

Rice Straw for BioEthanol in Thailand

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Abstract

Each year in Thailand agricultural industries generate millions of tons of various lignocellulosic biomass feedstocks as agricultural residues i.e. rice straw, sugar cane bagasse, corn stover and corn fibre. Sugarcane and rice are mostly concentrated in the North and North-eastern provinces of the country. Sugarcane and rice are the first two highest national agricultural productions (in weight). In general, the residues are utilized in very inefficient systems, which most often than not, also cause environmental problems. Rice straw is considered wastes and disposed off through various methods such, as open burning (as shown below), dumping or animal feeding. One of the major goals of our project was to make the technological development to allow for the utilization of these residues in a more efficient and clean manner. Rice straw was evaluated as a potential technically viable feedstock that might be used as low-cost, abundant feedstocks for the production of fuel ethanol. In our project research rice straw will be pretreated using steam explosion. After pretreatment, the hydrolysate can be enzymatically digested and fermented in one reactor via the simultaneous saccharification and fermentation method (SSF) of the entire slurry. Good carbohydrate recovery and high ethanol concentrations may be obtained in a single reactor with minimal enzyme and yeast supplementation. This substantially reduces the complexity of the overall rice straw to ethanol bioconversion, while simultaneously lowering the cost and time associated with the need for separate processes. The steam explosion will be applied because there is more advantage than the typical chemicals hydrolysis and pulping processes as following. First they combine mechanical, thermal, or chemical effects and allows a rather selective separation of into their individual components. Second significantly lower environmental impact. Third lower capital investment. Fourth more potential for energy efficiency. Fifth less hazardous process chemicals and conditions. And the last, the more complete recovery of all wood biopolymers in usable form.