

## Article

# Antimicrobial Potential of Aqueous Extract of Giant Sword Fern and Ultra-High-Performance Liquid Chromatography–High-Resolution Mass Spectrometry Analysis

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**Abstract:** Vibriosis and parasitic leech infestations cause the death of various farmed fish, such as groupers, hybrid groupers, sea bass, etc., in Malaysia and other Southeast Asian countries. In the absence of natural control agents, aquaculture operators rely on toxic chemicals to control *Vibrio* infections and parasitic leeches, which can have a negative impact on the environment and health. In the present study, we investigated the antivibrio and antiparasitic activities of the aqueous extract of giant sword fern (GSF) (*Nephrolepis biserrata*, Nephrolepidaceae, locally known as “Paku Pedang”) against four *Vibrio* spp. and the parasitic leech *Zeylanicobdella arugamensis*, as well as its metabolic composition using the ultra-high-performance liquid chromatography–high-resolution mass spectrometry system (UHPLC–HRMS). The data show that the aqueous extract of GSF at a concentration of 100 mg/mL exhibits potent bactericidal activity against *V. parahaemolyticus* with a zone of inhibition of 19.5 mm. In addition, the extract showed dose-dependent activity against leeches, resulting in the complete killing of the parasitic leeches within a short period of 11–43 min when tested at concentrations ranging from 100 to 25 mg/mL. The UHPLC–HRMS analysis detected 118 metabolites in the aqueous extract of GSF. Flavonoids were the primary metabolites, followed by phenolic, aromatic, fatty acyl, terpenoid, vitamin and steroidal compounds. Notably, several of these metabolites possess antibacterial and antiparasitic properties, including cinnamaldehyde, cinnamic acid, apigenin, quercetin, cynaroside, luteolin, naringenin, wogonin, 6-gingerol, nicotinamide, abscisic acid, daidzein, salvianolic acid B, etc. Overall, our study shows the significant antibacterial and antiparasitic potential of the GSF aqueous extract, which demonstrates the presence of valuable secondary metabolites. Consequently, the aqueous extract is a promising natural alternative for the effective control of *Vibrio* infections and the treatment of parasitic leeches in aquaculture systems.

**Keywords:** antibacterial; antiparasitic; *Vibrio* spp.; *Zeylanicobdella arugamensis*; metabolites; aquaculture; flavonoids; phenolics; giant sword fern; UHPLC–HRMS analysis