

13. Various other arthropods

13.1 Mosquitoes. Evaluation of repellents.

Two products intended for personal protection against mosquitoes were delivered by Danish companies for testing under field conditions. They both contained plant essential oils as the active ingredients; one formulation contained eucalyptus oil while the other contained a mixture of citronella, lemongrass, and eucalyptus, and geranium oil. The eucalyptus-based repellent was made for application to the skin and the other was a wrist band with the essential oil imbedded in polyethylene plastic.

The eucalyptus-based repellent gives an acceptable protection for at least two hours when tested in a typical Danish forest at a time of the year when mosquito nuisance is at its highest level. The level of repellency was similar to a commercial N,N-diethyl-m-toluamide containing repellent for the first two hours after application. There was no repellent effect of the wrist band.

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13.2 Treated packing materials for the protection of textiles in museums

In the Danish Pest Infestation Laboratory Annual Report 1996 we reported the results from the first part of a project concerning the possibilities of protecting textiles from insect damages by the use of treated packing materials. The investigations comprised assessment of the immediate effect as well as the possibilities for long term protection, i.e. after 12 and 24 months. The two insecticides were: α -cypermethrin (40 mg a.i./m²) and microencapsulated diazinon (50 mg a.i./m²). Three packing situations were simulated: a piece of woollen cloth was wrapped loosely in two pieces of untreated tissue paper and then either: (1) wrapped in a layer of tissue paper treated on the outer side, (2) placed in a cardboard box that was treated on the outside, or (3) placed on a treated wooden shelf.

Larvae of five species of Dermestid beetles were then exposed to these units. The species involved were: *Anthrenus verbasci*, *Attagenus unicolor*, *Attagenus museorum*, *Reesa vespulae* and *Trogoderma angustum*. The

extent of damage to the woollen cloth as well as mortality of the larvae were assessed 70 days after the larvae were introduced.

Test series were carried out after half a month with both active ingredients and after 12 months with α -cypermethrin (the 12 month trial with diazinon will be done in 1998). Half a month after the treatment, neither of the formulations could offer a good protection when used on shelves or on cardboard boxes, whereas the use of an extra piece of treated tissue for wrapping of the woollen cloth was effective. After 12 months α -cypermethrin could still not provide sufficient protection when used on shelves or on cardboard boxes. The use of an extra piece of treated tissue for wrapping of the woollen cloth led to good protection although little damage was observed in the units with *Anthrenus verbasci*. Further tests are recommended to optimize the doses and to formulate "insecticidal tissue paper" for wrapping of museum artefacts. Based on the information given, the above test can be based on investigations with *A. verbasci* alone.

The investigations are being carried out in collaboration with the Swedish group "PRE-MAL" (Pest Research Education - Museums, Archives and Libraries).

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