From the lead peptide BP100 to bifunctional peptide conjugates to control plant pathogens

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One of the main challenges facing the agricultural sector is to feed the growing world population. However, the impact of plant pathogens on crop production together with the emergence of antibiotic-resistant microorganisms make difficult to overcome this global problem. Moreover, the chemical pesticides currently used have some limitations: they are environmentally harmful and may be toxic. Therefore, there is an urgent need to develop effective and environment-friendly agents to control plant pathogens. Antimicrobial peptides are considered a promising alternative to conventional pesticides since they act through mechanisms in which pathogens rarely develop resistance while ensuring human and plant health.[1]

Within our continuous exploration of efficient agents to control plant diseases of economic importance, we identified the linear undecapeptide H-Lys-Lys-Leu-Phe-Lys-Lys-Ile-Leu-Lys-Tyr-Leu-NH_2 (**BP100**) with high antimicrobial activity, and low hemolysis and phytotoxicity.[2] Later, derivatives with improved biological profile were obtained by incorporating a D-amino acid and/or a fatty acid chain into the sequence of **BP100**.[3,4]

In our efforts to further explore the potential of **BP100** and its derivatives, we are currently focusing our interest on peptide conjugates with a dual mechanism of action. In particular, it is our aim to obtain sequences with antibacterial activity and, at the same time, able to induce the overexpression of genes related to plant defense responses. Thus, peptide conjugates were designed by conjugating an antimicrobial peptide at the N- or the C-terminus of a plant defense elicitor peptide.[5,6] These peptides were screened for their *in vitro* antibacterial activity against plant pathogenic bacteria, and their toxicity to eukaryotic cells and tobacco leaves. The effect of selected peptide conjugates on plant defense gene expression as well as their efficacy in reducing the severity of bacterial spot in tomato plants were also analyzed. Finally, the secondary structure of the best peptide conjugate was characterized by NMR spectroscopy.

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