County of Santa Clara
Integrated Pest Management Program
Annual Report
County of Santa Clara
Office of Sustainability
Integrated Pest Management Program

‘In pursuit of positive change, embracing evolution through innovations, smart solutions and maintaining a successful culture’
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A. Background

The County of Santa Clara Integrated Pest Management (IPM) Program, implemented in 2002, helps protect the health and safety of County employees, the general public, the environment, and water quality, as well as prevent and solve pest problems on County property with the least unintended impacts on people and their surroundings. The Ordinance does not apply to private property or other jurisdictions, but governs and guides the control of pests on properties owned and managed by the County, such as regional parks, roads, airports, office complexes, hospitals, correctional facilities, and animal shelters. Common IPM challenges in these locations include ants, bed bugs, flies, roaches, wasps, termites, rodents, birds, weeds, and plant diseases. The Program seeks to eliminate or reduce pesticide applications on County property to the maximum extent feasible through available non-pesticide alternatives. The Program is managed through the four tenets of IPM, Management, Research, Outreach, and Best Practices (figure 1). The IPM ordinance is overseen by the County IPM Manager and reviewed by the IPM Technical Advisory Group, the program is governed by County Ordinance Code Division B-28 - IPM and Pesticide Use.

![Figure 1](image-url)
IPM is a sustainable approach to preventing and suppressing pest problems while minimizing human health and environmental risks. IPM practitioners use a judicious blend of biological, cultural, mechanical, and chemical controls. Since established in 2002, the County IPM program continues to evolve based on science and best practices, shared knowledge, and pilot projects. As a result, the program has achieved significant progress in minimizing forest and agricultural losses from pests and reducing pesticide use to protect the public and the environment. This report covers the IPM Program’s performance on reducing pesticide and Program activities for FY 2019-20, from July 1, 2019 through June 30, 2020.

Not all pests are a problem. By continuously monitoring plant and animal populations, the County IPM Program focuses on pests that affect safety or are likely to damage locations used for public recreation and County services. Each location is individually assessed.

Treatment choices are based on level of risk, severity, timing, effectiveness, and available resources. Multiple, non-chemical integrated methods are often employed, including client awareness and outreach; pest proofing; improved sanitation and housekeeping; mulching; hand-pulling; trimming and mowing; and many more. The IPM program also provides oversight for several Countywide IPM contracts and coordinates communication and reporting with user departments. The County is a well-recognized regional, national, and international leader in ecologically sound IPM.

B. Fiscal Year 2019-2020 – Summary

1. Pesticide Usage - Summary

The long-term pesticide-use strategy is to favor non-chemical integrated methods to minimize the need for chemical applications, and supplement when necessary with the least-toxic, low environmental-impact treatments. IPM will vary each year based on the types of pests, risks, and conditions in the field.

Pursuant to the County IPM ordinance, The County has completely phased out the use of 26 high-risk conventional pesticides and has significantly reduced the total number of pesticide applications, and the volume used, of reduced-risk pesticides.
Minimal pesticide use in FY 2019-20 was maintained through the use scenarios as described below. For details please see Attachment 2, Pesticide Use Analysis by Year and by Project.

a. Pesticide Use in Structures
The use of reduced-risk pesticides in structures has been lowered to statistically insignificant levels. Regular site inspection, followed by building occupant education, sanitation, housekeeping, and maintenance (SHM) improvement, has significantly altered many pest situations that would have otherwise required pesticide applications.

b. Pesticide Use in Urban Landscapes
Since 2008, there has been extremely limited use of pesticides in County urban landscapes. Two pesticide applications were required in 2012; one to treat Magnolia scale infestation and the other to remove an unwanted Bamboo species that was compromising a pedestrian walkway. In 2018, an herbicide (triclopyr) stump treatment was needed to prevent the return of an invasive tree species (Ailanthus altissima) that was too close to a building foundation for stump grinding.

Trapping and use of carbon dioxide (CO2) are the preferred methods to capture and euthanize animals in urban landscapes. In FY 2019-20 these methods were used to remove: 54 ground squirrels from the Roads and Airport Department west yard; 11 ground squirrels, two opossums, and one racoon from Valley Medical Center.
c. Pesticide Use in Parks

In FY 2019-20, 25 of the 29 regional parks, representing recreational, open space, and rangelands, were managed completely by non-chemical methods, which resulted in 99.87 percent of the total County park landscape being managed non-chemically. Two regional parks are fully managed by external parties. Rancho San Antonio is managed by the Mid-Peninsula Regional Open Space District and Baylands Park is managed by the City of Sunnyvale. Valley Water and PG&E also have easements for vegetation control in regional parks as well. In FY 19-20 herbicide application by these external partners represented a vast majority (99.08%) of the acres chemically treated. The IPM Program continues to work with these external partners to ensure that chemical management is reduced as much as possible.

i. Parks Vegetation Management

Chemical intervention in invasive weed management projects throughout the parks system is maintained at a very low level (only 65.6 of 52,140 acres), and the emphasis remains on using non-chemical alternatives throughout park recreational areas. However, a slight increase or decrease from year to year in the acreage under chemical management is cyclic and need-based. In FY 2019-20, non-chemical means to control pests in regional parks included goat grazing on 190 acres at Ed Levin, Joseph D. Grant, and the Coyote Creek park chain.
ii. **Parks Vertebrate Pest Control**

In general, vertebrate control (e.g., raccoons, skunks, feral pigs) throughout the park system is managed non-chemically. In FY 2019-20 animal traps and CO2 were used to catch and euthanize 138 ground squirrels at Ed Levin, and a total of 59 more in other County parks. Apart from 4.3 lbs. of CO2 used as a ground squirrel burrow fumigant at Martial Cottle, no chemical rodenticide was used in any County park. The use of fumigant was required because ground squirrel infestations exceeded what is possible to control with non-chemical methods within the required economic threshold. To discourage re-infestation, remaining burrows are removed by collapsing.

iii. **Parks Aquatic Pest Management**

Since 2002, no pesticide has been used to control aquatic weeds on County-owned ponds, lakes, and creeks, except what was reported in 2006-2014 under the Arundo donax control project managed by Santa Clara Valley Water District (see figure V-1).

d. **Roadside Right-of-Way Vegetation Management**

Since 2005, the County has reduced by 75 percent the acreage under chemical management to control vegetation on County rights-of-way. During the FY 2019-20 period, the County Roads and Airport Department managed 1,073 roadside acres, of which, only 311 acres, or 29%, were managed with herbicides.

Selecting chemicals for roadside vegetation management remains challenging. As the market for least-toxic products expands, these products continue to evolve and improve, offering alternatives to conventional chemical applications. Pre-emergent, non-carcinogenic, organic, or reduced-risk herbicides may eventually be effective for weed control. However, such products are not yet proven effective and/or are not available to meet the needs of commercial-scale roadside vegetation management. Therefore, a successful ecological IPM strategy currently requires more physical labor techniques such as mowing, digging
out, hand pulling, weed wrenching, use of living systems (cattle, goats, sheep grazing), and design
improvements.

e. General Aviation Airports

County airports did not use any pesticides from 2007 through June 2020.

2. Projects - Summary

Due to the unpredictable nature of pest control, the scope and number of County IPM Program projects
will vary. Some pest issues are predictable, while others are not. Some projects have a beginning and an
end, while others are ongoing and will be reported on year after year. Below is a summary of IPM projects
that began in FY 19-20. More detailed overviews of these new projects, as well as detailed overviews of
the ongoing year-after-year projects are available in attachment 1. You may click book marks provided in
this project – summary to learn more about a particular project.

a. “EYE” is for Identification

Good IPM starts with accurate pest identification—ID for short. Whether you see a pest or the
evidence it leaves behind, correct ID is essential. Once you know what you are dealing with, you can
determine where it is coming from, the risks it poses, and what conditions must change to eliminate
it. Good ID makes IPM work. IPM Program staff continued to identify and promote effective, science-
based strategies to reduce or eliminate the impacts of pests on buildings, property, vegetation, and human health. Through daily field work, including numerous inspections and on-site supervision, a substantial percentage of County pest issues are solved non-chemically. Bedbug Sniffer Dogs also assist in resolving bedbug problems in buildings without using any chemicals.

b. Structural Pest Management

The most challenging pests in structural management last year included ants, cockroaches, drain flies, fleas, and rats. Using a multi-pronged approach including, greater emphasis on sanitation, housekeeping, maintenance, and also by seeking help and cooperation from all cadres of management and building occupants, significant efforts were undertaken that yielded successful outcomes. There are numerous examples of structural control projects undertaken in this reference. A few notable examples of FY 2019-20 are 1) ant, cockroach, rodent, and bird control at Elmwood Correctional facility; 2) rodent control at a demolition/construction site and the surrounding County Government Center campus at Hedding Street; 3) rodent control in and around both Juvenile Hall and the Main Jail campus; 4) bed bug control at both Social Services’ Julian Street Campus and HHS emergency treatment areas; 5) cockroach and drain fly control at HHS main hospital campus; 6) silverfish and termite control at New Almaden Quicksilver Mining Museum; 7) flea and wildlife control at VMC McKee Campus; and 8) ant and cockroach control at the Charcot campus.

c. Vegetation Management

The goal of vegetation management is to minimize the threat to County residents from fire, to ensure that infrastructure (roads, power lines, dams, runways, etc.) continues to operate as designed and in compliance with safety code, and to address resident’s aesthetic concerns. In addition to standard ongoing management, specific FY 2019-20 vegetation management projects included, 1) a roadside survey of over 130 miles of right-of-way management on County roads, including research/trials on the effectiveness of glyphosate alternatives; 2) the Grant Lake Dam vegetation management project, ensuring compliance with State inspection and protecting County infrastructure; 3) a non-chemical (hand-pulling and plant seed sterilization) project from Parks Natural
d. Blue-Green Algae Control

In September 2019, the County received inquiries from the public about blue-green algae in Cottonwood Lake (a no-swimming lake) in Hellyer County Park. Like True algae, Blue-green algae are a natural part of lake ecosystems and algal blooms have occurred for many centuries. However, blue-green algae are not True algae.

