

## **Inhibitory effects of validamycin on trehalase enzyme and wing development in the red flour beetle, *Tribolium castaneum***

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### **Abstract**

The red flour beetle, *Tribolium castaneum*, is a highly destructive stored-product pest. Trehalase (α-glucoside-1-glucohydrolase, EC 3.2.1.28) is the only enzyme capable of hydrolyzing trehalose to glucose. In many insects this enzyme plays an important role in such biological functions as chitin synthesis, flight and development. For its role in glucose metabolism, trehalase has been regarded as an interesting target for the development of new agents against insect pest. Validamycin, a potent trehalase inhibitor, has been used extensively as a fungicide. In this study inhibitory effects of validamycin on trehalase enzyme and wing development in the red flour beetle were examined. The mature larvae were treated with validamycin by mixing it into their diet or injection into their hemocoel. The larvae were reared until adult emergence for measurement of the trehalase activity and the abnormality of the wing in resulting adults were recorded. Results showed that validamycin treatments decreased trehalase activity in larvae, pupae and adults in a dose dependent manner. After validamycin treatments, the resulting adults exhibited wrinkle elytra and both elytra and hindwings did not fold properly. This indicates that trehalase may have an important role in wing development during pupal-adult transformation in the red flour beetle.

Keywords: trehalase, red flour beetle, validamycin, wing development, trehalase inhibitor