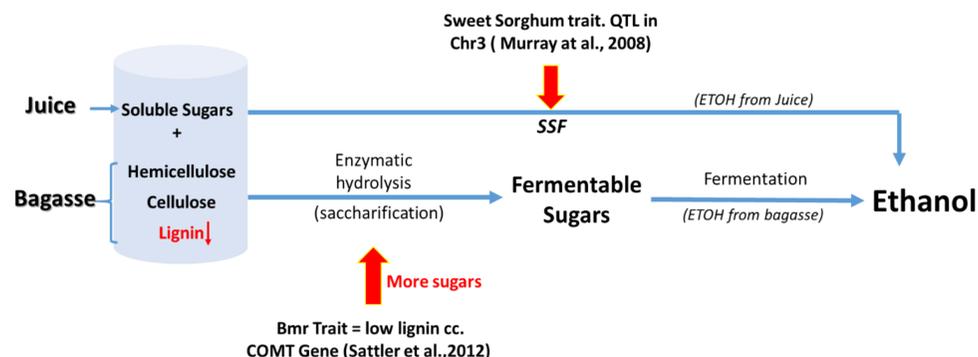


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## Rationale and approach:

Crops yield an appreciable amount of biomass that is often left unharvested. Left over biomass, arguably, could be used as source of energy through bioconversion. *Brown midrib* and *sweet stalk traits* can greatly enhance biomass quality.



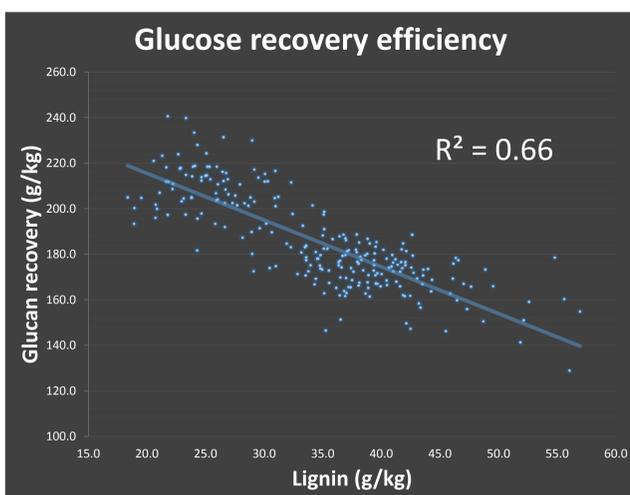
## Objectives:

1. Estimate **theoretical glucan recovery** and **ethanol yield** in a Bmr-sweet sorghum population.
2. Determine **predictors associated to glucan recovery and ethanol yield** in a Bmr-sweet sorghum population.

