Sugar cane spirit, or cachaça, is a typical Brazilian distilled beverage. As some distilled beverages, sugar cane spirits are aged in wooden barrels for a given period of time. During the aging process a series of compounds are extracted from the wood by the spirit influencing the beverage sensory characteristics. In this study, a method for simultaneous determination of representative compounds in different aged sugar cane spirits is reported. The low molecular weight phenolic compounds: vanillic, syringic, \( p \)-curmaric and ferulic acids and 4-methylumbelliferone, coniferaldehyde, syringaldehyde and synapaldehyde and vanillin were simultaneously quantified by high performance liquid chromatography coupled to mass spectrometry with electron spray ionization in the positive and multiple reaction monitoring mode. These compounds, together with aldehydes and tannins as used as aging indicators. The proposed method was applied to samples of aged sugar cane spirits in arariba and oak wooden with different years from Santa Catarina state. The compounds identified in the aged cachaça in arariba wooden were coniferaldehyde, syringaldehyde, synapaldehyde, vanillin, vanillic acid, syringic acid and \( p \)-curmaric acid. While in oak wooden were still found the previously mentioned compounds in addition to ferulic acid and 4-methylumbelliferone. Both substances were determined with their concentrations estimated in \( \mu \text{g L}^{-1} \). The aging markers contents in the samples analyzed by a selective and sensitive HPLC-ESI-MS/MS method are important and can be considered a good parameter to assess the authenticity and quality of these beverages.