

TITLE: ENDOPHYTIC PROPERTIES OF COLISTIN-RESISTANT *mcr-1*-POSITIVE *Escherichia coli*

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ABSTRACT:

Polymyxin antibiotics are used as last-resort therapies to treat infections caused by multidrug-resistant Gram-negative bacteria. However, recently the use of polymyxins has been greatly challenged by the emergence of the plasmid-mediated colistin resistance gene *mcr-1*. This gene has been identified in Enterobacteriaceae and its rapid dissemination has been described in isolates from animal, human, food and environment sources. In this way, plant-associated MCR-1-producing bacteria could originate from sources that come into contact with crops. Endophytic bacteria resist traditional methods of disinfection and, and so, can colonize hosts that use vegetables in the diet. Thus, the potential of *mcr-1*-positive strains to colonize the interior of plants and remain as endophytic bacteria was evaluated in this study. For this, a model with MCR-1-producing *Escherichia coli* strains 79 and 171 isolated from human and swine, respectively, and lettuce seedlings were used. Initially, lettuce seeds had the surface sterilized with sodium hypochlorite and were then germinated. In the next step, the sprouts were immersed for 30 min. in standardized suspension of the bacterial strains, and were then aseptically grown until the development of the plants for 25-30 days. Cefoxitin-resistant *Acinetobacter baumannii* ATCC 19606 was used as a negative control for endophytic colonization. Subsequently, the surface of the roots and leaves of the plants were disinfected separately, macerated and aliquots were transferred to MacConkey agar supplemented with colistin. The assays were performed in triplicate and the recovery of the *mcr-1* carrying strains was confirmed by detection of the gene by PCR and typing by Enterobacterial Repetitive Intergenic Consensus Sequence PCR (ERIC-PCR). Both *E. coli* strains colonized the plants efficiently. Colonization of root and leaves by the strain 171 (2.89×10^3 CFU.g⁻¹ and 3.92×10^2 CFU.g⁻¹, respectively) was greater than that by the strain 79 (1.37×10^3 CFU.g⁻¹ and 2.68×10^2 CFU.g⁻¹, respectively). In conclusion, colistin-resistant *mcr-1*-positive bacteria can colonize and persist within plant tissues, such as those used for feeding. In this way, vegetables could constitute an unseen source of multidrug-resistant bacteria and resistance genes, such as *mcr-1*, and lead to dissemination to humans and animals, severely compromising food security. The results presented suggest that continuous surveillance programs are needed to detect the health risk.

Keywords: endophytic, colistin, *mcr-1*, vegetables, food security.

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