A multivariate analysis of antibacterial activity of crude Carica papaya seed extract and its effectiveness as natural preservative in Asian yellow noodle

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Abstract

The antibacterial activities of Carica papaya seed extract at MIC (5.63mg/mL) was evaluated in a carbohydrate, protein and oil model systems against Salmonella enteritidis, Bacillus cereus, Vibrio vulnificus, and Proteus mirabilis to find the suitable food system. The efficacy of the extract was verified in Asian yellow noodles and studied by Principal Component Analysis (PCA), Cluster Analysis (CA), and Discriminant Analysis (DA) during storage at 30°C for 12 days. Extract at MIC inhibited the indicator microorganisms in up to 30% of starch, 15% palm oil, and 5% protein. PCA ranked variables

contributing to the yellow noodle spoilage as storage day>Aw>pH>extract concentration. Storage day had a strong correlation with TPC (R=0.842), pH (R=−0.794) and Aw (R=−0.803), respectively. Factor loading of PC2 indicated that 2MIC and 4MIC extracts rendered antibacterial activity in the noodle. The CA classified three spoilage patterns (SP): Cluster 1 (C1, low spoilage patterns) at 0-2d; Cluster 2 (C2, moderate SP) at 2-8d; and Cluster 3 (C3, high SP) at 10-12d of storage, respectively. DA identified 8 days of storage could be rendered with CP seed extract. The 22.5mg/g extract extended the shelf-life of the treated noodle as compared to 3 days (control). © 2026 Elsevier Inc. All rights reserved.

Author keywords

Carica papaya; Food model system; Multivariate data analysis; Shelf-life; Yellow noodle

Indexed keywords

Engineering controlled terms

Bacillus cereus; Bacteriology; Data reduction; Discriminant analysis; Food preservatives; Food storage; Microwave integrated circuits; Multivariant analysis; Principal component analysis; Salmonella; Spoilage

Engineering uncontrolled terms

Anti-bacterial activity; Carica papaya; Food model systems; Multi variate analysis; Multivariate data analysis; Natural preservatives; Principal-component analysis; Seeds extracts; Shelf life; Yellow noodle

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