Blue-green algae are photosynthetic bacteria known as cyanobacteria, which can cause illness and death in humans and animals. While blue-green algae can convert sunlight into energy, they are not an important part of the food chain because most organisms prefer not to eat them. When environmental conditions are right as mentioned above, the algal population can grow quickly, and a bloom can occur. A bloom is a sudden increase in algae cells in a certain area of water. Little wind, warm water, sunlight, and plentiful nutrients - especially phosphorus - all increase the chance that a bloom will occur. Warm weather patterns and large rain events that wash agricultural and residential fertilizers (which contain phosphorus) into the water can also jump-start a bloom. Blue-green algae follow sunlight and nutrients by floating to the surface where they can form thick scum layers or mats and the surface may look bubbly or frothy.

Knowing the biology, and with a careful review of control options, algal bloom levels were significantly decreased by focusing on two key non-chemical interventions 1) by increasing in-out water flow from the lake to remove stagnant water, high levels of nutrients (nitrates and phosphates), organic matter and surface suspended algal blooms, and 2) by increasing dissolved oxygen by use of aerators to
reduce the occurrence of algae blooms by removing their food sources. More research is needed including active monitoring, prediction, and long-term solutions to keep algal blooms below risk thresholds without using chemicals in County-owned and managed water bodies.

e. Urban Forestry

Trees are dynamic ecosystems that provide critical benefits to people and wildlife. Urban forests help to filter air and water, control storm water, conserve energy, and provide animal habitat and shade. They add beauty, form, and structure to urban design.

In FY 2018-19, with Board support, OOS and IPM Program staff commenced work on an important urban forestry initiative. Using the collective wisdom of all participating stakeholders, the County “Ecology Based Tree Management Guide” was completed in Spring 2019. Staff also worked on scopes of work and contracts with two non-profit organizations, namely Our City Forest (OCF), and Canopy; two sustainable tree maintenance contracts; and one tree inventory and professional arborist advisory services contract. Initial success of this work yielded a benchmark tree inventory for County facilities sites and Parks developed areas, and identification of tree planting and public outreach goals.

In FY 2019-20, with Board’s funding commitment to plant 3000 trees over next three years and to support extensive public outreach countywide, urban forestry in Santa Clara County took a powerful stride forward. OOS and IPM Program staff successfully processed contracts related to the (Tree Planting and Stewardship Project) with the non-profit organizations mentioned above, and has already initiated this work. Urban forestry is evolving from a project to a program. We continue to meet current assigned tasks including research on sustained funding sources, building cross-jurisdictional alliances (Santa Clara Valley Urban Forestry Alliance) leveraging resources, geo-spatial ecology-based tree placement surveys and analysis, active outreach engaging public interests (Arbor Week Activities, Canopy Outreach in North County) in tree stewardship and more.

f. Organic Solutions

Using nature as a model for the agricultural system – recycling nutrients, encouraging natural predators to manage pests, increasing plant densities to block weeds – organic farming doesn’t merely substitute non-toxic materials for pesticides and fertilizers, but rather considers the farm as an integrated entity, with all parts interconnected. In 2014, the County committed to organic farming by
leasing its open space agricultural land at Martial Cottle Park to Jacobs Farm. Since then, this urban park and working farm produces flavorful, local, organic fruits and vegetables that go directly from “field to fork” and conducts important “Organic Farming Public Outreach”.

A few highlights of the non-chemical pest management approaches undertaken by Jacob Farms in FY 2019-20 include, 1) effective trapping to control over 1000 ground squirrels, 2) the parasitoid fly, Trichopoda pennipes, and natural predators (killdeers and ravens) and changing cultural practices to effectively control squash bugs, 3) physical methods to rip, chisel and cultivate field bindweed during the season, carefully moving production times and areas to control 4) Yellow Blotch Virus in Cilantro production and 5) Tobacco Mosaic Virus in Tomato production, 6) inter-planting the squash with tomatoes and beneficial crops to confuse the cucumber beetles.

g. Other Sustainable Solutions

In addition to the organic farm, Martial Cottle Park also has other partners with vested interest in sustainable eco-system which includes Sustainable Gardening Education by Master Gardeners of Santa Clara County, University of California Cooperative Extension Office 4-H Program that promotes hands-on, experiential learning for all youth ages 5-19, and Arboretum by Our City Forest. While these programs have their independent operations and decision-making processes, the IPM Program staff engages with them where needed to help promote the Board’s vision of sustainability and compliance to IPM Ordinance.

In addition to the external partners in sustainability as mentioned above, in June 2019, County Parks Department staff, along with community volunteers, and IPM Program staff have been working to install a native plant demonstration garden at Hellyer County Park. The garden when finished will include interpretive signage educating on the topics of hydrology, wildlife, and native plants; statues of local wildlife; and animal tracks stamped in concrete. Completion is estimated in 2021. The garden is intended to motivate visitors to understand and adopt some of the conservation practices on display in this drought tolerant, native planting area that uses less fertilizer, pesticides and requires less energy and water to maintain.
h. **Education and Training**

For all stakeholders involved in pest management and for building occupants, training on the importance of sanitation, housekeeping, and maintenance activities provides many benefits. However, without awareness of these benefits, ensuring necessary support for education and training will prove to be a challenge. Advocating for, and executing, IPM-related education and training is an extremely time-consuming effort, often requiring active and on-going engagement of Program staff, as well as meetings with departmental management and building occupants, field inspections, follow-up communication, presentations on burning issues in staff meetings, on-site dialogue with affected groups during field inspections, IPM awareness at facility manager’s workshops, and coordinating contractor work.

Program staff is seeking to improve efficiency and effectiveness in education and training through collaborations with external partners (e.g. UCCE, SCVURPP, OCF, Canopy, contractors, consultants and other subject matter experts), also by developing web-based tools ([IPM Program website](#), [Sustainable Landscape Management Resource Guide](#), [Water Efficient Landscaping Ordinance Guidance](#)), on-line presentations, webinars, videos and other training materials; and subject specific mini-workshops to engage diverse audience on regular basis.

Besides the above the County and OOS IPM staff works with the [Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)](#), to educate citizens on pesticides and how to minimize harmful impacts and prevent point source and non-point source pollution. SCVURPP provides outreach through various platforms and events e.g. Outreach to Nursery Outlets and Local Landscapers and Public, Watershed Watch Campaign advertising, Watershed Watch “Half-Off” Car Wash Event, Pumpkins in the Park, Day on the Bay, Landscape Summit 2020, Coastal Clean-up Day, Stewardship and Citizen Science Programs – Gardening Without Chemicals.

3. **Future Challenges – Summary**

Proper resources are required to manage pest issues non-chemically. Departments must be adequately funded, well-trained and, equipped to provide effective IPM services to County staff and residents.
Furthermore, climate change, drought, temperature shifts, extreme weather, and flooding are posing new challenges which alter ecosystems and make them more susceptible to pests, disease, and non-native plant infiltration. Additional details on all challenges are included in attachment 1. Below is a summary.

a. IPM Data Collection

**IPM Spatial Monitoring and Database Solution:** Data collection, analysis, and reporting is a critical component of proper program management and adherence to the IPM ordinance. A spatial IPM data management system is important for enhancing the County’s IPM program by providing a cost-effective and efficient system that all departments can use to eliminate paper-based data collection, reduce errors, enhance data analysis, and simplify reporting and exemption requests.

The Program dedicated a very substantial level of resources into developing this database solution in FY 19-20. The RFP process for an external vendor was completed, including scope development and scoring. Due to limitations in cross-departmental data accessibility, the selected vendor decided that they would not be able to complete this project.

