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# Enumeration and molecular detection of *Bacillus cereus* in local indigenous and imported rice grains

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## Abstract

**Background:** *Bacillus cereus* is frequently related to foodborne illness outbreak. The common food vehicles for transmission of the bacteria are rice, rice products and starchy foods. As rice is a staple food for some countries including Malaysia, knowledge about safety of *B. cereus* in rice is important. This study was conducted to enumerate and identify *B. cereus* in local indigenous and imported rice grains. As Malaysia depends on imported rice to complement the food demands, it is crucial to assess on the imported rice besides the locals.

**Results:** Twenty local indigenous and twenty imported rice grains were investigated in this study. All samples showed positive for the presence of *B. cereus* using polymerase chain reaction targeting the *gryB* gene (475 bp) which encodes for B protein subunit for DNA gyrase or also known as topoisomerase II. The microbial load of *B. cereus* in all samples was >1100MPN/g. However, PCR analysis revealed all the samples were contaminated with *B. cereus* except for three samples of local indigenous rice (LIR 3, LIR 9 and LIR 20).

**Conclusions:** Due to the finding of high prevalence on the samples, it is therefore concluded that the local indigenous and imported rice grains can be one potential source of *B. cereus* transmission to the public.

**Keywords:** *Bacillus cereus*, Enumeration, *gryB* gene, Polymerase chain reaction, Rice

## Background

Food poisoning caused by *Bacillus cereus* is frequently associated with consumption of contaminated fried rice. The foodborne bacteria produce endospore which is resistant towards heat. They are able to grow in the temperature of 10–48 °C, and temperatures ranging from 28 to 35 °C are the optimum. To date, the available treatments for the disinfection are used which are high temperature for canning and lowering pH [6]. *B. cereus* pathogenesis depends on amount of dose consumed and site of the bacteria producing toxin in either food or

intestine [16]. The bacterial infection is manifested with diarrhoea and emesis.

Local rice in Sarawak contributes 214.97 tonne valued at RM 369,551 representing 3.7% of the total export value of agricultural product [8]. Rice cultivation in Sarawak had always been on a subsistence cash crop basis with low yields because of tough hilly terrains, drought, poor drainage and irrigation and lack of modern machinery usage. Rice is cultivated manually using traditional methods, and in some places, machinery is used to increase the yield. In spite of these setbacks, the local farmers had produced some of the world finest and very best home-grown aromatic rice. Notable traditional rice produced in Sarawak are the Bario rice, Biris rice, Bajong rice, Beras Hitam or black rice and Beras Merah or red rice. There are other aromatic rice varieties, namely Kanowit rice, Wangi rice, Rotan rice, Bali rice, Mamut rice, Selasih rice, Kateh Merah, Lemak rice and the black glutinous

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