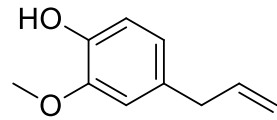


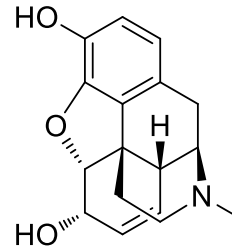
Learning how plants grow so we can grow better plants
Tailoring plants for sustainable biofuels

Plants have as many genes as humans

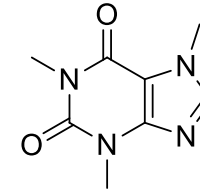
Plants are amazing chemists



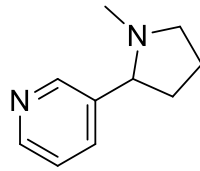
eugenol



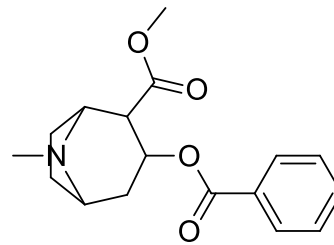
morphine



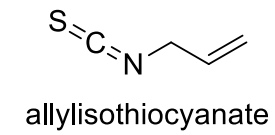
caffeine



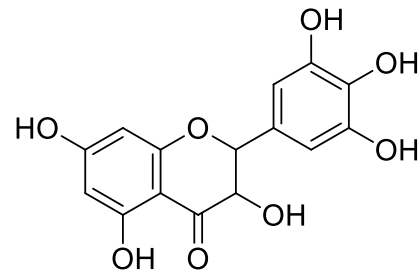
nicotine



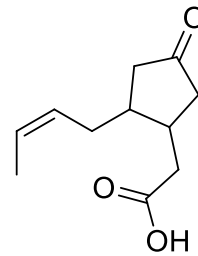
cocaine