The IPM program is currently planning to work with County Technology Services and Solutions to develop a solution through their in-house Microsoft Dynamics development team. Dynamics is a resource planning and customer relationship management software that can be configured to manage IPM data.

RDA has agreed to use the proposed software. FAF has determined that their department activities do not currently warrant the use of the IPM spatial mapping and data collection software. PRK will be using their own data management system which the IPM system will integrate with once fully developed.

Although the IPM program would like development, testing, and implementation to be completed during FY 20-21; resource availability, program staff bandwidth, and Dynamics team availability will determine system development timeline moving into the future.

b. The Importance of Continuing Professional Development

The availability of ongoing resources to support the continuing professional development of County staff involved in pest management, as well as in sanitation, housekeeping, and maintenance activities provides
many benefits. However, without awareness of these benefits, advocating to ensure needed support will prove to be a challenge.

c. **Rodents: Ground Squirrels and Pocket Gophers**
Controlling these pests through one department or entity alone is challenging, as pest migration from surrounding areas can continue to re-infest controlled landscapes. To execute an integrated management approach, a coordinated, cross-jurisdiction effort, including continually monitoring pest and non-target species populations throughout the year and seeking permits where needed, is warranted.

d. **Rodents: Rats and Mice**
Effective rodent control will require concerted ongoing building occupant and facility maintenance group education. Improvement in sanitation, housekeeping, and maintenance is the single most effective way to reduce rodent issues in County facilities. Adequate resources are required for employee and vendor outreach and training to educate these groups on the role that they play in keeping County facilities rodent free.

e. **Bed Bugs**
Like other states and cities, bed bugs are an emerging challenge in the County facilities. The IPM Program is responding to this re-emerging pest diligently on a case-by-case basis and using non-chemical approaches, such as conducting canine inspections to identify localized bed bug activity and using vacuums, steam, and dry heat to control bed bug activity.

f. **American and Oriental Cockroaches**
There is no conventional approach that is effective in controlling cockroaches in sewers or similar habitats. The IPM Program’s current approach to prevent infestations involves close monitoring and applying insecticide baits. While an effective bait program does not give immediate results (it may take seven or more days to be effective), baits can be effective for long-term cockroach control.
Attachment 1. Fiscal Year 2019-2020 – Details

1. Projects - Details

This section contains additional details on projects that began in FY 19-20 and also on year-after-year projects that were not included in the summary section.

a. Grant Dam Vegetation Management Project

On May 6th, 2019, an annual state inspection of the dams at Grant Lake in Joseph D. Grant County Park indicated that there was too much woody vegetation growing on the face of the dam, and too many tules growing at the waterline. The inspector required that this vegetation be removed, as the deep root systems from this vegetation could potentially compromise the structure of the dams. Mechanical removal (pulling) of the rooting systems is not an option due to the potential for damage to the dams.

These deep root systems also allow plants to re-sprout and continue to live if they are simply mechanically cut at the surface. With these circumstances, it was necessary to use an herbicide that would work systemically to kill the roots of the vegetation and be as least toxic as possible while still being effective. The application method must be in a manner that minimizes the amount and reduces environmental exposure as much as possible. The herbicide imazamox was selected for its reduced toxicity to aquatic life and for its systemic action, which would ensure that the root is killed. Vegetation was cut down, then herbicide was carefully applied only to the stumps.
The vegetation on the dams will be closely monitored in the future. The Parks Department plans to use their new asset management system to automatically schedule routine inspections and maintenance of the dams. Once the existing vegetation is completely dead, any new vegetation should be able to be removed non-chemically while it is still small.

b. Roadside Vegetation Survey Project

Part of maintaining County roads is controlling roadside vegetation. Of this control, fire-safety is an important component, including keeping backcountry roads open as fire-escape routes, and reducing potential fire-danger from human roadside activities (hot exhaust systems, cigarette butts, etc.). Also, vegetation growth in the wrong places can reduce visibility, making it more difficult to see traffic and signage. The County is also responsible for addressing complaints from County residents on aesthetic issues associated with vegetation growth. It is important to tackle these issues, but it is also important to ensure that the risks of chemical application do not outweigh the risks from alternative management strategies.

The herbicide glyphosate was extensively and effectively used in the past. However, due to its carcinogenic classification by the state, the County IPM Ordinance no longer allows for its application. Three herbicides, aminopyralid, imazamox, and flumioxazin have been identified as potential glyphosate alternatives and were tested on County Roads in late 2019. To provide County staff with tools to address potential issues with visibility and fire safety in the future, the effectiveness of these glyphosate alternatives must be evaluated.
In this effort, more than 130 miles of County roadways were surveyed in early 2020, with more than 1,200 images taken. These images were taken in stages, both before and after herbicide application. The survey will be evaluated to establish herbicide effectiveness and to monitor changes on the roadways in the future. In this capacity the survey will assist in prioritizing areas that require herbicide to maintain safe roadways and ensure that herbicide use is limited to areas that show need.

c. Cottonwood Lake Algae Control Project

In September 2019, the County received inquiries from the public about blue-green algae in Cottonwood Lake (a no-swimming lake) in Hellyer County Park. The water level at the lake was dropping because of reduced flow from Coyote Creek, leading to still, warm, dormant water, creating an ideal environment for algae to grow. The presence of blue-green algae is well known in ponds and lakes across U.S. There are many blue-green algae species, and most do not produce toxins that are harmful to people or animals; however, it is important to assess and address potentially toxic conditions.
A long-term partner agency, Valley Water, provided the County in-kind analytical support to test for algal toxins (also commonly known as cyanotoxins) at one location within Cottonwood Lake. The initial results of the test indicated high total microcystins at 50 parts per billion. Thus, per request from the County Parks Department, both agencies jointly developed a sampling plan to monitor cyanotoxin levels at the surface water of the lake for an assessment of the algal toxin levels. Algal toxins tend to congregate in slow moving or stagnant water and are not very mobile. They move up and down in the water column in response to weather conditions to photosynthesize, but wind and water current may influence their location. They may be more visible on calm, cloudy days as they rise in the water column to photosynthesize.

To avoid application of pesticides, non-chemical algae management methods were chosen. These included opening a gate valve in Coyote Creek to fill and allow water to flow through the lake and upgrading the aeration system to increase oxygenation. These non-chemical methods have reduced the growth of algae significantly. But upon testing, a small amount of blue green algae was still found in some shallow areas of the lake.

Currently, there are no state or federal regulations for cyanotoxins in recreational waters. The County follows the California Cyanobacteria Harmful Algal Bloom Network (CCHAB) guidance for action levels. The table below summarizes these action levels.
The sampling plan completed by Parks with Valley Water last year had identified a few areas (mostly shallow areas with very little water movement) that tested above “Caution Action Trigger,” level but below “Warning Tier I” level for Microcystin (three samples collected ranged from 1.2 to 4.6 ppb). All samples tested below “Caution Action Trigger” for Cylindrospermopsin and Anatoxin-a.

![CCHAB Trigger Levels for Human and Animal Health]

<table>
<thead>
<tr>
<th></th>
<th>Caution Action Trigger</th>
<th>Warning TIER I</th>
<th>Danger TIER II</th>
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<tr>
<td>Total Microcystsins</td>
<td>0.8 ppb</td>
<td>6 ppb</td>
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<tr>
<td>Cylindrospermopsin</td>
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<td>4 ppb</td>
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<tr>
<td>Anatoxin-a</td>
<td>Detection</td>
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<td>90 ppb</td>
</tr>
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</table>

(Note: One part per billion (ppb) is equivalent to one drop of water in an Olympic-size swimming pool)

Even though this is a no-swimming lake and an improved oxygenation system has been installed, the County has also taken the precautionary action of posting signs around the lake to communicate potential risks of algae to the public.

d. Tree Planting Services and Stewardship Program

On Feb 11, 2020 (Item No. 28), the Board of Supervisors directed OOS and the IPM Program to proceed with establishing a Tree Planting Services and Stewardship Pilot Program for public and private residents of Santa Clara County to plant and maintain 1,000 trees annually in urban areas of ecological need countywide over a three-year period through agreements with two non-profit groups: Our City Forest (OCF) and Canopy. Planted trees would help to mitigate tree canopy cover loss due to drought and urban development, reduce stormwater runoff, filter and clean air, provide shade to cool buildings, reduce urban heat islands, and help combat climate change.
Through this program, OCF will conduct urban forestry outreach to find locations for trees, as well as provide planting services and after planting support. These services are also available on an as-requested basis to County departments to facilitate compliance with mitigation requirements for County tree-removal projects and maximize efforts to expand urban forest in Santa Clara County.

