

Introduction

Learning Objectives:

After completion of the Introduction, the trainee should be able to:

- Know what is expected of you as a General Pest Control Applicator.
- Know how insects transmit human disease.

Expectations of a General Pest Control Applicator

Applicators must demonstrate a practical knowledge of a wide variety of pests, including their life cycles, types of formulations appropriate for their control, and methods of application that avoid contamination of food, damage and contamination of habitat and exposure of people and pets. Since human exposure, including babies, children, pregnant women, and elderly people, is frequently a potential problem, applicators must demonstrate practical knowledge of the specific factors that may lead to a hazardous condition, including continuous exposure in the various situations encountered in this category. Because health related pest control could involve outdoor applications, applicators must also demonstrate practical knowledge of environmental conditions, particularly related to this activity.

How Insects Affect Man

Insects have a long history through many geological periods. They appeared in the world long before man; yet insect fossils from coal, amber and limestone deposits differ little from their present-day descendants of 250 million years. As man appeared on earth and changed, his parasites and pests evolved with him.

Over 750,000 species of true insects have already been described, and it is estimated that we have about 20,000 to 30,000 species of insects in Arkansas. Arkansas also has hundreds of thousands of species of mites, ticks and other close relatives of insects.

For centuries man has fought insects as pests, carriers of disease and destroyers of his food. This combat will continue, for humans have never eradicated a single species. Today, many of the most important species are showing increasing resistance to insecticides. Consequently, other methods of control, either alone or in combination with insecticides, are necessary.

Insects are often thought of as man's most formidable competitors. Not only do they damage crops, but insects such as flies, fleas, lice and mosquitoes directly attack man and domesticated animals. Others attack indirectly by transmitting dangerous diseases to man and animals.

Transmission of Human Disease

Although insect bites or stings occasionally cause severe illness or are fatal to humans and animals, their disease-laden saliva or contaminated bodies are responsible for many illnesses or deaths over the world.

Mechanical or passive transmission of disease occurs, for example, when the housefly merely transports organisms – such as dysentery bacteria on its feet, body hairs and other surfaces – from filth to humans. Other examples include cockroaches and vinegar gnats that visit sewers and liquid excrement and then move to human habitations.

Biological transmission of disease occurs when an insect, such as the bedbug I or flea, mite or tick, is essential for the completion of the life cycle of the disease or parasite. Certain *Anopheles* mosquitoes, for example, are essential carriers and vectors of the malaria parasite. This parasite undergoes a portion of its life cycle in the *Anopheles* carrier and another portion in the human host.

Disease is also transmitted through the host-vector relationship. Such transmission is often further complicated by more than just the direct carrier of the disease from one host to another. Some other hosts called “reservoirs” are not affected by the disease but are able to perpetuate the disease organism by providing safe harborage for the disease organism. Some birds, for example, are reservoirs of mosquito-borne encephalitis

(sometimes called “sleeping sickness”). The birds are apparently unharmed by the encephalitis virus, but when the mosquito sucks blood from the bird and then bites man or horses, the virus may produce serious or fatal results.

Insects generally cannot transmit disease unless they have already bitten a diseased host. For example, an *Anopheles* mosquito cannot transmit malaria unless it has first bitten a person with the malaria parasite (in addition, there is often an “incubation period,” a period between when the disease is picked up by the insect and the time when it is able to transmit the disease). Some ticks and mites, however, are able to transmit disease-causing organisms, such as the rickettsia causing Rocky Mountain spotted fever, directly to their offspring through the egg.

Myiasis is the infestation of man or animals by living larvae (maggots) of flies. Maggots mostly infest dead tissue. An example of the other type is the “true screwworm” which attacks the living tissue of livestock and rarely man. The maggots of some flies, including the rat-tailed maggots of flower flies, may be accidentally swallowed and cause intestinal upsets.

Poison, Irritation and Allergy

Many insects and some spiders, scorpions and centipedes have developed poisoning mechanisms for self-defense or for paralyzing their prey. Stings and bites may be intensely irritating to humans but seldom cause death in Arkansas.

Probably the most dangerous are the bites of the black widow spider, *Latrodectus mactans*, and the sting of a small scorpion, *Centruroides vittatus*, found in Arkansas. The brown recluse spider, *Loxosceles* recluse, is common in Arkansas and may inflict a serious bite, which may result in sufficient dead tissue that skin grafting is needed. Even the stings of bees and wasps may be serious or even fatal to persons highly allergic to their venoms.

Some insects, such as the dermestid beetle larvae, have stiff hairs that when touched feel like stinging nettles. Cantharidin, present in the blood of blister beetles, causes painful blistering of the skin when the insect is crushed. Mosquitoes, fleas, chiggers and other pests have done much to irritate man.

Another, more recent finding concerning insects and allergy is the relation between cockroaches and asthma. Studies have shown that with increased weather-tight buildings, indoor air quality has been lowered and, in structures where roaches are present, cockroach dust will increase the likelihood of childhood asthma.