Xlure-MST - the Multi-Species Pheromone trap for Monitoring Major Stored Products Insects

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Abstract:

Monitoring is the corner stone of all integrated pest management programmes. Synthetic pheromones and food volatiles are now normally used in a variety of traps as detection and monitoring tools in pest management. A combination of insect pheromone and food attractant can provide an effective monitoring tool for stored products insects. Some traps are designed so the pheromones for more than one species can be used at the same time. Since the identification of black carpet beetle, *Attagenus unicolor* pheromone in 1967 (Silverstein *et al.,* 1967) the number of sex pheromones identified for stored product insect pests has increased up to 40 in recent years. Though most of the insect's pheromone is species specific, several stored products insects share a common pheromone component. For example, *(Z,E)*-9,12-tetradecadien-1-ol acetate is the major component of sex pheromone of *Ephestia cautella, E. elutella*, *E. kuehniella*, and *Plodia interpunctella*..

In present study it showed that by integrating three pheromone lures of *Tribolium* spp. *Lasioderma serricorne*, *Trogoderma granarium* and two food attractants wheat germ oil, carob volatile a synthetic pheromone trap Xlure-MST has been developed that is attractive to *Tribolium, castaneum, Tribolium confusum, Lasioderma serricorne, Trogoderma granarium, Trogoderma variabile, Oryzaephilus mercator, Oryzaephilus surinamensis, Sitophilus granarius, Sitophilus oryzae* and *Stegobium paniceum* without reducing the attractancy of the trap for then different species, The presence of pheromones and food attractant in one trap resulted increased the attraction due to the combination of its pheromone with food volatiles. Moreover, the attraction of individual insects did not reduced due to repellent characteristics of a pheromone from another species. The efficiency of has been evaluated against *T. castaneum* in a laboratory bioassay, the results indicated that Xlure-MST is attractive to *T. castaneum*, with a mean catch efficacy of more than 80% after 24 hours of trap evaluation. It also showed that once the beetles are caught in the trap they are unable to escape from it again. The slope of the trap does not present an obstacle to the ease of entry by the beetles into it.It provides a single cost effective detection tool to monitor wide range of insect pests which is likely to attack any food stock of manufacturing facility.

Reference:

Silverstein R. M., Rodin J. O., Burkholder W. E. and Gorman J. E. (1967) Sex attractant of the black carpet beetle. *Science* 157, 85–87.

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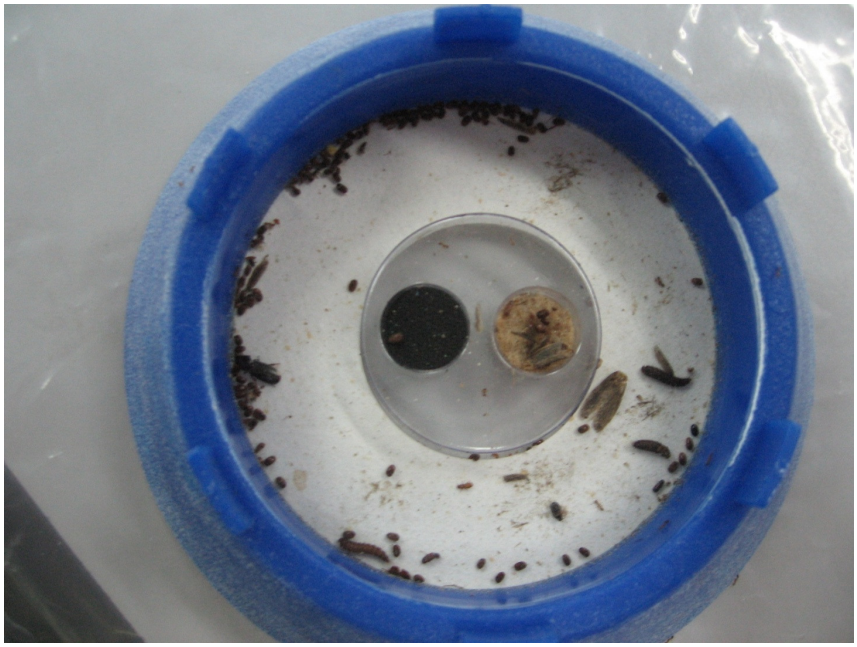
INTRODUCTION

Monitoring is the corner stone of all integrated pest management programmes. A combination of insect pheromone and food attractant can provide an effective monitoring tool for stored products insects. Though most of the insect's pheromone is species specific, several stored products insects share a common pheromone component. For example, (Z,E)-9,12-tetradecadien-1-ol acetate is the major component of sex pheromone of *Ephestia cautella, E. elutella, E. kuehniella*, and *Plodia interpunctella*.

