ASSESSMENT OF THE ENERGY CONSUMPTION AND POTENTIALS FOR THE USE OF RENEWABLE ENERGY IN PADDY CULTIVATION OF SRI LANKA

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Energy is utilized considerably in varying quantities in different stages. This case study assessed the energy consumption of all the operations from land preparation to the harvesting of paddy and identified the possibility of using renewable energy in paddy cultivation in Sri Lanka. A questionnaire survey was conducted to collect the farmer level information. The general information of farmers, rice production information, soil properties, energy consumption ways & factors, machinery information, land preparation methods, inputs, energy usages, biomass production ways and factors (paddy yield, straw yield, husk yield) were collected. Kuliyapitiya in Kurunegala district was selected as the surveying area. One hundred respondents were gathered. All the operations from land preparation to paddy harvesting and identify the possibility of using renewable energy in paddy cultivation in Sri Lanka. Possibility to use renewable energy was mainly concerned. Besides further, the consumption of diesel amounts for paddy land preparation for a four-wheel tractor and a two-wheel tractor are 12 L and 6 L per acre, simultaneously. Fertilizing and the weeding were done manually and consumed averagely 6 man-hours per acre, both. Straw produces 12 $MJkg^{-1}$ of High Heating Value (HHV) and 0.1916 million tons production annually per acre. Accordingly, biomass supply per acre was 2,397.5 kg of paddy straw and generated 0.985 – 1.437 million tons annually per acre and 479 kg of paddy husk per acre. Accordingly, biomass supply from an acre of rice has the potential to generate 29,961 – 41,469.5 MJ of energy. Accordingly, the total energy consumption at the fully mechanical condition for one acre was 1,148.2 MJ. Further, energy conversion coefficients of gasoline, diesel and human labour were 333.65 MJ/L, 36.61 MJ/L and 1.96 MJ/h, respectively. Therefore, it can be concluded that biomass generated by paddy production provides more energy than it consumed. There is a potential of using biomass energy in the rice cultivation of Sri Lanka.

Keywords: Heating value, Potential, Rice husk, Rice straw