Monitoring for Stored Product Pests during COVID-19

Pheremones are key attractants for many pests

Rikiya Sasaki

In 2020, human activities were restricted by the COVID-19 pandemic. Production activity and the manufacturing of products were temporarily suspended under lockdown. However, COVID-19 has had little to no influence on pest activity. In fact, pest activity was often higher, because of the absence of people in factories and warehouses. Anecdotally, I have heard that the number of stored product insects increased in some factories during the lockdown.

Why would the number of stored product insects increase? Because there is dust that can be used as food in a factory. Locations where dust is apt to collect may become the infestation sources. Dust is normally removed by regular cleaning, however there was often not enough time for cleaning prior to the lockdown. The dust may be left in a site for a long time, becoming the source for the infestation. What should we do to monitor for these pests during an unusual situation like COVID-19? Monitoring by pheromone traps are the usual pest management recommendation.

I'd like to think about pest control during COVID-19. Is there anything different between pest control before the pandemic and pest control during the COVID-19 pandemic? Let's begin with stored product insects, our targets.

Stored Product Insects

The main target of the topic in this article is stored product insects. They are defined as insects that attack intact seeds and commodities with low water content. They are divided into two groups by order of infestation: primary and secondary pests. Primary pests infest grains such as wheat and rice. Secondary pests infest milled products such as flour, and processed and manufactured food products. Maize and rice weevils are primary pests. The Indian meal moth, the red/confused flour beetle, and the saw-toothed grain beetle, are all secondary pests. The tobacco/drugstore beetle are both primary and secondary pests.

Both primary and secondary pests cause two forms of damage; the loss of raw materials as the pests consume the product and the contamination of the products with the insects. The early detection of an infestation is important for the prevention of damage of the stored product. Monitoring is an efficient way for early detection and a key component for pest control by Integrated Pest Management (IPM).

Pheromone Traps

Pheromone traps are one form of monitoring tool. A pheromone trap consists of two parts, a lure and a trap. The lure contains attractants to target the pests. Attractants are usually pheromones and sometimes kairomones. Pheromones are defined as a chemical substance that insects produce and emit from their body. Insects release pheromones to communicate with their own species – it is essentially their form of language. A kairomone is an odour from their food. The trap generally consists of a cardboard coated with an adhesive, sticky substance. As pheromones are species-specific, they will only attract the targeted pest. It is important to note that pheromone traps are only for monitoring use and not for direct control. Typically most only collect males and it is not possible to catch all males. Moreover, males can generally copulate multiple times and even a considerable catch of males may not lead to population reduction of the pest.

The Role of Pheromone Traps in Monitoring

In light of these limitations, what then is the role of the pheromone trap? Pheromone traps catch the target species within a certain effective range. By counting the number of insects captured we obtain a numerical value. Data from obscure infestations can be converted into concrete values through pheromone traps, thus a pheromone trap becomes a simple device for digitization. It is somewhat like a thermometer, which converts our body temperature into a numerical value.

Digitization is important for pest control with IPM. By digitization, visualization is possible. The situation of an infestation is more objectively shared by visualization. This is the first step of pest management.

Seasonal prevalence of catches and distribution maps of infestations are very typical examples of visualization. We grasp population density through the prevalence of catches and can estimate the timing of occurrence. From a map, we can identify the distribution of an infestation at a glance. We can determine when pest populations become significant, where they are occurring, and share the results easily.

Information accumulated from a distribution map of an infestation is especially helpful for pest management during COVID-19. We are able to recognize locations with potential risks of an infestation. In other words, we can focus on high risk areas to implement control measures more intensively. Thus, use time more efficiently, which is normally limited before a lockdown commences.

We conduct pest management based on information obtained from pheromone traps. However, reliable data and correct information can only come from the proper use of pheromone traps. Thus it is necessary to check product specifications and directions for use before employing a pheromone trap.

Recommended Usage of NEW SERRICO

The specification and directions for the NEW SERRICO pheromone trap for monitoring the tobacco beetle, based on experimental research, are as follows:

- Shelf life is one year, when kept in cool, dark conditions, and in the original packaging.
- A lure will last for one month once it has been taken out of the packaging.
- They should be installed at 10 metre intervals and at a height of 1.5 meters on a wall or a pillar.

Figure 1 is the relationship between storage period and performance. Performance is an efficacy value relative to the zero month. Zero month refers to a time within one week after the trap was produced. Performance was maintained over a value of 0.8, making the shelf life being one year.

