

Plant disease biocontrol by means of biodegradable proteinaceous nanoparticles

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Pesticides are widely used in agricultural production to reduce crop yield losses. However, serious concerns have been raised about health risks and environmental impact. Thus, there is a current need for alternative crop protection systems with improved safety profiles. Two strategies can be exploited, i.e. to induce plants own defense mechanisms with elicitor peptides (ITPs) or to fight pathogens with antimicrobial peptides (AMPs). However, such approaches are limited mainly by poor peptide stability and the lack of delivery systems. To overcome these limitations, virus-based nanotechnology offers the opportunity to produce viruses unable of self-replication for displaying small peptides, combined with the use of plants as bioreactors to produce such empty virus-like particles (eVLPs). In this context, eVLPs of the *Cowpea Mosaic Virus* (CPMV) and *Turnip mosaic virus* (TuMV) have been engineered to display antifungal, antibacterial or immunity-inducer peptides. Up to now, different peptide-harboring eVLPs have been successfully expressed *in planta* but their purification is still in progress to overcome some technical issues. Once purified, AMP-eVLPs will be tested against several plant pathogens. On the other hand, CPMV-derived ITP-eVLPs have been purified and preliminary analyses provided promising results regarding their capacity to induce defense responses at molecular level.