As the food industry sourcing its components from various geographical locations the chance of incidental infestation by different insects is more likely to take place. Therefore, a multispecies trap is needed to monitor wide range of insect pests which is likely to attack any food stock of manufacturing facility at the same time. The main objective of the present study was to develop a single and simple detection and tool to monitor multiple species of major stored products crawling insects *Tribolium, castaneum, Tribolium confusum, Lasioderma serricorne, Trogoderma granarium, Trogoderma variabile, Oryzaephilus mercator, Oryzaephilus surinamensis, Sitophilus granarius, Sitophilus oryzae* and *Stegobium paniceum*.

MATERIALS AND METHODS

Tribolium castaneum and *Oryzaephilus surinamensis* was initially supplied by Detia Ltd. From these insects a colony was established and the insects held under the following condition. Both insect species were held in preserving jars with mesh under a 12 hours light – 12 hours dark light regime with temperatures of 25°C ±2°C and a relative humidity of 60%±10%. In the present test 60



T. castaneum and *O. surinamensis* of mixed sex were place in a square plastic container sized 35X33 cm. A Xlure-MST trap was placed in the middle of the container. The number of insect in the trap and on the trap was recorded in different intervals (e.g. 5, 10, 20, 30, 60, 120, 240, 390, 1200 and 1440 minutes). The test was repeated 6 times on 3 subsequent days. Recordings were taken to show the capability of the insects to climb the slope of the trap.

A blend of synthetic pheromone components of 4,8-Dimethyldecanal, 14-methyl-Z-8-hexadecenal, 7-Hydroxy-4,6-dimethylnonan-3-one and food attractant (wheat germ oil and Carob volatiles) were released from two dispenser of the Xlure-MST trap.

RESULTS

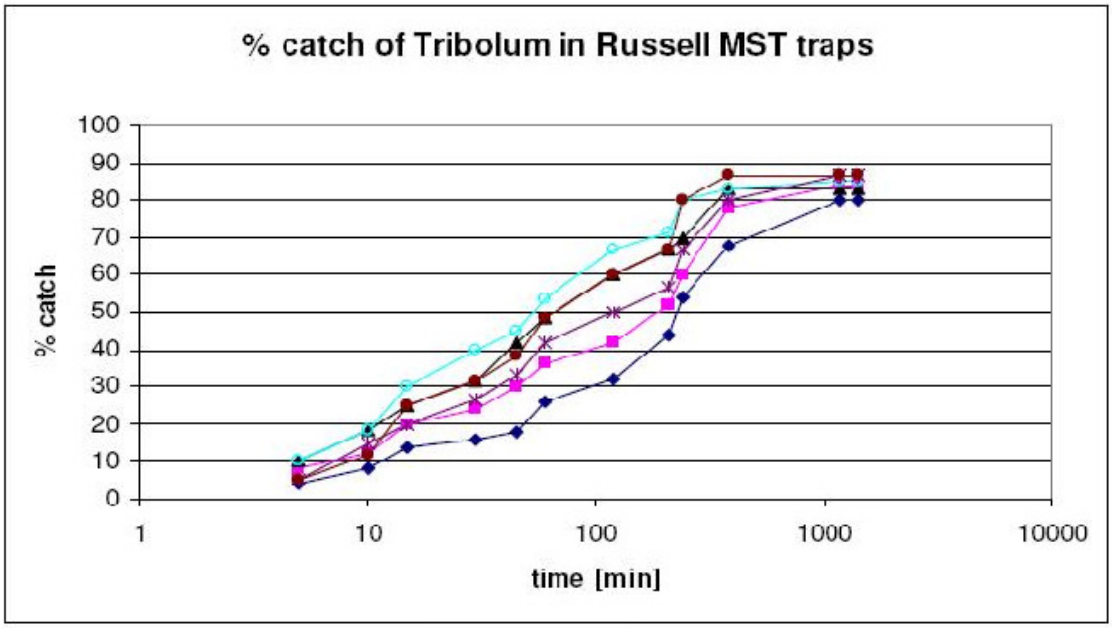


Fig.1. Percent catches of Tribolium castaneum in Xlure-MST trap.

