Dissecting the role of lysin motif receptor-like kinases (LYKs) in 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 plasma membrane localised pattern recognition receptors (PRRs) detecting conserved pathogen signatures, termed pathogen-associated molecular patterns (PAMPs). In *Arabidopsis thaliana* CERK1 is a lysin motif receptor-like kinase (LYK), which is involved in the perception of chitin released from invading fungal pathogens. In comparison to the five members of the *LYK* gene family in Arabidopsis, we have identified ten members of the gene family in grapevine (*Vitis vinifera*), three of which (*VvLYK1-1*, *VvLYK1-2* & *VvLYK1-3*) are highly homologous to CERK1. VvLYK1-1:GFP was shown to localise to the plasma membrane. Expression of *VvLYK1-1* in the *Atcerk1* mutant background restored chitin-induced defense responses as demonstrated by MAPK activation and infection assays with the non-adapted grapevine powdery mildew pathogen, *Erysiphe necator*. This suggests that VvLYK1-1 plays a key role in PAMP-triggered immunity to powdery mildew in grapevine.

The kinase domain of *VvLYK1-1* was used as a bait in a yeast two-hybrid screen to search for interacting factors. The yeast two-hybrid screen identified a U-box E3 ubiquitin ligase, which shows high homology to the Arabidopsis PUB13 protein. PUB13 has been previously demonstrated to polyubiquitinate FLS2, the receptor of bacterial flagellin (flg22), and promote flagellin-induced FLS2 endocytosis and subsequent degradation.