Canopy will assist the County in its goal of growing the urban forest by using focused outreach efforts in the North County that leverage education and advocacy programs. Services include conducting outreach and education aimed to equip professionals from government, non-governmental agencies, and the private sector with the awareness, resources, and tools necessary to grow urban tree canopy, and that targets community members and equips them with the knowledge, skills, and hands-on training needed to take immediate action in their community to advocate for and grow and maintain the urban forest.

e. Hellyer Native Demonstration Garden

Since June 2019, County Parks Department staff, along with community volunteers, and IPM Program staff have been working to install a native plant demonstration garden at Hellyer County Park. The garden when finished will include interpretive signage educating on the topics of hydrology, wildlife, and native plants; statues of local wildlife; and animal tracks stamped in concrete. Completion is estimated in 2021.
The garden is intended to motivate visitors to understand and adopt some of the conservation practices on display in this drought tolerant, native planting area that uses less fertilizer, pesticides and requires less energy and water to maintain.

f. Invasive Weeds – Hand Pulling and Seed Sterilization Project

The Parks Department’s natural resource management division has initiated a pilot program with the purpose of testing innovative techniques to be more responsible with the way invasive plants are handled after being pulled. The seeds from invasive plants can remain viable for a long period of time, even after pulling and other treatment techniques. This prolonged viability allows populations to be more stable in the long-term and is one of the reasons that treating an area once rarely results in complete eradication. Effective control practices incorporate seed management that minimizes the ability for viable seeds to spread.

The pilot involves the use of large capacity (90 gallon) plastic barrels, originally designed to hold hazardous materials. The barrels are used to “cook” entire plants, seeds included, by adding approximately 10 gallons of water and letting them sit in the baking sun for several months. Based on trials performed by California State Parks, it can be assumed that any seeds within are no longer viable after sufficient time in the sun. This has the dual benefit of both ensuring that invasive plant propagules are not being spread, while eliminating the need for single-use plastic bags.

The following table outlines species, area treated, and treatment types that were performed during this pilot program in FY 19-20. All these efforts were recorded on the Weed Manager mapping software suite provided by an annual license with the non-profit Calflora. The license is held by Valley Water. It is made accessible to Parks as a region-wide tool via County involvement in the Santa Clara Weed Management Area, a working group which is focused on a regional approach to invasive plant management. The data provided in the table was exported from Weed Manager.
<table>
<thead>
<tr>
<th>Species</th>
<th>Area treated in Sq. Meters</th>
<th>Treatment Type</th>
<th>Treatment Notes</th>
<th>Number of Bags/Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian knapweed</td>
<td>76</td>
<td>Hand pulled</td>
<td>Bag solarization</td>
<td>One bag</td>
</tr>
<tr>
<td>Goatgrass</td>
<td>19,966</td>
<td>Hand pulled</td>
<td>Barrel Solarization</td>
<td>One half barrel</td>
</tr>
<tr>
<td>Woolly distaff thistle</td>
<td>1,412</td>
<td>Hand pulled</td>
<td>Barrel Solarization</td>
<td>One half barrel</td>
</tr>
<tr>
<td>Cape ivy</td>
<td>927</td>
<td>Hand pulled</td>
<td>Barrel and Bag solarization</td>
<td>Two barrels, 150 bags</td>
</tr>
<tr>
<td>Stinkwort</td>
<td>18,765</td>
<td>Hand pulled</td>
<td>Barrel and Bag solarization</td>
<td>Six barrels, 30 bags</td>
</tr>
</tbody>
</table>

**g. Arbor Week Activities**

A 2018 Board resolution declared March 7th to the 14th of every year to be “Arbor Week” in Santa Clara County. This coincides with Arbor Week in California and is intended to raise awareness of how trees are a valuable economic asset and play a role in energy conservation, improving air quality, protecting water resources, providing habitat, and contributing to the overall health of residents.

In 2018, Arbor Week was celebrated with an informational tree care symposium titled “Urban Forest Management for People in a Hurry.” It was tailored towards those in city management and local government who are not directly involved in tree management, but whose work affects urban forests.

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1 Santa Clara County Board of Supervisors, February 06, 2018 (Item No. 58(j)), Office of Sustainability, “Proclamation declaring March 7-14 of each year as “Arbor Week” in Santa Clara County,” (Commentation/Proclamation 89889, Adopted 02/06/2018) available at: http://sccgov.iqm2.com/Citizens/Detail_LegiFile.aspx?Frame=&MeetingID=9789&MediaPosition=&ID=89889&CssClass=.
In 2019, to raise community awareness about the benefits of trees, all 60 trees in McEntee Plaza at 70 W. Hedding were labeled with “price tags” quantifying both the economic value and ecologic benefits provided by each tree and a summary of the total benefits provided by all trees in the plaza was displayed in the breezeway.

A tabling area in the breezeway of the County building at Hedding was planned for 2020. OOS would be partnering with local urban forestry non-profit, Our City Forest (OCF) to provide County staff and residents with information on trees and how to get a free tree planted. Unfortunately, this outreach was canceled due to the dangers of spreading COVID-19.

h. Santa Clara Valley Urban Forestry Alliance

The County’s environmental stewardship goals include exploring, with other local governments, agencies and partners, strategies, approach, and resource needs to build a comprehensive urban forest in Santa Clara County. OOS and the IPM Program are exploring grant opportunities to fund the establishment of the Santa Clara Valley Urban Forestry Alliance (SCVUFA).

SCVUFA will eventually include public, private, neighborhood, and non-profit stakeholders, facilitating sustained collaboration on: funding opportunities; targeted public education and outreach; expertise; adaptive policy tools such as model ordinances, guidelines, resolutions, and goals; and tools such as, tree inventories and canopy analysis. By augmenting traditional outreach methods with data-driven targeting, disadvantaged communities can be specifically encouraged to participate, embracing more than the populations and demographics that currently benefit and support urban forestry.

Expected outcomes would be, enhanced management of trees and urban green spaces, increased public awareness of the value of urban forestry, elevated recognition of urban forestry ecosystems as essential contributors to community sustainability, and stronger policy supporting urban forestry.
The IPM program has evolved over the years and has adopted a variety of projects in both pest management and sustainability, as the principles of smart resource management are an important commonality in both. Many of these projects have resulted in positive outcomes that solve pest issues, reduce pesticide use, and address many of our current environmental challenges such as climate change, air and water pollution, water management, habitat conservation, and waste-stream concerns. Sustainability concepts that compliment IPM program goals include pesticide pollution prevention outreach, sustainable landscaping, healthy forests, organic agriculture, and increased collaboration between regional educational organizations and County departments to maximize outreach.

### Sustainable Forestry Projects

Forest ecosystems are vital County “green infrastructure.” Forests contribute greatly to a high quality of life and provide important resources and services including timber, livestock grazing, water, wildlife habitat, recreational opportunities, and biomass inputs. Sadly, threats to forest health from wildfire, insects, disease, and development are increasing because of climate change and population growth. The negative impacts of deforestation can be devastating to the environment.
The most dramatic impact is the loss of habitat for millions of species. Tree loss deprives the forest of its canopy, which beneficially blocks the sun’s rays and holds in heat at night. Forest soils need to stay moist. Without sun-blocking tree cover, soil quickly dries out leading to forest losses and eventually making former forest lands barren deserts. Trees also help perpetuate the water cycle by returning water vapor to the atmosphere. Cycle disruption from tree loss leads to more extreme temperature swings that can be harmful to plants and animals. Trees absorb and sequester greenhouse gases that increase global warming. Forested lands are the County’s largest land-based carbon sink, drawing carbon from the atmosphere and storing it in wood and in forest soils. Fewer or smaller forests result in larger amounts of greenhouse gases remaining in the atmosphere—which can increase the speed and severity of global warming.

Managing County forests sustainably can help mitigate the adverse impacts of climate change and improve local conditions and quality of life. The ongoing health and fortitude of County forests will require cohesive, comprehensive, long-term strategies involving countywide restoration and sustained maintenance strategies.

ii. Water Conservation Projects

Water conservation relates to IPM program goals in several ways. Landscape weeds thrive in disturbed and poorly irrigated land. Drip and subsurface irrigation techniques that are targeted to desired landscape plant species can alleviate weed issues. Additionally, trees that have adequate water will maintain the health and vigor necessary to prevent insect and pathogen attacks.
a. **County of Santa Clara Sustainable Landscape Ordinance**

In 2015, the State of California enacted major changes to the Water Efficient Landscape Ordinance\(^2\), marking a groundbreaking shift toward landscape design and management practices better suited to the state's climates and conditions. New development and retrofitted landscape water efficiency standards are governed by the State Model Water Efficient Landscape Ordinance (MWELO), established to promote water efficiency and are administered by the County Department of Planning and Development. About half of California's urban water use is for landscape irrigation. Therefore, with proper landscape design, installation and maintenance, substantial water savings can be achieved. All California agencies are required to either adopt, implement, and enforce the MWELO, or adopt a more stringent ordinance.

The OOS IPM Program will continue to review opportunities to improve countywide water management for conservation, efficiency, wastewater utilization, pollution prevention, education/outreach, and operational efficiencies.

