

A switchgrass transformation pipeline allowed coordinated construction and screening of over 88 genes

Background

- The BESC transformation pipeline (TP) was developed to create transgenic feedstocks with the goal of understanding and/or decreasing recalcitrance.

Approach

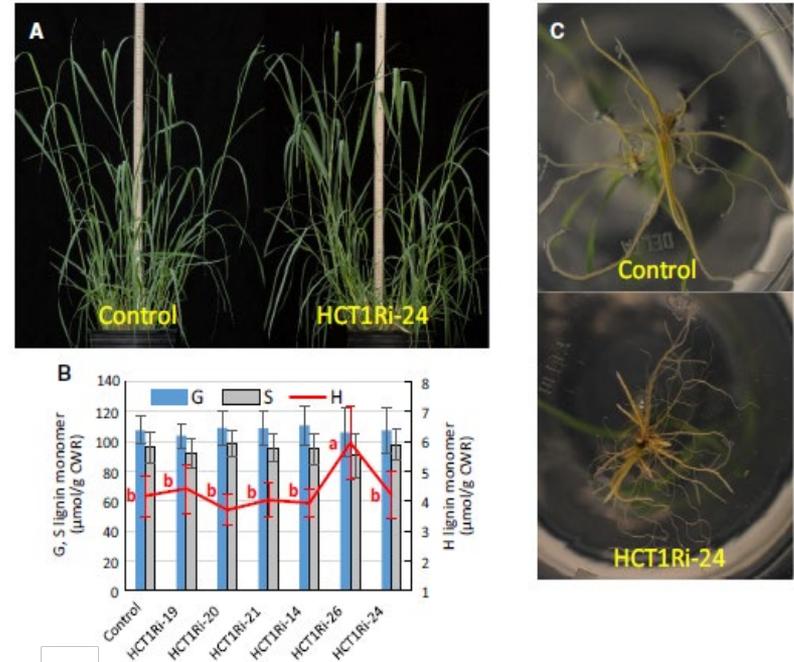
- An inter-institutional committee was established to organize procedures to evaluate and accept genes into the pipeline.
- A laboratory information management system (LIMS) was established to catalog constructs, plant lines and results from subsequent analyses.

Outcome

- 128 constructs representing 88 candidate genes were accepted into the TP for expression in switchgrass in the first 5 years. Fifty-three constructs were approved by the TP committee, 31 were chosen for knockdown of target genes via RNAi.
- Results in this publication represent a subset of the total number of target genes evaluated.

Significance

- The transformation pipeline produced plants with decreased recalcitrance, and a LIMS for archiving and retrieving data from these plants, were created.
- This publication represents the release of data to the general public for constructs that displayed negative recalcitrance and/or growth phenotypes.
- And it supplies useful information to anyone developing coordinated, large- scale, multi-institutional reverse genetic pipelines to improve crop traits.



Visual and molecular phenotypes of HCT1-RNAi transgenic plants (HCT1Ri).

A T1 generation null segregant (Control; left) and HCT1Ri transgenic (HCT1Ri-24 line, right) plants at R1 stage of development.

B Lignin monomer content in stems of plants from null segregant (control) and HCT1Ri lines sampled at R1 stage. Values represent mean \pm S.D. of three biological (plant) replicates. For G and S monomer levels, no significant differences were seen between lines at the 0.05 significance level. For G and S monomer levels, no significant differences were observed between lines at the 0.05 significance level. Non-identical letters in red indicate significant difference in the H monomer levels between two lines at the 0.05 level determined by ANOVA and least significant difference (LSD) test. Guaiacyl (G), syringyl (S) and p-hydroxyphenyl (H) lignin monomers were measured. CWR cell wall residue.

C Root architecture of 1-month-old plants.

Nelson, et al., Development and use of a switchgrass (*Panicum virgatum* L.) transformation pipeline by the BioEnergy Science Center to evaluate plants for reduced cell wall recalcitrance

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