CITY OF IRVINE

Integrated Pest Management Program

2022 Annual Report

Introduction

The City of Irvine continues to implement the Public Works and Transportation Department Integrated Pest Management (IPM) program adopted by the City Council in February 2016. This IPM policy sets forth the following goals:

Citywide Pest Management Guiding Principles

- Use of organic pesticides in all City properties.
- Limit exposure to any pesticides where children and the general public congregate.
- Incorporate additional guidance on use of pesticides for City right-of-ways, facilities, and other properties, as reflected in the February 23, 2016, staff report.
- Use Environmental Protection Agency (EPA) Level pesticides in a targeted manner, and only if deemed necessary to protect public health and economic loss by a licensed pest control advisor and City staff, when pests cannot be managed by other methods.

The California Department of Pesticide Regulation (DPR) honored the City of Irvine for its effort to reduce the use of synthetic pesticides to manage pests with the 2019 IPM Achievement Award. The Award recognizes organizations that use integrated pest management (IPM) to address the diverse pest management needs throughout California. The City's comprehensive program prioritizes non-chemical pest control methods and is committed to manage municipal landscapes and parks in this most responsible way.

The 2022 IPM annual report summarizes program activities and application data for the year. The IPM program applies to all City departments, although the majority of pest management responsibilities are under the guidance of the Public Works and Transportation, Landscape Division.

Program Components

The City of Irvine IPM Policy promotes environmentally sensitive pest management practices while preserving assets, protecting the health and safety of the public, and City employees. All costs and impacts associated with pesticide use, including community and environmental health, are considered.

IPM is a decision-making process for managing pests. A monitoring system is utilized to determine pest levels and tolerance thresholds. It combines biological, cultural, physical, and chemical tools to minimize health, environmental, and financial risks. The monitoring system requires extensive knowledge about pests, such as infestation thresholds, life histories, environmental requirements, and natural enemies to complement and facilitate control of pests.

As part of an IPM program, pesticides may be used when pest thresholds get too high. A pesticide is any substance, or the mixture of substances, used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may be detrimental to vegetation, humans, or animals. Regardless of the pesticide being organic or synthetic, the goal is to rid a pest and caution should be taken when applying the product.

To ensure the IPM program continues to be an adequate tool to meet the City's pest challenges while upholding the program goals adopted by the City Council, staff shall continuously examine and evaluate components of the program's effectiveness. In addition, all contractors that apply pesticides on the City's behalf are required to adhere to the IPM Policy.

Alternative Pest Control Methods for Landscape Maintenance

The Public Works and Transportation Department's Landscape Division employs alternative methods for weed control, such as using steam and mechanical removal. Other non-pesticide weed control measures include applying three inches of mulch in landscape planter areas to minimize weed growth. City contract services manually remove cattails in drainage facilities to ensure proper water flow. In addition, Smart Irrigation Controllers apply the proper amount of water to City landscapes, which minimizes disease and weed growth, thus limiting pesticide use.

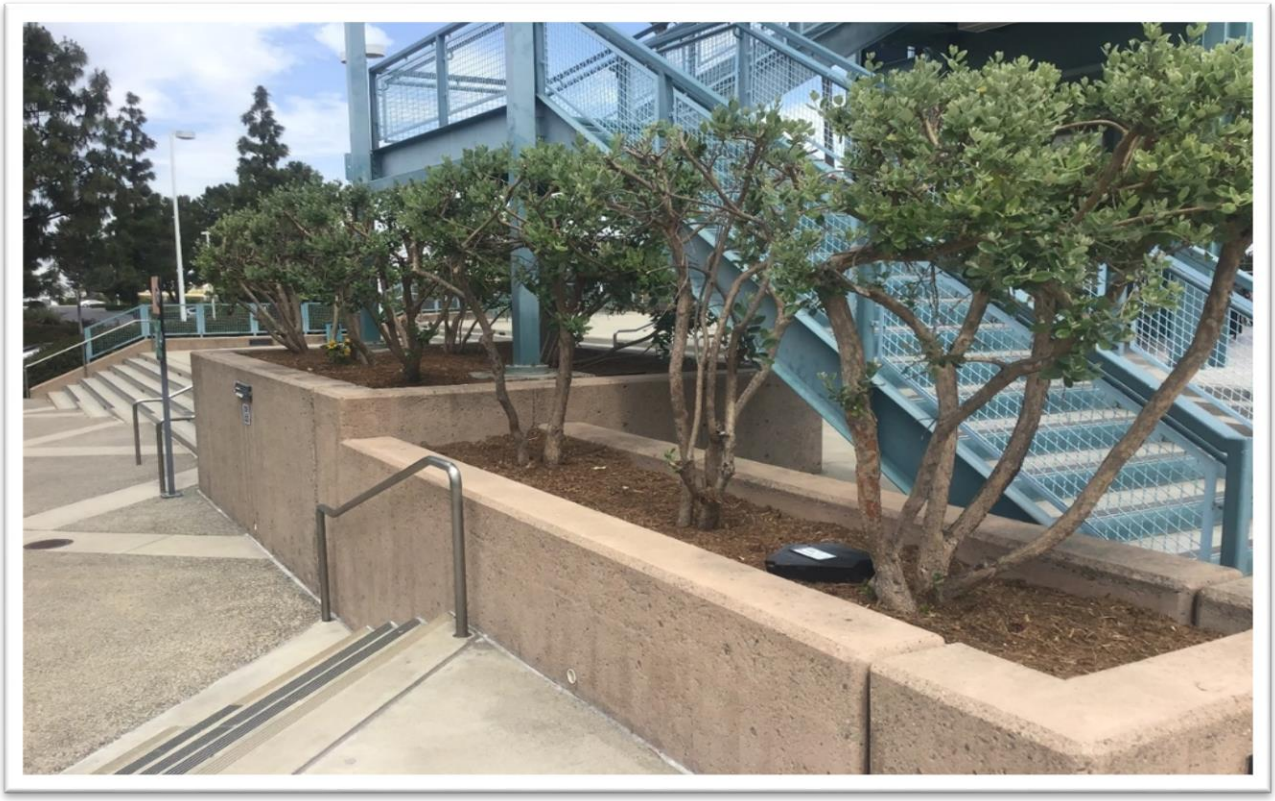
Example of a landscape contractor using steam to eradicate weeds in hardscapes.

