



Expression and function analyses of *sex-lethal* gene in *Phytoseiulus persimilis**

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Phytoseiulus persimilis is a specialist predator of spider mites, with promising control effects. Its population generally has stable sex ratio. Under appropriate conditions, the proportion of female offspring can reach 80%. But the mechanism of sex determination in *P. persimilis* is still unclear. *Sex-lethal* (*sxl*) is an important gene in studying sex regulation mechanisms in insects. In the model organism *Drosophila melanogaster*, it has been proved to control sex determination and dose compensation. Herein, we screened one *sex-lethal* gene ortholog in the transcriptome of each stage of *P. persimilis* that fed with spider mites (*Ppsxl*). It contains three highly conservative RRM domains. The expression pattern and function of *Ppsxl* were analyzed using real-time quantitative PCR and RNA interference. *Ppsxl* expressed in *P. persimilis* males and females at different developmental stages: the expression peaked 10 h after mating in females, and it was also highly expressed in eggs that developed into males (the first egg). The adult females, 5 hours after mating, were interfered through soaking in a mixed system of dsRNA and nanomaterials Star Polycation (dsRNA and SPc were 1:1 mixed, the concentration was 500 ng/μl). When *Ppsxl* was interfered, the expression of *Ppsxl* decreased by 47%. All female individuals after interference were fertile, and the first eggs still always developed into males. However, the daily fecundity per female decreased by 13.4%, and the proportion of female offspring decreased by 22.7%. This study showed that *Ppsxl* gene had a certain influence on reproduction of *P. persimilis*, but its influence on sex determination may not be as critical as that of *D. melanogaster*.

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