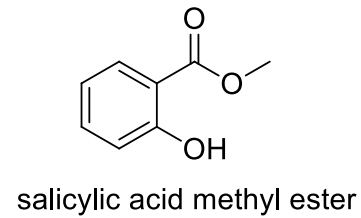
allyl isothiocyanate



dihydromyricetin



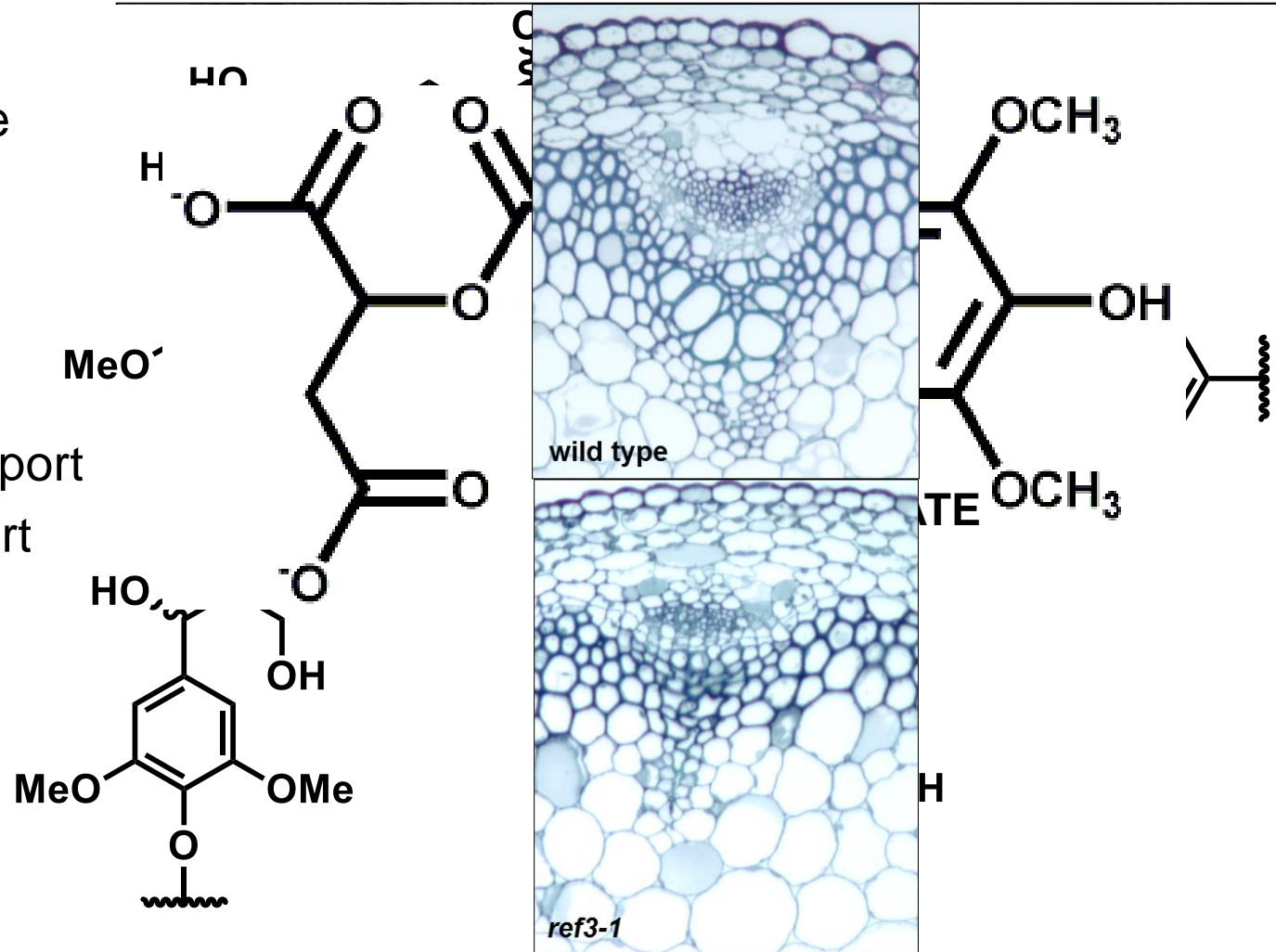
jasmonic acid



salicylic acid methyl ester

Phenylpropanoid metabolism is critical for plant survival

- UV resistance
- plant microbe interactions
- structural support
- water transport



Lignin impedes the conversion of biomass to biofuel

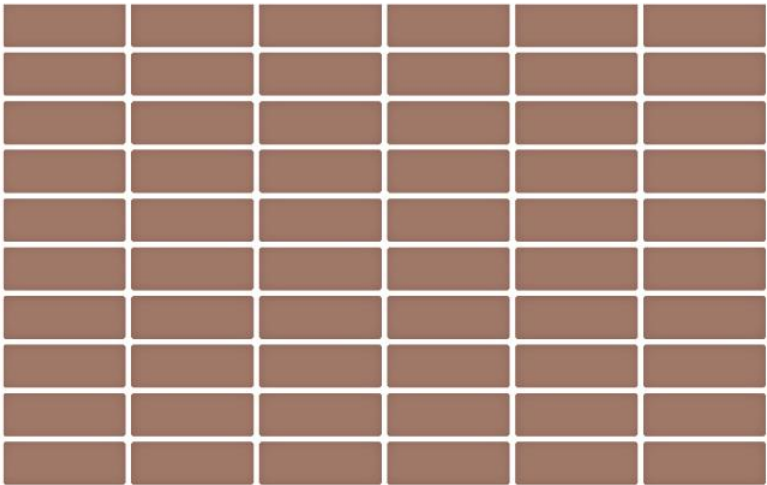


vs.



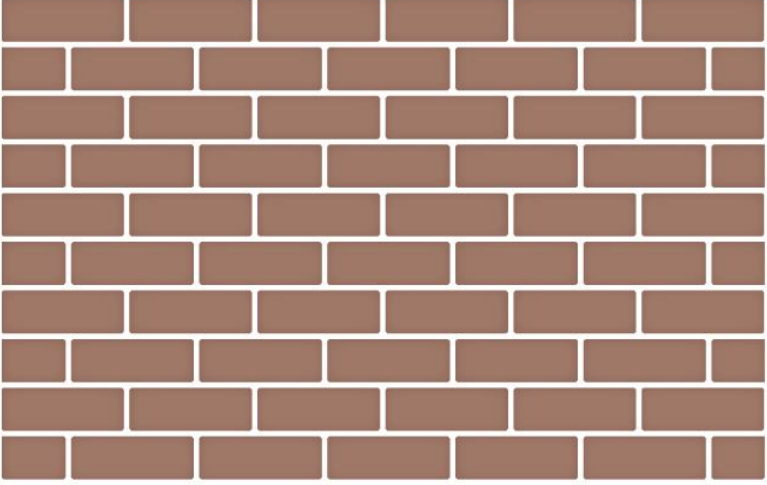
Lignin impedes the conversion of biomass to biofuel

Stack Bond



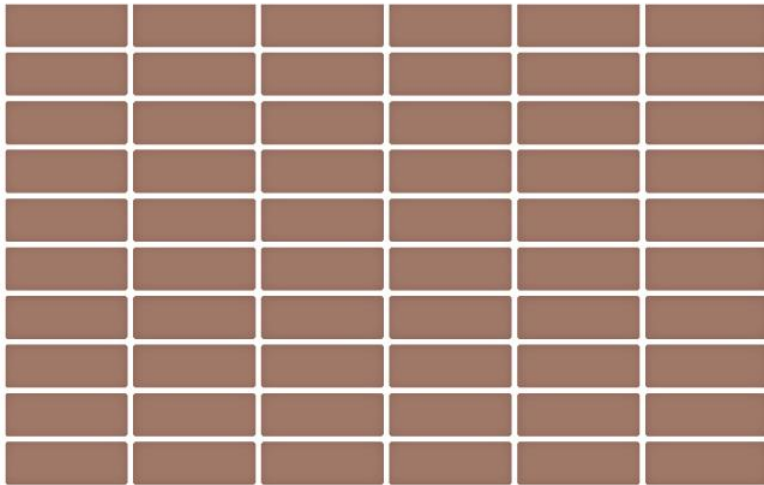
VS.

