MICROWAVE ASSISTED PYROLYSIS OF WASTE FROM SHORT ROTATION COPPICE OF POPLAR

Mattia Bartoli, Department of Chemistry, University of Florence, Via della lastruccia, Italy
mattia.bartoli@unifi.it
Marco Frediani, Department of Chemistry, University of Florence, Via della lastruccia, Italy
Luca Rosi, Department of Chemistry, University of Florence, Via della lastruccia, Italy
Piero Frediani, Department of Chemistry, University of Florence, Via della lastruccia, Italy

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Poplar short rotation coppice (SRC) plays an important role in biomass production because they are largely employed both in industry or used as solid fuel [1]. Recently there is a great interest in the below-ground biomass recovery (stump-root system) of poplar SRC because: a) it accounts for about 20% of the total plant dry weight [2] and the average poplar chips can yield 18 ton/ha of root biomass; b) it is easily accessible and harvested (sand-loamy soils); c) the root wood often has higher heating values than tops and branches, and may prove to be a better fuel [3]. Furthermore, the removal of the stump-roots systems does not require the payment of a concession, and using efficient recovery systems, the delivered cost might range from 28 to 66 €/ton [4]. The most common method to dispose waste from forestry biomass is combustion, which is an environmentally unfriendly process. Recently a remarkable interest has been focused on microwave assisted pyrolysis (MAP) of biomass due to the fast and efficient heating and the appealing characteristics of the products obtained [5]. Biomass are able to absorb microwave (MW) and even if a MW absorber is not strictly necessary, it may have some positive effects on the quality of products and pyrolysis time [6]. In this work MAP of residues from SRC of different poplar clones have been studied in a multimode batch oven.. MAP of stump-roots and leaves residues from different poplar clones were thoroughly investigated to produce high quantity and quality of bio-oils. They were obtained with high yield (up to 32.0%) and small water percentage (up to 17.5 %)and showed low density and viscosity and they were fluid at room temperature. Among bio-oils a sample with high acetic acid concentration (543.3 mg/mL) was obtained. Bio-oils were characterized with several analytical techniques: ^{1}H-NMR, IR-ATR, density and viscosity measurements, and an original and innovative quatitative GC-MS method[7, 8]. These techniques let to make possible a detailed study on the bio-oils to define a correlation between their chemical and rheological properties with the parameters of the process.

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