

## **Inhibition and kinetic studies of cellulose- and hemicellulose-degrading enzymes of *Ganoderma boninense* by naturally occurring phenolic compounds**

### **ABSTRACT**

#### **AIM:**

*Ganoderma* sp, the causal pathogen of the basal stem rot (BSR) disease of oil palm, secretes extracellular hydrolytic enzymes. These play an important role in the pathogenesis of BSR by nourishing the pathogen through the digestion of cellulose and hemicellulose of the host tissue. Active suppression of hydrolytic enzymes secreted by *Ganoderma boninense* by various naturally occurring phenolic compounds and estimation of their efficacy on pathogen suppression is focused in this study.

#### **METHODS AND RESULTS:**

Ten naturally occurring phenolic compounds were assessed for their inhibitory effect on the hydrolytic enzymes of *G. boninense*. The enzyme kinetics ( $V_{max}$  and  $K_m$ ) and the stability of the hydrolytic enzymes were also characterized. The selected compounds had shown inhibitory effect at various concentrations. Two types of inhibitions namely uncompetitive and noncompetitive were observed in the presence of phenolic compounds. Among all the phenolic compounds tested, benzoic acid was the most effective compound suppressive to the growth and production of hydrolytic enzymes secreted by *G. boninense*. The phenolic compounds as inhibitory agents can be a better replacement for the metal ions which are known as conventional inhibitors till date. The three hydrolytic enzymes were stable in a wide range of pH and temperature.

#### **CONCLUSION:**

These findings highlight the efficacy of the applications of phenolic compounds to control *Ganoderma*.

#### **SIGNIFICANCE AND IMPACT OF THE STUDY:**

The study has proved a replacement for chemical controls of *G. boninense* with naturally occurring phenolic compounds.

**Keyword:** Amylase; Basal stem rot disease; Cellulase; Noncompetitive inhibitors; Uncompetitive inhibitors; Xylanase