

## Antifungal Susceptibility of *Saprolegnia parasitica* Isolated from Rainbow Trout and Its Host Pathogen Interaction in Zebrafish Disease Model

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**Abstract :** Saprolegniasis is one of the most devastating fungal diseases in freshwater fish which is caused by species in the genus *Saprolegnia* including *Saprolegnia parasitica*. In this study, we isolated the strain of *S. parasitica* from diseased rainbow trout in Korea. Morphological and molecular based identification confirmed that isolated fungi belong to the member of *S. parasitica*, supported by its typical fungal features including cotton-like whitish mycelium, zoospores (primary and secondary) and phylogenetic analysis with internal transcribed spacer (ITS) region. Pathogenicity of isolated *S. parasitica* was developed in embryo, larvae, juvenile and adult zebrafish as a disease model. Up regulation of host genes encoding ZfTnf- $\alpha$ , Zfc-Rel, Zfil-12, ZfLyz-c, Zf $\beta$ -def, and ZfHsp-70 was identified in zebrafish larvae after experimental challenge of *S. parasitica* showing the host immune responses against the *S. parasitica*. Survival of the juveniles upon fungal infection might be due to the increased immune protection in the host. Investigation of antifungal susceptibility of *S. parasitica* with natural lawsone (2-hydroxy-1,4-naphthoquinone) revealed the minimum inhibitory concentration (MIC) and percentage inhibition of radial growth (PIRG %) as 200  $\mu$ g/mL and 31.8%, respectively. Lawsone was able to change the membrane permeability, and cause irreversible damage and disintegration to the cellular membranes of *S. parasitica* which might have effect on fungi growth inhibition. Moreover, the mycelium exposed to lawsone (MIC level) changed the transcriptional responses of *S. parasitica* genes. Overall results indicate that lawsone could be a potential and novel anti-*S. parasitica* agent for controlling *S. parasitica* infection.

**Keywords :** host-pathogen interactions, lawsone, rainbow trout, *Saprolegnia parasitica*, Saprolegniasis, zebrafish

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