Stretcher Bond



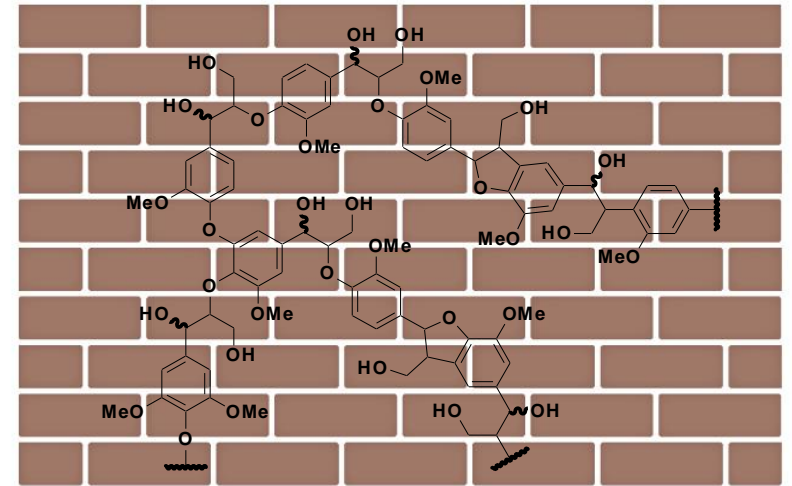
Lignin impedes the conversion of biomass to biofuel

