

# **Appendix 4**

## **Integrated Pest Management Program**

**California State University, Fullerton**

**Fullerton Arboretum**



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## Introduction

The Environmental Protection Agency (EPA) states that Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.

A pest is an unwanted organism that damages or interferes with desirable organisms and landscapes. We are primarily concerned with invasive non-native plants (weeds), insects, and diseases, but this program may also apply to vertebrate pests.

The IPM program at the Fullerton Arboretum uses current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to enact best practices. The program aims to minimize pest damage by the most economical means and with the least possible safety hazard to people, property, and the environment. We also consider location, season, rainfall, wind, temperature, types of plants, disease outbreaks, and past control methods to inform our decision making.

The southeastern corner of the Arboretum, home of the U-ACRE cooperative project for sustainable urban agriculture, is not addressed in the IPM program. Nor are any Arboretum buildings.

It is recognized that the effectiveness of an IPM program depends upon adequate resources - funding, staff/volunteers, and time.

## Goals

The Fullerton Arboretum Strategic Plan (2005-2020) lists Environmental Stewardship and Conservation as an important organizational goal. California State University, Fullerton (CSUF) recognizes sustainability as an important value.

The Arboretum's thriving, robust, and sustainable landscape benefits from an IPM plan conforming to our goals and values. It provides staff, visitors, and volunteers with a safe and healthy environment while ensuring that pest problems are addressed effectively, economically, and sustainably.

The Arboretum strives to use the least amount of pesticide practical and to become a model IPM program that may be emulated by gardens tended by both homeowners and other institutions.

## Integration with other Plans

The *Landscape Management Plan (2018)* provides overarching guidance for the Fullerton Arboretum. It addresses staff, management approach, collections information, and other guidance. **This IPM Program document is Appendix 4 of that Plan.**

The *Pesticide Management Program (as updated June 2018)* provides overall guidance on the use of pesticides at the CSUF campus including the Fullerton Arboretum. It contains policy, authority, scope,

definitions, responsibilities, and specific program information (including safety, training, licensing, and record keeping).

The *University of California, Agriculture and Natural Resources, Statewide Integrated Pest Management Program* (UCIPM) website is a valuable resource that provides insight, research, and current guidance for managing garden and landscape pests.

<http://ipm.ucanr.edu/>

## Arboretum Roles and Responsibilities

Staff roles and responsibilities are provided in the table below:

Title	Responsibilities
Director	<ul style="list-style-type: none"><li>• General oversight</li><li>• Liaison to CSUF administration</li></ul>
Living Collections Curator	<ul style="list-style-type: none"><li>• Ensures that the pest management program is executed</li><li>• Coordinates with CSUF Health and Safety</li><li>• Trained and licensed as a Qualified Applicator License through the state of California Department of Pesticide Regulation (DPR)</li><li>• Ensures that the horticulturist pest control applicators are fully trained and adhere to the program procedures</li><li>• Conducts regular inspections as needed for implementation of pest management</li></ul>
Horticulturists (4)	<ul style="list-style-type: none"><li>• Implement pest management program within the Arboretum</li><li>• Trained and licensed as Qualified Applicator Certificate through the state of California Department of Pesticide Regulation</li><li>• Oversee volunteers, interns, or student workers participating in physical (non-chemical) pest control</li></ul>

## How does our IPM program work?

IPM is not a single pest control method but rather a comprehensive long-term strategy to effectively reduce pests to tolerable levels with minimal environmental and safety impacts.

The Fullerton Arboretum will follow a five-tiered approach to implement IPM.

- *Identify*—Identify weed pests, insect pests and their hosts, and possible beneficial organisms.
- *Monitor*—Regularly monitor pest populations and their locations.
- *Set Thresholds*—Establish acceptable site-specific pest levels, called thresholds, that determine injury level or pest population.
- *Treatment*—The emphasis is on control, not eradication. Treatments may occur concurrently.
  - *Prevention: cultural and non-cultural*—Select species best suited for local growing conditions and maintain healthy plants as the first line of defense against insects or

disease. Provide adequate sunlight, air circulation, hydration, and nutrients to improve the plant's natural immune system. Prevent weed pests by applying mulch and managing water application, including the timely repair of irrigation leaks.

