



ETHANOL FROM GRAIN SORGHUM: AN INVESTIGATION OF THE INFLUENCE OF THE METABOLIC PROFILE ON ETHANOL PRODUCTION

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The United Nations Organization established seventeen goals to accomplish Sustainable Development by the year 2030. One of them proposes to achieve sustainable management and efficient use of natural resources. One way to fulfill this goal is to use renewable fuels as an alternative to fossil fuels. In Brazil, we can highlight ethanol as one of the main sources of renewable fuel. Lately, the ethanol industry has once again become the focus of attention with the search for new raw materials to optimize its production. In that regard *Sorghum bicolor* (L.) Moench is a potential alternative to produce ethanol due to its similarity with corn. Our laboratory is investigating different *Sorghum* cultivars to produce biofuels and biochemicals. This work aims to report our progress in characterizing and discriminating four different cultivars: SC084, CMSXS180, BRS501 and BRS305. Among these, the main differences are in the tannin contents (SC084, BRS305), and origin: lines (SC084, CMSXS180) or hybrid (BRS501, BRS305). ¹H NMR analyses were applied to investigate the overall composition of *Sorghum*. Sample preparation was carried out according to Kim, Choi, and Verpoorte's (2010) Protocol¹, and the measurements were done using the Bruker Avance Neo 600 MHz NMR equipment. ¹H NMR spectrum showed crowding of multiple peaks with varying intensities from δ 0.85 to 8.50 indicating the presence of various compounds and multiple functional groups. The majority of signals were present in the alcohol region (δ 3.0-4.2) for all cultivars, followed by the alkane region (δ 0-1.6). The cultivar SC084 presented the highest signal intensities in the aromatic region (δ 6.4-8.5) compared to the others, which could be due to its highest tannin content. The Principal Component Analysis (PCA) of the ¹H NMR spectra showed a clear separation between SC084 and the other cultivars by principal component 1 (PC1) and principal component 3 (PC3). ¹H NMR data and PCA analysis also showed that it was possible to differentiate defatted and *in natura* grains.

¹ Kim, H.K.; Choi, Y.H; Verpoorte, R. "NMR-based metabolomic analysis of plants". *Nature protocols*, 5 (3), 536-549, 2010.