Stack Bond

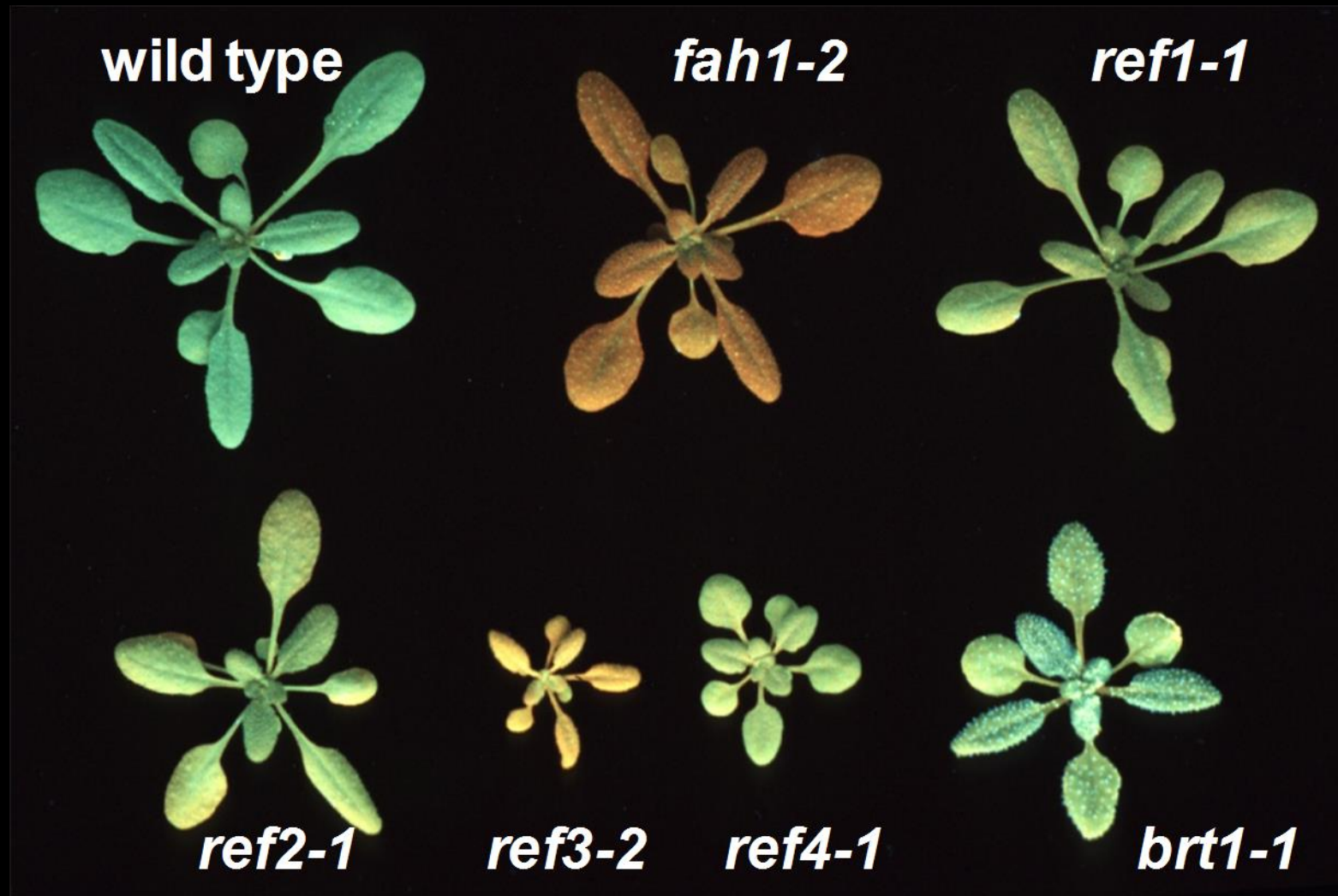


VS.

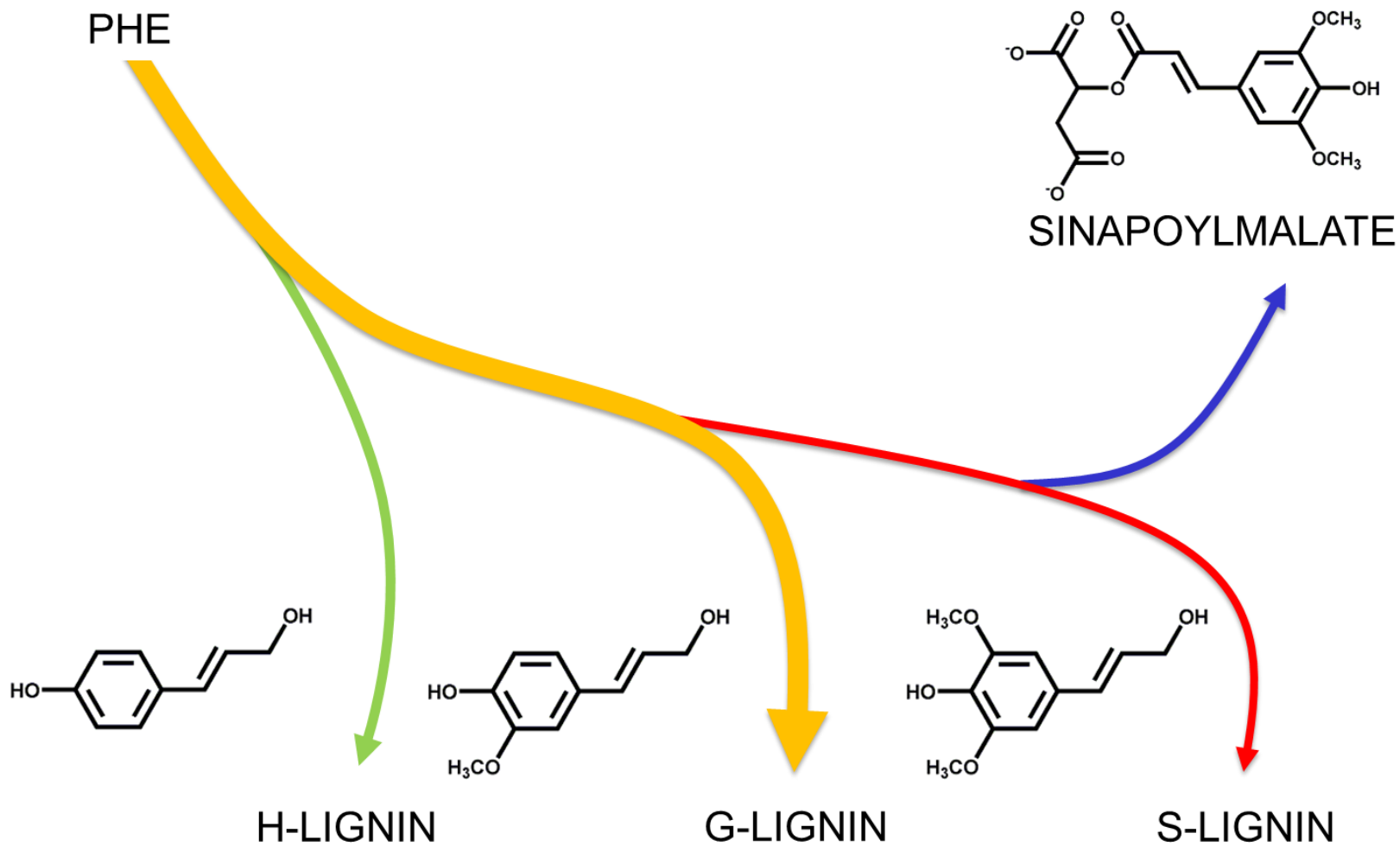
Stretcher Bond



Sinapoylmalate-deficient mutants exhibit a *reduced epidermal fluorescence* phenotype under UV

