EFFECT OF TWO STEPS MICROWAVE HEATING IN ACID HYDROLYSIS OF SAGO PITH FOR BIOETHANOL PRODUCTION

Sri Dewi Yanti and Titi Candra Sunarti
Department of Agroindustrial Technology, Faculty of Agricultural Technology, Bogor Agricultural University, IPB Darmaga Campus, PO Box 220, Bogor 16002, West Java, Indonesia
Phone 081287605337, e-mail: sridewi_TIN44@gmail.com

ABSTRACT

Sago is a genus of palm that can be utilized to produce fermentable sugars as substrate for bioethanol. Sago pith is a heterogeneous substrate consists of starch and fiber. Acid hydrolysis by microwave heating radiation can break down starch and fibers together in a very short time, so it is considered to be very efficient. The use of microwave energy (as power level) and variation of heating time can produce fermentable sugar with certain characteristics. This study included the preparation of sago pith flour, pith composition analysis including proximate components, starch, and fiber components, the process of acid hydrolysis (0.3 M and 0.5 M sulphuric acid) with two steps microwave heating (power level 30% with time variation 1 minute, 2 minutes and 3 minutes the next step followed by power level 70% for 3 minutes), and characterization of fermentable sugar. As comparison, conventional treatment carried out using the autoclave on 121°C for 15 minutes. The highest sugar (105.7 g/l) contents of fermentable sugar is produced from microwave heating with power level 30% for 2 minutes followed by the power level 70% for 3 minutes. This hydrolyzate then used as substrate fermentation for Issatchenkia orientalis with different acidity (pH 3, 4 and 5), but highest ethanol produced from substrate with pH 5. Ethanol produced is still low (2.8 g/l) compared with autoclave treatment (14.5 g/l). Not all sugar were consumed and it is proved that Issatchenkia orientalis only consumed glucose for growth and ethanol production.

Keyword: sago pith, acid hydrolysis, microwave treatment, Issatchenkia orientalis, ethanol