Figure 2 is the relationship between use period and performance. Performance remained constant for six weeks, however, we recommend that they are used only for up to one month. The reason for this was that the experiments undertaken in our laboratory were done so under stable environmental conditions. In contrast, conditions in a site, factory, or a warehouse, may

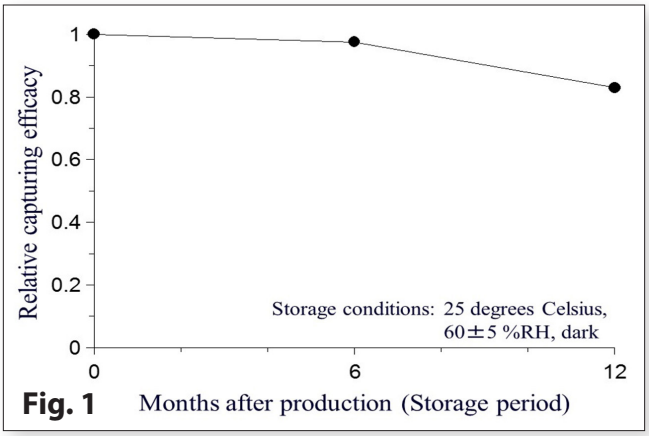

Fig. 1

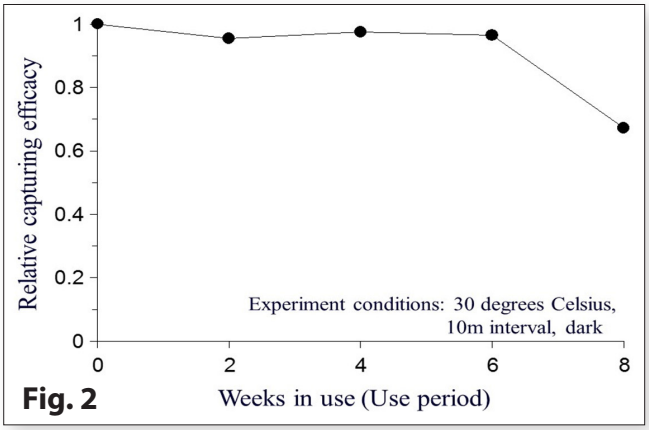

Fig. 2

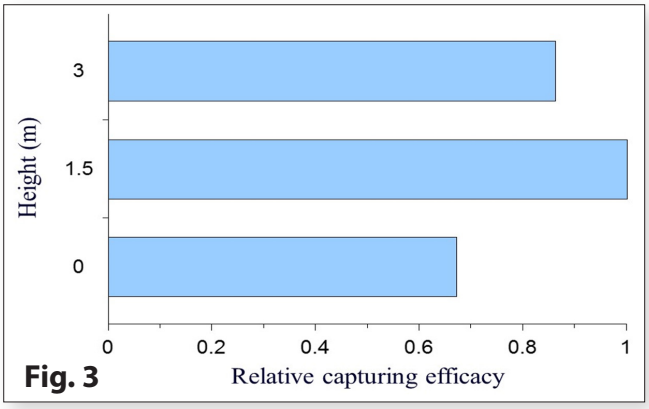

Fig. 3

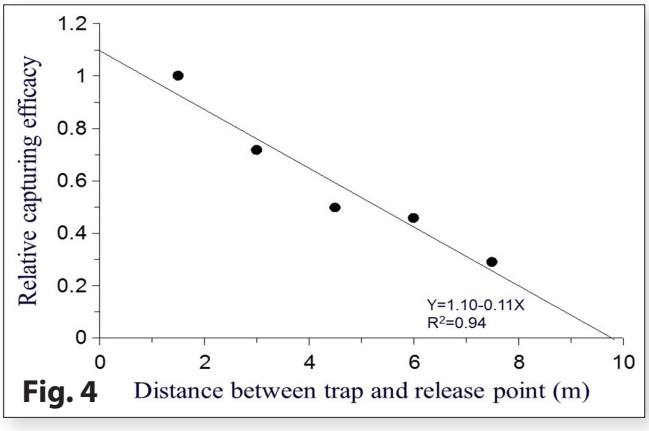

Fig. 4

fluctuate considerably. Thus we recommend that pheromone traps are used for up to one month in a site where environmental conditions constantly change.

Figure 3 is the relationship between heights that traps are placed, with their performance. At zero height, a trap was placed against a wall. Performance was not constant, although there was no significant difference between three traps at this height. Thus we recommend 1.5 metres as installation height for a trap. The height is nearly equal to eye-level, thus it is easy to check the traps and to count the number of catches.

Figure 4 is the relationship between distance and performance. A trap was placed at 1.5 metres height on a wall. Performance decreased linearly with distance, to half at five metres and to zero at around ten metres. So, we conclude that the effective range is five meters and recommend that ten metres intervals are used between traps at a site.

Pheromone traps continue to work once installed at a site and there is no need for a power supply. Thus they can still function even during a power cut. Pheromone traps are also very easy-to-use for monitoring.

Monitoring by pheromone trap enables the following three points:

1. The early detection of an infestation,
2. The obtaining of information pertaining to the insect occurrence,
3. The effectiveness of the treatments.

All of these points are essential in pest management. Moreover, these are all important aspects for a smooth response in an unusual situation, such as with a COVID-19 lockdown. Preparation in usual times will come in handy when the situation becomes unusual! ■

This article is a summary of Mr Rikiya Sasaki's presentation given at the FAOPMA-Pest Summit 2020 Virtual Conference.

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