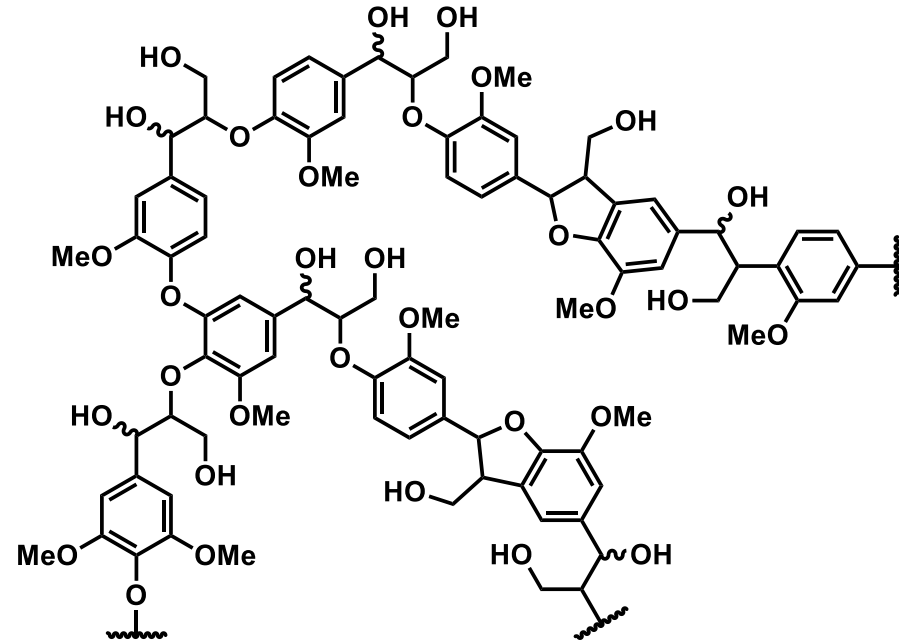


Lignin is a biosynthetically plastic polymer

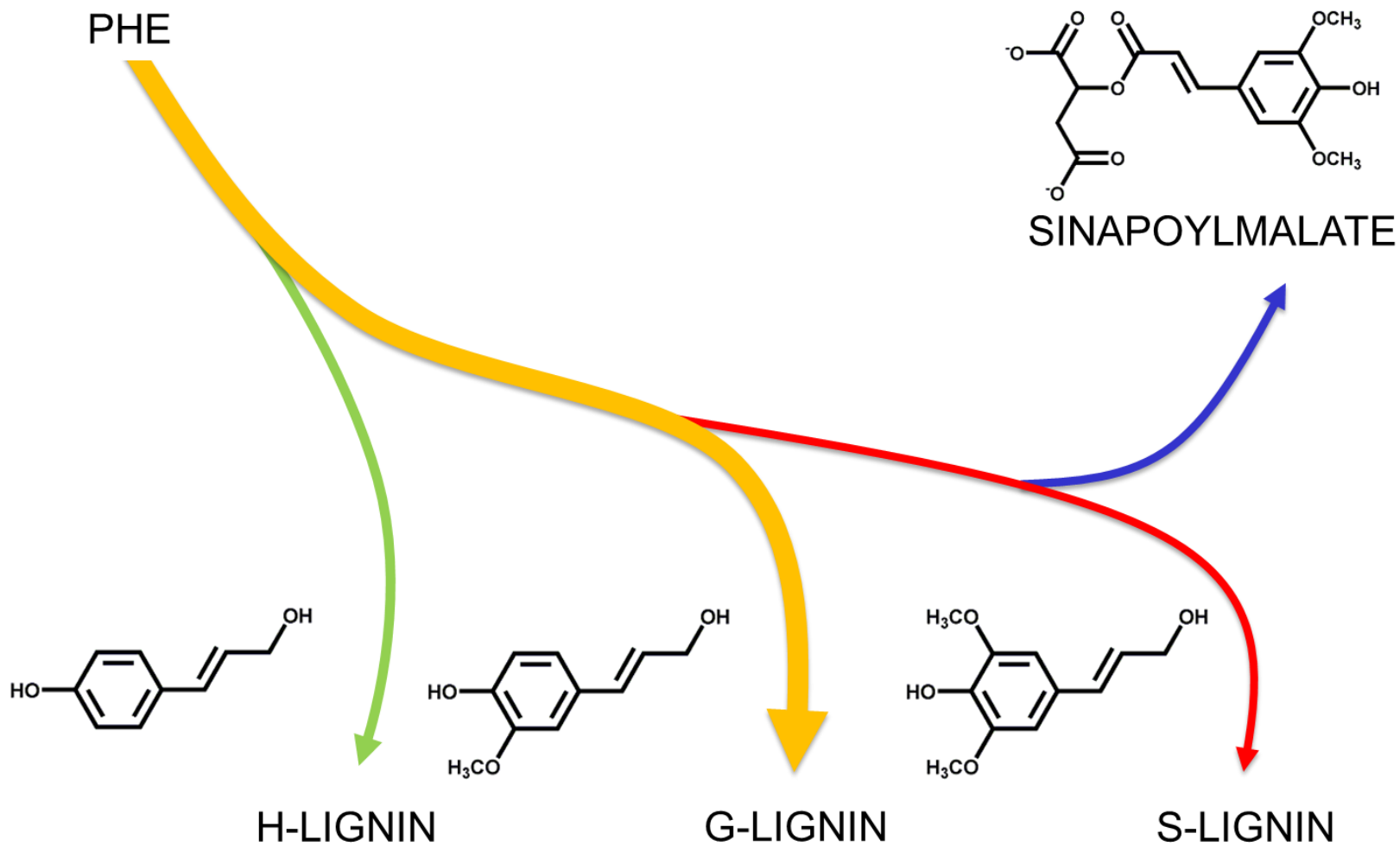


Lignin is a biosynthetically plastic polymer

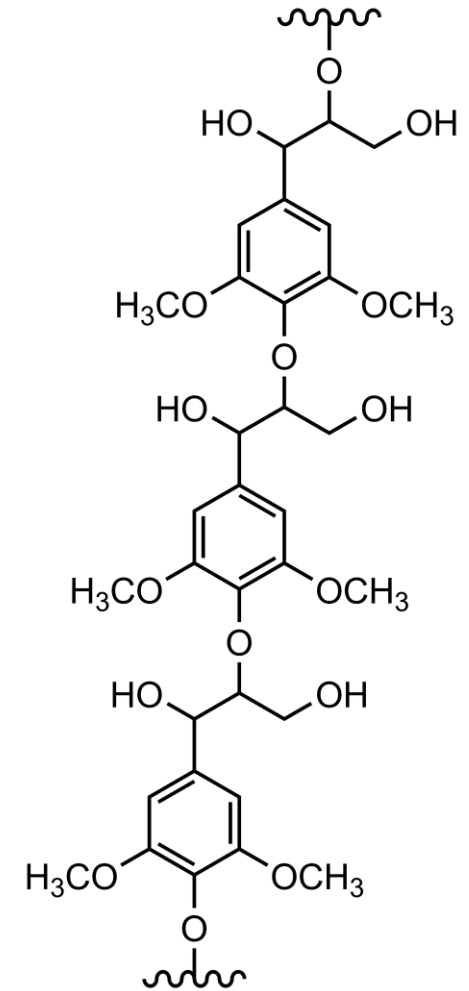
