

Abstract

Thailand, a major producer of the Kluai Hom Thong banana variety, offers an abundant source of resistant starch (RS) from unripe green bananas, known for supporting gut and metabolic health. This study investigates the development of a synbiotic powder combining green banana powder (peeled and unpeeled) with *Bacillus coagulans* spores. The research evaluates how banana type and incubation temperature (35 °C and 45 °C) affect spore production and survival. *B. coagulans* spores were infused into banana powders, dried at 60 °C, and analyzed for sporulation, viability, and physicochemical stability. Heat and acid resistance were assessed through SFU counts post-treatment. Results demonstrated that incubation at 45 °C yielded a significantly higher number of viable *B. coagulans* spores compared to 35 °C. This is likely due to elevated metabolic activity at the higher temperature, which promotes faster growth and more efficient sporulation. Additionally, unpeeled banana powder supported higher spore viability than the peeled counterpart. The presence of banana peel components may provide a protective matrix that enhances spore adhesion and shields spores from environmental stress. This natural barrier effect likely contributed to improved resistance during drying and heat or acid exposure. These findings emphasize the combined role of temperature and substrate composition in optimizing synbiotic formulations. The results support the use of unpeeled green bananas and elevated incubation temperatures to enhance the probiotic potential of banana-based functional foods.

Keywords: *Bacillus coagulans*, Banana powder, Synbiotic, Resistant starch, Probiotic stability.