\(^2\) County of Santa Clara Sustainable Landscape Ordinance. Available at https://www.sccgov.org/sites/dpd/PlansOrdinances/Landscape/Pages/welo-background.aspx
iii. Sustainable Landscaping Projects

Many pest issues can be reduced or avoided by using sustainable landscaping practices. For example, landscape plants that are native, or otherwise well-suited for the Santa Clara Valley, will be stronger and less susceptible to pest infestation. Features such as mulch, efficient irrigation, and wildlife habitat designed into sustainable landscapes reduce the ability of pests to establish and flourish.

a. Sustainable Landscape Management Resource Guide

Guided by the County’s sustainable landscaping policy, the IPM program maintains an online resource guide to educate and promote sustainable landscape design, implementation, and maintenance. The webpage can be accessed at: https://www.sccgov.org/sites/slm/Pages/Home.aspx.

This outreach is designed to provide step-by-step sustainable gardening education for the novice, the avid, and the professional gardener. It also provides information about where to buy native plants locally and water smart landscaping including water harvesting, efficient irrigation systems, reduction of non-functional lawns, and greywater usage. The goal of this educational outreach is to encourage local communities to improve their gardening practices, to protect and enhance the natural environment, and to increase sustainable practices.
The OOS will continue to promote the use of Bay-Friendly landscaping maintenance principles and practices: landscaping locally; landscaping to reduce waste to the landfill; nurturing the soil; conserving water; conserving energy; sequestering carbon; protecting water and air quality; and creating and protecting wildlife habitat.

b. Sustainable Building/Landscape Design

Sustainable building and landscape design require a big-picture view of how choices affect facilities’ pest management efforts. Prevention of pest problems at the design level is the heart of any state-of-the-art IPM program. Pest proofing, in conjunction with sanitation efforts, provides the best long-term management and prevention of pest infestations. Relatively simple design features can substantially reduce long-term pest control costs in buildings and landscapes, while also eliminating the health and environmental impacts of pesticide use.

j. Organic Agriculture Projects

Organic farming systems rely on ecologically based practices such as cultural and biological pest management, and virtually exclude the use of synthetic chemicals in crop production. The goal is to design the production system using integrated non-chemical techniques so that pests do not find plants, are controlled by natural enemies (biological control), or their damage is kept to a minimum. Vigorous, healthy plants are more able to withstand damage caused by arthropods and disease. Therefore, a “plant positive” (as opposed to “pest negative”) approach of managing the system to enhance beneficial processes and cycles and create healthy soil and plants, is at the foundation of integrated pest management in organic systems.
The integrated non-chemical techniques used in organic farming systems are carefully planning planting and harvesting dates, providing habitats that supply resources for beneficial organisms, managing soil fertility and crop nutrients through tillage and cultivation practices, crop rotations, cover crops, and supplementing with manure, composts, crop waste material, and other allowed substances.

i. Urban Organic Farming at Martial Cottle County Park

In 2014, the County committed to organic farming by leasing its open space agricultural land at Martial Cottle Park to Jacobs Farm. Since then, this urban park and working farm produces flavorful, local, organic fruits and vegetables that go directly from “field to fork.”

The IPM Program, along with the County Parks Department, worked closely with Jacobs farms during the initial development of the working farm at Martial Cottle and continues to work with them on current pest management issues including: use exemptions, rodent control, orchard disease management, and departmental coordination.

The farm also includes public events and activities, ensuring the community has access to “farm life” and an education on why organic is so important. Locally grown farm produce and products include:

- strawberries
- melons
- sweet corn
- sweet peppers
- bell peppers
- shishito peppers
- beets
- Carrots
- fresh salsa
- heirloom lettuce
- arugula
- kale
- heirloom tomatoes
- cherry tomatoes
- cucumbers
- onion
- sugar snap peas
- raw honey
- edible flowers
- lavender
- cilantro
- mint
- thyme
- rosemary
- ginger
- jams
The farm has become a showcase for the latest in sustainable farming techniques, conservation, and food production, and now is moving into the “dry farming” of Heirloom and Early Girl tomatoes to conserve water. All produce is grown using IPM principles and practices which include:

- Maintaining and enhancing soil fertility and promoting optimal biological activity within the soil by building the soils with natural inputs like compost, cover crops, worms, and healthy fungi;
- Crop selection and rotation, and plant and animal residue recycling to manage nutrient cycling;
- Water management and the augmentation of beneficial insects to encourage a balanced predator–prey relationship, and promote biological diversity and ecologically-based pest management; and
- When these good management practices are unable to prevent or control crop pests, weeds and diseases, a biological or other substance allowed for use in organic farming is applied to prevent, suppress, or control pests.

**Major Pests, Diseases, and Responses at Martial Cottle**

**Ground Squirrels**

Colonies of ground squirrels still reside in all areas of the park. Jacobs Farm estimates that they have trapped and eliminated over 1000 squirrels in FY 19-20. Due to limited tractor availability in spring 2020, Jacobs has been mostly using individual and family traps instead of the burrow blocker. Squirrels remain the largest pest challenge within Martial Cottle.

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3 Dry farming refers to crop production during a dry season, utilizing the residual moisture in the soil from the rainy season. Dry farming works to conserve soil moisture during long dry periods primarily through a system of tillage, surface protection, and the use of drought-resistant varieties.
**Squash Bugs**

To address an issue with squash bugs, Jacobs worked with the California Department of Food and Agriculture (CDFA) to introduce the parasitoid fly, Trichopoda Pennipes. The source of the parasitoid was the UC Davis research farm and the release was pre-approved by the County Agriculture Commissioners office. In June 2020, CDFA came out to assess and found a 19.6% parasitized rate, which is considered hugely successful. Additionally, Jacobs changed their practices to apply compost as a mulch around the seeds at planting time. This eliminated the typical squash bug escape routes from predators mainly birds such as killdeers and ravens, as pictured below.

![Killdeer](image1.png)
![Raven](image2.png)

**Morning Glory/Field Bindweed**

With deep rooting systems, field bindweed is the biggest weed problem at Martial Cottle. Jacobs tailors most of its crop programs around bindweed, growing smaller herbs during the winter months as the bindweed dies back and ensuring that summer crop programs are vigorous enough to out compete. Jacobs also utilizes physical methods to rip, chisel and cultivate field bindweed during the season. However, they do allow the bindweed to grow in unused portions of Martial Cottle during the summer months because repeated tractor work on non-irrigated land would pulverize
the soil. This would potentially cause blowing dust and associated poor air quality and complaints from park neighbors and pedestrians.

**Cilantro Yellow Blotch Virus**

This problem causes cilantro leaves to develop bright yellow, irregularly shaped, blotchy lesions with diffuse margins and yellowed veins. The pathogen causing this problem has not yet been characterized, but is tentatively named Cilantro yellow blotch virus. This virus was first seen in fall 2019 and is believed to be vectored by flushes of aphids migrating into Martial Cottle in the fall. Jacobs expanded nectar sources for beneficial insects and moved the fall production of cilantro to zone A, which is farther from the drainage channel between zones B and C.

**Tobacco Mosaic Virus**

This virus was first identified in Martial Cottle in 2015. The specific insect vector has not been identified, as the vector previously established in research literature isn’t present in significant numbers when the virus is active. However, during significant outbreaks, there are always spikes of native flies similar to Lygus bugs but smaller. The infections seem to start in early fall near the drainage channel between zones B and C. Jacobs is focusing the early tomato production in that area and then shifting fall tomato production across the park to zone A.

**Cucumber Beetles**

These cause damage to the butternut and spaghetti squash crops by eating the outside skin of the curing product. Cucumber beetles are difficult to control and Jacobs is using a strategy of inter-planting the squash with tomatoes and beneficial crops to confuse the cucumber beetles.
2. Program Collaboration - Details

The IPM Program continues to seek public and private alliances to strengthen IPM policies, research, best practices, and outreach. In FY 2019-20, the Program worked with various departments, agencies, and stakeholders on IPM concepts and implementation at various venues.

a. Pesticide Pollution Prevention Outreach

Numerous pesticides are used in the U.S. for production agriculture, non-production agriculture, and in the urban environments. People use insecticides, herbicides to eliminate insects and weeds and chemical fertilizers to enhance their plant growth from their gardens or buildings, but these have the potential to harm our health and the environment. While oftentimes beneficial, pesticides are also risky. Misuse of pesticides and accidents involving pesticides occur regularly. Pesticide pollution can harm the environment and non-targeted living species. Because of this, the County and OOS IPM staff works with the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)\(^4\), to educate citizens on pesticides and how to minimize harmful impacts and prevent point source and non-point source pollution.

i. Outreach to Nursery Outlets and Local Landscapers and Public

SCVURPPP's target audience for outreach has primary been the urban audience. Outreach is achieved by distributing information about how to manage pests using sustainable landscape practices, promoting structural sanitation, housekeeping and maintenance to manage or control pests. Established in 2011, SCVURPPP, of which the County is a member, continues to conduct IPM educational programs and trainings.

