

## Antimicrobial Activity of GC-100X against Major Food-Borne Pathogens and Detaching Effects of It against *Escherichia coli* O157:H7 on the surface of Tomatoes

Nam Hoon Kwon<sup>1</sup>, S. H. Kim<sup>1</sup>, J. Y. Kim<sup>1</sup>, J. Y. Lim<sup>1</sup>,  
J. M. Kim<sup>1</sup>, W. K. Jung<sup>1</sup>, G. T. Park<sup>1</sup>, W. K. Bae<sup>1</sup>,  
K. M. Noh<sup>1</sup>, J. W. Choi<sup>2</sup>, and Y. H. Park<sup>1</sup>

<sup>1</sup>Department of Microbiology, College of Veterinary Medicine and School of Agricultural Biotechnology, Seoul National University, Seodooon-Dong 103, Kwonsun-Gu, Suwon, Gyunggi, 441-744, KOREA

<sup>2</sup>Buhmwoo Institute of Technology Research, 70-3 Yangjae-Dong, Seocho-Gu, Seoul, 137-130, KOREA

### Instruction

GC-100X is non-corrosive alkaline ionic water (pH 12). It is composed of hydroxyl radicals and supplemented with xylitol. It is also toxicologically safe. The objectives of this study were to determine its effectiveness against major food-borne pathogens as a sanitizer and to compare it with other sanitizers based on washing-out effect against *Escherichia coli* O157:H7 which had attached to tomatoes.

### Materials and Methods

Its antimicrobial activity was examined against 6 major food-borne pathogens; *Staphylococcus aureus* FRI 913, *Salmonella enterica* serova Enteritidis ATCC 13076, *S. enterica* serova Typhimurium isolate, *Vibrio parahaemolyticus* ATCC 17803, *Escherichia coli* O157:H7 ATCC 43894 and *Pseudomonas aeruginosa* KCTC 1637 at three different temperatures (4°C, 25°C and 36°C) with or without an organic material (2% yeast extract), respectively. Its washing-out efficacy against *E. coli* O157:H7 exposed to the surfaces of tomatoes (grapes) was compared with that of other sanitizers such as kitchen synthetic detergent used commercially and 100-ppm chlorine water. For the toxicological evaluation of the sanitizers, viable counts of *E. coli* O157:H7 penetrated into the core of tomatoes after washing were also compared.

### Results and Discussion

Antimicrobial activity of GC-100X showed over 4 log-reductions ( $1.0 \times 10^4$  CFU/ml reduction) against all pathogens reacted at 37°C for 3 hours in the absence of organic materials. The activities showed same results when GC-100X was diluted with same volume of distilled water or standard hard water (CaCO<sub>3</sub> 300 ppm). Its antimicrobial activity was more

effective and quicker in Gram-negative bacteria than Gram-positive bacteria, and in the condition of higher temperature. Its washing-out efficacy against *E. coli* O157:H7 on the surfaces or in the core of tomatoes was compared with that of other sanitizers. The result revealed that GC-100X stock solution and its 5% diluted solution had similar washing effects to 100-ppm chlorine water and more effective than the other kitchen synthetic detergent. This result indicated that GC-100X would show good antimicrobial activity and detaching effects against food-borne pathogens on vegetables and fruits, therefore, could be useful for a new sanitizer in food safety and kitchen hygiene.

## Acknowledgements

The authors are grateful for funding provided by Brain Korea 21 Project.

## References

1. Ahmed, N. M. and Conner, D. E.: Evaluation of Various Media for Recovery of Thermally-injured *Escherichia coli* O157:H7, *J. Food Prot.*, 58, 357-360 (1995).
2. Beuchat, L. R., Farber, J. M., Garrett, E. H., Harris, L. J., Parish, M. E., Suslow, T. V. and Busta F. F.: Standardization of a Method to Determine the Efficacy of Sanitizers in Inactivating Human Pathogenic Microorganisms on Raw Fruits and Vegetables, *J. Food Microbiol.*, 64, 1079-1084 (2001).
3. Harris, L. J., Beuchat, L. R., Kajs, T. M., Ward, T. E. and Taylor C. H.: Efficacy and Reproducibility of a Produce Wash in Killing Salmonella on the Surface of Tomatoes Assessed with a Proposed Standard Method for Produce Sanitizers, *J. Food Prot.* 64, 1477-1482 (2001).
4. Beuchat, L. R. and Ryu, J. H.: Produce Handling and Processing Practices, *Emerg. Infect. Dis.*, 3, 459-465 (1997).
5. Kwon, N. H., Kim, S. H., Kim, J. Y., Lim, J. Y., Kim, J. M., Jung, W. K., Park, K. T., Bae, W. K., Noh, K. M., Choi, J. W., Hur, J., and Park, Y. H.: Antimicrobial activity of GC-100X against Major Food-Borne Pathogens and Detaching Effects of Its against O157:H7 on the surface of Tomatoes, *J. Food Hyg. Safety*, 17, 36-44 (2002).