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二化螟滞育幼虫的蛋白和核酸含量以及保护酶活性的变化

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Changes of the protein and nucleic acid contents and the activities of protective enzymes in diapausing larvae of the rice stem borer, *Chilo supprressalis* (Lepidoptera: Crambidae)

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摘要 为了阐明二化螟*Chilo supprressalis*滞育幼虫的分子特征及滞育期间保护酶活性的变化规律， 本研究应用Trizol法、 总量DNA提取法和蛋白定量试剂盒， 测定了在长光周期16L：8D和25℃下发育的非滞育老熟幼虫、 在短光周期12L：12D 和25℃下诱导滞育51 d的幼虫（称为滞育0个月）、 滞育1， 2和3个月幼虫的核酸含量和总蛋白含量； 同时应用试剂盒测定了老熟幼虫、 滞育0， 1和2个月的二化螟幼虫5种保护酶（POD， CAT， SOD， LDH和ATP酶）的活性。结果表明： 滞育幼虫的总RNA含量显著低于非滞育的老熟幼虫（$P<0.05$）， 而滞育1， 2和3个月的幼虫之间没有显著差异（$P\geq0.05$）。老熟幼虫的总DNA含量显著高于滞育幼虫（$P<0.05$）。老熟幼虫的RNA/DNA比值较低， 滞育幼虫的RNA/DNA比值较高， RNA/DNA比值随着滞育时间的推移呈现出先上升后下降的趋势。滞育期大于1个月的幼虫中蛋白含量均显著高于非滞育的老熟幼虫（$P<0.05$）， 而滞育1， 2和3个月的幼虫之间没有显著差异（$P\geq0.05$）。二化螟幼虫体内5种保护酶活性随发育阶段不同而存在差异。滞育幼虫中POD， CAT和SOD的活性随滞育时间延长而逐渐增强， 滞育2个月幼虫中的活性最高， 而非滞育老熟幼虫中的活性最低； LDH和ATP酶的活性则相反， 非滞育老熟幼虫中的活性最高， 滞育2个月幼虫中的活性最低。这些结果说明， 总RNA和DNA含量降低、 RNA/DNA比值先升后降、 总蛋白含量升高以及保护酶活性的变化是二化螟幼虫滞育过程中的主要生理特征。

关键词： 二化螟 滞育 核酸含量 蛋白含量 RNA/DNA比值 保护酶

Abstract: To understand the molecular characteristics of diapausing larvae of the rice stem borer, *Chilo supprressalis*, we analyzed the contents of proteins and nucleic acids in non-diapausing mature larvae reared under a long photoperiod of 16L：8D at 25℃ and diapausing larvae with the diapause duration of 0-3 months induced under a short photoperiod of 12L：12D at 25℃ by using Trizol method, total DNA extraction and protein quantitative kit, and the activities of protective enzymes (POD, CAT, SOD, LDH and ATPase) in non-diapausing mature larvae and diapausing larvae with the diapause duration of 0-2 months. The results showed that the RNA content in diapausing larvae was significantly lower than that in non-diapausing mature larvae ($P<0.05$), but was not significantly different among diapausing larvae with different diapause duration ($P\geq0.05$). The DNA content in non-diapausing mature larvae was significantly higher than that in diapausing larvae. The RNA/DNA ratio increased first and then decreased with diapause progress. The RNA/DNA ratio in non-diapausing mature larvae was higher than that in diapausing larvae. The protein content in diapausing larvae was significantly higher than that in non-diapausing mature larvae, but it was not different among the diapausing larvae with different diapause duration of 1-3 months. Activities of CAT, POD, and SOD were the lowest in non-diapausing mature larvae and the highest in diapause larvae with the diapause duration of 2 months, while activities of LDH and ATPase were the highest in non-diapausing mature larvae and the lowest in diapausing larvae with the diapause duration of 2 months. These results suggest that diapausing larvae of the rice stem borer are characterized by low RNA and DNA contents and high protein content, and variations in activities of protective enzymes.

Key words: *Chilo supprressalis* diapause nucleic acid content protein content RNA/DNA ratio; protective enzymes

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