SCVURPPP contributed funds to, and actively participated in, the Bay Area Stormwater Management Agencies Association (BASMAA) IPM Store Partnership Program (also known as the Our Water, Our World program (OWOW)). The OWOW Program partners with retail stores and nurseries to provide less-toxic

\(^4\) Member agencies (co-permittee) include Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, Sunnyvale, the County of Santa Clara, and the Santa Clara Valley Water District.
pest control information to residents at the point of purchase. This involves stocking literature racks at stores with “Less Toxic Pest Management” fact sheets and placing shelf-tags on store shelves. Shelf-tags are small product identification signs that are placed on store shelves to help customers identify less-toxic products. The OWOW Program also includes a training component where store employees are trained on IPM and selling less-toxic pest control products to customers. The website can be found here: http://ourwaterourworld.com/.

Currently, 23 local stores in Santa Clara Valley participate in the OWOW Program. The number is a decline from prior years due to COVID-19 related cancelations. OWOW program staff visited each participating to restock literature racks and update shelf-tags. OWOW program staff trained 15 employees representing two stores. These on-site trainings informed attendees about stormwater issues and IPM and supplied them with informational handouts and lists of less-toxic products. SCVURPPP continued with outreach about less-toxic pest control to residents who use, or contract for, structural or landscape pest control and landscape professionals. Information provided included: pesticide use and water quality; proper use and disposal of pesticides; IPM and IPM Certification Programs; hiring a Green Gardener and the list of trained Green Gardeners; , and the OWOW Program.

ii. Advertising and Outreach Efforts

Watershed Watch Campaign advertising included a total of 870 ads (512 paid and 358 free/PSAs) on IPM topics. The ads were placed on radio stations, TV, and online media. Information provided included: less-toxic pest management and the list of Green Gardeners; IPM certification programs; and OWOW fact sheets. The list of stores selling less-toxic products was posted on the County Household Hazardous Waste Program’s website (www.hhw.org). The website also promotes proper disposal of pesticides and refers users to an appropriate nearby disposal location.
iii. Public Outreach Events

Additionally, SCVURPPP and Watershed Watch Campaign conducted IPM outreach at five events. Events were selected based upon target audience and attendance. Materials distributed at the events included the following: Less Toxic Pest Management fact sheets, “10 Most Wanted Backyard Bugs” brochure, “Draining Pools & Spas” brochure, “You are the Solution to Water Pollution” brochure, “Clean Cars & Clean Creeks” brochure, “Mercury in Fish” brochure, and giveaways (e.g. flyswatters, drawstring backpacks, and temporary tattoos). The flyswatters had the Watershed Watch website and hotline number and the words “The Original Earth-Friendly Pest Control” printed on them. The bean bag toss game for children was used at most of the events. Event staff distributed approximately 1,700 outreach materials and giveaways.

Watershed Watch “Half-Off” Car Wash Event

This event was held twice, at two different carwashes. Target audience was car wash customers and the target message was proper car washing to prevent stormwater pollution. For both events, estimated attendance was 135, with 36 flyers distributed.

Pumpkins in the Park

This event was held in October in Guadalupe River Park. Target audience was families with children and the target messages were less-toxic pest control, litter prevention, and proper disposal of hazardous household waste to prevent stormwater pollution. Estimated attendance was 13,000 to 15,000, with 281 brochures and 315 giveaways.

Day on the Bay

This event was held at Alviso Marina County Park. Target audience was families with children and the target messages were less-toxic
pest control and litter prevention to prevent stormwater pollution, as well as and mercury in fish consumption advisory. Estimated attendance was 10,000, with 190 brochures and 393 giveaways.

**Landscape Summit 2020**

This event was held at Valley Water headquarters. Target audience was landscape professionals and the target messages were less-toxic pest control to prevent stormwater pollution and the Green Gardener program. Estimated attendance was 105, with 115 brochures and 9 giveaways.

SCVURPPP also supports the involvement of Santa Clara Valley residents by providing advertising support for two events. Due to shelter-in-place mandates a third event, National River Cleanup Day, was canceled in FY 19-20. Also, several citizen involvement and stewardship programs are conducted as part of the SCVURPPP-funded Watershed Watchers Program at the Don Edwards San Francisco Bay Wildlife Refuge.

**Coastal Cleanup Day**

This event was held at various locations throughout the County and was coordinated by the Creek Connections Action Group. A total of 2,166 volunteers participated in cleaning 46 sites in Santa Clara County, and removed approximately 53,296 pounds of trash and recyclables. SVURPPP provided funding for local advertising.

**Stewardship and Citizen Science Programs – Gardening Without Chemicals**

The event was held at Don Edwards Wildlife Refuge. Stewardship programs are conducted in partnership with corporate groups, schools, and not-for-profit organizations. Participants pick up trash, and work in the Refuge garden planting native plants, pulling non-native plants, and mulching. Citizen science programs monitor the effects of climate change and the results of the stewardship activities on plants and wildlife. Stewardship programs reached a total of 358 attendees, including 2 preschool children, 169 elementary school students, 9 middle school students, 42 high school students, and 136 adults.

SCVURPPP funded a South Bay Green Gardens website ([www.southbaygreengardens.org](http://www.southbaygreengardens.org)) to educate residents, landscape construction maintenance professionals, and municipal staff on sustainable landscaping techniques, as well as the Green Gardener Program, which trains gardeners to reduce urban runoff and stormwater pollution from landscape maintenance activities. Eighteen participants completed the Green Gardener training and 14 Green Gardeners were re-certified. The Green Gardeners site is: [http://www.mywatershedwatch.org/residents/green-gardener-program/](http://www.mywatershedwatch.org/residents/green-gardener-program/).
b. Sustainable Gardening Education

Besides organic farming, Martial Cottle park’s community education center is a showcase for ongoing education through cooperative partners such as University of California Cooperative Extension (UCCE), Our City Forest, the City of San Jose’s Community Garden Program, Master Gardeners of Santa Clara County, 4-H Youth Development, Small Farm Program and Composting Education Program. Each of these community partners operate parcels at the park and offer opportunities for the public to tour, take a class, attend a workshop or volunteer. Each partner helps to uphold the vision of the Cottle Lester family to inform and educate the public about agriculture in Santa Clara Valley.

The Martial Cottle Park’s Master Gardener program extends research-based knowledge and information on home horticulture, pest management, and sustainable landscape practices to County residents. In the summer of 2015, Master Gardeners began working on a four-acre parcel covered in weeds. Since then they have developed a native garden, 51 raised beds for research and ornamental plants, a farm stand, a barn with rain catchment, and pathways into the parcel, a 72-foot solar light greenhouse. The greenhouse is used to grow most of the plants for Master Gardener projects throughout Santa Clara County. Many of the vegetables, flowers, herbs, and plant seedlings grown on-site are sold at Spring and Fall garden markets. Other plants are used for research and teaching purposes.

*UC Master Gardeners are a primary resource for the dissemination of gardening information from the University of California to the Santa Clara County community.*
In FY 2019-20, UCCE hosted 11 field workshops, events, and classes in several Santa Clara County cities on a wide array of IPM topics such as weed management, IPM and beneficial insects, vertebrate pests, and pollinators. On any given weekend, there are a variety of workshops, tours, volunteer days, and special events, including the Spring Celebration and Fall Festival, happening at Martial Cottle Park and residents are encouraged to visit during open hours.

c. Organic Farming Community Outreach at Martial Cottle

Community outreach about farming activities at Martial Cottle is extensive. Jacobs Farms responds directly to park visitors’ questions about farming practices including all public inquiries received through the visitor center, by phone, and by email. Questions about practices are answered in a timely manner and Jacobs works with neighbors and park users to increase effectiveness of control methods and reduce any inconveniences that farming operations cause.

In 2019, a neighbor complained that he was having similar issues with the squash bugs on his zucchini as Jacobs was with their hard squash crop. The neighbor was invited over to discuss and ended up helping Jacobs release the previously mentioned parasitoid at the farm. The neighbor was given parasites for his yard as well. Social media is also used to inform the public about farming practices and activities.
d. Review of Built Environments - From the Eyes of an IPM Professional

Pest prevention recommendations at the design and/or retrofit stage of construction can help improve indoor air quality and save money over the life of the building, but they require architects and builders to rethink their design strategies in a more holistic fashion. This rethinking is needed both for established design approaches, such as the standard acoustical gaps in ceilings that can also serve as rodent or cockroach hotels, and for emerging approaches, such as the promotion of living walls that have unknown impacts on pest infestations. In other examples, tactics needed to conserve energy such as sealing, and weatherization will likely harmonize well with tactics for designing-out pests.

