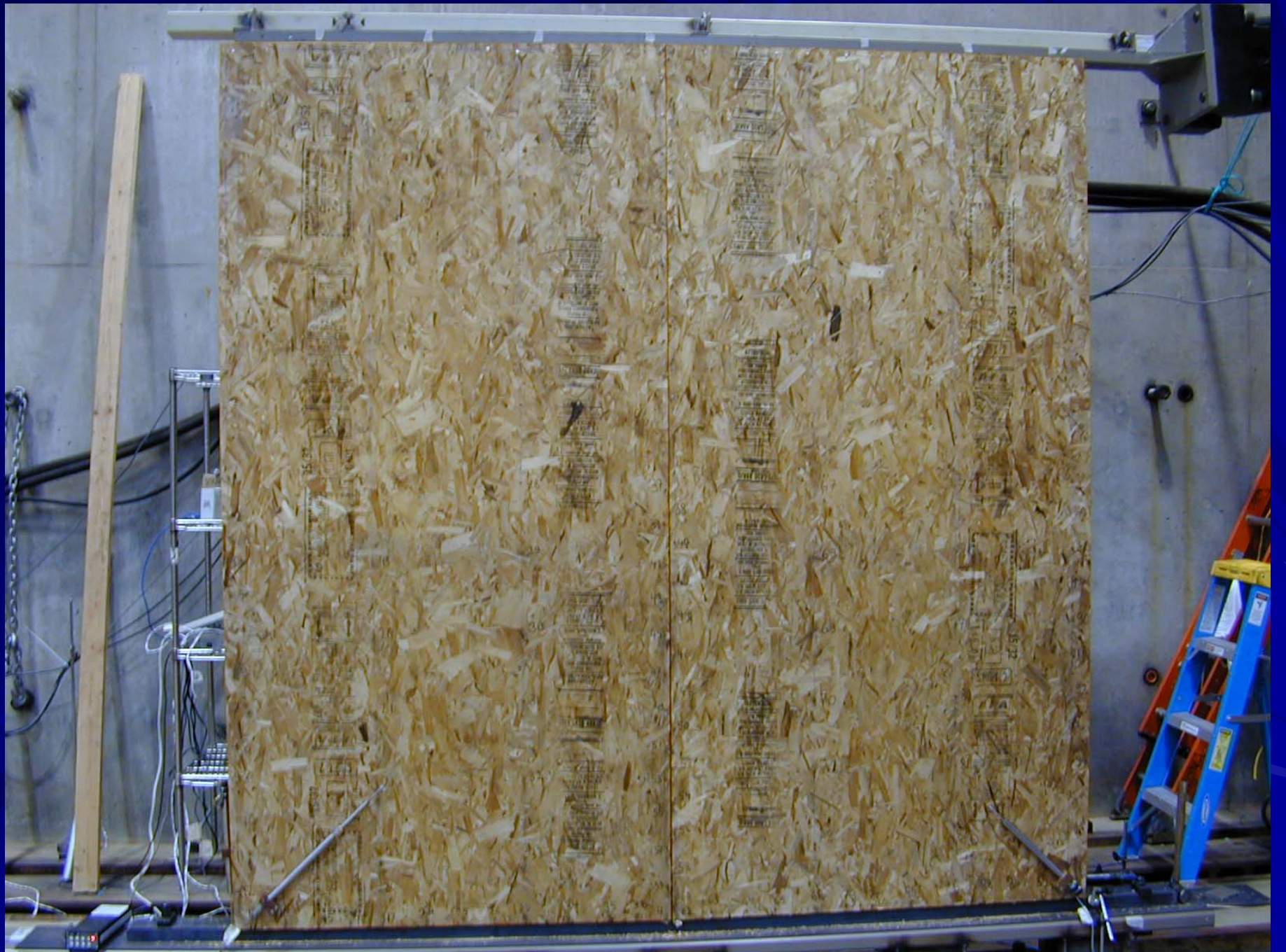
# Hem-Fir Plywood Durability



# Conclusions

- Heat/Moisture significantly affected MOR/MOE
- Brown rots tended to affect plywood
- *G. trabeum* more aggressive in most cases