The City is responsible for maintenance of 100 acres of fuel modification zones in the Village of Turtle Rock. The City works with the Orange County Fire Authority to remove vegetation in these zones through mechanical means to avoid the use of pesticides.

The Landscape Division also used biological control to reduce pest populations. Biological control uses organisms often referred to as beneficials, natural enemies, or biocontrols. The biological controls act to keep pest populations low enough to prevent significant economic damage. The most common organism types used for biological control in landscapes to combat pest populations are predators and parasites. In 2022, nearly 650,000 beneficial insects were released in the parks and streetscapes to combat destructive pests, instead of relying on pesticides.

Example of beneficial insects about to be released in a City park.

Lastly, Landscape modification and proper sanitation continues to be an effective non-chemical approach to rodent management. By removing plants away from buildings, removing understory vegetation and using closed trashcan receptacles, rodent populations are manageable.



Example of raising shrub canopies to reduce covered habitat for rodents.

Alternative Pest Control Methods for Public Facilities Maintenance

The Facilities Maintenance Division of Public Works and Transportation has implemented an integrated and tiered approach to manage pests in compliance with the City's IPM policy. Facilities Maintenance Staff perform routine inspections to identify, report, and manage pest activity. Compliance has been achieved using monthly services provided by the City's existing pest control contractors and ongoing staff training. Staff frequently communicates with building occupants to identify pest activity and trends. Staff works closely with facility operators to improve food storage, sanitation, and waste management practices.

Exclusion methods and barriers have been deployed at several City facilities to minimize pest intrusions and the staff is dedicating additional time to pest management research, planning, and response.

Staff addressed 119 requests for pest control service during the 2022 calendar year. Staff addressed 96 requests in 2021. Requests to address pest issues are tracked and logged using the division work order system (Lucity).

Staff performs facility inspections to identify and eliminate mosquito-breeding habitats. Staff has been trained on best practices to control mosquitos around storage yards and facilities. During the latter part of the rainy season, staff inspects outdoor storage areas to correct situations where rainwater is trapped in containers or equipment. Staff used adhesive paper traps to control flying insects that managed to reach the interior of the facilities. Staff is documenting preventive pest-related inspections, field reports, and service requests using the division work order system (Lucity). Improvements in tracking and managing pest-related requests and complaints are being made continually in the software and the process of issuing work orders to the pest control contractor.

The Landscape Division works closely with Facilities Maintenance to reduce the density of foliage around facilities to minimize pest activity. The effectiveness of the modified program has provided control of the rodents in most cases. The program also places an emphasis on controlling rodent, roach, and ant activity at facilities routinely serving food to the public.

Due to limited availability of compliant insecticides and rodenticides, behavioral and operational changes play a key role in maintaining tolerable pest control under the IPM Policy. The overall pest program in Facilities Maintenance focuses towards improving seasonal planning, preventive control measures, monitoring, and reporting.

