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TRANSGENIC PLANTS AS A PLATFORM FOR THE PRODUCTION OF COLICIN-LIKE BACTERIOCINS

Background/Aim. The rapid spread of multidrug-resistant pathogenic bacteria has intensified the search for novel antimicrobial agents. Colicin-like bacteriocins are narrow-spectrum antibacterial proteins with potent activity against clinically relevant bacterial pathogens, making them attractive candidates for food safety and veterinary applications. Plants have become very suitable hosts for the production of colicin-like bacteriocins, as recombinant antibacterial proteins produced in planta retain biological activity without causing noticeable negative effects on plant growth. In this study, we present the development of transgenic plants for the production of recombinant colicin M and salmocin – two colicin-like bacteriocins with proven antibacterial activity against pathogenic *Escherichia coli* and *Salmonella* strains. **Methods.** The vectors for colicin M and ethanol-inducible salmocin expression were kindly provided by Nomad Bioscience GmbH. An expression vector for constitutive salmocin expression was assembled using Golden Gate cloning. Accumulation of recombinant bacteriocins in transgenic plants was confirmed by Western blot analysis. The antibacterial activity of transgenic plant extracts was evaluated using the soft-agar overlay assay. **Results.** Stable accumulation of biologically active colicin M or salmocin was demonstrated in tobacco, lettuce, carrot and kale transgenic plants. The obtained plant extracts effectively inhibited the growth of pathogenic *E. coli* and *Salmonella enterica*. Among the evaluated host plants and expression systems, constitutive expression in transgenic tobacco and lettuce plants resulted in the highest antibacterial activity of plant extracts. **Conclusions.** Our results demonstrate that transgenic plants represent an efficient platform for the production of colicin-like bacteriocins. The identified host plant-expression system combinations provide a promising basis for the scalable production of recombinant antibacterial proteins. Furthermore, edible plant species represent particularly attractive production platforms, as their biomass may enable direct applications in food safety and animal nutrition without extensive downstream protein purification.

Keywords: colicin M, salmocin, recombinant proteins, transgenic plants.

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