SECONDARY METABOLITES A POTENTIAL IMPROVEMENT FOR THE ECONOMY OF SECOND GENERATION BIOFUEL PRODUCTION

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Key Words: Secondary metabolites, Biomass extraction, Gas chromatography, Liquid chromatography, Mass spectrometry

The decreasing prices of oil ($29.44US – feb.2016) and natural gas ($1.97US– feb.2016) have significantly restrained the opportunity for the development of the second-generation biofuel industry.
Numerous investigations focus on improving processes in order to improve the yield of biofuels. However, the latter being a commodity submitted to a strong competition by the fossil fuel industry, there is strong necessity to find other approaches allowing getting more revenues per tonne of converted biomass. Furthermore, despite the fact that the price of fossil fuels is decreasing, biomass still requires to be transported over long distances to reach a centralized conversion facility, thus, it is of outmost importance to get the most of this renewable feedstock.
Secondary metabolites may represent an interesting way to generate complementary value to biofuels production. Extraction of secondary metabolites can 1) improve processes by removing undesirable compounds thus purifying the raw material (as an example by removing fermentation inhibitors) and 2) add an increased value by recovering high value compounds that could represent additional values as pharmaceuticals, cosmetics or food additives.

Amongst the different types of biomass for which the secondary metabolites could represent significant values, energy crops represent another opportunity. The latter could, in a couple of years, be grown in very large volumes and thus interesting secondary metabolites could be available at large scale adding value to a potential biorefinery. Hence in this work, three different biomass samples were compared: *Sorghum bicolor, Panicum virgatum* and *Phalaris arundinacea*. All samples were first dried at 105°C then grinded and sieved to 40-60 mesh. Then, all biomass samples were extracted using a Soxhlet apparatus with three different mixtures of organic solvents. The latter was selected to cover three different polarities in order to recover the widest range of organic compounds. Each fraction was then concentrated and analyzed through different analytical techniques such as GC/MS, GC/FID, UHPLC-TOF and UHPLC-QTOF.

Preliminary results show large differences between each specie. Although, they all present large amount of similar fatty acids, some compounds (as phytosterols) were species specific. The identified compounds with the highest economic value were then quantified using an external calibration.
Furthermore, our results showed that for sweet sorghum, the use of steam processes allowed recovering a larger volume of secondary metabolites thus showing that their extraction could be performed as a second step in a briorefinery approach.