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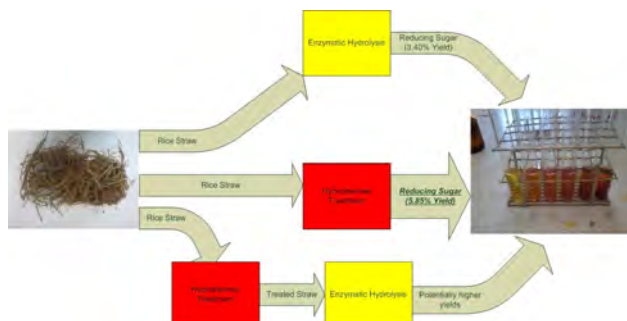
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Hydrothermal Pretreatment on Rice Straw to produce Reducing Sugars

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Statement of the Problem: Biomass is a type of material very common in the fields and as an agricultural by-product which is rich in sugars and phenolic compounds. Lignocellulosic biomass is a material that is usually resistant to influences from the environment and therefore difficult to process in order to obtain cellulose, hemicellulose and lignin. To enhance the separation of such materials from rice straw, for example, it can be applied heat and pressure, to a certain extent, in order to separate lignocellulosic biomass into its building blocks. Such substances can be obtained through hydrothermal treatment, using ionic liquids, enzymatic or acid hydrolysis, or a combination thereof. Methodology & Theoretical Orientation: Hydrothermal treatment is such a method that when applied pressure (15 atm) for one hour and temperature of 200 °C result in a aqueous solution with reducing sugars detected using 3,5-DNS standard method. When comparing two methods of obtaining reducing sugars, that is enzymatic hydrolysis and hydrothermal treatment, the latter yields more sugar than the prior. Such results are obtained mainly because when heat and pressure are applied to rice straw, the sheathing of hemicellulose and the lignin layers are broken, leaving the cellulose and the reducing sugars free to be extracted. The sugars mainly from cellulose are extracted only after breaking with the crystallinity of cellulose from rice straw. The results are sugars obtained in larger amounts when compared with enzymatic hydrolysis alone, because the lignocellulosic matrix is still recalcitrant to enzymes when reacted at biological reactors at mild conditions (around 50 °C for several hours). Conclusion & Significance: Extraction of reducing sugars by hydrothermal treatment render better results when compared with biological reactions using commercial enzymes only. Combinations of pretreatment methods can yield better results.



Recent Publications

1. Miranda Neto, Miral. Desenvolvimento de processo hidrotérmico e enzimático para a obtenção de açúcares redutores a partir da palha de arroz-BRS AG. MS thesis. 2018. Online at <https://sistemas.furg.br/sistemas/sab/arquivos/bddt/e3fee962546734f1d95a8d4fea98efe3.pdf>
2. Miranda Neto, Miral, Lopes, T. J., Rodrigues, R. F., Beck, P. H., Augusto-Ruiz, W. Sacarificação enzimática da palha de arroz varietal 'BRS AG'. VI Reunião Técnica de Agroenergia. IX Simpósio de Energia e Meio Ambiente (2017).
3. Miranda Neto, Miral, Lopes, T. J., Rodrigues, R. F., Beck, P. H., Augusto-Ruiz, W. Análise da influência de tratamento hidrotérmico sobre a eficiência da sacarificação enzimática sobre palha de arroz varietal 'BRS AG'. VI Reunião Técnica de Agroenergia. IX Simpósio de Energia e Meio Ambiente (2017).