Available online at:
http://journal.unila.ac.id/index.php/tropicalsoil
DOI: 10.5400/jts.2017.22.1.43

Isolation of Cellulolytic Bacteria from Peat Soils as Decomposer of Oil Palm Empty Fruit Bunch

Gusmawartati, Agustian, Herviyanti and Jamsari

Departement of Agricultural Science, University of Andalas, Kampus Limau Manis University of Andalas Padang, 25163, Indonesia, e-mail: gusmawartati@yahoo.com

Received 07 September 2016/ accepted 20 December 2016

ABSTRACT

The aim of the research was to find out potential strainsof cellulolytic bacteria isolated from two tropical peat soils and to studythe potency of the isolated bacteria to decompose oil palm empty fruit bunch (EFB). The research was carried out in two stages: (1) isolation of cellulolytic bacteria from peat soils and (2) testing the potency of isolated bacteria to decompose oil palm EFB. The cellulolytic bacteria were isolated from two peat soils, i.e. a natural peat soil (forest) and a cultivated peat soil (has been used as agriculture land). Isolation of cellulolytic bacteria was conducted by preparing a series dilution of culture solutions using a streak plate method in a carboxymethyl cellulose(CMC) selective medium.Isolates that were able to form clear zones surrounding their bacterial colony were further tested to study the potency of the isolates to decompose cellulose in oil palm EFB. The cellulolytic activity of the selected isolates were further determined via production of reducing sugars in an oil palm EFB liquid medium using Nelson-Somogyi method. The results showed that there are six isolates of cellulolytic bacteria that have been identified in two tropical peat soils used in the current study. Two isolates are identified in a natural peat soil (forest) and four isolates are identified in a cultivated peat soil. The isolates collected are identified as *Bacillus sp.*, *Pseudomonassp.* and *Staphylococcus sp*. Among the isolates, an isolate of GS II-1 produces the highest concentration of reducing sugars, namely 0.1012 unitmL^{-1}or 101 ppm, indicating that the isolate of GS II-1 is highly potential to decompose oil palm EFB. Therefore, the isolate of GS II-1 can be used as a decomposer in the bio-conversion processes of oil palm EFB.

Keywords: isolation, bacteria, cellulolytic, oil palm empty fruit bunch (EFB), peat soil

ABSTRAK

Bahan penyusun tanah gambut di daerah tropis berasal dari kayu-kayuan yang komponen terbesarnya adalah selulosa. Penelitian bertujuan untuk mendapatkan strain unggul bakteri selulolitik asal tanah gambut dan mengetahui potensinya dalam mendegradasi TKS (Tandan Kosong Sawit). Penelitian dilakukan secara bertahap yaitu: isolasi dan uji potensi bakteri selulolitik asal tanah gambut. Bahan yang digunakan sebagai sumber isolat adalah tanah gambut alami (hutan) dan tanah gambut terganggu (yang telah digunakan untuk budidaya tanaman). Isolasi dilakukan menggunakan seri pengenceran dengan metode cawan gores pada media selektif Carboxymethyl cellulosa (CMC). Isolat yang membentuk zona bening disekitar koloni dilanjutkan dengan uji potensinya dalam mendegradasi selulosa pada TKS. Isolat– isolate terseleksi diuji aktivitas selulolitiknya melalui pembentukan gula reduksi pada media cair TKS menggunakan metode Nelson-Somogyi.Hasil isolasi diperoleh 6 isolat bakteri selulolitik, 2 isolat berasal dari tanah gambut alami dan 4 isolat dari tanah gambut terganggu. Isolat-isolat tersebut teridentifikasi sebagai *Bacillus sp, Pseudomanas sp* dan *Staphylococcus sp.* Hasil uji gula reduksi diperoleh 1 isolat (GS II-1) yang berpotensi tinggi dalam mendegradasi TKS dengan konsentrasi gula reduksi yang dihasilkan 0,1012 unit per ml setara 101 ppm,sehingga dapat digunakan sebagai agen perombak dalam biokonversi TKS.

Kata kunci: Bakteri, gambut, isolasi, selulolitik, tandan kosong sawit,

INTRODUCTION

A great prospect of palm oil in the world vegetable oil trading has encouraged Indonesian government to extend oil palm plantation in Indonesia. Since 2006, Indonesia has become the largest palm