Control of β- sitosterol biosynthesis under light and watering in desert plant Calotropisprocera

Abstract:

Most scientific studies on *Calotropisprocera* refer to the plant as an important source of pharmaceutical compounds and its valuable benefits in medicine. One of the most important substances in this plant is the potential immune-stimulant β-sitosterol (BS) that acts in improving human health. This study focused on the effects of lighting before and after irrigation on the BS accumulation pathway namely steroid biosynthesis. Studying the enzymes in BS biosynthetic pathway indicated the up-regulation at dawn and predusk of the *SMT2* and *SMO2* genes encoding sterol methyl transferase 2 and methyl sterol mono-oxygenase, two key enzymes in BS accumulation in *C. procera.* The results almost indicated no regulation at the different time points of the *CYP710A* gene encoding sterol 22-desaturase, an enzyme that acts in depleting β-sitosterol towards the biosynthesis of stigma sterol. RNA-Seq data was validated via quantitative RT-PCR and results were positive. The data of ultra-performance liquid chromatography-tandem mass spectrometry analysis with regard to BS accumulation also aligned with those of RNA-Seq analysis. We focused on the effects of light before and after watering on BS accumulation in *C. procera.* Our results show that BS accumulation is high at dawn in both dehydrated and well-watered condition. While, the BS was dramatically decrease at midday in well-watered plants. This increase/decrease in BS content is correlated with rates of expression of *SMT 2* gene. This gene is a key convertor between the different branches in the cardiac glycoside biosynthesis. Accordingly, it could be suggested that BS (or one of the descendent products) may play an important role in *C. procera* tolerance to drought/light intensity conditions.

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