

Article

# Isolation, Identification, and Optimization of $\gamma$ -Aminobutyric Acid (GABA)-Producing *Bacillus cereus* Strain KBC from a Commercial Soy Sauce *moromi* in Submerged-Liquid Fermentation

Wan Abd Al Qadr Imad Wan-Mohtar <sup>1,2</sup>, Mohamad Nor Azzimi Sohedein <sup>1</sup>, Mohamad Faizal Ibrahim <sup>3,\*</sup>, Safuan Ab Kadir <sup>1</sup>, Ooi Poh Suan <sup>4</sup>, Alan Wong Weng Loen <sup>4</sup>, Soumaya Sassi <sup>1,5</sup> and Zul Ilham <sup>2,5</sup>

<sup>1</sup> Functional Omics and Bioprocess Development Laboratory, Biotechnology Program, Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia; qadyr@um.edu.my (W.A.A.Q.I.W.-M.); azzimi@um.edu.my (M.N.A.S.); safuankadir1207@gmail.com (S.A.K.); sassi.soumaya94@gmail.com (S.S.)

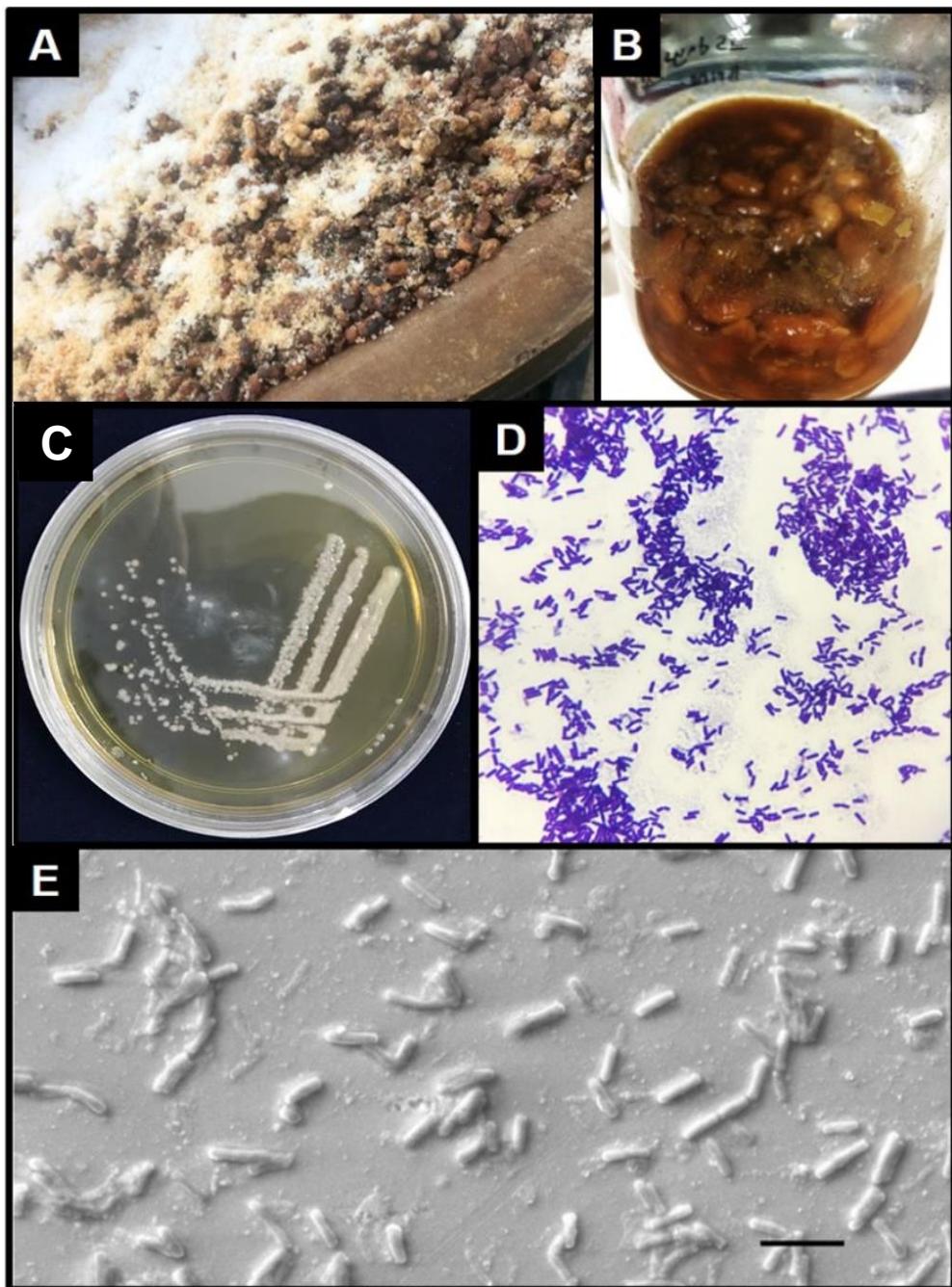
<sup>2</sup> Bioresources and Bioprocessing Research Group, Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia; ilham@um.edu.my