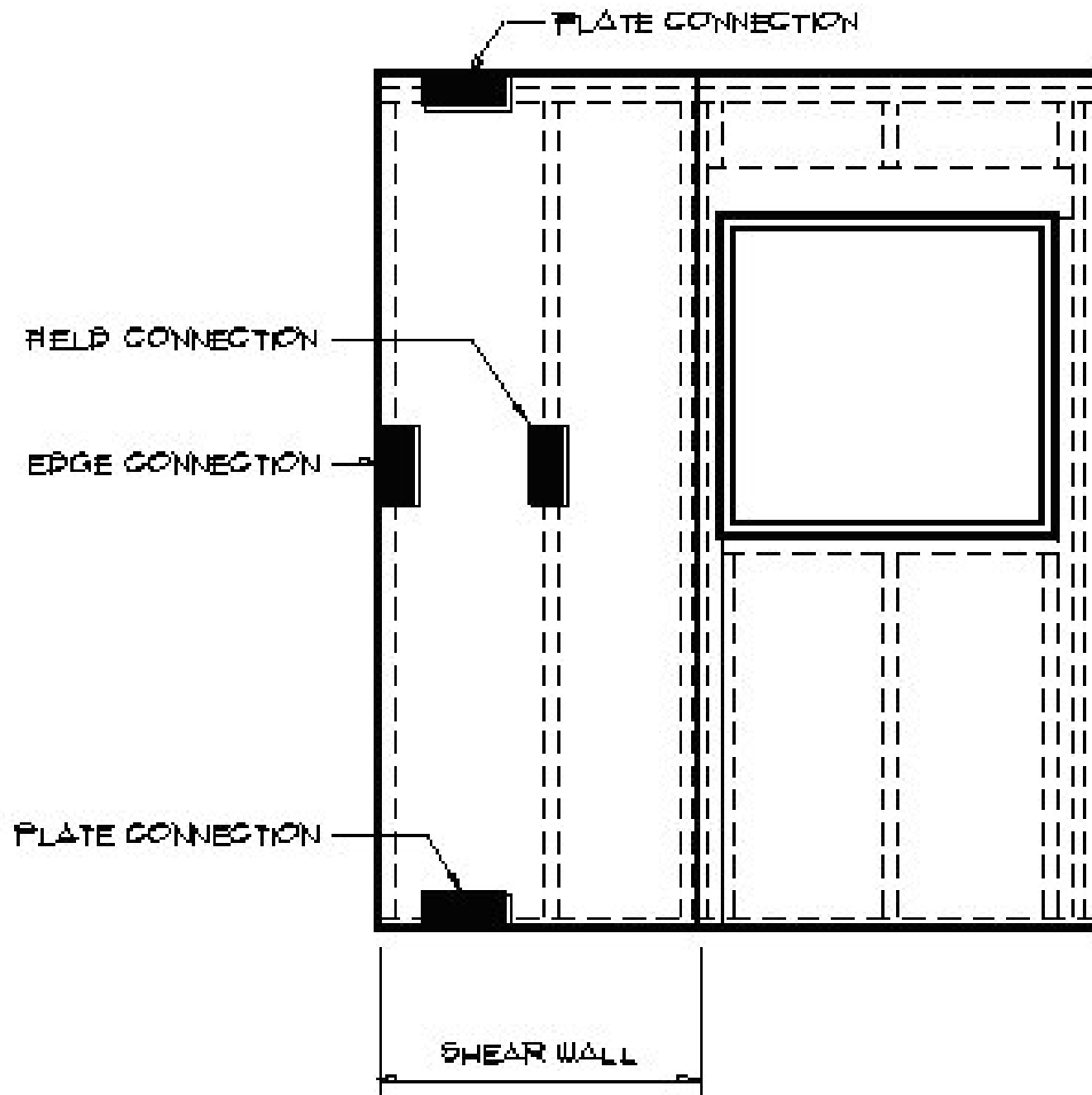
# **Decay Effects On Sheathing Assemblies**





