

Biochemical characterization of α -amylases from differently feeding pests: sap-sucking *Aphis craccivora* and tissue chewing *Pectinophora gossypiella*

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Abstract

Aphis craccivora (Hemiptera) is a major sucking pest of cowpea. *Aphis craccivora* is also known as the cowpea aphid. *Pectinophora gossypiella* (Lepidoptera) is an oligophagous chewing pest of cotton, commonly known as the pink bollworm. These insects cause severe losses in the production of cowpeas and cotton, respectively. The α -amylases of these insects were characterized to shed light on the complement of amylases of these two insects from different orders. The α -amylases of *A. craccivora* and *P. gossypiella* were found highly active at pH 8 and 9 respectively. At 37 °C, the activities of α -amylase in *P. gossypiella* and *A. craccivora* were 1.720.078 mg/min/ml and 0.36430.007 mg/min/ml,

respectively. As calculated by Lineweaver–Burk plots, the K_m values of *A. craccivora* and *P. gossypiella* were $10.5 \pm 1.5 \mu\text{M}$ and $27.7 \pm 6.5 \mu\text{M}$ respectively. The V_{max} value of *A. craccivora* amylase was $5 \pm 0 \text{ mM/min}/\mu\text{g}$ and $21.8 \pm 4 \mu\text{M/min}/\mu\text{g}$ for *P. gossypiella*. Electrophoretic visualization indicated 6 isoforms of α -amylase in both the 3rd and 4th instar larvae of *P. gossypiella*. In *A. craccivora*, 3 isoforms were observed. The molecular weight of *P. gossypiella* amylases was around 30 to 294 kDa and *A. craccivora* amylases were around 77 to 160 kDa. Fe and Mn activated amylase activity in *P. gossypiella*, while Co and Zn were inhibitory. In *A. craccivora*, Mn activated the amylase activity. The biochemical and electrophoretic characterizations of the amylases of these insects may significantly contribute to the understanding of the physiology of these chewing and sucking pests. The insights may be exploited for amylase inhibitor-based pest control strategies against this differently-feeding insect.

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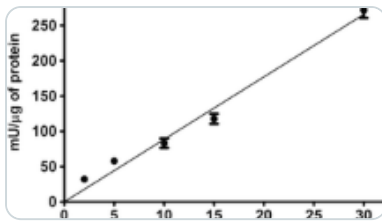
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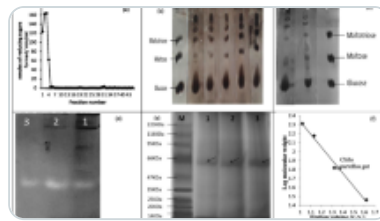
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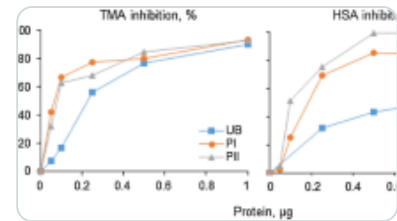
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Ethics declarations

Competing of interest

The authors have no competing interests to declare that are relevant to the content of this article.

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