Effects of low light intensity on PS3-induced resistance of grapevine leaves against Plasmopara viticola

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Dissection of chitin-triggered immunity in grapevine

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A key aspect of the plant innate immune system is the recognition of invading pathogens. This occurs through pattern recognition receptors (PRRs) within the plasma membrane that detect conserved pathogen signatures, termed pathogen-associated molecular patterns (PAMPs). In *Arabidopsis thaliana*, the PRR CERK1 is a lysin motif receptor-like kinase (LYK) which has three lysin motifs in the extracellular domain, which are responsible for recognition of chitin released from the cell wall of the invading fungal pathogen, and an intracellular kinase domain which is the ''master switch'' of the signalling cascade leading to PAMP-triggered immunity. The aim of this research was to investigate the involvement of grapevine LYKs in defence against powdery mildew. In comparison to the five members of the *LYK* gene family in Arabidopsis, we have identified ten members of this gene family in grapevine (*Vitis vinifera*), three of which (*VvLYK1-1*, *VvLYK1-2* & *VvLYK1-3*) are highly homologous to *CERK1*. The coding sequences for *VvLYK1-1*, *VvLYK1-2* & *VvLYK1-3* were cloned behind the 35S promoter and transformed into the *Arabidopsis cerk1* mutant. A minimum of 5 positive F3 lines were selected per each construct and tested in response to powdery mildew infection. Only *VvLYK1-1* was found to functionally complement the *cerk1* mutation by re-establishing the penetration resistance against a non-adapted powdery mildew species. Expression of *VvLYK1-1* in the *cerk1* mutant background was also demonstrated to restore chitin-induced activation of the MAPK signalling pathway. The VvLYK1 protein was localized in the plasma membrane of onion cells using the biolistic method. These results suggest that *VvLYK1-1* plays a key role in PAMP-triggered immunity against to powdery mildew in grapevine. A yeast two-hybrid screen carried out with the kinase domain of *VvLYK1-1* identified a U-box E3 ubiquitin ligase which shows high homology to the Arabidopsis PUB13 protein. The possible role of *VvPUB13* in modulating perception of chitin by VvLYK1-1 will be discussed.