

EFFICACY OF CONTROLLED ATMOSPHERES ON *CIMEX LECTULARIUS* (L.) (HETEROPTERA: CIMICIDAE) AND *ARGAS REFLEXUS* FAB. (ACARI: ARGASIDAE)

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The control of bedbugs (*Cimex lectularius*) as well as pigeon ticks (*Argas reflexus*) in human dwellings is usually carried out by a treatment with residual insecticides/acaricides combined with special flushing-out-preparations. As the hiding and breeding places of bed bugs and pigeon ticks can be spread all over an apartment or throughout a house (e.g. behind wallpaper, in furniture, pictures, books or hifi-devices), there are potential undesirable chemical or physical reactions of insecticides on surfaces of these and other materials or with electrical installations. Furthermore, the decreasing public acceptance of chemical pest control methods and new knowledge about the effect of insecticide residues in the indoor environment forces private and governmental agencies to look for alternative measures for eradication of arthropod pests.

Controlled atmospheres (either single or gas mixtures) are already used as non-toxic and residue-free alternatives to control stored product insect pests or to treat rare and valuable objects to eradicate material destroying insects. The method should be efficient against other urban insects and acari as well. However, no systematic investigation has been conducted concerning the lethal exposure time, concentration, temperature and pressure needed for the control of these arthropods.

In the presented trials the response of three different stages of *Cimex lectularius* (eggs, nymphal stage and adult) and two different stages of *Argas reflexus* (male and first nymphal stage) to carbon dioxide (CO₂) and nitrogen (N₂) at normal pressure and 20° C was investigated.

The experiments with *Cimex lectularius* were carried out with mixtures containing 60, 90 vol.-% CO₂ in air, and with 100 vol.-% CO₂. The exposure period was 3, 6, 9, 12, 24, 48 and 96 hours. The treatment with 100 vol.-% CO₂ lead to 100 % mortality of all stages within 6 hours. The air-mixture with 60 vol.-% CO₂ produced the same effect within 24 hours.

Exposure of all stages to 98 vol.-% N₂ (rest oxygen) had only little effect (10 - 20 % mortality) after exposure of up to 72 hours.

The experiments with *Argas reflexus* were carried out with 90 % CO₂. Exposure times up to 4 days resulted in low kill rates. Even after 8 days of exposure only a maximum of 60 % mortality was obtained. 8 days of exposure to 98 vol.-% N₂ did not show any pronounced effect (< 10 % mortality).

The results indicate a practical possibility to treat infested materials against all stages of bed bugs in an acceptable short time of 24 hours. The control of pigeon ticks by this method seems to be not sufficiently effective under the tested conditions.