# Complete depletion of monolignol *p*-coumarate conjugates in CRISPR/Cas9-generated maize *pmt* mutants towards a lignocellulose biorefinery

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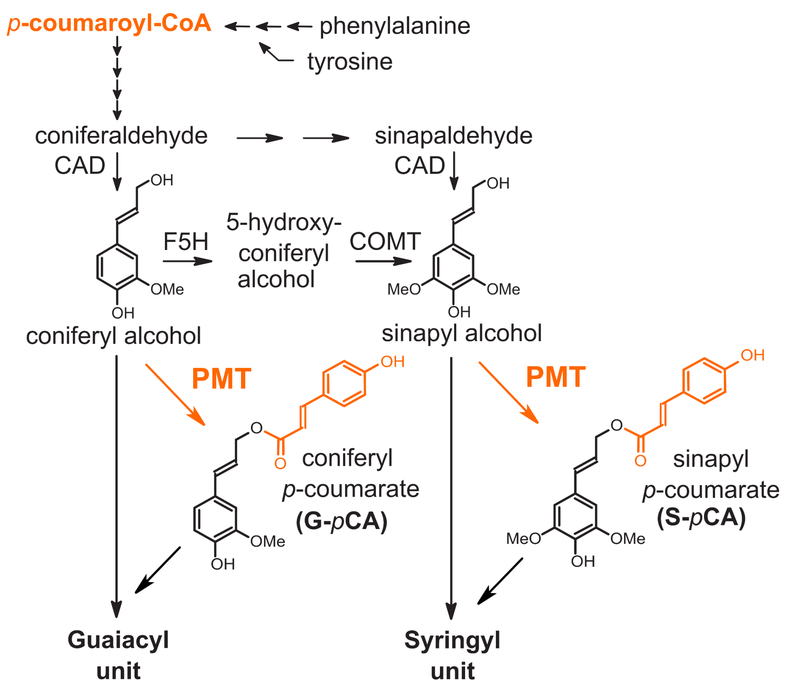
## BACKGROUND

- Maize is an important crop for food and animal feed, with potential as **sustainable feedstock for biorefining**.

- Lignin poses a major challenge for the **efficient conversion of lignocellulose** into renewable fuels and chemicals.

- **Engineering of lignin structure** is pivotal for the success of the lignocellulose biorefinery.

- ***p*-Coumaroyl-CoA monolignol transferase (PMT)** acylates monolignols with *p*-coumarates (*p*CA) producing monolignol *p*CA conjugates, which are oxidatively incorporated into lignin.

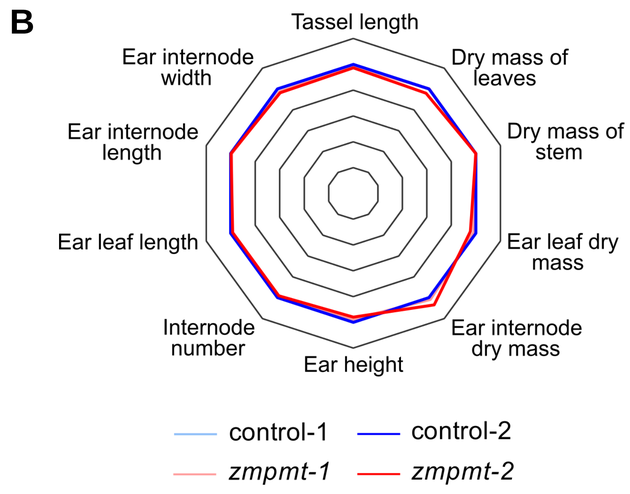



Simplified representation of the lignin biosynthesis in grasses.

- We aim to evaluate the potential of CRISPR/Cas9-generated ***zmpmt*** **knockout mutants towards lignocellulose biorefinery.**

