

Scopoletin is revealed as the natural bioactive compound resisting against *P. litchii* in lychee combined population screening and multi-omics analysis

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Abstract

Lychee (*Litchi chinensis* Sonn.), is an important economic fruit with delicious taste and rich nutrition. However, the fruits are highly susceptible to various diseases. Lychee downy blight, caused by *P.litchii*, is one of the major diseases in lychee, and mainly controlled by intensive application of fungicides. The natural substances against lychee downy blight need to be developed. In this research, one natural population consisting of 276 lychee landraces from a wide geographic range was employed. Two traits, the disease index (DI) of freshly fruit and freshly leaf were evaluated as indicators for *P. litchii* resistance. Follow-up a continuous investigation of two years, ‘Guiwei’ and ‘Yurong1’ displayed stable susceptibility and resistant against *P. litchii*, respectively. By widely target metabolomics analysis, we screened five natural organic compounds, including scopoletin, vomicine, protocatechuic acid, gentisic acid and podophyllotoxin, which significantly elevated in lychee leaves after treated with *P. litchii*. Subsequently, we performed inhibition tests on carrot agar (CA) medium for these five substances. The results showed that scopoletin significantly inhibited the growth of *P. litchii* on CA medium, and its inhibition effect was even better than the positive control nystatin. Finally, we carried out a test against *P. litchii* for scopoletin on fresh lychees. The results showed that scopoletin also exhibited antibacterial effect on fresh lychee. This study determined the efficacy of scopoletin in inhibiting the growth of *P. litchii*, which may be used for the development of novel antibiotics or agrochemicals.

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