

The control of the drugstore beetle, *Stegobium paniceum* (Coleoptera: Anobiidae) with high and low temperatures

Abdelghany, A.Y.#^{1,2}, Awadalla, S.S.², Abdel-Baky, N.F.², EL-Syrafy, H.A.², Fields, P.G.*¹

¹ Cereal Research Centre, Agriculture & Agri-Food Canada, 195 Dafoe Road, Winnipeg, Manitoba, R3T 2M9, Canada. Email: paul.fields@agr.gc.ca

² Economic Entomology Department, Faculty of Agriculture, Mansoura University, Mansoura 35516, Egypt

* Corresponding author

Presenting author

DOI: 10.5073/jka.2010.425.132

Abstract

Botanicals; dried plants, roots, stems, leaves, seeds and flowers, have been used from the dawn of history as drugs or spices (Craker, 2007). Botanicals have been used in the health care system to improve blood circulation, reduce chronic fever and cure chronic constipation (Golob et al., 1999; Samy et al., 2008). The drugstore beetle, *Stegobium paniceum* (L.) (Coleoptera: Anobiidae), is a pest of stored medicinal and aromatic plants and one of the most common insects found in botanical warehouses (Abdelghany et al., 2010). Generally, mortality of each stage increased with an increase of temperature and exposure time. Heat tolerance for different stages from highest to lowest was; young larvae, old larvae, eggs, adult and pupae. The mortality after 7 h, at 42°C for young larvae, old larvae, eggs, adult and pupae respectively was; 16 ± 5 , 31 ± 6 , 48 ± 3 , 63 ± 8 and $86 \pm 2\%$ (mean \pm SEM). Similarly, the lethal time for 90% mortality (LT₉₀) at 42°C was; too low to estimate, 773, 144, 12 and 11 h. The LT₉₀ value for young larvae at 42, 45, 50, 55 and 60°C was 25, 20, 3.9, 0.18 and 0.08 h respectively. The cold tolerance of different stages at 0°C from highest to lowest was adult, old larva, young larva, pupa, and egg. The LT₉₀ at 0°C was 298, 153, 151, 89 and 53 h, respectively. The LT₉₀ value for adults at 5, -5, -10 and -15°C was 792, 58, 2 and 0.8 h, respectively. The supercooling point of adults, young larvae, old larvae and pupae was $-15.2 \pm 2^\circ\text{C}$, $-9.0 \pm 0.8^\circ\text{C}$, $-6.5 \pm 0.5^\circ\text{C}$, and $-4.0 \pm 1.4^\circ\text{C}$ respectively. Heat treatments that control young larvae should control all other stages of *S. paniceum*. Cold treatments that control adults should control all other stages of *S. paniceum*. Dried plants stored at 5°C for 45 days or 42°C for 30 h and then kept below 18°C throughout the rest of the year, should remain pest-free without any chemical control. The full paper was submitted to *Entomologia Experimentalis et Applicata*.

Keywords: Anobiidae, Heat, Cold, Supercooling point, Tolerance, Storage, Warehouse

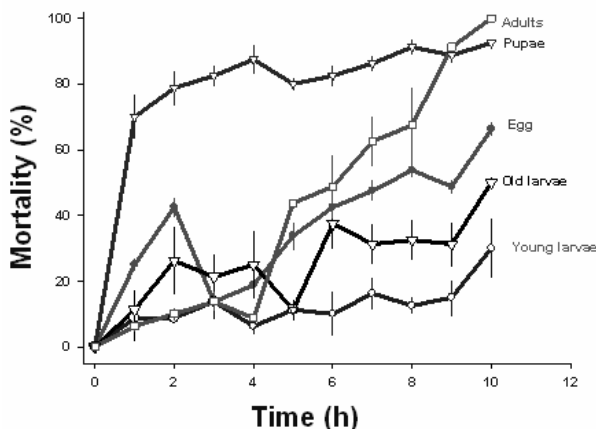


Figure 1 Mortality of various stages of the *Stegobium paniceum* at 42°C.

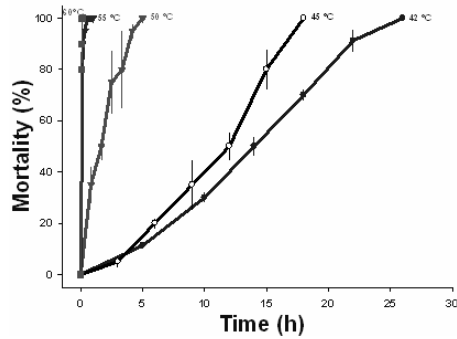


Figure 2 Mortality of *Stegobium paniceum* young larvae at five constant temperatures.

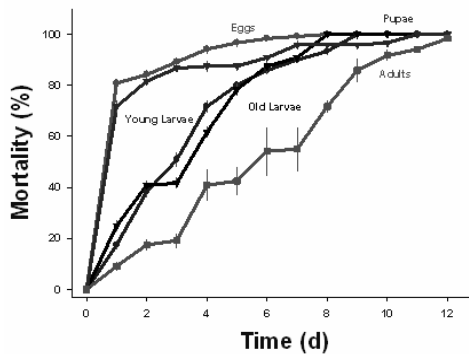


Figure 3 Mortality of various stages of the *Stegobium paniceum* at 0°C.

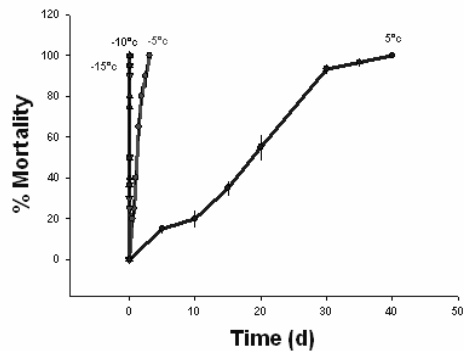


Figure 4 Mortality of *Stegobium paniceum* adults at low constant temperatures.

References

- Abdelghany, A.Y., Awadalla, S.S., Abdel-Baky, N.F., EL-Syraf, H.A., Fields, P.G., 2010. Stored-product insects in botanical warehouses. *Journal of Stored Products Research*, in press.
- Craker, L.E., 2007. Medicinal and aromatic plants—Future opportunities. In: Janick, J., Whipkey, A. (Eds), *Issues in New Crops and New Uses*. ASHS Press, Alexandria, VA, USA, pp. 248-255.
- Golob, P., Dales, M., Fidgen, A., Evans, J., Gudrups, I., 1999. *The Use of Spices and Medicinals as Bioactive Protectants for Grains*. FAO, Rome, Italy.
- Samy, R.P., Pushparaj, P.N., Gopalakrishnakone, P., 2008. A compilation of bioactive compounds from Ayurveda. *Bioinformation* 3, 100-110.