55

THE NOVEL ACTIVE SUBSTANCE COS-OGA PROTECTS POTATO AGAINST LATE BLIGHT THROUGH SALICYLIC ACID-DEPENDENT DEFENSE REACTIONS

G. van Aubel [1], A. Legrève [2], P. Van Cutsem [1]

[1] Unit of Research in Plant Cellular and Molecular Biology, Namur University, Namur, BELGIUM
[2] Earth and Life Institute (ELI), Phytopathology, UCL, Louvain-La-Neuve, BELGIUM

Potato is one of the most important culture in Europe with more than six millions Ha cultivated in 2011. Annual losses and control costs caused by *Phythophthora infestans*, the late blight agent, are assessed at more than one billion euros per year. *P. infestans* possesses a strong adaptability and the susceptible cultivar Bintje continues to be dominant as resistant cultivars struggle to enter the market. The disease in essentially controlled by considerable amounts of chemical fungicides and environmental considerations completed by European regulation framework on plant protection products foster research for new alternatives.

Plants possess an innate imunity that offers the opportunity to develop new efficient plant protection tools. Indeed, the so-called elicitors are at the forefront of the plant defense system that comprises both non-self conserved microbial signatures often called microbe-associated molecular patterns (MAMP) and self molecules called damage-associated molecular patterns (DAMP) released from the plant host by wounding or enzymatic degradation. Together they form pathogen-associated molecular patterns (PAMP) that are recognized by pattern recognition receptors mostly localized to the plasma-membrane. The recognition at the level of the plasmalemma induces PAMP-triggered immunity (PTI), as opposed to effector-triggered immunity that relies on interaction between the products of plant R genes and pathogen effectors injected into the cytoplasm.

COS-OGA is a new active substance for plant protection that stimulates PTI. The product is currently following the European registration process under EC Regulation No 1107/2009 for use on cucurbits against powdery mildew. The elicitor contains chitosan oligomers (COS) associated with pectin-derived oligogalacturonides (OGA). The COS MAMP combines with the OGA DAMP and thereby mimicks the interaction between a plant and a fungal pathogen. Together they form an oligosaccharidic complex formed by COS and OGA with a supramolecular conformation stabilized by calcium.

The plant defense stimulation was investigated on solanaceae after several foliar sprayings of COS-OGA. A proteomic study on leaves revealed that the elicitor treatment led to overexpression of pathogenesis-related proteins, heat shock proteins, proteins involved in DNA/RNA remodeling and proteins involved in energy metabolism and in photosynthesis. The expression of a selection of genes related to plant defense was also followed by quantitative RT-PCR. Transcripts coding for jasmonic acid and ethylene-responsive genes were not affected by COS-OGA but transcripts of salicylic acid (SA)-associated genes were significantly up-regulated. SA quantification showed an increase of free SA level in leaves proportional to the number of COS-OGA applications. These results suggest a SAR-like mechanism of action of the oligosaccharide complex. We also studied COS-OGA efficacy in the protection of potato against late blight. The elicitor was effective and slight modifications of its standard formulation seemed to considerably increase the efficacy of the elicitor to control late blight.