- *Physical controls: mechanical, biological, chemical*—If a pest reaches an unacceptable threshold level, physical controls are the next option. They include weed removal, knocking insects off leaves with water, barriers, traps, heat, and tillage to disrupt breeding or propagation. Natural biological processes and materials can provide control, with acceptable environmental impact, and often at lower cost. Organic chemicals are used if available and effective for that pest type; all pesticides are applied as minimally as possible during optimal times in a pest's life cycle in order to reduce impact to the environment and people.
- *Evaluation*—Determine the outcome of the treatment actions.

## Identify

The Curator and Horticulturists are responsible for properly identifying pests and diseases. They use a variety of resources to identify pests including professional experience, books in the Arboretum's horticultural library, and the UCIPM website and other online resources. Proper identification of weeds is important because different weed species are controlled using different methods. Staff have hand lenses and a stereomicroscope to help observe small pests and minute details of pests and damage to plants. Staff will also survey for the presence of beneficial organisms that may help control pests by searching for these organisms themselves or evidence of their presence. Staff will also confirm whether plant damage was caused by biotic or abiotic problems in the identification process. There are a wide variety of common pests found in the Arboretum and the majority of them are controlled through natural processes.

## Monitor

Horticulture staff regularly monitors, identifies, and locates pests so that appropriate control decisions can be made in conjunction with thresholds. This prevents the overuse or misapplication of synthetic pesticides, which should only be used in extreme cases. Approximate locations by collection and area of Fullerton Arboretum weeds, pests, and disease are identified in the *Landscape Management Plan*.

If a pest problem is observed, then horticulture staff will investigate the problem, which may involve researching the pest if it is unfamiliar. The Curator and Horticulturist assigned to the respective location where the pest was found, will coordinate to identify and monitor the pest. Staff will determine whether the pest is getting worse over time, or if it is being controlled naturally at a tolerable level.

Objectives of the monitoring program are as follows:

- Investigate the extent, nature, and progression of any plant damage given current life stage conditions of the plant.
- Determine the presence, population, and life stage(s) of pests.

- Determine the presence, identity, and population levels of the beneficial insects, wildlife, and birds.
- Evaluate control methods for effectiveness after treatment.

## Set Thresholds

Before taking any pest control action, our IPM program first sets an action threshold - a point at which pest populations and/or environmental conditions indicate that pest control action must be taken. These thresholds differ by pest, host, location and their priority designation in the *Landscape Management Plan*. Thresholds will differ between nursery plants and plants in the garden. The presence of beneficial organisms, seasonality, and other environmental factors will also contribute to decision making. It is overwhelmingly difficult to establish action thresholds for all pests and diseases in all situations in the arboretum due to the enormous amount of biodiversity and ever-changing natural conditions. Specific thresholds may be developed over the long term for reoccurring pest problems that require extra attention. In general, the threshold is the point that staff determine significant plant damage has occurred or is likely to occur if no action is taken. Preference will always be given to resolving pest issues in the most natural way possible. When necessary, specific thresholds will be determined by staff using standard IPM practices.

## Treatments

### Prevention

As a first line of pest control, the IPM program will work to prevent pests from even becoming a threat. Prevention involves providing plants with the food and environment they need to thrive or by removing the conditions that might attract a pest or disease. Some plants need full sun, some do better in shade. Some grow best in sandy soils, others in clay or wetlands. Some need fertilizer or extra water. No plant does well surrounded by weeds that compete for light, nutrients and water. Weeds may also harbor harmful insects and diseases.

When selecting annuals, perennials, shrubs, trees, and turf we will make sure the soil, light and irrigation conditions support the plant's needs. Strong healthy vegetation is much less susceptible to attacks by insects or disease. Species that we choose are selected for adaptation to the southern California environment, even though they may be native to other parts of the country or world. Strong plant growth and close spacing can help suppress weeds.

