

Receptor-like kinases (RLKs) mediate enhanced immune responses in the *Achnatherum inebrians*-*Epichloë gansuensis* symbiotic system against *Claviceps* pathogen infection

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Ergot is a disease affecting cereals and grasses caused by certain members of the fungal genus *Claviceps*. Ergot can not only affect the growth and seed yield of the host plant but, when ingested, the fungus can also cause livestock poisoning. Host resistance to *Claviceps* spp. is rare, but the infection of *Achnatherum inebrians* by *Claviceps purpurea* can be significantly reduced if the host plant is colonised by the fungal endophyte *Epichloë gansuensis*. Therefore, analysing the disease resistance mechanisms exhibited by this grass-endophyte symbiosis is of great practical significance for developing ergot-resistant germplasm. In this study, we investigated the expression and enrichment analysis of differentially expressed genes within the *A. inebrians*-*Epichloë* symbiosis with and without *C. purpurea* infection. The RNA-seq results indicated that the receptor-like kinase family was highly expressed in *A. inebrians*-*Epichloë* symbiosis with *C. purpurea* infection. Among them, 353 receptor-like kinases were up-regulated (fold changes ≥ 2). Leucine-rich repeat

receptor-like kinase, Wall-associated kinase (WAK), Lectin receptor-like kinases were found by PFAM (the protein family database, MSA) prediction. Receptor-like kinases are key pattern-recognition receptors for microbe- and plant-derived patterns-triggered immune (patterns-triggered immune, PTI). Thus, further research screened these RLKs through the *Nicotiana benthamiana* Reactive Oxygen burst system (ROS burst). The results showed that several RLKs consist of WAK domain and Lectin domain had nearly twice ROS burst compared to the mock in response to chitin or Eg- and Cp-derived crude extract. These RLKs are therefore speculated to have important functions in the regulation of PTI in *A. inebrians*. An understanding of the molecular mechanism of these RLKs will contribute to a deeper understanding of the complex and diverse biological functions of RLKs and provide a theoretical basis for improving ergot resistance in other Poaceae grasses.