## Material and Methods

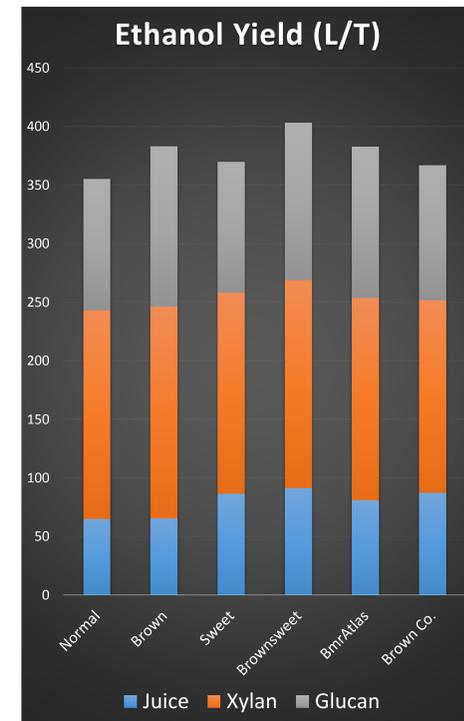
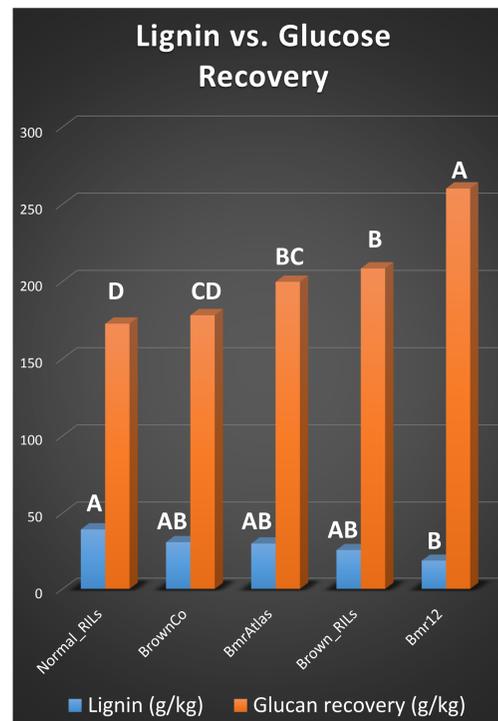
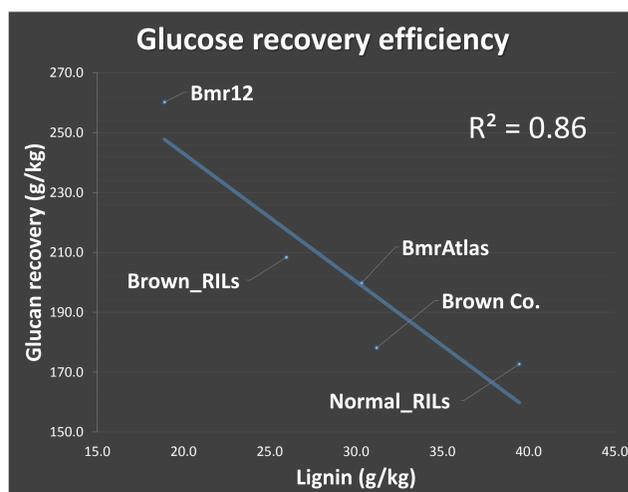
A two year trial of 236 *brown midrib* sweet sorghum RILs was conducted to assess biomass agronomic performance and quality. Degree brix were measured in both years. Similarly, Fiber Detergent Analysis was performed to estimate NDF, ADF and ADL in stover.

## Results and Discussion



The 236 RILs follow a clear **pattern** of glucose recovery when lignin is reduced

Brown-RILs are glucose recovery efficient. The check and the normal parent recovered less amount of sugar than Brown-RILs.



- Significant differences were observed among lines for lignin content and glucose recovery.
- Brown sweet sorghum RILs obtained the best estimates for Ethanol Yield from three difference sources of sugar.

Lignin is good predictor of glucan recovery (g/kg)

### Glucan Recovery (g/kg)

Equation	R <sup>2</sup>	Probability
<b>Simple Linear regression</b>		
y = 256.9 - 2.06 Lignin	0.66	<0.0001
y = 64.8 + 0.51 hemicellulose	0.11	<0.0001
y = 102.2 + 0.32 Cellulose	0.08	<0.0001

Lignin and sugar levels can serve as predictors for Ethanol Yield

### Ethanol Yield (L/T)

Equation	R <sup>2</sup>	Probability
<b>Simple Linear regression</b>		
y = 447.6 - 2.01 Lignin	0.46	<0.0001
y = 291.2 + 6.04 Brix	0.35	<0.0001
y = 199.61 + 0.75 hemicellulose	0.17	<0.0001
y = 309.5 + 0.26 Cellulose	0.04	0.0024

## Conclusions

1. The Bmr-sweet sorghum population is a potential enhanced feedstock for ethanol production with a clear trend of glucose recovery.
2. On average, Bmr-sweet RILs are capable to produce considerable amount of ETOH yield from three different sources of sugar.
3. Low lignin content in stover is good predictor of increased fermentable sugars during biomass conversion for ethanol production.
4. Low lignin content and sugar levels can serve as predictors of empirical Ethanol Yield for a Bmr-sweet sorghum population

## References:

Improved sugar conversion and ethanol yield for forage sorghum lines with reduced lignin contents. Dien et al. 2009.  
Quantifying actual and theoretical ethanol yield for switch grass using NRIS analysis. Vogel et al.