

Semiochemicals: Manipulating Insect Behaviour for Sustainable IPM

Chemical communication plays an essential role in the survival of insect pests. Semiochemicals are behaviour-modifying organic compounds used by insects to convey specific chemical messages. These are species-specific, harmless to the environment, and are of immense significance in the sustainable management of agricultural pests, particularly under organic cropping systems. Semiochemicals are divided into two broad groups viz. pheromones, which mediate interactions among individuals of the same species (intraspecific reactions), and allelochemicals which mediate interactions among individuals of different species (interspecific interactions). Allelochemicals are divided into kairomones mediating interactions favouring the recipient and allomones favouring the emitter. Semiochemicals are well-known management tools, especially for cryptic species and are vital components of integrated pest management programmes the world over.



The sex pheromone of the silkworm moth, *Bombyx mori*, was the first to be chemically identified in 1959 and is considered the most important semiochemical used in pest management. Isolation and identification of semiochemicals is a sophisticated process generally involving analytical procedures such as SPME, GC-EAG, GCMS and NMR.

Control of pest populations can be achieved via several methods, including the use of attractants for mating disruption, mass trapping, attract-and-kill, push-pull, a combination of an attractant and a repellent or attract-and-infect when the attractant is combined with a pathogen to enhance biological control. Among insect pests, most identified pheromones are of Lepidoptera and Coleoptera species. Furthermore, sex pheromones that have been most successfully used are lepidopteran pests while aggregation pheromones are significant in combating coleopterans. In the Middle East and North Africa, pheromone technology is widely used to monitor, and mass trap the Red Palm Weevil (RPW), *Rhynchophorus ferrugineus* (Coleoptera : Curculionidae) in date palm. Recently the trap and bait free 'attract and kill' technique against RPW has emerged as a promising tactic to control this lethal pest in hot spots, while the repellent tumerone holds promise as an oviposition deterrent against RPW.

Insecticide based chemical agriculture poses a significant threat to human health and the environment. In this context the role of semiochemicals for sustainable IPM is of overwhelming significance.

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