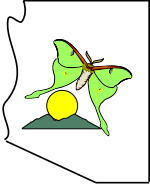


COOPERATIVE EXTENSION



Insect Pheromones

No. 5

More About Bugs and Their Relatives Series

1. What are pheromones?

Pheromones are chemical “scents” produced by animals of a species to communicate to other members of that species.

Many insects produce pheromones. Although they don't have a "nose" like we do, they are able to detect chemicals in the air with their antennae. There are several kinds of pheromones:

a. Sex pheromones are produced by either the male or female to attract members of the opposite sex for mating. Because insects are quite small relative to their environment, they have difficulty finding one another. Some insects make noises to attract other members of that species, such as crickets chirping or cicadas trilling. But noises may also attract predators that feed on the calling insect. Another strategy is to produce a scent that only members of your species can detect. For example, female codling moths (pests of apples) produce sex pheromones from a special gland to attract male moths. The male moths detect the chemicals with their antennae. Once they detect the pheromone, they fly upwind until they reach the female.

b. Trail pheromones are used by social insects, such as ants and termites, to indicate the location of food to other members of their group. If a single ant finds a mass of food that is too large to carry, it lays a chemical trail back to its nest. There it either passes the food around while making noises, or produces another chemical scent that tells other ants to follow the trail back to the food source.

c. Alarm pheromones are released in times of danger to warn others of the threat of harm. For example, aphids may produce an alarm pheromone when a predator is nearby, which causes all the members of the group to jump from the plant. Bees, wasps, and ants produce alarm pheromones when one member of the nest is attacked to draw defenders to the site.

d. Aggregation or grouping pheromones bring members of a species together to jointly attack a food source or to overwinter together in one site. An example of an aggregation pheromone is found in the bark beetles. A single or a few bark beetles can not successfully attack a pine tree because the tree produces pitch or sap and drowns them when they attempt to burrow in. But numerous bark beetles can overcome a tree's defenses. The first bark beetles to find a suitable tree produce an aggregation pheromone to attract other bark beetles in the area to join in the assault.

Other examples of this type of pheromone occur in ladybeetles, which group together in locations in the mountains to wait for aphids to build up the next spring. Also, the green traps seen along the roads in agricultural areas contain an aggregation pheromone to monitor for boll weevils, which attack cotton.

e. Marking pheromones are left behind by some female insects to indicate where they have laid their eggs, so that other females do not lay in the same spot. This is especially true of parasitic wasps that lay their eggs in other insects. Too many eggs in one host would cause the parasites to use up the host before they could complete development.

2. Can I smell insect pheromones?

Because sex, marking, and aggregation pheromones are used within a species, other species generally can't perceive them. But humans can occasionally smell alarm pheromones, such as the acrid smell produced by certain ants when they are alarmed.

3. How are pheromones used to control insects?

Scientists have been able to identify and make some of the pheromones used by insect pests. The insects respond to the artificial chemical just as they would to the naturally produced material and can thus be managed. The use of pheromones is likely to expand in the near future in both agricultural and urban environments.

Sex pheromones may be used to monitor the number of insect pests in an area. For example, cotton growers may use cardboard sticky traps baited with the sex pheromone of female pink bollworm moth, an economically important pest of cotton. Male pink bollworms are attracted to the pheromone and fly into the trap, where they get stuck. If there are a certain number of males in the trap per night, we can usually assume the numbers of pink bollworms have reached critical levels, and a chemical insecticide may need to be applied (when the proper plant growth conditions exist). Unfortunately, trapping the males is not thought to control pink bollworms.

Pheromones may be used to control other insects, however. Sex pheromones may be spread throughout a field to confuse males searching for females, and disrupt mating in some cases. Aggregation pheromones may be used to attract cockroaches or beetles of both sexes to sticky traps where they are killed.

4. Do humans have pheromones?

Although humans are not known for their sense of smell, there is some evidence that we do produce a few pheromones. For example, most nonsmokers can readily identify a person's sex by smelling a t-shirt that has been worn for 24 hours, even if that person did not use perfumes, soaps or shampoos.

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