Abstract

Sorghum bicolor L. constitutes one of the major forage crops throughout the world. It has long been cultivated as millet crop also in semi-arid tropics. Recently, it is being used as a potential source for the production of ethanol. However, presence of high amount of lignin with unfavourable composition (S/G ratio) in sorghum often appears as an impediment in breaking down the plant fibre for releasing the available energy to ruminants and in chemical extractability of desired carbohydrate components for industrial use. Thus, strategies for reduction of the lignin content and/or alteration of its composition are of considerable interest. Two independent transgenic sorghum plants have been developed by down regulating two pivotal genes, caffeic acid O-methyltrasferase (COMT) and caffeoyl CoA O-methyl transferase (CCoAOMT) of the lignin biosynthetic pathway using dsRNA mediated gene silencing approach. The expected alteration in lignin content and composition with enhanced biomass production were achieved in both the transgenics as revealed by histochemical study and confirmed by GC and spectrophotometric analysis. The reduction in total lignin content was found to be a little more in the transgenic plant with suppressed endogenous COMT expression (~13.8%) than in the transgenic plant with suppressed endogenous CCoAOMT expression (~10%) compared to control. On the other hand, remarkable change in lignin composition estimated by S/G ratio (~25.53) was observed in plant with suppressed endogenous CCoAOMT expression. Additionally, decreased lignin content in both the transgenic plants was found to be compensated by increase in total carbohydrate. However, the transgenic plant with suppressed endogenous CCoAOMT expression was found to be enriched with more amount of soluble sugar (~30.7 mg/gm of tissue). The results demonstrated that among the two transgenics, one with suppressed endogenous CCoAOMT expression could be of better use as the favourable alteration of lignin content as well as composition and enhanced carbohydrate content may facilitate energy availability to ruminants and industrial utilization towards economic gain.