



## **Assessment of the scientific article entitled: "Recent paradigm shifts in the perception of the role of *Bacillus thuringiensis* in foodborne disease"**

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# Assessment of the scientific article entitled: "Recent paradigm shifts in the perception of the role of *Bacillus thuringiensis* in foodborne disease"<sup>1</sup>

This recently published review paper very nicely summarizes the current knowledge related to safety aspects of *Bacillus thuringiensis* (*Bt*) used as the active substance in plant protection products. The main points are:

1. Direct evidence for the involvement of (approved) *Bt* stains in human illness remains absent. The authors emphasize the long history of safe use and state that: "*given the massive global use of B. thuringiensis spores in agriculture and vector control, it seems unlikely that ingestion of the organism causes a substantial number of foodborne cases of severe disease*". Furthermore, the authors note the observation that: "*Given the widespread use of Bt based biopesticides and their prevalence in retail food, the presence of Bt in food or human fecal samples is not unexpected*". This is important, since several studies (e.g. Bonis et al 2021<sup>2</sup>) indicate correlation between Bio-pesticidal *Bt* strains in food and food-borne disease, yet causality has not been established.
2. Risk-assessment must continue to be performed at the strain- and not species-level for *Bt*. The authors note that: "*The B. thuringiensis-defining cry- or cyt-carrying plasmids are horizontally transferable and polyphyletically distributed across the phylogeny (of Bc sensu lato isolates)*". Thus *Bt* "*shares a genetic background with other B. cereus group members rather than forming a separate taxonomic unit.*" For this reason, the authors conclude: "*Taxonomic approaches to determine the risk of diarrheal syndrome are unreliable.*" For this reason, strain-level risk assessment is necessary.

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<sup>1</sup> Biggel M, Jessberger N, Kovac J et al. Recent paradigm shifts in the perception of the role of *Bacillus thuringiensis* in foodborne disease. Food Microbiol 2022;105:104025.

<sup>2</sup> Bonis M, Felten A, Pairaud S, Dijoux A, Maladen V, Mallet L, et al. (2021) Comparative phenotypic, genotypic and genomic analyses of *Bacillus thuringiensis* associated with foodborne outbreaks in France. PLoS ONE 16(2): e0246885.

3. The pathogenicity mechanisms underlying the diarrheal syndrome are complex, multifactorial and remain incompletely understood. Again, this emphasises the need to perform strain-level risk assessment. The molecular mechanism of the emetic disease associated with some strains within the *Bacillus cereus* group (*Bc*) are however well established and not linked to approved *Bt* bio-pesticide strains.
4. Finally, the authors reflect on: "*The crucial role of Bt in transforming agrosystems as an alternative to chemical pesticides*" towards ecologically friendly and sustainable food production.