Overexpression of gibberellin 2-oxidases leads to reduced recalcitrance in switchgrass

**Background:**
- Gibberellin 2-oxidases (GA2oxs) are a group of 2-oxoglutarate-dependent dioxygenases that catalyse the deactivation of bioactive GA or its precursors through 2b-hydroxylation reaction.
- Putatively novel switchgrass C_{20} GA2ox genes were identified with the aim of genetically engineering switchgrass for improved architecture and reduced biomass recalcitrance for biofuels.

**Approach:**
- Using a transgenic approach, test the overexpression of two C_{20} GA2ox genes in switchgrass.

**Outcomes:**
- Three C_{20} GA2ox genes showed differential regulation patterns among tissues including roots, seedlings and reproductive parts. The changes in plant morphology appeared to be associated with GA2ox transcript abundance.
- Transgenic semi-dwarf lines displayed increased tillering and reduced lignin content and reduced syringyl/guaiacyl lignin monomer ratio. This was accompanied by the reduced expression of lignin biosynthetic genes compared to non-transgenic plants and a moderate increase in glucose release in a HTP enzymatic recalcitrance assay.

**Significance:**
- Results suggest that overexpression of GA2ox genes in switchgrass is a feasible strategy to improve plant architecture and reduce biomass recalcitrance for biofuel.