City of Boulder

Integrated Pest Management



What is Integrated Pest Management or IPM?

Integrated Pest Management (IPM) is a process that is used to address pest issues, while minimizing risks to people and the environment.

IPM uses a common sense approach to decision-making, based on the best available science, observation and a knowledge of the biology of the target organism, which is viewed within the context of the functioning ecosystem where it lives. It is a "whole systems approach," which selects, integrates, and implements a combination of strategies to prevent or manage pest populations within established thresholds. When choosing management strategies, consideration is given to potential impacts to human health, the environment, non-target organisms, and overall biodiversity and ecosystem health. These strategies should augment or restore natural checks and balances within the ecosystem or food web; with rare exceptions, the goal is not to eliminate the pest species, but to suppress or decrease its population to the point that environmental factors and natural enemies keep it within tolerable levels. Therefore, an important aspect of IPM is the development of specific criteria for when damage from the pest reaches a threshold before action is taken to manage it.

What is a pest?

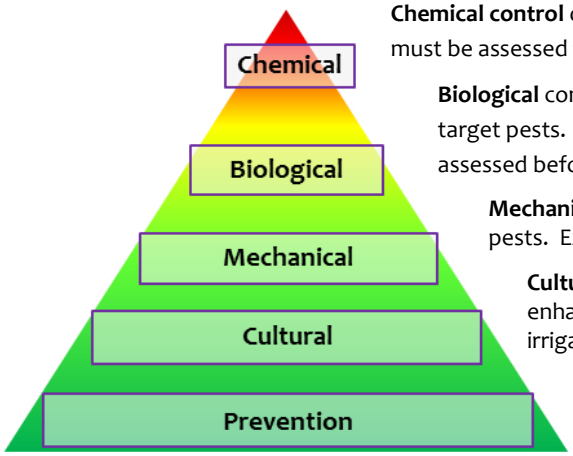
Broadly, a pest is an organism that interferes with desirable plants, impacts human or animal health, damages structures or harms some component of the ecosystem. The pest can be an insect, rodent, nematode, fungus, weed, or any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism.

How are IPM strategies chosen?

Options are weighed and chosen by reviewing information about the site that is being managed and the pest threshold. The IPM process categorizes management practices and places them within a hierarchy, which is prioritized from the least impactful and most ecologically compatible to the most impactful options that carry the most potential risk of harm or can interfere with other management options or ecosystem balance. This can become quite complex and can require continuous gathering of information and developing new approaches.

Often, a combination of approaches is necessary. Many times, the most environmentally sound management practices on the lower tiers of the hierarchy pyramid keep pest populations within acceptable levels and pesticides are rarely if ever needed. When non-chemical approaches fail or are not feasible, then judicious use of pesticides is considered.

The IPM Hierarchy



Chemical control or pesticides are the last resort. Before any use, the product and proposed use must be assessed for potential human and/or environmental impacts.

Biological controls include the introduction or enhancement of natural enemy organisms of target pests. Introduction of non-indigenous organisms carries risk and must be thoroughly assessed before consideration.

Mechanical control uses physical methods or mechanical equipment to remove or exclude pests. Examples include mowing, hand removal of insects or weeds, barriers and traps.

Cultural control uses practices that reduce pest survival, reproduction or establishment due to enhancement of desired conditions. Examples include grass mowing height to shade weeds, irrigation to reduce fungal diseases, or securing trash to avoid rodent problems.

Prevention is the foundation of successful IPM. It reduces the capacity of the ecosystem to support target pest populations through design and appropriate management. Examples include appropriate plant choice, soil preparation, using weed-free soil, taking care to prevent introduction of exotic organisms, building healthy soils and protecting biodiversity.

City of Boulder Pesticide Assessment Process

The City of Boulder requires that all pesticides undergo an assessment process before application is permitted on city-owned properties. In addition, approval must also be given for the target pest, where and when the pesticide can be used, and the application method. The more hazardous the pesticide and the more potential risk, the more restrictions are in place in order to minimize unintended effects to people, non-target organisms, surface and ground water and overall environmental health.

The city's IPM policy states that "the city assumes that all pesticides are *potentially* hazardous to human and environmental health" with the goal "to reduce and eliminate, where possible."

What is a pesticide?

Many people consider the terms pesticide and insecticide to be interchangeable. However, an insecticide is one type of pesticide. A pesticide is defined as any substance or mixture of substances intended for destroying or repelling any pest. Besides insecticides, this also includes herbicides, fungicides, rodenticides and other products. Any substance that is used to control a "pest" (see definition of pest on the other side of this sheet) is a pesticide.

Why doesn't the city rely solely on the EPA's pesticide registration process?

Pesticides are different from all other chemicals in that they are *designed* to kill or repel a living organism. In the majority of pesticide applications, a small amount of the pesticide actually reaches the target pest. Much of the pesticide can end up in the air, water or soil where non-target organisms are inadvertently exposed. The EPA requires the manufacturers of pesticides to conduct a range of tests on representative organisms. In almost all cases, only the active ingredient is tested. This is potentially an issue, since the formulated product can contain undisclosed ingredients that may have toxic properties or can boost the activity of the active ingredient. In the real world, mixtures of pesticides are often applied and most organisms, including people, are exposed to a range of environmental pollutants. Some independent researchers have tested mixtures, but the regulatory process usually looks at only one chemical a time.

The process

A qualified city staff member or consultant begins by reviewing the regulatory data from the EPA and other relevant and vetted regulatory agencies from other countries. This information includes standard toxicity testing on representative lab animals and plants that the agencies use to develop exposure standards, including food, drinking water, occupational exposure, non-target species and environmental fate. When pesticides are new to the market, independent studies are often lacking. If a particular pesticide has been on the market for many years or concerns are raised, then it's more likely that independent studies become available in a variety of areas. The city conducts a literature review and includes these in any pesticide assessment. The following information is gathered:

Acute Toxicity: This is a single dose or short exposure from ingestion, inhalation or dermal exposure of a pesticide. The term LD50 refers to the lethal dose that kills 50% of test animals.

Chronic Toxicity: This is repeated exposures that occur over long periods of time. Some tests look for health issues in single individuals such as cancer, nerve system damage and other health effects, while others look at reproductive issues that are passed on to progeny. This includes "sublethal" effects, where the exposure doesn't kill the animals, but can cause other health issues over its life.

Endocrine Disruption: Some chemicals can mimic or interfere with the body's hormonal systems. This can happen at very low doses can cause reproductive problems, birth defects, cancer and developmental issues.

Environmental Fate: These studies look at how the pesticide acts in the soil, water, air and how it breaks down and interacts with other factors in the environment. These studies measure persistence in the soil and water, volatility, ability to leech and other factors.

Ecological Toxicity: A whole range of studies, both regulatory and independent research, examine the effects of pesticides on non-target organisms from micro-organisms to mammals. These can be direct effects or indirect effects, such as a bird or fish being impacted from a pesticide killing the insects they rely on for food.

The city gathers this information and categorizes each pesticide by potential risk. When a pesticide is allowed to be used, guidelines are developed to try to mitigate as many potential issues as possible.