
ABSTRACTS (MASTER THESIS)

Production of antiviral compounds from sugarcane bagasse by microwave reactions

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Lignocellulosic biomass is renewable carbon source and its efficient conversion is crucial for establishing sustainable society due to its huge quantity, non-competitiveness with food supply and mitigation effects on increasing atmospheric carbon dioxide concentration. Therefore, a large number of studies have been conducted to produce biofuels, platform chemicals and materials from lignocelluloses. So far, a number of natural products have been extracted from plants and identified as bioactive agents including antiviral compounds [1]. However, only a limited number of reports can be found for production of bioactive agents by chemical degradation of plant biomass. According to the IPCC report, global warming attacks human health by direct heat effects and indirect acceleration effects on spread of infectious diseases [2]. Therefore, a novel strategy protecting human life and global environment by the use of plant biomass is strongly required.

In the present study, we studied production of antiviral compounds from sugarcane bagasse using microwave reactions. Sugarcane bagasse is one of the most abundant agro-industrial lignocellulosic residues [3], and microwave irradiation is known as efficient heating methods in polar solvents. Sugarcane bagasse was decomposed by microwave acidic solvolysis and the degradation products were subjected to viral replication inhibition assay against encephalomyocarditis virus (EMCV), which is a nonenveloped single strand RNA virus classified as the family Picornaviridae. As results of the screening, we found an acidolysis reaction producing strong anti-EMCV compounds from sugarcane bagasse. After purification, the antiviral compounds were subjected to the analyses of chemical structure and emerging mechanisms of the antiviral activity. The production of antiviral compounds increases economic feasibility of lignocellulosic biorefinery and contributes to human health and establishment of sustainable society.

References

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