



Toxicity of delta endotoxins from native *Bacillus thuringiensis* isolates against the larger grain borer *Prostephanus truncatus* (Horn) under different maize-based toxin delivery forms

Otieno, S.A.^{1,2*} and Onyango, P.A.³

¹ Centre for Biotechnology and Bioinformatics, University of Nairobi, P.O. Box 30197–00100, Nairobi, Kenya

² Department of Crops, Horticulture and Soils, Egerton University, P.O. Box 536–20115, Egerton, Njoro, Nakuru, Kenya

³ Health Services Department, Jomo Kenyatta University of Agriculture and Technology (JKUAT), P.O. Box 62000–00200, Nairobi, Kenya

*Corresponding author: akellosandy@gmail.com

Submitted 12/02/2026, Published online on 30/09/2026 in the <https://www.m.elewa.org/journals/journal-of-applied-biosciences-about-jab/> <https://doi.org/10.35759/JABs.224.3>

ABSTRACT

Objectives: To evaluate the toxicity of delta endotoxins from native *Bacillus thuringiensis* isolates against adult *Prostephanus truncatus* and determine whether maize-based toxin delivery form and toxin solubility influence mortality under laboratory conditions.

Methodology and Results: Adult *P. truncatus* were exposed separately to soluble toxin fractions or insoluble spore–crystal preparations from eight *B. thuringiensis* isolates delivered on whole maize grains, coarsely ground maize particles or maize flour. Re-entry of the surviving mortality worksheet at the ten-assessment structure documented in the thesis appendix gave 539 observations. Three-way ANOVA detected effects of isolate ($F_{8,485} = 4.268$, $p < 0.001$) and maize form ($F_{2,485} = 3.676$, $p = 0.026$), but not solubility ($F_{1,485} = 0.249$, $p = 0.618$); all interactions were non-significant.

Conclusions and application of findings: Toxicity was isolate-dependent, with KG 20 producing the highest pooled mortality. Dunnett-adjusted comparisons showed greater mortality than the untreated control for KG 12, KG 20, KG 411, TEN, KUR and KM 31, whereas KM 24 and ISR were not significant after multiplicity adjustment. Maize form affected mortality, but the absence of a solubility effect indicates that a less processed spore–crystal formulation may be a practical development route. The findings support confirmatory dose–response, persistence, food-safety and whole-grain storage trials.

Keywords: *Bacillus thuringiensis*; delta endotoxins; *Prostephanus truncatus*; stored maize; biological control