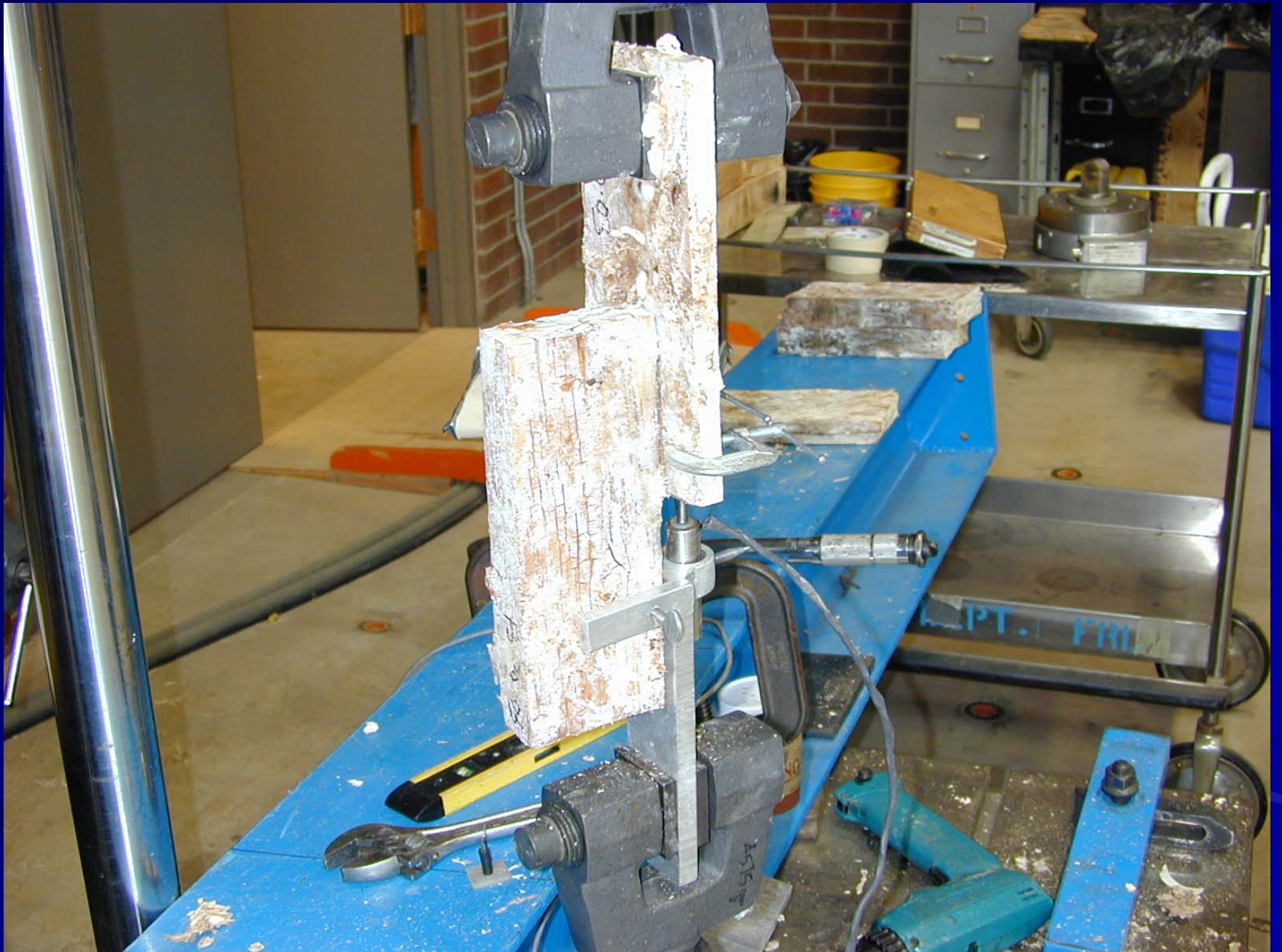
# Assembly Test

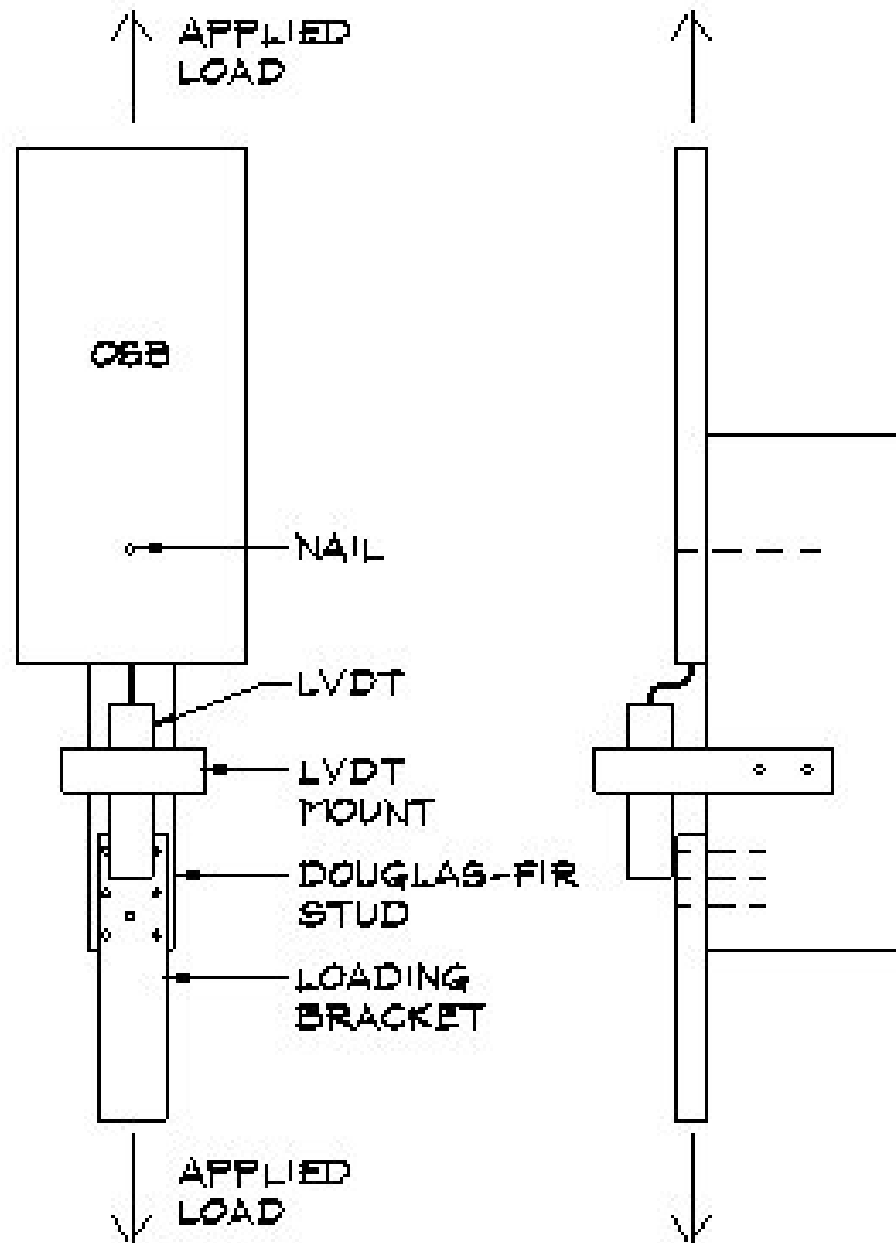
- OSB Sheathing/Douglas-fir stud
- *Postia placenta* (Brown rot)
- Assess density loss, monotonic and cyclic loading
- NIR/X-ray densitometry