<sup>3</sup> Department of Bioprocess Technology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, UPM Serdang 43400, Malaysia

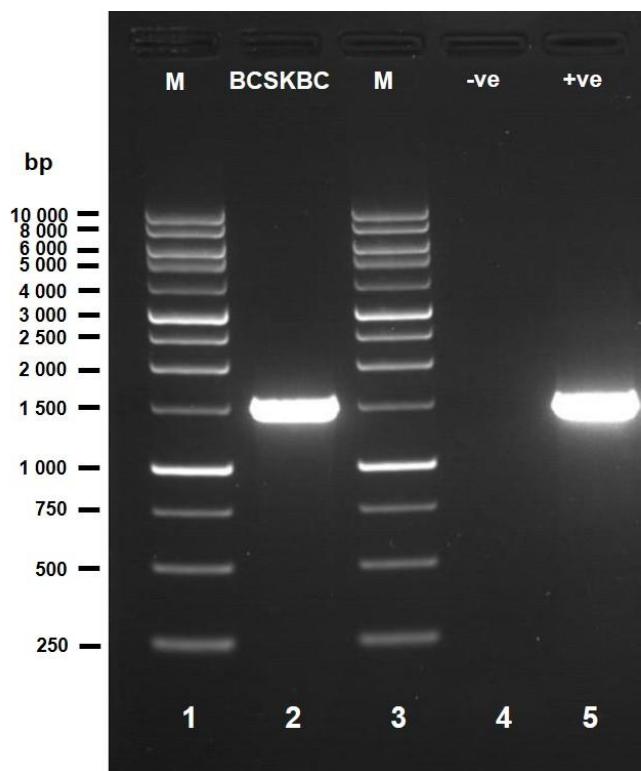
<sup>4</sup> Lot 3406, Jalan Perusahaan 3, Kamunting Industrial Area, Kwong Bee Chun Sdn. Bhd. Soy Sauce Factory, Kamunting 34600, Perak, Malaysia; ps.ooi\_06@yahoo.com (O.P.S.); kkkbcfood@yahoo.com (A.W.W.L.)

<sup>5</sup> Biomass Energy Laboratory, Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia

\* Correspondence: faizal\_ibrahim@upm.edu.my; Tel.: +60-397691936



**Figure S1.** (a) Fermentation tank containing soy sauce *moromi* at a commercial soy sauce factory in Perak, Malaysia (b) 80 days soy sauce *moromi* sample in which the bacterial strain was isolated. (c) Morphologies of *B. cereus* KBC on MRS agar plate (d) *B. cereus* KBC under light microscope (400x magnification) after Gram staining (e) *B. cereus* KBC at 1000x magnification under Scanning Electron Microscope (Bar = 10  $\mu\text{m}$ ).



**Figure S2.** Agarose gel electrophoresis of 16S rRNA isolated from *B. cereus* KBC culture plate. Lane 1 and 3 correspond to 10kb marker. Lane 2 corresponds to the sample (*B. cereus* KBC). Lane 4 corresponds to negative control (-ve) and Lane 5 corresponds to positive control (+ve).