

## PRESENCE OF *Bacillus cereus* FROM LOCAL UNHUSKED (ROUGH) RICE SAMPLES IN SARAWAK, MALAYSIA

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**Abstract:** *Bacillus cereus* is a widespread endospore forming pathogen that can cause diarrhoeal and emetic food poisoning. The purpose of this study was to determine the occurrence of *B. cereus* from local unhusked (rough) rice. A total 24 local unhusked (rough) rice samples were collected from various locations in Sarawak, Malaysia. The analysis was carried out using the most probable number–polymerase chain reaction (MPN–PCR) method. The bacterial loads of *B. cereus* in all samples were found to be more than 1100 MPN/g. PCR analysis showed that all the samples were positive for *B. cereus*. The finding of this study suggests that the local unhusked rice can be one of the potential sources for *B. cereus* foodborne outbreak. This study can be used as a baseline data for future risk assessment of *B. cereus* in local food sources.

Keywords: *Bacillus cereus*, MPN-PCR, unhusked rice

### Introduction

*Bacillus cereus* is a gram-positive, endospore-forming and motile rod-shaped bacterium that can be found in food and soil. Its common association with food spoilage is attributed by highly adhesive endospores that can taint many kinds of foodstuff. Enterotoxins produced by *B. cereus* are strongly associated with the symptoms manifested (i.e. diarrhoeal and emetic syndromes). Diarrhoea-causing enterotoxins are haemolysin BL (HBL), non-haemolysin enterotoxins (NHE) and cytotoxin K (CytK) which are heat labile. The toxins are produced by vegetative growth of the bacteria in small intestine (Granum & Lund, 1997). While, emesis-causing enterotoxin is cereulide, that is heat- and pH-stable, and toxic at low dose (Ehling-Schulz *et al.*, 2004). The toxin is produced by the bacteria in food (Granum & Lund, 1997). Hemolysin gene is related to the production of HBL and pore forming haemolysins. Pore-forming haemolysins produced by *B. cereus* are haemolysin I or cereolysin O, haemolysin II, haemolysin III, and haemolysin IV (Ramarao & Sanchis, 2013).

Rice is an important staple food in Malaysia. Production of paddy rice in Malaysia was 3,322 tonnes in 2015 and it increased as much as 16.6% from the previous year (Department of Statistic Malaysia, 2016). Sarawak is one of the states in Malaysia that endowed with rice varieties where they are cultivated in terrains, hills and lowland areas and had approximately 122,200 hectares of paddy area in 2015 (State Planning Unit, 2015). As rice is staple food for Malaysians, it is crucial to ensure the safety level of unhusked (rough) rice before being processed and consumed. Occurrence of *B. cereus* contamination on local Sarawak rice is underreported, thus the finding from this study would provide information for the related food industries and the public for any risk control measures.

*Bacillus cereus* is a common soil inhabitant. Taint of foods and foodstuffs (e.g. rice, sago starch, grain) with the bacteria can occur through soil contamination on the crops (Notermans & Batt, 1998). There are a few local studies on *B. cereus* occurrence in food such as noodles, spices and legumes (Rusul & Yaacob, 1995), ready-to-eat cooked rice (Sandra *et al.*, 2012),