The acid hydrolysis of *A. spinosa* pulp in the production of second generation bio-ethanol

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The increase on world’s energy demand and the progressive depletion of oil reserves encourage studies searching for alternative fuels, especially for those derived from renewable materials such as biomass. In terms of biofuels, bioethanol is considered as the most promising alternative on short and medium terms and its use as a biofuel additive has rapidly increased. Bioethanol is produced from the fermentation of sugars obtained from biomass. Bioethanol feedstock can contain either sucrose (e.g. sugarcane, sugar beet) or starch (e.g. corn, wheat) or be a lignocellulosic material (e.g. sugarcane bagasse, wood and straw). A potential source for low-cost ethanol production is to utilize lignocellulosic materials such as crop residues, grasses, sawdust, wood chips, animal and industrial residues. The aim of the present study was to use the *A. Spinosa* residue as a cheap substrate for the production of bioethanol as fuel, the hydrolysis of the *A. Spinosa* pulp by HCl and H$_2$SO$_4$ at different conditions of the reaction was investigated. The final reducing sugars concentration and remaining fiber in the hydrolyzates depended on the type and concentration of acid and the ratio of plant material to acid solution.

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Willingness of rural communities to adopt biogas system in Pakistan: Critical factors and policy implications

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The collective hazards of dependence on fossil fuels, namely rapid depletion, constant volatility of fuel prices, and increased greenhouse gas (GHG) emissions, have triggered a sense of urgency among researchers and policymakers to explore alternative sources of energy. A growing body of literature suggests that countries of the world have explored renewable energy to find sustainable and viable solutions to their energy problems. The common renewable energy sources include hydropower, wind energy, solar energy, ocean energy, geothermal energy, and biomass such as biogas. Biogas is a methane rich gas that is produced by anaerobic fermentation of organic material such as animal dung. Pakistan has the sixth largest livestock based economy in the world and thus demonstrates a great potential for biogas production. The government has already started Biogas Support Program (BSP) in the country. This study attempts to determine a household's predicted willingness-to-adopt a biogas system in Khyber Pakhtunkhwa (KP). The study is based on primary data collected from four districts, namely Peshawar, Nowshera, Charsadda, and Mardan. Data were collected from 200 livestock farming households selected through equal allocation technique. Probit analysis was used to identify the factors that influence the willingness of a household to adopt a biogas system. The results of the probit model reveal that education of respondents, total daily electric shortfall, effect of electric shortfall on children education and female drudgery, and respondents' awareness regarding pros and cons of using biogas were statistically significant factors. The overall model was highly significant as shown by p<0.001 which depicts that the socio-economic characteristics of population are the main factors contributing to adoption of biogas system in the area. This study has important policy implications.

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