In a laboratory bioassay, the efficacy of the Xlure-MST trap was evaluated against *T. castaneum.* The results indicated that Xlure-MST is attractive to *T. castaneum*, with a mean catch efficacy of more than 80% after 24 hours (see Figure 1). It also showed that once the beetles are caught in the trap they are unable to escape from it again. The slope of the trap does not present an obstacle to the ease of entry by the beetles into it.

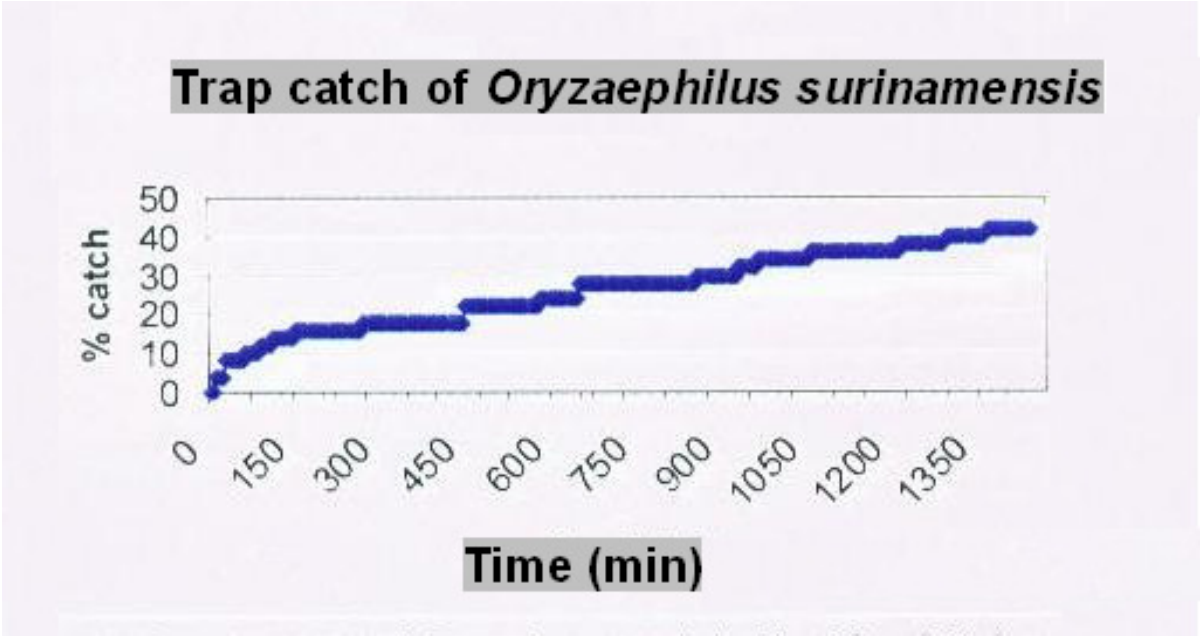


Fig.2. Percent catches of Oryzaephilus surinamensis in Xlure-MST trap.

In a laboratory bioassay, the efficacy of the Xlure-MST trap was evaluated against *O. surinamensis.* The results indicated that Xlure-MST is attractive to *O. surinamensis* and it found that 42% of the *O. surinamensis* were caught 24 hours after release the beetle *O. surinamensis* (see Figure 2).

DISCUSSION

Three pheromone components and two food attractant mixture containing trap Xlure-MST can be successfully used to monitor *T. castaneum*, *O. surinamensis* and other stored product crawling insects. It is one cost effective one trap for ten different insects and this multi-species trap can be used as one uniform monitoring tool in all stages of the production, transit and storage which will help asses and pin point the point of pest infestation in this chain.