



## Spaetzle responds to the process of *Neoseiulus barkeri* resistance to *Beauveria bassiana* infection\*

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The application of *Beauveria bassiana* is proved to be a feasible biological control measure against pest insects and mites (e.g. Liu *et al.* 2018; Al Khoury *et al.* 2020). But the complex and variable ecological environment can affect the efficiency of *B. bassiana*. Due to the powerful search and spread ability of predatory mites, they were proposed to carry and spread pathogenic microbial spores to places that are difficult to be covered by conventional spray methods (Chen *et al.* 2020; Hao *et al.* 2021). This biocontrol strategy of combining fungi with predator mites is predicted to play a synergistic role in pest control. Therefore, the tolerance of predator mites to *B. bassiana* and the underlying mechanism have been the subject of extensive research and remained to be explored further. The infection of insects by *B. bassiana* can induce insect innate immune response. Spaetzle protein (Spz), as an important ligand of insect Toll pathway, has been demonstrated to play an important role in insect innate immune defense system.

In this study, we investigated the infection process of *B. bassiana* on *Neoseiulus barkeri* by scanning electron microscopy, and identified a Spz protein. It was found that *NbSpz-1* was universally expressed in all developmental stages of *N. barkeri* by qPCR. At the same time, its expression was up-regulated by *B. bassiana* infection. After knocking down the expression of *NbSpz-1* by dsRNA, the tolerance of *N. barkeri* to *B. bassiana* was weakened, and the survival rate was reduced. Our data proved the potential role of Spz protein in the immune response of *N. barkeri* against *B. bassiana*. These results shed light on immune response of phytoseiid mites.

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**Keywords:** Phytoseiid mite, immune response, *Beauveria bassiana*, Spaetzle, RNA interference

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