

# Role of pheromones and its antioxidants in IPM

## Abstract

Pheromone technology has potential to add value in long-term pest management of many economically important pests. Inclusion of insecticides or sterilant in pheromone formulations may not be major obstacles to public acceptance in urban areas. Pheromone technology is cost effective and applicable in area wide pest management approach.

Volume 6 Issue 2 - 2017

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**Received:** October 12, 2016 | **Published:** January 30, 2017

## Introduction

Insects rely more heavily on chemical signals than on any other form of communication. Semiochemicals or infochemicals serve as a form of language that helps to mediate interactions between organisms. Semiochemicals are of two types namely pheromones and allelochemicals. Pheromones are exocrine secretions of insects which are used for communication among different individuals of the species. Pheromones are "Semiochemicals used for intraspecific communication between individuals of a single species".<sup>1</sup> Insect pheromones fall into several categories viz., change in insects (Primer and Releaser), functional group (Type- I & II) and number of components (Mono & Multi component).

## Different types of pheromone traps

According to the studies conducted by Karuppuchamy et al.,<sup>2</sup> in Tamil Nadu with gossypure revealed that water pan traps were superior to sticky delta traps in catching more male moths. Among the water pan traps used, yellow pan traps caught more males followed by black tray and red pan traps. The peak male activity was found between cotton crop was 120 days old (December) to 180 days old (February-March). The effectiveness of sticky delta traps was increased by changing the side of the traps.

Taneja et al.,<sup>3</sup> reported that maximum number of moth catches was obtained when rubber stopper was used as a dispenser and cotton seed oil as a moth sticking material.

## Factors affecting the pheromone trap

Taneja et al.,<sup>3</sup> reported that the effectiveness of pheromone lure against *P. gossypiella* is affected by number of factors viz., ratio of component pheromones; trap design; height and distance and wind velocity. The trap installed at plant canopy level with 60 meters distance between two traps was effective to capture more number of moths compared to 40 and 20 meter distance. Athanassiou et al.<sup>4</sup> evaluated the various trap designs and quantity of lure for trapping of pink bollworms and observed that the funnel trap was very effective to trap higher number of moths whereas the trap baited with one lure was sufficient to capture higher number of moths.

## Antioxidants

Yuxiu Liu et al.,<sup>5</sup> suggested that persistence and catching efficacy of synthetic chemicals was improved by addition of the antioxidant BHT. The optimum percentage was obtained at 5-10% BHT. The data also exhibited that high percentage of BHT (20%) inhibited the attractiveness of pheromone chemicals.

## Pheromone as component of IPM

### Monitoring and mass trapping

Ghodki et al.,<sup>6</sup> reported that the high moth catches (432 catches/trap/week); maximum eggs and larval population per plant during 48th meteorological week (November-December). A field study on population dynamics of *P. gossypiella* based on moth catches in pheromone trap at Junagadh revealed that its population gradually increased from first week of October, reached the peak in third week of December and decreased gradually in the later period of cotton crop.<sup>7</sup>

### Mating disruption

Boguslawski et al.,<sup>8</sup> reported that organic cotton with mating disruption had less infestation of pink bollworm larvae as compared to conventional cotton, with or without insecticide.

### Effectiveness of pheromone traps over other protection measures

Dhawan et al.,<sup>9</sup> observed that gossypure @ 10g ai/ha can increase the effectiveness of quinalphos 50g ai/ha or cypermethrin 50g ai/ha for pink bollworm control and gave higher yield than that of the insecticides used alone.

Gupta et al.,<sup>10</sup> found that application of sex pheromone lures for all the three bollworms (Pink bollworms, American bollworms and Spotted bollworms) in trap @ 10/ha and six sprays of insecticides resulted in less shedding of fruiting bodies, damage to locule and bolls and higher net profit.

## Conclusion

Pheromone technology has potential to add value in long-term pest management of many economically important pests. Inclusion of

insecticides or sterilitant in pheromone formulations may not be major obstacles to public acceptance in urban areas. Pheromone technology is cost effective and applicable in area wide pest management approach.

### Future thrust

The cocktail approach i.e., putting together several pheromones in one device or treatments has not been successful and more studies should be conducted in order to get a better understanding of the concept. The current approach therefore is that one has to focus attention on synthesizing large quantities of pheromones for the farmers' use by producing them indigenously at a highly competitive economic price. Further, effectively integrating pheromone application into an IPM strategy where mixture of specific and general pest control application are used will be a sustainable approach and deserves to be tested.

### Acknowledgements

None.

### Conflict of interest

The author declares no conflict of interest.

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