Facility sanitation, housekeeping and maintenance, and the role of building occupants in preventing pest attraction, harborage, and breeding is critical. The complex cultural and sociological components of office complexes indirectly and, in some cases, directly causes pest populations to proliferate. This requires concerted efforts towards on-going customer (building occupants and facility maintenance group) education - for them to help themselves resolve these pesky issues. This includes segregating food storage away from workspace, eating food only in designated breakrooms (not in workspaces), and daily removing garbage from receptacles etc., thus eliminating conditions that lend to the proliferation of pests.

The IPM Program provides regular structural and build environment advisory services with greater emphasis on good operational management practices (e.g., sanitation, housekeeping and maintenance), policies, procedures, and protocols (often known as Best Management Practices (“BMPs”)) in existing facilities for reducing and/or preventing and controlling pests. Implementing these practices and identifying gaps in implementation is an ongoing effort that is a regular part of IPM program staff’s
everyday duties. Through daily field work, including numerous inspections and on-site supervision, a substantial percentage of County structural pest issues are solved non-chemically.

A few notable examples of FY 2019-20 are 1) ant, cockroach, rodent, and bird control at Elmwood Correctional facility; 2) rodent control at a demolition/construction site and the surrounding County Government Center campus at Hedding Street; 3) rodent control in and around both Juvenile Hall and the Main Jail campus; 4) bed bug control at both Social Services' Julian Street Campus and HHS emergency treatment areas; 5) cockroach and drain fly control at HHS main hospital campus; 6) silverfish and termite control at New Almaden Quicksilver Mining Museum; 7) flea and wildlife control at VMC McKee Campus; and 8) ant and cockroach control at the Charcot campus.

3. Education and Training - Details

County parks, roads, and urban landscape employees involved in IPM activities participate in an annual IPM training program. In FY 2019-20, 69 County employees working in pest (primarily weed) management activities were trained. Trainings in roadside vegetation management included: biological, mechanical, chemical control methods; factors that influence herbicide application; effective mechanical removal of grasses; re-vegetation and native seeding; and using living systems. Trainings in invasive weed management included: top weeds of Santa Clara County; mapping weeds; understanding the source; evaluating progress; control methods; and plant suggestions for out competing weeds. Trainings in pesticide applicator safety included: personal protective equipment, chronic vs, acute toxicity, safe handling of pesticides, heat related illness, environmental hazards of pesticides, laws and regulations, and label and SDS reviews.
Seven County FAF landscape maintenance staff also attended Recycled Site Supervisor Training and three staff attended Bay Friendly Landscape Maintenance Training.

OOS IPM Program staff attended educational workshops, certification courses, and meetings with other Bay Area IPM personnel to learn about and discuss current issues, alternative IPM methods, new products, best management practices, and the science behind IPM. IPM Program staff also attended the PestWorld 2019 and the 2019 Entomological Society of America conferences, the 2019 California Invasive Plant Council symposium, the 2020 Purdue Pest Management Conference, and the International Society of Arboriculture’s (ISA) “New Insects and Disease Problems in Trees” webinar, as well as completion of the International Society of Arboriculture’s Urban Forestry online learning course.

4. Use of Living Systems to Help Manage Pests - Details

a. Bioremediation of Drains to Control Flies

Grease and organic buildup in drains are primary feeding and breeding sites for drain flies/small flies. County facilities use bioremediation to eliminate these fly breeding sites. It is an innovative technology, which uses microorganisms (Bacillus genus) and enzymes injected into drain lines. These microorganisms digest fat, oil, and grease and convert them into water and carbon dioxide, which helps to minimize fly breeding sites and food sources. Use of this living system can be expanded to keep our facilities drainage systems clean.
b. Sniffer Dogs to Aid in Bed Bug Control

Like other states and cities, bed bugs are an emerging challenge in County facilities. In the past few years, some of our facilities have been affected by the resurgence of bed bug activity, causing anxiety among County staff. The most difficult and important step in eliminating bed bugs is early detection and identification to correctly recognize these blood-feeding pests. While adult bed bugs can be easy to see, bed bug eggs (which are white) and nymphs (which are virtually colorless) are nearly microscopic.

The IPM Program is responding to this re-emerging pest diligently on a case-by-case basis, using non-chemical approaches such as conducting canine inspections to help identify localized bed bug activity, and using vacuums, steam, and dry heat to control bed bug activity.

A dog can quickly locate bed bug trouble spots, ensuring that treatments can efficiently target and eliminate bed bug infestations. A canine bed bug inspection can also be used to follow-up after treatment to ensure that all bed bugs have been killed. Coordination at all levels (departments and contractors) has helped achieve the desired results. The IPM Program plans to continue to use canines (intelligent living system) for pest detection.

c. Cattle Grazing

Carefully managed selective grazing in County parks is used to manage and promote perennial native grasses and wildflower stands. Grazing is used to reduce non-native grasses and invasive species such as yellow star-thistle, Italian thistle, other broadleaf weed infestations, which compete with native annual wildflowers and grasses. Grazing is also used to reduce fire fuel loads and minimize wildfire risks from invasive weeds and plants such as coyote brush, chamise or greasewood and California sage, that encroach into grasslands.
d. Goat Grazing

Goats can be used to reduce or eradicate invasive plants in areas where cattle cannot roam, or to eat plants that cattle avoid. Goats eat primarily yellow star-thistle in fields where Santa Clara County has serious infestations. Goats can also clear creek corridors and grasses around old buildings, protecting these properties from wildfire.

e. Barn Owls

Barn owls have long provided a natural way to control destructive gophers and ground squirrels. Supplying habitat for these predators is another excellent IPM technique to control rodents. Barn owls occupy nesting boxes year-round. A family of owls will consume several thousand rodents in a year. Therefore, owls can help keep rodent populations at a manageable level, preventing spiking to the point where other measures become necessary. Owl boxes at Martial Cottle park continue to house owls to aid ground squirrel and gopher control.
5. IPM Data Collection - Details

a. IPM Spatial Monitoring and Database Solution

Data collection, analysis, and reporting is a critical component of proper program management and adherence to the IPM ordinance. A spatial IPM data management system is important for enhancing the County’s IPM program by providing a cost-effective and efficient system that all departments can use to eliminate paper-based data collection, reduce errors, enhance data analysis, and simplify reporting and exemption requests.

The Program dedicated a very substantial level of resources into developing this database solution in FY 19-20. The RFP process for an external vendor was completed, including scope development and scoring. Due to limitations in cross-departmental data accessibility, the selected vendor decided that they would not be able to complete this project.

The IPM program is currently planning to work with County Technology Services and Solutions to develop a solution through their in-house Microsoft Dynamics development team. Dynamics is a resource planning and customer relationship management software that can be configured to manage IPM data.

RDA has agreed to use the proposed software. FAF has determined that their department activities do not currently warrant the use of the IPM spatial mapping and data collection software. PRK will be using their own data management system which the IPM system will integrate with once fully developed.

Although the IPM program would like development, testing, and implementation to be completed during FY 20-21; resource availability, program staff bandwidth, and Dynamics team availability will determine system development timeline moving into the future.
b. Tree Inventory

A tree inventory facilitates proactive tree management decisions in both maintenance and planting. Knowing the size, species, condition, and age of trees gives an overall picture of what the forest needs now, and what it will need in the future. It allows better tracking of pest issues, and it quantifies the benefits provided by trees as well.

In 2019, the County contracted with Davey Resource Group for tree inventory services, which documents the trees and their condition. The County purchased inventory services for all trees on 38 FAF-managed sites as well as trees in “use-areas” at 29 County parks (“use-areas” are those which receive the most interaction with people, such as restrooms, picnic areas, parking lots, and buildings).

Completed in July 2019, the inventory counted 19,054 County-managed trees, with a total leaf surface area of 2.3 million square feet. The total annual value of the benefits provided by these trees is estimated to be $3,083,000. The calculated benefits also include, 1,828,000 lbs. of CO2 avoided, 4,162,000 lbs. of CO2 sequestered, 29,415,000 gallons of water saved, 2,535,000 kWh of energy saved, and air pollutants reduced by 6,744 lbs. The average annual rainfall interception rate per tree ranges from a low of 102 gallons to a high of 1,481 gallons based on tree size, rainfall amounts, and foliation period.

Understanding the benefits that trees provide can give County residents and departments a better understanding of the value provided by trees and help them to budget maintenance and planting resources in a manner that can develop a healthy, pest-free urban forest.
6. Future Challenges - Details

a. Emerging Trends

To minimize conventional pesticide application, IPM is increasingly data-driven, strategic, and creative. Targeted sites often require phased, multiple methods, with higher levels of monitoring, analysis and integrated ecologically sound non-chemical solutions. County pesticide applications continue to decline, being reserved for critical use when other options are unfeasible. As mentioned previously, selecting less-toxic chemicals for roadside vegetation management is challenging. With emerging facts and observations of deleterious impacts on human health and to the environment, these hidden costs are difficult to enumerate in economic terms, exacerbating the challenge to approve or not to approve pesticide use against their difficult-to-measure risks. Proper resources are required to manage pest issues non-chemically. Departments must be adequately funded, well-trained and, equipped to provide effective IPM services to County staff and residents. Furthermore, climate change, drought, temperature shifts, extreme weather, and flooding are posing new challenges which alter ecosystems and make them more susceptible to pests, disease, and non-native plant infiltration.

b. The Importance of Continuing Professional Development

The availability of ongoing resources to support the continuing professional development of County staff involved in pest management, as well as in sanitation, housekeeping, and maintenance activities provides many benefits. However, without awareness of these benefits, advocating to ensure needed support will prove to be a challenge.

