5-Summary

The present work was planned to study the following points:-

- A survey on some foods for the occurrence of *B. cereus*.
- Survey the same foods for a range of general populations which indicate the ecology of those foods, relative to the incidence of *B. cereus*.
- Examine the isolates for ability to produce diarrhoeal toxin.
- Emetic toxin from *B. cereus*
- Examine enzyme activity of the isolates.
- Antagonistic activity between *Bacillus spp.* alone and with other genra.
- Susceptibility of *Bacillus spp.* to antibiotic.
- Growth of *B. cereus* in Asian rice product.
- Effect of Sodium chloride and pH values on the growth of B. cereus.

- A survey on some foods for the occurrence of *B. cereus:* The present work was conducted to study the presence of *B. cereus* in some foods using PEMBA medium. The examined food samples included: Psteurised milk, raw vegetables, fresh noodle and pasta, fried rice, meat products (minced beef meat, fresh beef burger, pasterami, chicken sausage chicken frankfurter and hamburger) and Asian rice products. Data indicated that *Bacillus spp.* were found in 12.5 %, pasteurized milk, 33.3 % raw vegetables, 40 % fried rice, 25 % minced beef meat, 25 % pastrami, 25 % chicken sausage, 25 % chicken frankfurter and 50 % hamburger meanwhile fresh noodle and pasta and fresh beef burger were free from *Bacillus spp.*

The level for *Bacillus spp.* in all samples (13 samples) were less than 100 cfu/g. while in starch based Asian foods, failed to detect organisms in five samples immediately

after production but the population was found to be ranging from 50 to 5.6 x 10^4 cfu/g. in retial samples.

Fourty isolates were identified using API50 CHB medium (carbohydrate metabolism) and the results were as follow: Twenty two *B. cereus,* three *B. pumilus,* two *B. brevies,* nine *B. lentus,* one *B. firmus,* two *B. licheniformis* and one was unknwon strain.

- Survey the same foods for a range of general population which indicate the ecology of those foods, relative to the incidence of *B. cereus:* All samples were analysed for aerobic plate count, psychrotrophic count, lactic acid bacteria, coliform, yeast and moulds and halotolarent count except Asian products and the data indicated that there was little correlation between the incidence of *Bacillus spp.* and other population.

- Examine the isolates for ability to produce diarrhoeal toxin: Diarrhoeal toxin production for *Bacillus spp.* was tested using enzyme linked immunosorbent assay (ELISA) and the data indicated that *B. cereus* and other *Bacillus spp.* produced diarrhoeal toxion under different condition but the problem for this kit that the antibodies are not specific for the enterotoxin so this kit can detect non toxic proteins and according to the instrcution the medium (BHIB) must be inoculated by higher number of organismes.

- Examine enzyme activity of the isolates: The enzyme activity of the isolates were tested by API ZYM kit, Biomerieux Sa France and the data indicated that *B. cereus* produced phosphatase alcaline, esterase (C4), estrase lipase (C8), lipase(C14), leucine arylamidase, valine arylamidase, chymotrypsin, phosphatase acid, naphthol-AS-BI-phosphohydrolase and glucosidase. *Bacillus pumilus* only produced β-glucosidase and α-mannosidase. One strain only (*B. brevies*) produced trypsin and one strain only (*B. lentus*) produced N-acetyl-β-glucosaminidase

- Antagonistic activity between *Bacillus spp.* (alone) and with other other genra: Agar well diffusion method were used to detect antagonistic activity between the isolates. Data indicated that some strains inhibite another strains. Three strains of *B. lentus* are the higest inhibitor strains. Some of the culture supernatants for inhibitor strains inhibited some strains but with small zone. On the other hand *Bacillus spp.* can not inhibit *E. durance* and *P. aerogenose* . One strain only (*B. brevies)* inhibited *E. faecalis.* Two strains of *B. lentus* inhibited *L. monocytogenes* . *Bacillus firmus* and *B. lichnoformes* could not inhibit any srains.

- Susceptibity of *Bacillus spp.* to antibiotic: This work was done by disk agar diffusion for 10 antibiotic. Data indicats that all isolates were susceptible to all antibiotic. Chloramphenicol, erythromycin, novobiocin and tetracyclin are strongest antibiotics against *B. cereus* and other species.

- Growth temperature of *Bacillus spp.*: Data indicated that all isolates able to grow at 10, 15, 20, 25, 30 and 42 °C. Four *B. cereus*, 2 *B. pumilus* and 3 *B. lentus* were able to grow at 50°C. Some strains were able to grow at 7°C. (psychrotrophic strains).

- Growth of a rifampicin resistant strain, *Bacillus cereus* in Asian rice based confectionery product: The results indicated that cooking temperature for this product could not kill all *B. cereus* spores. The growth of *B. cereus* spores could be controlled by keeping this product at low temperature or combination with added some preservatives such as potassium sorbate.

- Effect of combination of sodium chloride and pH on the growth of *B. cereus* was studied: *Bacillus cereus* can growth at pH 7.5 with salt concentration from 3-8 %, except 8 % were the growth for *B. cereus* diarreal toxin is weak and no growth for *B. cereus* emetic toxin.

The growth of *B. cereus* is going down with decreasing of pH and increasing of salt concentration.