Synthesis and bioactivity of natural ferulic acid derivatives against Ralstonia solanacearum isolated from mulberry tree

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Introduction

Wheat bran is a by-product when wheat is processed into flour. Only in China, the annual output of wheat bran is more than 20 million tons, which is mainly used as feed raw materials, with low added value, resulting in a serious waste of resources. Ferulic acid is one of the main active substances in wheat bran. It plays an important role in plant growth and the interaction between plant and microorganism. It is a common plant defense substance. *Ralstonia solanacearum* is one of the ten most harmful pathogenic bacteria in the world.

Therefore, the study on the antibacterial activity of ferulic acid derivatives is conducive to the development of deep processing products of wheat bran and the control of *Ralstonia solanacearum*.

Methods

Ferulic acid was extracted from wheat bran by enzymatic method. Ferulic acid acyl chloride was obtained by chlorination. Ferulic acid monoterpenes were synthesized from seven monoterpenes by esterification. Their structures were characterized by NMR and MS. The antibacterial activity of ferulic acid derivatives was studied by the inhibition rate of *Ralstonia solanacearum.*

Results & Discussion

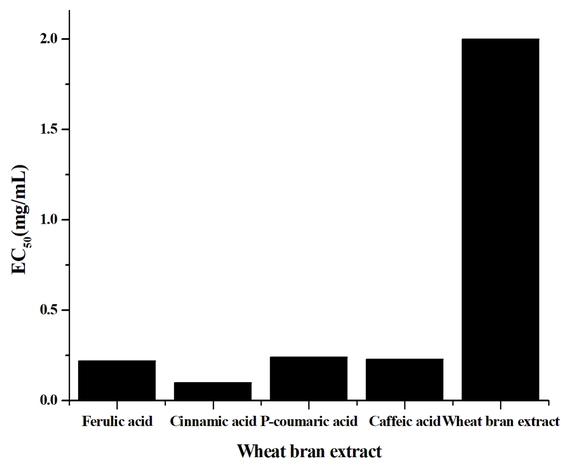

Fig. 1 shows that wheat bran extract and phenolic acid have inhibitory effect on *Ralstonia solanacearum*

Fig. 1 EC_{50} value of wheat bran extract and phenolic acids, ethanol was used as blank group.

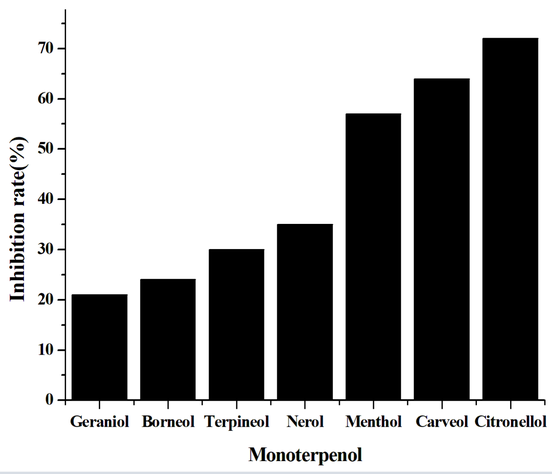

Fig. 2 shows that monoterpenol has inhibitory effect on *Ralstonia solanacearum*

Fig. 2 Inhibition rate of monoterpenol against Ralstonia solanacearum. The concentration was 10 mg/L and ethanol was used as blank group.

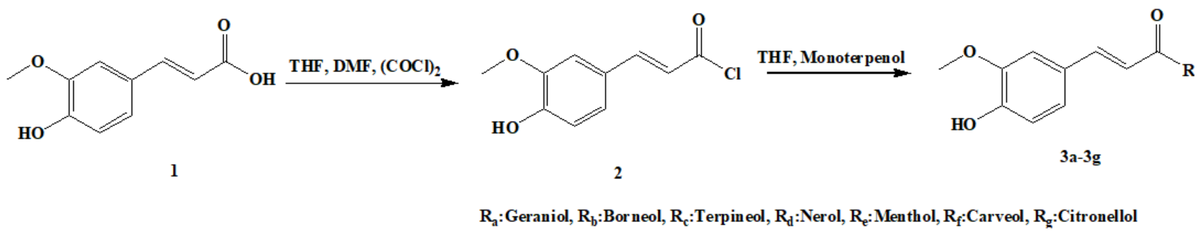

Fig. 3 Synthesis of monoterpene ferulate

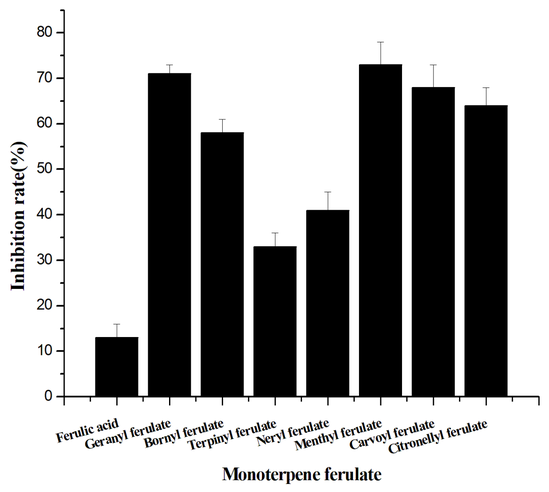

Fig. 4 shows that the inhibitory effect of monoterpene ferulate on Ralstonia solanacearum was better than that of ferulic acid

Fig. 4 Antimicrobial activity of monoterpene ferulate. The concentration was 1 mg/L and ethanol was used as blank group.

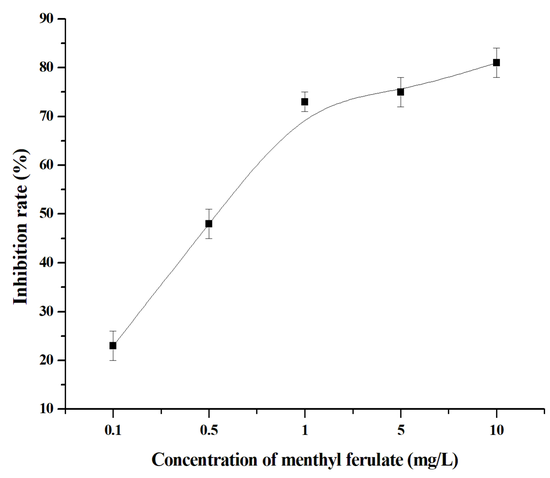

Fig. 5 shows that the antibacterial activity of menthyl ferulate is proportional to the concentration and the EC_{50} value was 0.52 mg/L.

Fig. 5 Antibacterial curve of menthyl ferulate. ethanol was used as blank group.

Conclusion

wheat bran extract, phenolic acid and monoterpenol had inhibitory effect on *Ralstonia solanacearum*. The antibacterial activity of monoterpenoid ferulate was better than that of its precursor. The EC_{50} value of menthyl ferulate was 0.52 mg/L.

References

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