Efficiency comparison of three attractant products against Webbing clothes moth *T.bisselliella* (Hummel) (Lepidoptera: Tineidae) using a four arms olfactometer

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Introduction

The webbing clothes moth, *Tineola bisselliella* (Hummel) (Lepidoptera,Tineidae) is a worldwide pest of clothing and textiles in domestic environments and causes also serious damages to textiles and ethnographic material in museum collections. Such damages are caused by the larvae of webbing clothes moths which have the unusual ability to digest keratin, a protein forming the main constituent of animal origin materials such as fur, wool, feathers and hides. When feeding the larvae cause visible damages by making holes and producing large numbers of webbing tubes and sheets containing considerable quantities of faecal pellets which spoil the object's appearance.

In order to fight against this pest, various methods have been developed. In this study the attraction of three olfactive traps, used during campaigns of trapping by the RLHM (Research laboratory of historic monuments), are tested to improve our knowledge on their attractiveness and thus on their efficiency for the trapping of the webbing clothes moth (WCM).

Examples of damage caused by WCM larvae

Materials and methods

Biological material

WCM are raised in plastic box with mesh lids at 25 ±1°C, 40-60% R.H and a 12L:12D inverted photoperiod. Larvae are feed with untreated, untanned and dry rabbit's pelts with hair.

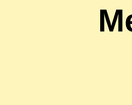
Every day, WCM adults are collected and their sex is determined through the presence of claspers and aedagus or ovipositor.

WCM adult

WCM larva

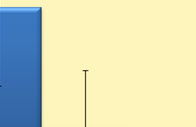
Attractants

- Webbing clothes moth bullet lure, Insect limited®



- Attractant Russell IPM®

- Attractant Finicon®



These attractants (A,B and C)are supposed to contain WCM's sex pheromones i.e koiganal I ((E)-2-octdecenal) and koiganal II ((E,Z)-2,13-octadecadienal), but they may also contain other attractive semiochemicals like male's aggregation pheromones and kairomons (larval habitat and food).

Experiments

Laboratory

- **choice bioassay:**

A closed arena consist of 4 trapping chambers (Figure 1) and each of these contains a sticky trap. At each of replicates (5), 10 male moths (1 to 4 days old) were tested during 24 hours.

- **non- choice bioassay:**

The same device is used except that it consists of two arms only. In every trap's arena we arrange sticky traps. For every replicate, 15 males are tested and then we apply the same protocol and number of replicates, as for the choice test.

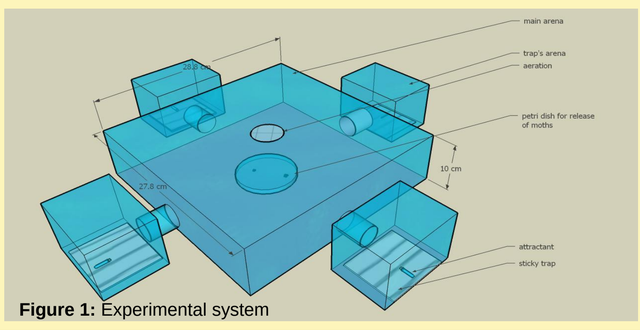


Figure 1: Experimental system

Application in furniture stockroom

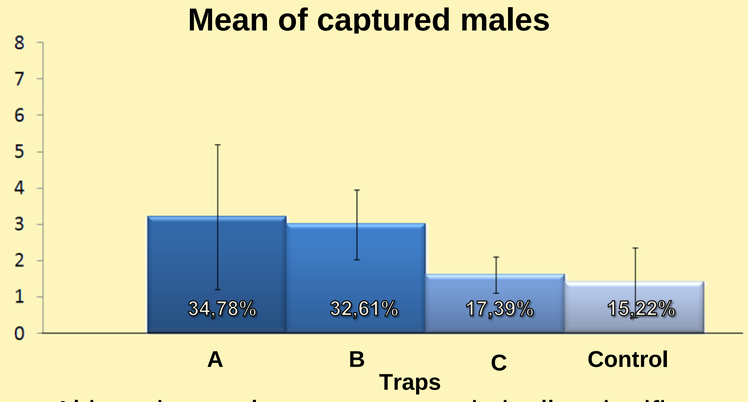
The three attractants were placed, during 4 months, in several infested reserves belonging to "Mobilier nationnal " (Paris).

Traps in furniture stockroom

Results and discussion

Choice bioassay

Mean of captured males

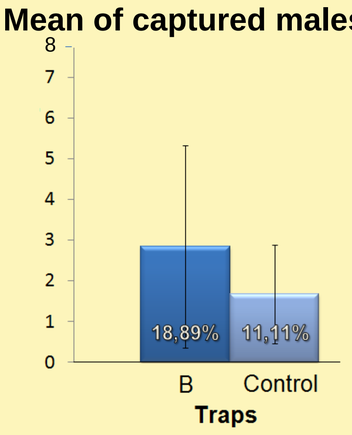


Although results are not statistically significant (Kruskal Wallis test, α=0.05,p-value = 0.1912), but real trends are observable. We can distinguish two groups of different efficiencies. Indeed, the first group is constituted by the attractants "A" and "B" which show similar efficiencies with respectively 34,78 % and 32,61 % males trapped. The second group consists of the attractant "C" which seems to have an efficiency close to the control's one.

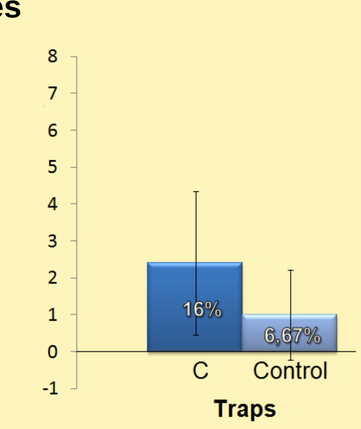
Non-choice bioassay

Mean of captured males

Wilcoxon test, α=0.05, p-value = 0,1056



Wilcoxon test, α=0.05, p-value = 0,4652

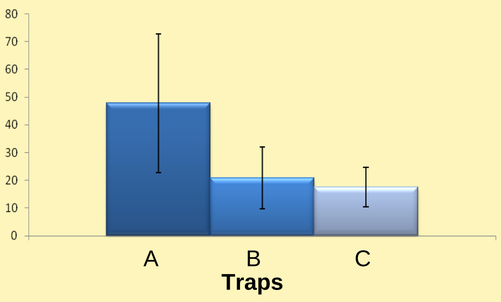


Wilcoxon test, α=0.05, p-value = 0,9408

This results show that there is no significant difference, in the number of males trapped, between attractants and control. However, the tendency is that the attractant "A" is the most different from the control. This seems to confirm the trend observed in the choice bioassay.

Application in furniture stockroom

Mean of captured individuals



Kruskal Wallis test, α=0.05, p-value = 0,3173

These results reveal that in real condition there is no significant difference between three attractants. However, we observe the same tendency with the attractant "A" capturing the highest number of insects.

In order to obtain more significant results we could increase the number of individuals in replicates (50 insects).

Conclusion

These experiments reveal a real tendency of "A" to be more attractive than "B" and "C". Nevertheless, this kind of attractants are not able to do actually a mass trapping (maximum "A" trapping: 34,78 %). But, these attractants are interesting for efficient monitoring. Thus, it is really necessary to develop better attractants for WCM.

Photographic credits: Mobilier nationnal: Dominique De Reyer , Guido Gerding, Emilie Meunier, Ingrid Arnault