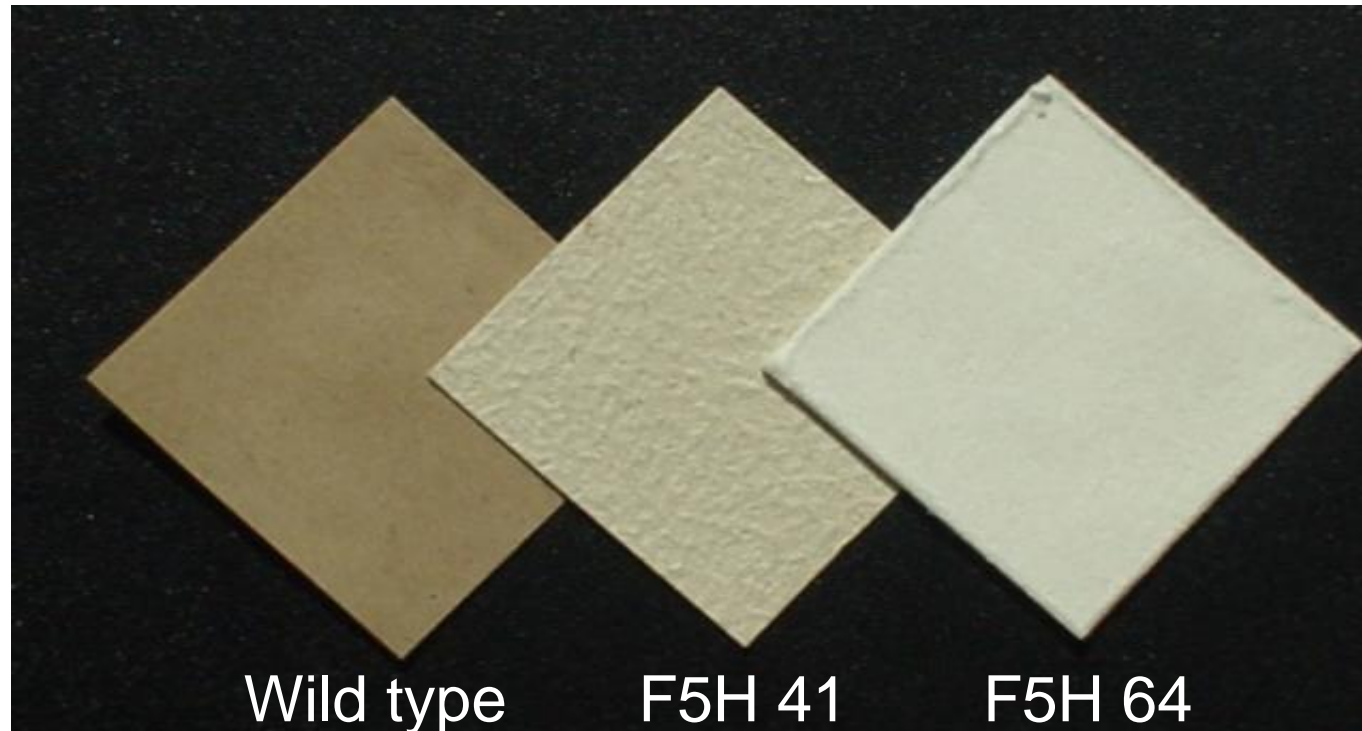
- DNA synthesis
 - Template-dependent
- Protein synthesis
 - Template-dependent
- Polysaccharide synthesis
 - Enzyme specificity-directed
- Lignin synthesis
 - Random radical coupling dependent on precursor supply



