



不同温度影响下绿盲蝽丝氨酸蛋白酶基因AISP 3的表达谱分析

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Expression Patterns of the Serine Protease Gene AISP 3 in *Apolygus lucorum* (Hemiptera: Miridae) at Different Temperatures

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摘要

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摘要 利用荧光定量PCR技术, 系统分析了不同温度处理下绿盲蝽成、若虫丝氨酸蛋白酶基因AISP 3的表达谱。结果表明: 在24 ℃下, 若虫各虫龄AISP 3表达量差异未达到显著水平($P > 0.05$), 而雌虫交配前期与雄虫交配后期的AISP 3表达量分别达1龄若虫对照的19.71倍与7.16倍, 显著高于其他时期。但在21~30 ℃内, 4~5龄若虫AISP 3的表达量随温度升高而上升, 2~5龄若虫在30 ℃时AISP 3的表达量均达最高; 不同温度处理下, 刚羽化、交配前的雌、雄成虫的AISP 3的表达量较24 ℃对照均显著升高($P < 0.01$); 而交配后的雌、雄成虫的表达量却是18 ℃下显著高于其他温度处理。此外, 极端温度4 ℃与40 ℃诱导后, 雌、雄成虫AISP 3的表达量均显著高于24 ℃。绿盲蝽AISP 3的表达谱综合分析表明, 外在环境温度与绿盲蝽虫龄与性别因素均可显著影响绿盲蝽AISP 3的表达量($P < 0.01$), 并存在一定的互作效应。由此可见, AISP 3对于绿盲蝽雌成虫早期获取寄主营养具有重要作用, 并且温度是影响AISP 3表达的一个很重要的因素。

关键词: 绿盲蝽 丝氨酸蛋白酶 表达谱分析 温度

Abstract: As an important digestive enzyme gene, the serine protease gene AISP 3 plays a key role in *Apolygus lucorum* for digesting conventional cotton. To understand the effect of different temperatures on the expression level of AISP 3, we analyzed the expression patterns of AISP 3 in *A. lucorum* reared at different temperatures using real-time polymerase chain reaction. The results showed that at the normal temperature of 24 ℃, the expression of AISP 3 in *A. lucorum* at different nymphal stages was similar. The expressions of AISP 3 in the female adult at the pre-mating stage and the male adult at post-mating stage were 19.71- and 7.16-fold higher than their control at the 1st nymphal stage, respectively, which were significantly higher than at any other stages. However, expression in the 4th to 5th A. *lucorum* at the nymphal stage increased with rising temperature in the range of 21~30 ℃. At 30 ℃, the expression of AISP 3 in the 2nd to 5th A. *lucorum* was the highest. The expression levels of AISP 3 in adult *A. lucorum* reared at different temperatures during the new emergence and pre-mating stages were significantly higher than that of the control reared at 24 ℃ ($P < 0.01$), while the expression during the post-mating stage at 18 ℃ was higher than that at other temperatures. When incubated at extreme temperatures (4 ℃ and 40 ℃), the expression of AISP 3 in female and male adult *A. lucorum* was significantly higher than that at 24 ℃ ($P < 0.01$). Taken together, our results showed that the external environment temperature and the internal stage of *A. lucorum* or its sex all had significant effects on the expression of AISP 3 in *A. lucorum* ($P < 0.01$), and that there was some interactions between them. Therefore, AISP 3 is very important for the female adult *A. lucorum* to obtain nutrition at the early stages and temperature is an important limiting factor for the expression of AISP 3.

Keywords: *Apolygus lucorum* serine protease expression pattern analysis temperature

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