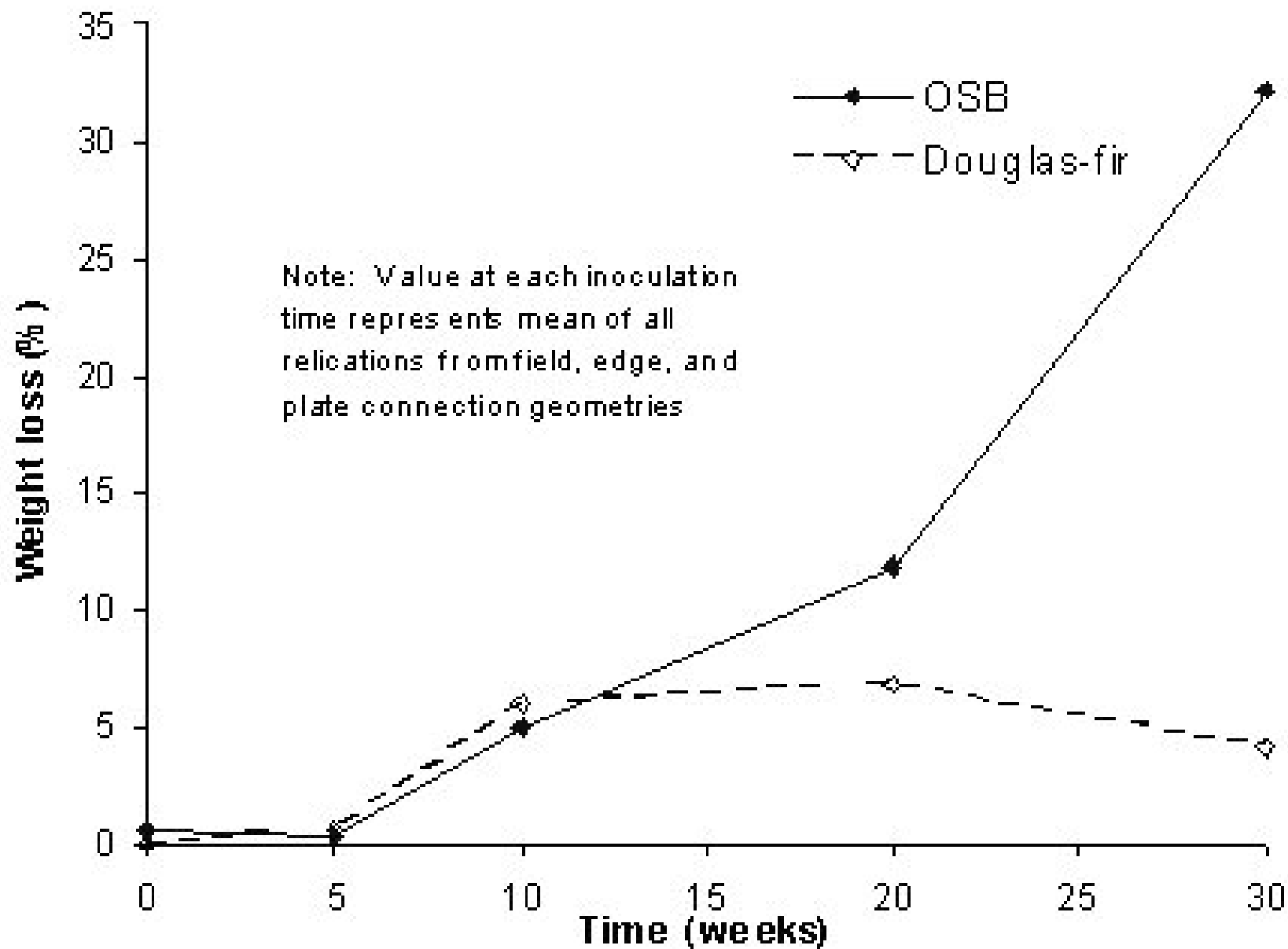




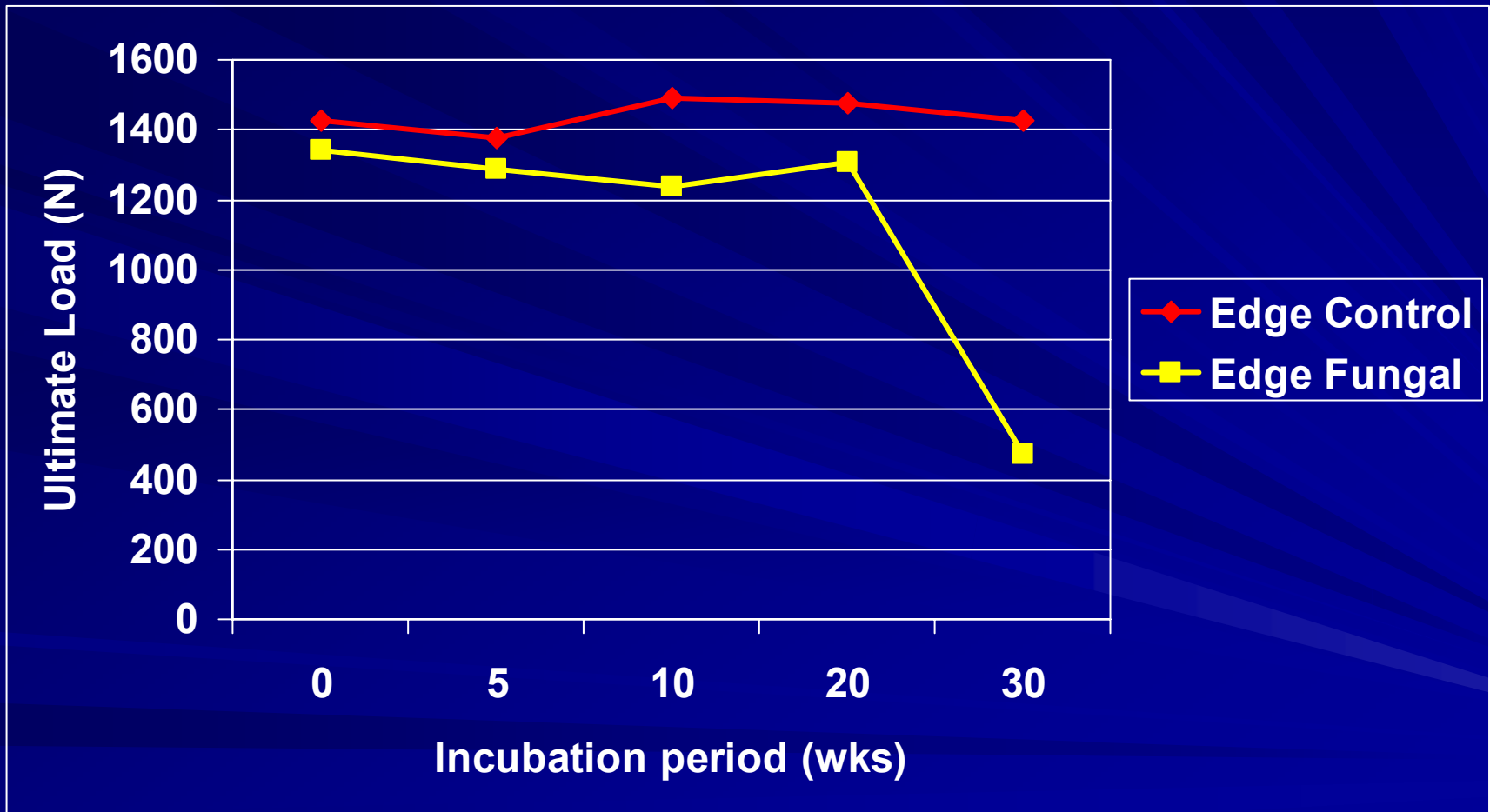








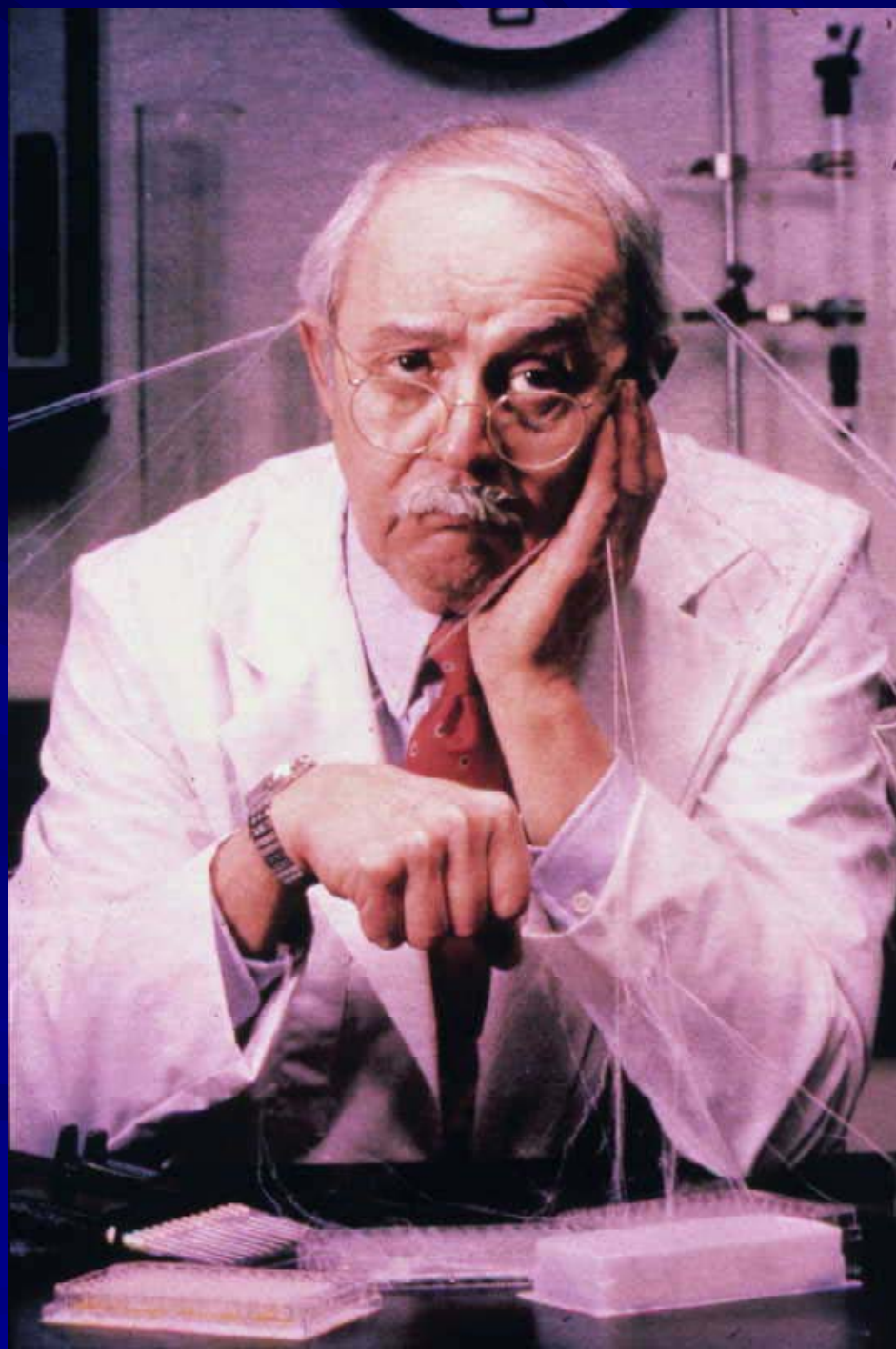
# Effect of Decay on Ultimate Load





# Conclusions

- **Weight losses were severe in OSB/mild in Douglas-fir**
- **Failures were by pull through in sheathing**