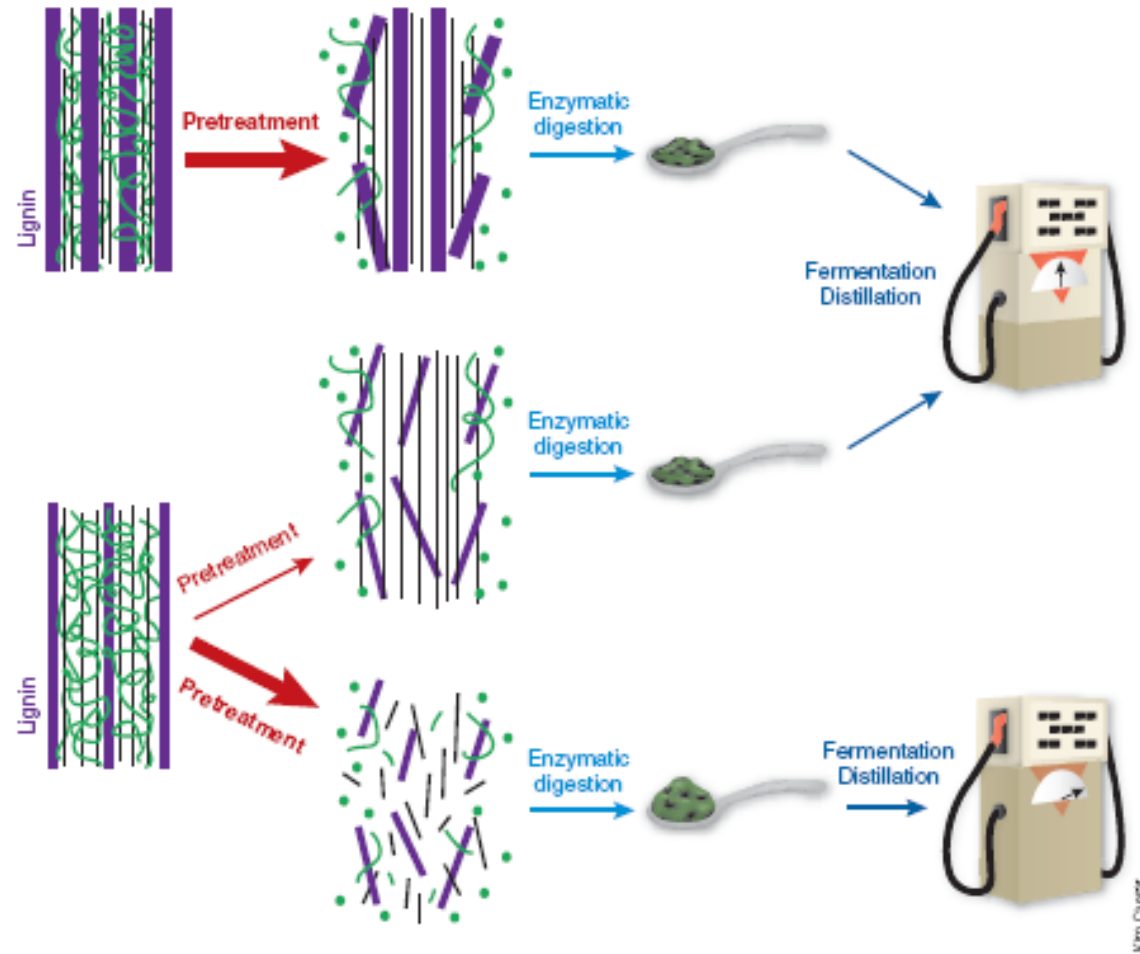
Lignin is a biosynthetically plastic polymer



