

Chemotactic orientation of neonate larvae of the Indianmeal moth *Plodia interpunctella* and implications on integrated pest management

Adler, C.*#

Julius Kühn-Institut, Institute for Ecochemistry, Plant Analysis and Stored Product Protection, Königin-Luise-Str. 19, 14195 Berlin, Germany

*Corresponding author, Email: cornel.adler@jki.bund.de

#Presenting author, Email: cornel.adler@jki.bund.de

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Abstract

Chemotaxis in the orientation of stored product pests is known to be of major importance. Volatiles emitted from various stored products have been shown to attract adult insects. In a laboratory trial using Petri dishes (190 mm diam.) it was now possible for the first time to prove that neonate larvae of the Indian meal moth *Plodia interpunctella* also orientate by smell. For this purpose the Petri dish was divided into four equal sectors by two lines drawn like a cross outside on the lower half of the glass dish. Food substrate was placed along the rim of the Petri dish in a 10 mm wide quarter circle. Single individuals of neonate larvae were placed into the center of the Petri dish where the crossing lines met. Visual orientation was ruled out by testing glass pearl dummies that gave results quite similar to experiments without any substrate. Effects of light were reduced by sticking an adhesive transparent red film onto the outside of the lid that reduced light intensity from 300 lux to 25 lux. Potential environmental effects were reduced by turning the dish clockwise after each experiment. Each experiment was carried out with a single larva and either no food, wheat bran, broken almonds, dried fruit or broken chocolate with hazelnuts (N=200 per substrate). The position of each larva was marked after 5 min. Potential volatile traces of the previous larva were erased by cleaning the dish with alcohol before each experiment. Results showed that larvae moved significantly more frequently towards the food substrate than away from it. This should be taken into account when designing food or feed packages, storage structures and food processing plants as neonate larvae have been proven to enter pores slightly larger than 0.1 mm.

Keywords: chemotaxis, volatiles, larval movement