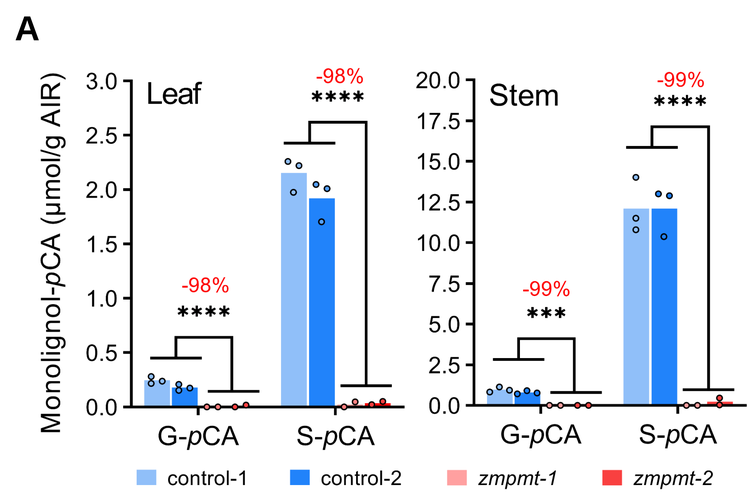
## RESULTS

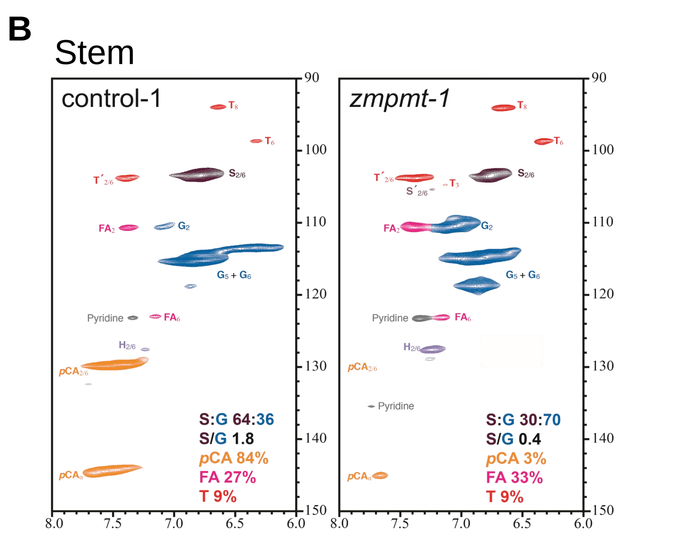
### *zmpmt* mutants grow similarly to control lines


Representative photo of controls and *zmpmt* mutants (**A**). The spider web presents phenotypic measurements of mutants relative to the respective controls (**B**).

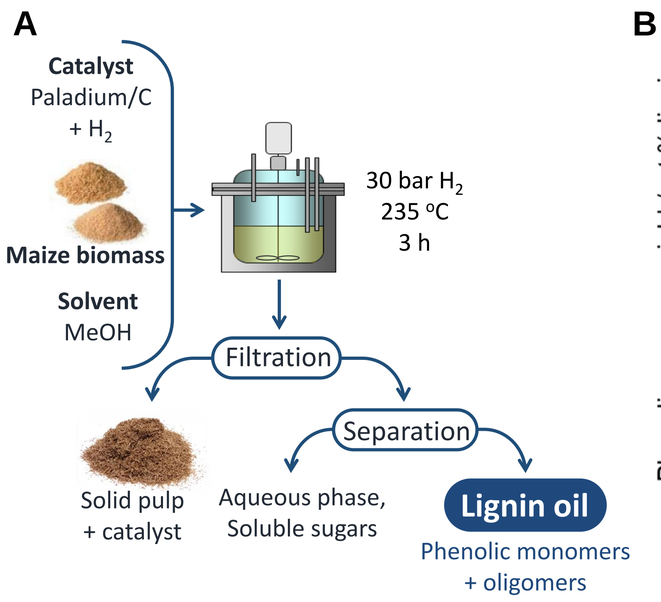
### Complete depletion of lignin *p*-coumaroylation in *zmpmt* mutants

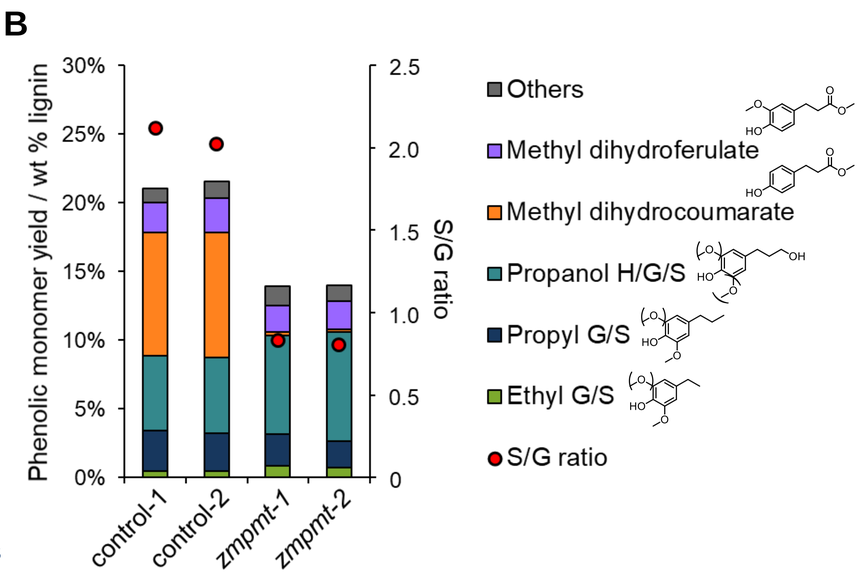



*zmpmt* mutants do not incorporate *p*CA into lignin (**A**). Representative 2D-NMR spectra of maize stem showing strong reductions in S/G ratio and *p*CA levels in stem (**B**).

### Reductive catalytic fractionation (RCF) of maize stem biomass




General scheme of the RCF process of maize stem biomass and downstream separation (**A**). Phenolic monomers and S/G ratio in lignin oil of controls and *zmpmt* mutants (**B**).

## CONCLUSION

- The complete disruption of lignin *p*-coumaroylation does not affect the phenotype and growth of maize in greenhouse conditions.
- Differences in levels of monolignol *p*-coumarates may predict RCF yields.

## CONTACT

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