

SbCOMT (Bmr12) is involved in the biosynthesis of triclin-lignin in sorghum

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Project Goals: The most abundant organic material on earth is lignocellulosic biomass or non-food plant material. JBEI's mission is to convert biomass to biofuels and bioproducts. The goal is to provide the nation with clean, renewable transportation fuels and chemicals. Building a successful lignocellulosic biofuels industry depends, in part, on developing specialized bioenergy crops or feedstocks that are optimized for deconstruction and conversion. Understanding the molecular basis underlying the synthesis of lignocellulosic biomass is a prerequisite to achieve these goals.

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Abstract: Lignin in plant biomass represents a target for engineering strategies towards the development of a sustainable bioeconomy. In addition to the conventional lignin monomers, namely *p*-coumaryl, coniferyl and sinapyl alcohols, triclin has been shown to be part of the native lignin polymer in certain monocot species. Because triclin is considered to initiate the polymerization of lignin chains, elucidating its biosynthesis and mechanism of export to the cell wall constitute novel challenges for the engineering of bioenergy crops. Late steps of triclin biosynthesis require two methylation reactions involving the pathway intermediate selgin. It has

recently been demonstrated in rice and maize that caffeate *O*-methyltransferase (COMT) involved in the synthesis syringyl (S) lignin units derived from sinapyl alcohol also participates in the synthesis of tricetin *in planta*. In this work, we validate in sorghum (*Sorghum bicolor* L.) that the *O*-methyltransferase responsible for the production of S lignin units (SbCOMT / Bmr12) is also involved in the synthesis of lignin-linked tricetin. In particular, we show that biomass from the sorghum *bmr12* mutant contains lower level of tricetin incorporated into lignin, and that SbCOMT can methylate the tricetin precursors luteolin and selagin. Our genetic and biochemical data point toward a general mechanism whereby COMT is involved in the synthesis of both tricetin and S lignin units.

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