

Degradation of polysaccharides from sugarcane bagasse using electron beam accelerator¹Cardoso, V. M.; ¹Mori, M.N.; ²Finguerut, J.; ¹Nagatomi, H. R.; Oikawa, H.; ¹Duarte, C. L¹Instituto de Pesquisas Energéticas e Nucleares (IPEN / CNEN - SP). Radiation Technology Center - Av. Professor Lineu Prestes 2242 - 05508-000 São Paulo, SPclduarte@ipen.br²Sugarcane Technology Center, CTC. Caixa Postal 162 Piracicaba SP Brazil 13400-970

In recent years, there has been an increasing trend towards more efficient utilization of agro-industrial residues, such as sugarcane bagasse, as raw materials for industrial applications. Sugarcane bagasse is the fibrous residue remaining after sugarcane stalk has been crushed and the juice removed. Ethanol represents only one third of the energy available in cane; the other two thirds is represented by fiber in the cane stalks (bagasse) and in cane leaves (trash). Because of its fibrous nature, sugarcane bagasse has been most widely used as a fuel, paper and pulp, structural materials, and agricultural uses. Due to increasing worldwide shortage of food and energy sources, sugarcane bagasse has been considered as a substrate for single cell protein, animal feed, and renewable energy production. The effects of high energy radiation on purified cellulose materials such as cotton and wood pulp have been fairly extensively studied, but comparatively little work has been carried out with natural biomass. Sugarcane bagasse generally contain up to 45% glucose polymer cellulose, much of which is in a crystalline structure, 40% hemicelluloses, an amorphous polymer usually composed of xilose, arabinose, galactose, glucose, and mannose and 20% lignin, which cannot be easily separated into readily utilizable components due to their recalcitrant nature. Pure cellulose is readily depolymerised by radiation, but in biomass the cellulose is intimately bonded with lignin, that protect it from radiation effects. As a pre-treatment method, ionizing irradiation is somewhat equivalent in terms of increasing the digestibility to that of NaOH treatment, one of the most commonly used method in upgrading foliage digestibility. The main objective of this study is the evaluation of the cleavage of polysaccharides from sugarcane bagasse using ionizing radiation from electron beam industrial accelerator as a pre-treatment to enzymatic hydrolysis of cellulose in order to facilitate its fermentation and improves the production of ethanol and use cellulose and its derivatives in a diverse array of other applications, such as films, plastics, coatings, suspension agents, and composites. Samples of sugarcane bagasse were obtained in sugar/ethanol Mill sited in Piracicaba, Brazil, and were irradiated using Radiation Dynamics Electron Beam Accelerator with 1,5MeV energy and 37kW, in batch systems with various absorbed doses.

Keywords: Sugarcane bagasse, Polysaccharide degradation, electron beam accelerator.