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Effect of Roxion-S (Dimethoate) on the Body Temperature of the Honey-Bee

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For the evaluation of sublethal effects of insecticides on Apis mellifera carnica PULLIM, the body temperature was taken as a biodestructor.

METHODS: Foragers were after 1 hour of starvation individually fed with 30μl 1M sucrose-solution, which was contaminated with various amounts of Roxion-S (Celamerck, 400 g Dimethoate/10 Roxion-S). Then they were kept isolated in "Liebefelder-boxes" with 1M sucrose-solution available. In each experiment the surface temperatures of 10 contaminated bees and 10 controls were measured by an AGA 762 SW infrared scanner through an IR-transmissive foil. For thermographic measurements on bees see SCHMARANZER 1983,1984; STABENTHEINER & SCHMARANZER 1986. The band-emissivity (3,5-5,6μm) of the heated intact thorax is 0.99±0.028(s) (STABENTHEINER & SCHMARANZER in prep.). Absolute measurement accuracy: ≤±0.35 °C.

RESULTS: The highest thoracic temperatures (t_{θ,max}) reached by poisoned bees and controls within the observation period of 2 min (referred to the ambient temperature t_{θ}≈23°C-26,5 °C) were compared. Already 5 hours after contamination with 70ng Dimethoate/beet the treated animals had up to 16 °C lower mean t_{θ,max}. The animals fed sublethally with 43ng Dim./bee showed up to 13 °C lower mean t_{θ,max} (Fig.1-3, δ: P<0,02, U-test).

DISCUSSION: The sublethally poisoned bees were strongly irritated in their thermal behaviour. Their cooler thoraces indicate reduced flight muscle activity and thus an abnormal diminished metabolic rate. Body temperature could be shown to be a very sensitive parameter for detection of disease in intoxicated honeybees.


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