

THE USE OF BIO-TEST IN THE DISINFESTATION OF FOOD INDUSTRIES

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Introduction

The efficacy of a pesticide treatment with chemical or physical means can be evaluated exactly in experimental conditions; however, in actual applications, we observe that the volume of the buildings, the difficulty in achieving hermetic sealing, the complexity of the plants and the distribution of apparatus and machines present in the departments interfere on the final results significantly.

Consequently, in the case of heat treatments or fumigations with sulfuryl fluoride the proper use of bio-test is essential for assessing the results.

Materials and methods

Alive insects, at different stages of development, are placed in the bio-test; the species are chosen in relation to the industrial production and real presence of insects in the plants where the treatment will be carried out. In 2012 two special containers were prepared: one sized 7 cm x 5 x 4 h for placement on floors or in the crevices and the other, sized 6 x 6 cm x 7 h to be hung at different heights in empty silos. The cages are equipped with special air vents by metal mesh to 100 mesh.



Species	Growth stage	Number of insects
<i>Tribolium confusum</i>	Adult	5 every bio-test
"	Larvae	5 every bio-test
"	Pupae	5 every bio-test
"	Eggs	10 gr of infested flour
<i>Ephestia kuehniella</i>	Eggs	50 every bio-test
"	Larvae	5 every bio-test
<i>Plodia interpunctella</i>	Eggs	50 every bio-test
"	Larvae	5 every bio-test
<i>Sitophilus oryzae</i>	Adult	5 every bio-test
"	Larvae and pupae	A mixed population with eggs in 10 gr of rice every bio-test
<i>Lasioderma serricorne</i>	Adult	5 every bio-test
"	Larvae and pupae	A mixed population with eggs in 10 gr of biscuits every bio-test

Results and discussions

In 2012, several Pest Control Companies were provided with in total 387 bio-tests to assess the efficacy of heat treatments or fumigation with sulfuryl fluoride in food plants; other 103 were prepared and kept as Untreated Control Test (UCT). The insects of any stage placed in the UCT bio-test resulted fully alive. Overall, complete mortality occurred in 368 of the 387 total, while in 19 cases survival was recorded. In one case it was ascertained survival of eggs of *Plodia interpunctella* after insufficient heat treatment; in other 5 cases survival was demonstrated for *Tribolium confusum* (eggs) in areas treated with sulfuryl fluoride and for *Sitophilus oryzae* (15 cases) treated in environments with both heat or sulfuryl fluoride. Obviously, in these few cases and few sites further localized treatments of chemical pesticides became indispensable.

In conclusion, the use of bio-test was particularly useful to highlight different results reachable in different areas of the same plant. It is thus confirmed that the use of such a practice is extremely important in the modern pest control management.

The use of bio-test in the disinfestation of food industries

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Abstract: In 2012, 387 bio-tests were given to several Pest Control Companies in Italy. The treatments were carried out in Mills and Food Industries with sulphurilfluoride or hot air. The species employed in the bio-tests were *Tribolium confusum*, *Ephestia kuehniella*, *Plodia interpunctella*, *Sitophilus oryzae* and *Lasioderma serricorne*. In 19 cases survival was recorded. In these few cases localized treatments with pesticides became indispensable.

Introduction

The efficacy of a pesticide treatment with chemical or physical means can be evaluated exactly in experimental conditions; however, in actual applications, we observe that the volume of the buildings, the difficulty in achieving hermetic sealing, the complexity of the plants and the distribution of apparatus and machines present in the departments interfere on the final results significantly. Consequently, in the case of treatments with sulphurilfluoride or hot air, the proper use of bio-tests in Food Industries, is essential for assessing the results obtained in the control of many species of insects at different development stages.

Materials and methods

Alive insects, at different stages of development, are placed in the bio-test; the species are chosen in relation to the industrial production and real presence of insects in the Plants where the treatment will be carry out. In 2012 two special containers were prepared: one sized 7 cm x 5 x 4 h for placement on floors or in the crevices and the other, sized 6 x 6 cm x 7 h to be hanged at different heights in empty silos. The cages are equipped with special air vents by metal mesh to 100 mesh. After the insects are placed, the containers are sealed with a strip of security to prevent accidental opening and alteration of the content; each cage is coded, numbered as in the map and species and stage of development are also indicated. About 10 grams of food substrate (flour, rice or biscuits) are also placed in to ensure the survival of insects up to the time of the control in the laboratory.

The time between the preparation of the biological material and the use of bio-test should be within a maximum of 48 hours.

The species used are indicated in Table 1.

Species	Growth stage	Number of insects
<i>Tribolium confusum</i>	Adult	5 every bio-test
"	Larvae	5 every bio-test
"	Pupae	5 every bio-test
"	Eggs	10 gr of infested flour
<i>Ephestia kuehniella</i>	Eggs	50 every bio-test
"	Larvae	5 every bio-test
<i>Plodia interpunctella</i>	Eggs	50 every bio-test
"	Larvae	5 every bio-test
<i>Sitophilus oryzae</i>	Adult	5 every bio-test
"	Larvae and pupae	A mixed population with eggs in 10 gr of rice every bio-test
<i>Lasioderma serricorne</i>	Adult	5 every bio-test
"	Larvae and pupae	A mixed population with eggs in 10 gr of rice every bio-test

The treatments were carried out in Mills and Food Industries. The results were verified after 48 hours, monitored and recorded again after 30 days.

Results and discussions.

In 2012, several Pest Control Companies were provided with in total 387 bio-tests to assess the efficacy of heat treatments or fumigation with sulphurilfluoride in food plants; other 103 were prepared and kept as Untreated Control Test (UCT).

The insects of any stage placed in the UCT bio-test resulted fully alive. Overall, complete mortality occurred in 368 of the 387 total, while in 19 cases survival was recorded.

In one case it was ascertained total survival of eggs of *Plodia interpunctella* resulting in larval development. It was verified that the bio-test was installed in the room of an industry for the processing of rice subjected to insufficient heat treatment. In other cases, survival has been demonstrated for *Tribolium confusum* (eggs: 5 cases) in areas treated with sulphurilfluoride and *Sitophilus oryzae* (mixed population in kernels: 15 cases) treated in environments with both the heat or sulphurilfluoride. It has been therefore shown that in all these cases, the application time of the treatment was not sufficient to reach insects nested in depth.

Obviously, in these few cases and few sites further localized treatments of chemical pesticides became indispensable.

In conclusion, the use of bio-test was particularly useful to highlight any different results reachable in different areas of the same Food Plant. It is thus confirmed that the use of such a practice is extremely important in the modern management of pest control.

References

Pagani, M., Savoldelli, S., Cravedi, P. & Süß, L. 2012: Gestione delle gabbiette spia in concomitanza di interventi di disinfestazione nelle industrie alimentari. *Tecnica Molitoria*, 63 (12): 1244-1253.