Overexpression of F5H enhances lignin S subunit content



Lignin modification may decrease the need for biomass pretreatment



Acknowledgements

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Abby Sipes
Caden Tuinstra
Roger Braun

John Ralph
Hoon Kim
Yuki Tobimatsu

Bryon Donohoe
Peter Ciesielski

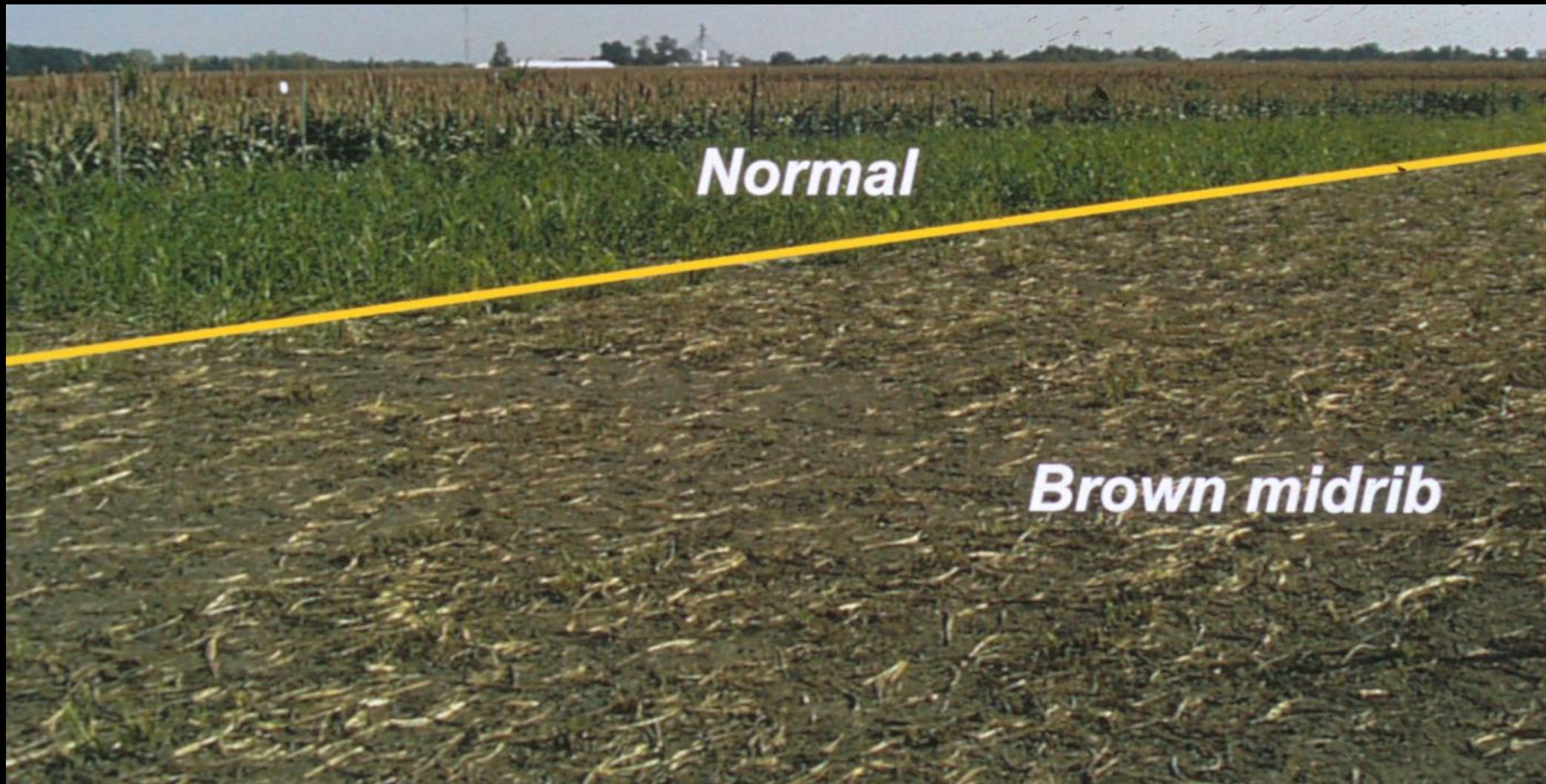
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Xuebin Zhang

Brian Dilkes
Jacob Olson
Charles Addo-Quaye
Elizabeth Svedin



Mutants are valuable in both basic research and in applied settings



Source: Keith Johnson, Department of Agronomy

Arabidopsis is our model system



- easy to isolate mutants
- full genome sequence available
- large research community
- facile transformation
- short life cycle
- validated model for many crops