**Cell-wall properties contribute to improved deconstruction in diverse maize lines**

The recalcitrance of plant cell walls to biological degradation, deconstruction, or conversion is the most critical challenge in developing successful bioprocessing technologies for lignocellulose conversion to renewable fuels and chemicals. There is scant literature on the relationship between plant cell-wall properties and hydrolysis yields for diverse maize lines subjected to delignifying pre-treatments such as mild alkaline pre-treatment. Thus the goal of this work is to understand how maize cell-wall properties impact initial recalcitrance as well as alkaline pre-treatment. We employed a maize (*Zea mays* L. subsp. *mays*) diversity panel consisting of 26 maize lines exhibiting a wide range of cell-wall properties and responses to hydrolysis by cellulolytic enzymes to investigate the relationship between cell-wall properties, cell-wall responses to mild NaOH pre-treatment, and enzymatic hydrolysis yields. Enzymatic hydrolysis of the cellulose in the untreated maize was positively correlated with the water retention value, which is a measure of cell-wall susceptibility to swelling. It was also negatively correlated with the initial cell-wall lignin, xylan, acetate, and *p*-coumaric acid (*p*CA) content, as well as *p*CA released from the cell wall by pre-treatment. The hydrolysis yield following pre-treatment exhibited statistically significant negative correlations to the lignin content after pre-treatment and positive correlations to the solubilized ferulic acid and *p*CA. We observed several unanticipated results, including a positive correlation between initial lignin and acetate content, lack of correlation between acetate content and initial xylan content, and negative correlation between each of these three variables to the hydrolysis yields for untreated maize. Another surprising result was that *p*CA release was negatively correlated with hydrolysis yields for untreated maize and, along with ferulic acid release, was positively correlated with the pre-treated maize hydrolysis yields. This indicates that these properties may negatively contribute to the recalcitrance in untreated cell walls and may positively contribute to their deconstruction by alkaline pre-treatment. Understanding the relationship between cell-wall recalcitrance and pre-treatment is important in that this may lead to the identification of strategies for plant breeding or genetic engineering that may improve cell-wall deconstruction, thereby improving bioenergy production.

**References:** Li, M., Heckwolf, M., Crowe, J. D., Williams, D. L., Magee, T. D., Kaeppler, S. M., de Leon, N., Hodge, D. B. (2015) Cell-wall properties contributing to improved deconstruction by alkaline pre-treatment and enzymatic hydrolysis in diverse maize (*Zea mays* L.) lines. Journal of Experimental Botany **66**, 4305-4315.

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