AgriCos e-Newsletter
ISSN: 2582-7049
Volume : 01 Issue : 07 November 2020 Article No: 13

Pheromones of Insect is an Eco-Friendly Tool for Pest Management

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SUMMARY

Organic compounds that convey chemical signals are semiochemicals. They are used for intra- and inter-species contact by insects. Intra-specific pheromones are chemicals capable of functioning beyond the body of the individual who secretes to influence the person who receives the action. There are various types of pheromones available, including sex pheromones that are of vital importance in the management of eco-friendly pests. These have been commonly used to track the disruption of harmful insect pests, mass trapping and mating.

INTRODUCTION

In the food chain and in our breakfast, lunch and dinner, the contaminants have joined". This is one of the comments that we hear at least once a day from individuals. There were also some big repercussions of the glory of the green movement. The introduction of high yielding varieties and the use of excess fertilizer have intensified the issue of insect pests in India. The increased issue of insect pests prompted scientists to recommend the use of synthetic insecticides to farmers. Now we are in a frame of mind to correct our errors after five decades of continuing damage to the environment. As Integrated Pest Management (IPM), several techniques were introduced by scientists in an umbrella to handle insect pests, including biological control, habitat manipulation, and cultural practice adjustment, the use of resistant varieties, insect growth regulators, and last resort pesticides. In IPM, insect pheromones are one of the significant components that have been proven successful.

Pheromones are?

Semiochemicals are called chemicals involved in signaling between species and influencing behavioral change. These chemical signals are both intraspecific (within the same species) and interspecific (between species). Chemicals that mediate intraspecific relationships are known as pheromones. Allelochemicals are called chemicals that mediate inter-specific interactions. The former has been used more widely and commercially for the control of pests, while the latter is less widely used. Pheromones, derived from the Greek words meaning "too bring" and "to stimulate or stimulate," are chemicals released by one member of the species that only cause individuals of the same species to react. There are many kinds of pheromones, such as aggregation pheromones, alarm pheromones, trail pheromones, and sex pheromones. The most well-known are the sex pheromones in IPM. A sex pheromone is usually secreted by one-sex insects, causing sexually mature individuals of the opposite sex to be attracted and excited, leading to copulation between females and males of the same species. This opposite sex attraction mechanism was exploited and many synthetic or para pheromones were developed for their control against a variety of insect pests.

Uses in Pest Control of Sex Pheromones

For three reasons, several insect sex pheromones were used in IPM,

1. Monitoring

The most active use of sex pheromones has been in insect pest monitoring. Traps baited with synthetic pheromone lures help reliably identify pests. It can be used to consider the life cycle of insects, the pattern of adult emergence and the prediction of early infestation in the crop season. This knowledge can be used efficiently to make insecticide spray decisions at the correct time. It is possible to use the information obtained from the trap catches to establish a pest forewarning device. For effective implementation of pest management, careful monitoring and efficient data interpretation are critical. So far, over 2000 insect sex pheromones have been reported worldwide. Just a few hundred have been used for pest control in agriculture and horticulture (Nandagopal *et al*., 2008). Less than 20 insect sex pheromones have been used for tracking in India.

Gram pod borer (*Helicoverpa armigera*), tobacco cut worm (*Spodoptera litura*), rice stem borer (*Scirpophaga incertulas*), brinjal shoot and fruit borer among several successful examples where sex pheromones are used in control; there are few borers (*Leucinodes orbonalis*).

2. Mass-trapping:

Mass trapping with pheromones to minimize total numbers, or simply capturing as many insects as possible. In order to get the population below dangerous levels, a large number of traps have been built here to capture insects. This approach is a direct form of insect pest control. If the population is moderate, mass trapping accompanied by the use of bio-pesticides would be appropriate for insect pest control. The efficient mass-trapping of insect pests, such as type of trap, trap height, trap density and environmental conditions, are determined by several factors. Mass trapping technology has been used in the management of more than 10 insect species in India. Some studies indicate that brinjal shoot and fruit borer, cotton pink bollworm, tobacco cut worm, and gram pod borer can be handled exclusively by mass trapping. In larger regions, however, the effectiveness of mass trapping still has to be confirmed. But it is necessary not to underestimate the potential of this technology (Cork and Hall, 1998).

3. Mating disruption:

This has been used most extensively in agricultural management. The critical pests of moths. Synthetic pheromones are released onto crops in this case, and the false odour plumes draw males away from females waiting to mate. This allows mating to decrease, thus reducing the population density of the pests. The impact has been so great in some cases that the pests have been eradicated locally. Mating disruption in India, in numerous cropping systems, it is shown to be successful. Sugarcane stem borer (*Chilo auricilius*), tobacco cutworm (*S. litura*) in groundnut, rice yellow stem borer are some examples. Cost is a concern, so it appears to be used where insecticide resistance is a problem, efficient and low-cost insecticides are missing, and the use of insecticides will conflict with biological control and environmentally sensitive areas.

Insect Sex Pheromone Traps (Points to be remembered while using)

- Various types of traps, such as funnel traps, wing traps, water traps, etc. Trap selection depends on which insect you want to treat.
- Pheromone lures are only available for particular pests, and particular lures for targeted insect pests are picked.
- It is important to position traps 40-100 m apart.
- Traps are tested twice a week; trap count registered and insects removed from the trap.
- Often inspect the crop in accordance with the traps to determine the behavior and harm of insects.
- During the entire season, substitute pheromone lures, referring to the manufacturer's instructions about how long pheromones last.
- Replace them when they get dirty or wet.

The pheromone tracking and mass-trapping technology can be better appreciated in India's brinjal shoot and fruit borer management. The pheromone trap in brinjal and other guidelines for the use of pheromones are shown in the following illustration (Table 1).

Table 1. Sample instructions for the use of Pheromones

Pest	**Brinjal shoot and fruit borer (For Monitoring)**	**Brinjal shoot and fruit borer (for mating disruption)**
Type of trap	Pheromone lure + Water trap/Funnel trap/Wing trap	Pheromone lure + Water trap/Funnel trap/Wing trap
Place in field	8	100
No. of traps/	Before the flowering of brinjal	Before the flowering of brinjal

ha Arrangement in field	For successful attraction, place the traps either at the canopy level or slightly above the canopy level.	For successful attraction, place the traps either at the canopy level or slightly above the canopy level.
Interpreting catches	Insecticides may be applied at upswing in pheromone trap counts or 6-10 days afterwards, depending on the insecticide picked. If emergence is prolonged or fresh injury continues to be observed, a repeat application may be required.	If mating disturbance works properly, these traps should be caught in very low numbers or without shoot and fruit borer moth. This indicates a potential failure of mating disruption if moths are caught in traps, and supplemental insecticide sprays may be needed at borders and/or the entire block.

CONCLUSION

Pheromones may be used to detect and manage insects that are non-toxic to animals and plants and that are unique to the target pest. The use of pheromone technology takes an hour. However, the lack of knowledge among farmers, the slow pace of research on the identification of insect pest pheromones in India and inadequate investment in the popularisation of pheromone technology are some of the major constraints. Effective innovations will, however, still be at the forefront.

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