

**Relationship between total carbon, total nitrogen and carbon to nitrogen ratio on growth, sporulation rate and  $\delta$ -endotoxin synthesis of *Bacillus thuringiensis*.**

ABSTRACT

The relationship between intracellular and extracellular total carbon, total nitrogen and carbon to nitrogen ratio on *Bacillus thuringiensis* MPK13 growth, sporulation rate and d-endotoxin synthesis were carried out in shake flask using different types of carbon (glucose, galactose, sucrose, lactose and maltose) and nitrogen (yeast extract) sources. The highest initial intracellular TC (5.15 g/L) and intracellular TN (1.45 g/L) were recorded in medium containing glucose. On the other hand, the highest initial extracellular TC (34.54 g/L) and TN (7.61 g/L) were recorded in medium containing maltose and lactose, respectively. At 48 h of cultivation, the highest final intracellular TC (11.96 g/L) and intracellular TN (3.26 g/L) were also recorded in medium containing glucose. The highest final extracellular TC (27.85 g/L) and TN (7.27 g/L) were recorded in medium containing galactose which showed the lowest growth and sporulation. The presence of d-endotoxin was only detected at 48 h of cultivation using medium containing glucose. The result indicated that high initial intracellular TC and TN values during the cultivation anticipated in high cell growth, sporulation and d-endotoxin production and may be used for indirect measurement of cultivation performance for *B. thuringiensis*.

**Keyword:** *Bacillus thuringiensis*; Carbon; Nitrogen; Endotoxins.