Antimicrobial peptides in plant defence

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Abstract

Antimicrobial peptides (AMPs) are small molecules with antimicrobial activity. In plants, they represent one of natural defence barriers of plant immune system. A number of AMPs has been isolated from a wide variety of species, which show activity against plant-pathogenic and human-pathogenic bacteria. That is why AMPs attract attention as a possible substituents of classical antibiotics, to which resistance of microbes dangerously increases. Several groups of these proteins were identified and named as defensins and later followed by other groups as cyclotides, glycine-rich proteins, snakins, 2S albumins, and hevein-type proteins in plants. Besides a direct antimicrobial activity, these peptides can function also as endogenous elicitors activating other plant´s defence mechanisms. Number of AMPs has been isolated also from other organisms e.g. from insects.

The aim of our research was to study the effect of non-plant antimicrobial peptides on plant defence system and to test the protecting activity against fungal pathogen *Leptosphaeria maculans*, the causal agent of stem canker, in oilseed rape. We used synthetic animal AMP chrysophsin isolated from *Chrysophrys major* (Red sea bream), insect AMP anoplin present in *Anoplius samariensis* (Solitary wasp), and β-alanyl-tyrosin, a naturally occurring compound in the blowfly hemolymph *Neobellieria bullata*. Antimicrobial activity of these peptides was tested against *L. maculans* using growth measurement in vitro. The effect on plant defence signalling pathways was investigated detected by real-time PCR. Anoplin and chrysophsin treatment induced activation of salicylic acid and ethylene pathways in *B. napus* cotyledon. Anoplin reduced development of *L. maculans* symptoms in *B. napus* cotyledons. Possible utilization of AMPs in plant protection against plant pathogen is discussed.

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