- **Cultural Methods**

Cultural preventative methods are essentially measures which block or reduce the extent of pest problems and focus on plant health. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

Examples of cultural preventative methods that the Arboretum uses are as follows:

- Select native or pest-resistant trees, shrubs, and ornamentals in landscape beds. Use high quality, disease-free stock.
  - Incorporate organic amendments (such as compost) in areas where organic content of the soil is low. This improves water and nutrient-holding capacity, enhances drainage, and promotes aeration.
  - Aerate compacted soil to provide good drainage.
  - Raise mowing height and reduce mowing frequency. Mow with sharp blades. Use mulching blades to return grass clippings to grass areas wherever possible.
  - Schedule early-morning irrigation in areas that are susceptible to disease.
  - Minimize shade in areas where plants are susceptible to disease or avoid planting there.
  - Prevent the spread of disease by sanitizing garden equipment with sanitizer.
  - Use fences and tree guards to control damage by rabbits.
  - Prune out diseased or infested portions of plants
  - Apply organic mulch over areas with bare ground and around desirable plants.
- **Non-Cultural Methods**  
Non-cultural preventative methods use either biological or pesticides for pest control.

- Biological controls involve the use of specific organisms (e.g., ladybugs) to control pests. Other control organisms include bacteria, predatory insects, bats, and birds. The Arboretum already has a robust population of beneficial organisms on-site. Given that the use of biological controls is relatively new, combined with the potential adverse consequences of introducing new species into the local environment, we consult with a biologist prior to implementing any new introduced control options.
- Chemical controls are used to ensure a plants survival or to prevent an outbreak of pests before it occurs. For example, pre-emergent herbicides may be used along some exterior fence lines, in parking lots, or onto lawns to prevent those areas from being overrun with weeds. And organic dormancy oil may be applied to roses and/or fruit trees. Timing for these applications is based on growing season and weather.

### Physical Controls

When monitoring, identification, and thresholds indicate that preventive methods are no longer effective or available, then pest control is required. The IPM program will use adaptive management to evaluate the proper control method for environmental safety, effectiveness, and risk. Low risk pest controls will be chosen first.

Using physical controls will mean taking a more active role in pest management without spending time and money on pesticide treatments that may harm the environment.

- **Mechanical**

Mechanical control of weeds includes removal by hand or mechanical device (weed whacker). Tilling, raking and regular mulching can also suppress existing weeds. Some insect pests can be removed through pruning, or by using a strong jet of water. Trapping can be used for vertebrate pests.

- **Biological**

Biological controls are another safe way to manage pests without the use of chemicals. The main approach is to promote naturally occurring beneficial insects that eat or parasitize target pests. The most common natural enemies include predators, parasites, and pathogens. Predators, including various insects, birds, bats and other mammals help consume and eliminate large numbers of pests. Ladybugs, for example, help control aphids.

- **Chemical Controls**

Chemical applications are integrated into our program based on necessity and as a last resort. Non-chemical approaches will be employed first. If further monitoring, identification, and thresholds indicate that these controls are not working, pesticides may be applied. Highly targeted, low-toxicity organic pesticides will be used first, and if not effective then additional methods may be employed, such as targeted spraying of synthetic pesticides. We follow all California Department of Pesticide Regulation regulations and manufacturer's labels. All applicators are certified and receive continuing education to maintain their licenses. Great care is made to not adversely affect Arboretum waterways and impact pollinators, especially around the orchard apiary. We use small capacity sprayers which produce much less chance of drift and achieve a more precise application. Application is usually done in the morning when wind speeds are lower and pollinators are less active.

If a pesticide needs to be applied to control the outbreak, we record the following information:

- Target pest
- Location in the arboretum
- Date of application and name of applicator
- Chemical name, EPA Registration Number and amount used

## Evaluation

All treatments will be evaluated for effectiveness through careful monitoring. Staff will observe the site that was treated and determine whether the pest was controlled to a tolerable level. Repeat applications may be necessary if the target pest was not controlled below the threshold level. However,

we will first determine whether there were other factors that made the treatment less effective than desired, such as environmental conditions, pest life cycle or improper application. Treated areas and adjacent spaces will be routinely monitored for pest reemergence and subsequent outbreaks.