The grape stalks are the second most by-product produced in the winemaking process. The use of the by-products is increasing due to the huge potential for recovery, but also because of environmental issues. Currently the grape stalks are deposited on farmland as fertilizer or use as fuel. The grape stalks is a residue of lignocellulosic origin, not competitive to food or industrial use, and it is possible to convert them into value-added products (energy, fuels, materials and chemicals), an alternative to the products produced from resources fossils. The chemical analysis showed that grape stalks are composed mainly by cellulose (30.3%), hemicelluloses (21.0%), lignin (17.4%), tannins (15.9%) and proteins (6.1%). Thus cellulose was isolated by Kürschener and Höffer method and characterized by X-ray scattering analysis. X-ray analysis revealed the parameters of cell unit typical for Cellulose I polymorph with a high degree of crystallinity (75%). The high abundance of water extractable compounds in grape stalks (ca.24%) was highlighted and assigned mainly to soluble inorganic salts, soluble tannins and pectin compounds [1]. The liquefaction of wood is a process that reduces the consumption of fossil fuels and the resulting emissions of CO₂, being a promising way to produce either valuable chemicals or fuel. This paper assesses the liquefaction extent of grape stalks pre-treated by two distinct processes: extrusion and pre-steaming followed by mechanical refining. The liquefaction process of residue was compared with pine sawdust. The extrusion was carried out using the conventional process. The pre-steamed raw material (145 °C, 10 min) was mechanically refined at ca 140 °C. The liquefaction was made using grape stalks sieved with a mesh of 40-60 mm using ethylene glycol (EG) as solvent and sulphuric acid as catalyst. The reaction temperature used was 160°C and the yield was found to liquefaction different times, Figure 1.
Figure 1 – Liquefaction percentage (%) with time (minutes) for grape stalks prepared by pre-steaming and extrusion and pine sawdust.

Results show that pre-steaming process has revealed a higher amount of liquefied matter than after the extrusion. The oligomers dissolved in EG obtained from the stalks residue represented similar yields when compared to pine sawdust [2]. These primary results demonstrate grape stalks as a promising raw material to be used, after liquefaction, as a precursor for polymers and/or adhesive resin formulations within context of biorefinery concept.

References: