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# CHAPTER 9

# Semiochemicals

A semiochemical (semeon means a signal in Greek) is a generic term used for a chemical substance or mixture that carries a message. These chemicals acts as messengers within or between species. It is usually used in the field of chemical ecology to encompass pheromones, allomones, kairomones, and synamones. Within both allelochemicals and pheromones it is sometimes useful to refer to chemicals as arrestants, attractants, repellents, deterrents, stimulants or other descriptive terms.

Probably all insects use semiochemicals; natural chemicals released by an organism that affect the behaviours of other individuals. Semiochemicals are subdivided into allelochemicals and pheromones depending on whether the interactions are interspecific or intraspecific, respectively. Allelochemicals, then, are chemicals that are significant to individuals of a species different from the source species. Allelochemicals are subdivided into several groups depending on whether the response of the receiver is adaptively favourable to the emitter but not the receiver (allomones), is favourable to the receiver but not the emitter (kairomones) or is favourable to both emitter and receiver (synomones). Pheromones are intraspecific signals that aid in finding mates, food and habitat resources, warning of enemies, and avoiding competition. Interspecific signals known as allomones and kairomones have similar functions.

The goals of using semiochemicals in pest management are:

- To monitor pest populations to determine if control is warranted.
- To alter the behaviour of the pest or its enemies to the detriment of the pest.

In general, the advantages of using semiochemicals are:

- They have adverse effects only on target pests.
- They are relatively nontoxic and required in low amounts.
- They are non-persistent and environmentally safe.
- They appear difficult for insects to develop resistance against.

Monitoring of pest populations with pheromones is often integrated in management programmes.

## 9.1. ALLELOCHEMICALS

### 9.1.1. Allomone

An allomone is any chemical substance produced and released by an individual of one species that affects the behaviour of a member of another species to the benefit of the originator but not the receiver. Production of allomones is a common form of defense, particularly by plant species against insect herbivores. "Allomone" was proposed by Brown and Eisner to denote those substances which convey an advantage upon the emitter.

### 9.1.2. Kairomone

A kairomone is a semiochemical, emitted by an organism, which mediates interspecific interactions in a way that benefits an individual of another species which receives it, without benefitting the emitter. Two main ecological cues are provided by kairomones; they generally either indicate a food source for the receiver, or give warning of the presence of a predator. Kairomones can be employed for insect control in a variety of baits and traps.

### 9.1.3. Synomone

A synomone is a semiochemical, emitted by an organism, which mediates interspecific interactions in a way that is favourable to both emitter and receiver(s). Synomones include floral odours which attract pollinators (such odours are mutually beneficial if a food reward—nector or pollen—is associated with the flower) and volatile compounds produced by plants when attacked by herbivorous insects that attract predators and parasitoids attacking herbivores.

## 9.2. PHEROMONES

The term "pheromone" was introduced by Peter Karlson and Martin Lüscher in 1959, based on the Greek word pherein (to transport) and hormone (to stimulate). They are also sometimes classified as ecto-hormones. German Biochemist Adolf Butenandt characterized the first such chemical, Bombykol (a chemically well-characterized pheromone released by the female silkworm to attract mates).

A pheromone (from Greek phero "to bear" + hormone from Greek – "impetus") is a secreted or excreted chemical factor that triggers a social response in members of the same species. Pheromones are chemicals capable of acting outside the body

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