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Potential of By-Products from Primary Coffee Processing as Source of Biofuels

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Abstract

Coffee is second most traded legal commodity next to petroleum. Millions of people particularly from developing countries rely their livelihood on coffee production. Primary coffee processing is conversion of fresh cherries to green bean by following the dry or wet methods. Both processing methods generate almost half the weight of the coffee cherries as by-products, mostly seen as waste and dumped, which causes environmental problems. The main process by-products from wet method are pulp (43 % w/w), mucilage (11.8 % w/w) and parchment (6.1 % w/w); while the dry method generates the husk, which is 44 % of the dry cherry. In the present study, physical and chemical properties of the coffee processing by-products were made on dry weight basis. Sample by-products were obtained from coffee processing farm in Jimma, (Ethiopia) and sundried before transported to Germany. The neutral detergent fibre (NDF) of pulp, husk, mucilage and parchment were 61.84 %, 65.77 %, 40.16 %, 96.84 % respectively. The acid detergent fibre (ADF) of pulp, husk, mucilage and parchment were 47.12 %, 149.49 %, 36.92 %, 76.85 % respectively; whereas the acid detergent lignin (ADL) was 23.85 %, 25.24 %, 13.51 % and 32.91 % respectively. The parchment has highest crude fibre content (76.92 %) of the waste fractions while the mucilage (19.38 %) exhibits the least. The fixed carbon content of the by-products was 15.80 %, 16.52 %, 9.37 % and 13.73 % for pulp, husk, mucilage and parchment respectively. Coffee parchment has highest organic total solid content of 99.55%; the other fractions show 85.10 % (mucilage), 88.31 % (pulp) and 92.85 % (husk). The parchment has higher calorific value of 19.70 MJ/kg which is comparable to common fuel woods. The husk and pulp has heating values of 18.79 MJ/kg and 17.37 MJ/kg, respectively. The characterisation of the by-products indicated promising potential source for renewable energy production particularly biogas and briquette/pellets.

Keywords: Biofuel, fibre, heating value, husk, mucilage, parchment, pulp