In addition to staff proficiencies and knowledge being kept up to current standards, new information and techniques are introduced. The skillsets of County employees are kept relevant and modern. Outdated methods and materials are replaced. This is particularly important in the world of pest control, as knowledge of safe pesticide application and non-chemical alternatives can change rapidly as new research is published.
County employees become better equipped to identify and manage pest control issues. This fosters proactive management, which saves money, eliminates facility downtime, and ultimately leads to a safer environment for employees and residents.

Finally, professional development can provide a sense of accomplishment and value. It can offer a platform for career advancement and can encourage increased job satisfaction. It is an upgrade to an employee’s skillset, but ongoing upgrades require ongoing investment.

c. Rodents: Ground Squirrels and Pocket Gophers

Maintaining a site-specific gopher and squirrel-free buffer area around critical infrastructure (airport taxiways and runways, levees, earthen dams, canals, roadways, berms, bridge abutments) is critical. In some cases, regulations require zero tolerance for grounds squirrels, and may warrant on-going control. Available non-chemical control includes using a combination of methods - trapping, explosive burrow collapsing, deep-ripping to destroy burrows, slurry filling to block burrows, fencing, and predators. Chemical control options at our disposal include burrow fumigation using carbon monoxide, carbon di-oxide, and/or phosphene gas. Rodenticides (poison baits) are not used on County-owned and managed facilities.

Ground squirrels work hard on their burrows and do not readily give them up. They continue to improve their burrows through multiple years and generations, creating complex systems that can be anywhere from 3 to 135 feet long and 2 to 4 feet deep. It has been observed that when burrows are abandoned, new squirrels will re-infest the area and occupy the old burrows. Squirrel populations in these areas (when left unattended) that persist at high densities over time are more likely to make longer and more interconnected burrows and can cause damage or sudden failure.
Controlling these pests through one department or entity alone is challenging, as pest migration from surrounding areas can continue to re-infest controlled landscapes. In additional, while controlling these pests, protecting potential habitat for any endangered or threatened species needs to be taken into consideration. To execute an integrated management approach, a coordinated, cross-jurisdiction effort, including continually monitoring pest and non-target species populations throughout the year and seeking permits where needed, is warranted. IPM Program staff is exploring opportunities to engage cross-jurisdiction stakeholders to address these issues.

d. Rodents: Rats and Mice

Increased rat and mouse activity in buildings pose another challenge due to a variety of reasons including construction that disturbs rodent burrows; or poor sanitation, housekeeping, and maintenance (SHM). The complex cultural and sociological behaviors of people inhabiting buildings indirectly, and in some cases directly, cause rodent populations to proliferate. Effective rodent control will require concerted ongoing building occupant and facility maintenance group education to help resolve these pesky issues. Improvement in SHM is the single most effective way to reduce rodent issues in County facilities. Adequate resources are required for employee and vendor outreach and training to educate these groups on the role that they play in keeping County facilities rodent free.

Rodent prevention includes segregating food storage away from workspaces, eating food only in designated breakrooms (not in workspaces) and removing garbage daily from receptacles, thereby eliminating the conditions that lead to rodent proliferation. The IPM Program is working closely with the
structural IPM contractor to identify these conditions on a case-by-case basis and is seeking help from the departments and the facilities maintenance group to resolve rodent and associated ecto-parasite issues.

e. Bed Bugs

Like other states and cities, bed bugs are an emerging challenge in the County facilities. The IPM Program is responding to this re-emerging pest diligently on a case-by-case basis and using non-chemical approaches, such as conducting canine inspections to identify localized bed bug activity and using vacuums, steam, and dry heat to control bed bug activity. There were three bed bug inspections at County facilities in FY 19-20. Coordination at all levels has helped achieve desired results, but funding will be required for ongoing customer education and control efforts.

f. American and Oriental Cockroaches

Managing American cockroaches is not easy. They prefer warm and humid environments, readily live outdoors under mulch and other vegetative covers, and are common in irrigation boxes, sewers, steam tunnels, and masonry storm drains. Occasionally they forage from sewers and other areas into the ground.
floor of buildings. These intrusions in many County buildings have become more common in the last four years due to drought conditions because sewers and exterior grounds were running dry.

There is no conventional approach that is effective in controlling cockroaches in sewers or similar habitats. The IPM Program’s current approach to prevent infestations involves close monitoring and applying insecticide baits. While an effective bait program does not give immediate results (it may take seven or more days to be effective), baits can be effective for long-term cockroach control. The primary keys to controlling cockroaches are sanitation and exclusion. Cockroaches are likely to reinvade if a habitat is suitable to them (i.e., food, water, and shelter are available); therefore, the conditions that promoted the infestation must be changed.

Also, the County Structural IPM Contractor is currently exploring an experimental opportunity to apply a fungus that is capable of infecting and killing American cockroaches into sewers. The use of an entomopathogenic biopesticide would be under a research permit issued by the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation. This approach is already used in Europe.

The product, Mycokil, is a bio-pesticide with the fungus Beauveria bassiana. This fungus is an insect specific pathogenic fungus found in every corner of the globe. This strain of B. Bassiana in Mycokil came from Europe and has been found to be more effective on American cockroaches. The product is in the final stage of gathering field data to support EPA registration. For now, Mycokil is labelled to fog into sewer manholes to treat American cockroaches only. If successful, a new product may soon be available to the American market to address this issue.
Attachment 2: Pesticide Use Analysis by Year and by Project Type

### S-1. Structural Pest Control - Liquid Pesticide Use: 2010-2020

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![Bar chart showing pesticide use by year and project type](chart.png)
## S-2. Structural Pest Control - Dry Pesticide Use: 2010-2020

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<td>Niban Granular Bait</td>
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S-3. Termite Control Pesticide Use: 2010-2020
R-1. Roadside Acreage Under Herbicide Management: 2005-2020

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<thead>
<tr>
<th>Year</th>
<th>Acres</th>
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<tr>
<td>2006</td>
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<td>2007</td>
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</tr>
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<td>2018-19</td>
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<tr>
<td>2019-20</td>
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R-2. ANNUAL ROADSIDE ACREAGE UNDER CHEMICAL VS. NON-CHEMICAL: 2019-2020

- Chemical: 29%
- Non-Chemical: 71%
## P-1. Parks Chemical Versus Non-Chemical Management: 2019-20

<table>
<thead>
<tr>
<th>Park</th>
<th>Total Acres</th>
<th>Non-Chemical Management (Acres)</th>
<th>Chemical Management (Acres)</th>
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<td>Almaden Quicksilver</td>
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<tr>
<td>Anderson</td>
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</tr>
<tr>
<td>Calero (includes Rancho San Vicente)</td>
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<tr>
<td>Chesbro Reservoir</td>
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<td>Chitwood Adams</td>
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<td>Coyote Creek South</td>
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<tr>
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<tr>
<td>Joseph D. Grant</td>
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P-2. Pesticide Use By External Partners: 2019-20

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<th>Location</th>
<th>Gallons</th>
<th>Feet</th>
<th>Yards</th>
<th>Inches</th>
<th>Acres Treated</th>
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P-3. Pesticide Use By Parks Department: 2019-20

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P-3. Number of Parks Under Pesticide Treatment
Out of 29: 2002-2020

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<td>2012</td>
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<td>2018</td>
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</tr>
<tr>
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P-4. 99.87% of Total Regional Park Area Managed Non-Chemically: 2019-20

Acres Under Non-Chemical 99.87%
<table>
<thead>
<tr>
<th>Year</th>
<th>Acreage</th>
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<tbody>
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<td>53</td>
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</tr>
<tr>
<td>2019</td>
<td>65.61</td>
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### V-1. Arundo Donax Management - Valley Water: 2006-2019

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<th>Aquamaster</th>
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<th>Acres</th>
<th>Gallons</th>
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<tr>
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Office of Sustainability
Integrated Pest Management Program
Putting IPM into Practice through Real World Examples

<table>
<thead>
<tr>
<th>2005 CA IPM Innovator Award</th>
<th>2009 Green California Leadership Award</th>
<th>International IPM Symposium 2009</th>
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<td>CA Dept of Pesticide Regulation</td>
<td>Green California Summit</td>
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<table>
<thead>
<tr>
<th>2012 PestWise Shining Star Award</th>
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<td>United States Environmental Protection Agency</td>
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Exploring Sustainable Tools and Technologies
For
Pest and Pesticide Free Environment