- **Decay effects were very slow**









# Composite Protection

■ Moisture uptake

■ Mold attack

■ Decay

■ Fire?

# Protection Approaches

- Alter wood chemistry
- Enhance water repellency
- Add biocides

# Composite Treatment Options

- Pressure treatment

- Treating flakes/particles

- Glue-line additives

- Vapor-phase treatment

- Supercritical Fluids



# Treatment Requirements

- Uniform distribution
- Non-swelling
- Non-volatile
- Easily disposed
- Inexpensive



# Pressure Treatment

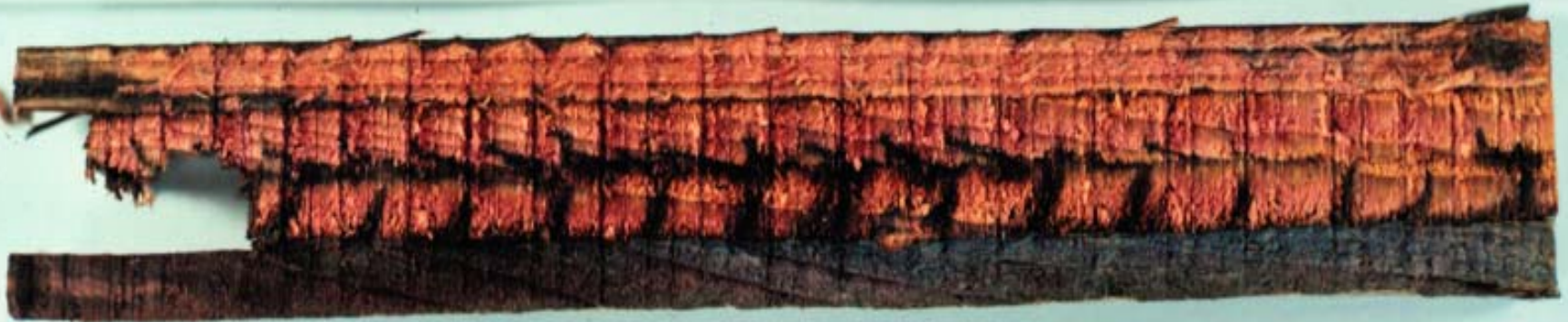
- Complete treatment
- Permanent swelling
- Panel deformation

