Usefulness of Conventional UV Light Traps in Capturing Stored Product Pests

Preserving the safety of food for human consumption

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Introduction

Food production under HACCP requires all impurities or foreign objects, including biological contaminants such as pests to be kept out from the premises, the production process and the final product. Raw materials are usually the critical route where stored product pests make their entry into the food processing procedure. Even though fool proof methods for their elimination can be implemented once they are noticed, their earliest detection continue to remain a challenge.

There are many methods which have evolved over time to detect stored-product pests in bulk grain, food processing, and retail environments. These include the use of visual methods by sampling the products, detection methods such as using chemicals including pheromones, and physical detection through the use of traps. However, it is common knowledge that methods involving the capture, detection or trapping requires considerable knowledge of the pest biology, behaviour, and ecology.

Trapping the pest eventually helps gather the correct nature of information on the distribution dynamics and helps to pin-point the source of the infestation. Unfortunately, to the author's knowledge, there is no single protocol available to date to determine the best capture method. Another challenge in capturing and detecting stored product insects comes from the fact that these pests are often sedentary, cryptic and remain concealed deep inside commodities. Stored product insects often are also active at night when they search for food, mate, and shelter (Toews and Nansen, 2012). In addition, insects have natural movement influenced by many factors. Work showed that only 6% of red flour beetles were moving at any given time (Campbell and Hagstrum, 2002). Also, there are a number of stored pests which are not capable of flight, these even though are attracted to light or

a pheromone, may not be captured in a trap situated at some distance.

In spite of these limitations most stored products can be monitored by traps of varying designs. These pests are captured with traps using various types of attractants such as pheromone, food baits, sticky coloured boards, and light. Even though such traps are extremely limited in providing population data, they are much more effective than visual counting. Also, these traps do not necessary reflect correctly on overall pest populations as many of the pests may not be mobile or capable of flying, or in a position to be attracted. But practitioners with experience have used multiple traps and trap types to determine spatial distribution of pests and use the data to implement management strategies.

UV Lights as an attractant to stored pests

Light traps using ultraviolet (UV) light are a popular tool in capturing flying insects in food establishments. They are designed primarily for houseflies. In spite of this, it has been shown that light traps can be effective in attracting and trapping stored product pests. Research on this aspect is available and evidence of firsthand field use has been documented.

Light traps use light as an attractant to capture the insects. These traps are powered by bulbs emitting a light in the ultraviolet range, constituting 315 to 400nm wavelength. The principle of operation is that flying insects are attracted to the light and are captured or killed when they enter the trap through the front grill and get stuck on the glue board. Some stored product pests are attracted by

light of wavelengths between 280 and 600nm: and others to wavelengths in the green light region measuring between 500–560nm (Rees, 1985). A similar observation showed that some stored-product insects, such as the Mediterranean flour moth adults in particular, are more attracted to electroluminescent green light than to UV light (Soderestrom et al., 1987). Nualvatna et al. (2002) found that light traps were useful for capturing Angoumois grain moths, lesser grain borers, maize weevils, and red flour beetles in rice mills and paddy seed stores. Hagstrum et al. (1977) found that the rate of female almond moth captures increased when a black light was included on the trap compared to separating the lamp from the trap; no differences were observed for male almond moth captures. In another study, light trap size and light trap location was shown to be important criteria in capturing of cigarette beetle, *Lasioderma serricorne* (Waguri et al., 2016).

Conclusion

Light traps are useful tools for detecting stored product pests. It also serves as an additional methodology in running IPM programs in this sector. However, practitioners must identify their limitation when employed. They may not be suitable for all types of pests. Also, the nature of presentation of the light traps, such as intensity of the light and the design of the trap may play a significant role in the attraction of the insect pests. It has also been shown that the response of the insects toward an attractive light source is also influenced by the insect species, age, sex, temperature, and other environmental conditions, as well as intensity of surrounding light and photoperiod (Rajendran, 2005). Rees (1985) reported the location and position of the traps are crucial factors in trapping stored product insects. At the business end, the decision on which trap to use is heavily influenced by price, and under these circumstances it is important to recognize the importance of having as many trapping stations as is feasible, a must requirement to get the best results (Toews and Nansen, 2012). ■

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