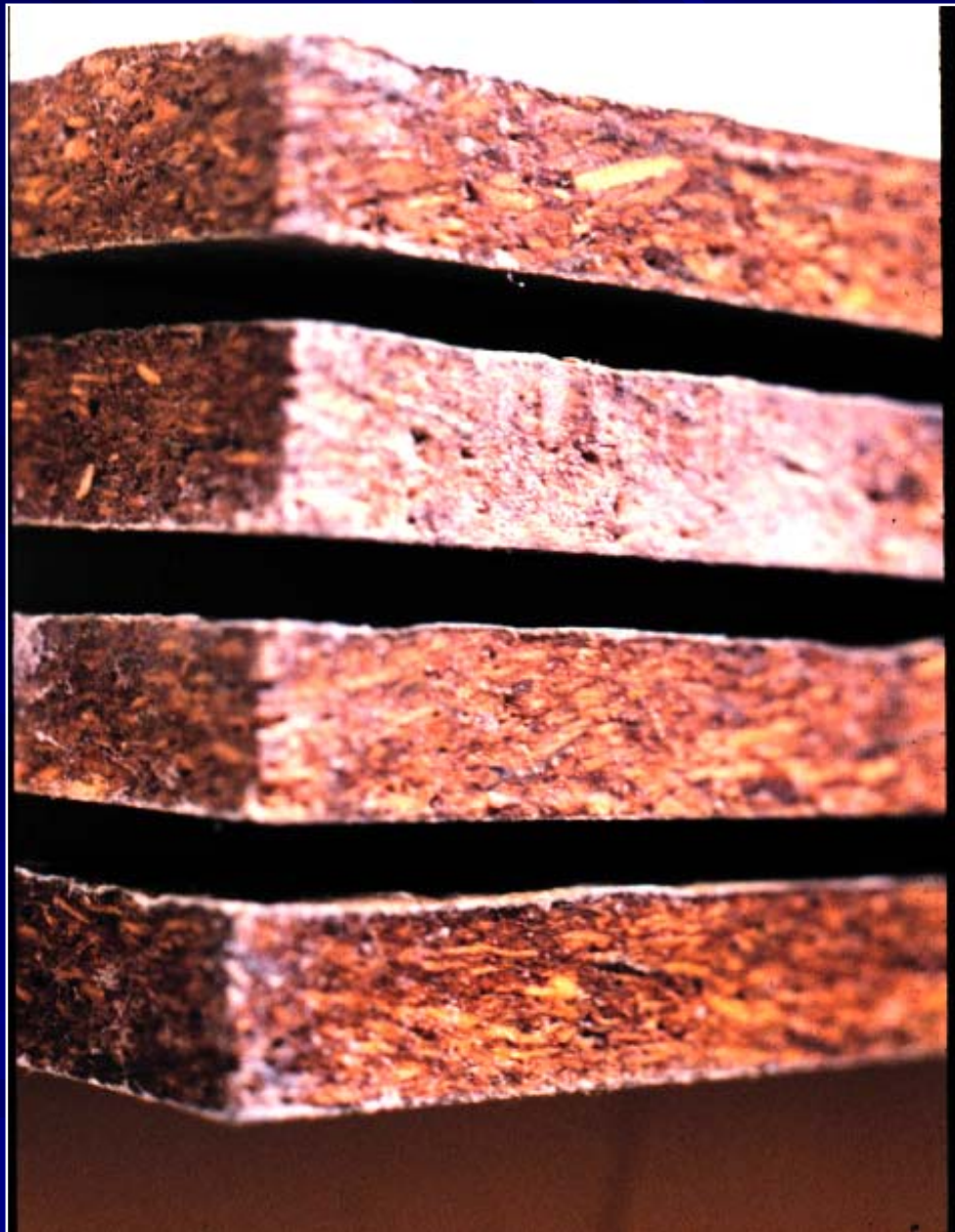
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# Glueline Additives

- Primarily insecticides
- Easily added
- Affect bond properties
- Little wood penetration

# Furnish Additives

- **Evenly distributed**
- **Easily applied**
- **Affect bonding**
- **Must be low toxicity**



# Alternative Treatment

- Vapor boron/copper

- Supercritical fluids

# Research Needs

- Non-swelling treatments
- Non-biocidal protection
- Improved education
- Improved training