Alternative Pest Control Methods for Open Space Maintenance

City open-space and City farm lease property are also covered by the IPM policy. The Public Works and Transportation Department contracts with Irvine Ranch Conservancy (IRC) for its open-space management. IRC has incorporated the City's IPM policy into its maintenance protocols.

Priority invasive plant species were removed/treated across approximately 360 acres, 277 of which were within Natural Community Conservation Plan (NCCP) Reserve boundaries. Artichoke thistle continues to be a major target species due to past effort invested and the ability of this species to rebound without control. Efforts continue to include other species, such as Sahara mustard, crown daisy, tree tobacco, Fountain grass, and castor bean. With support from the Natural Communities Coalition, North African knapweed in the Irvine Open Space Preserve was treated for the fourth year in a row. It was first detected bordering Quail Hill along University Drive and the 405 freeway in May 2019 as part of the preserve-wide early detection/rapid response (EDRR) program.

IRC completed active planting activities at the 4.2-acre East Fork restoration site in January 2022. The approach to weed control at this site involved hand weeding around installed shrubs and mechanical removal of most broadleaf weeds. IRC staff allow non-native annual grasses to proliferate (and suppress broadleaf weeds) with the expectation that the shrub plantings will shade out the grasses over time. Facilitated ("passive") restoration activities will continue in the area along Bommer Pass Trail for the next few years.

Site preparation activities at the 9.8-acre Bommer Meadow site (at the junction of the Bommer Meadow and Nature Loop trails) have been ongoing since 2019. IRC evaluated the effectiveness of the goat grazing and mowing and determined that these activities produced a shift in weed species composition but have not prepared the site for direct seeding of native plants. In consultation with City staff, and consistent with City guidelines, IRC began limited use of synthetic, non-Prop 65 herbicides at the site in December 2022. This included one application of the pre-emergent herbicide Indaziflam ("Esplanade").

Monitoring for Invasive Shot Hole Borer (ISHB) was initiated in September and completed in October. IRC conducted surveys in Quail Hill, Bommer Canyon, and Shady Canyon. Of the 490 previously tagged trees that were re-surveyed, 31 were actively infested; 439 were non-infested or showed signs of an inactive infestation; and 20 were unconfirmed.

All infested trees surveyed were of low-to-moderate severity without dieback, and did not warrant treatment.

IRC remained in compliance with the City's IPM policy. No pesticides were applied to control invasive species outside of Bommer Meadow in 2022. Only manual/mechanical methods were used. Most annual species including Sahara mustard were pulled by hand. Most perennial species cannot be controlled with organic herbicides and must be dug out of the ground. In particular, mature artichoke thistle is nearly impossible to hand pull and must be removed by shovel in an attempt to destroy the tap root and prevent seeding. However, this approach causes soil disturbance and is largely ineffective due to the size of the tap root and re-sprouting. The magnitude and threat of the North African knapweed population necessitated mechanical cutting followed by bagging and removal of mature seed.

Pesticide Usage

The City's contractors are all licensed by the State of California to use organic and synthetic pesticides, as required by their contracts with the City. As the party responsible to the State for the application of any pesticide, the City's maintenance contractors researched available organic products approved for use in the State of California. All products used were reviewed by the City's Maintenance Superintendents or Department Managers and approved prior to use. Due to the high acidity of the organic weed control products, applicators must use protective equipment to shield their eyes and skin which can sometimes give the public the perception the pesticide being applied is toxic.

Table 1 provides the active ingredient(s) for the approved organic pesticides used in 2022.

Pesticides Usage in Parks and Public Facilities for Weed Control

Since the IPM Policy implementation, the City has continued the practice of not using "Speedzone" (2, 4-D) and "Round-Up" (glyphosate) weed killers. With 61 parks and the Great Park, the use of organic products was necessary to keep up with effective weed control in the parks. At the Great Park, synthetic herbicides are used to kill invading Bermuda grass in the synthetic soccer fields, to control bindweed in planters and for disease control on the high-profile athletic stadium fields. Tables 2 lists the products used for pest control in citywide parks and open space. Table 3 lists the products used for pest control in the Great Park.

In 2020, the athletic fields had an increased growth of goosegrass and crabgrass so staff worked with the City contractor to apply an organic pre-emergent product called corn gluten in 2021. The product was difficult to find and required a high use rate per field. The parks where the product was applied demonstrated no decrease in weed infestation and the athletic fields continued to be infested with goosegrass and crabgrass causing unsightly and unsafe fields. The City's landscape maintenance contractor applied a synthetic pre-emergent in 2022 at a few community parks to control the germination of these problematic weeds since there is no effective organic product.

The picture above demonstrates the extent of the weed infestation on City fields that mechanical removal and organic products were deemed as unsuccessful in control.

Pesticides Usage in Parks and Public Facilities for Insect Control

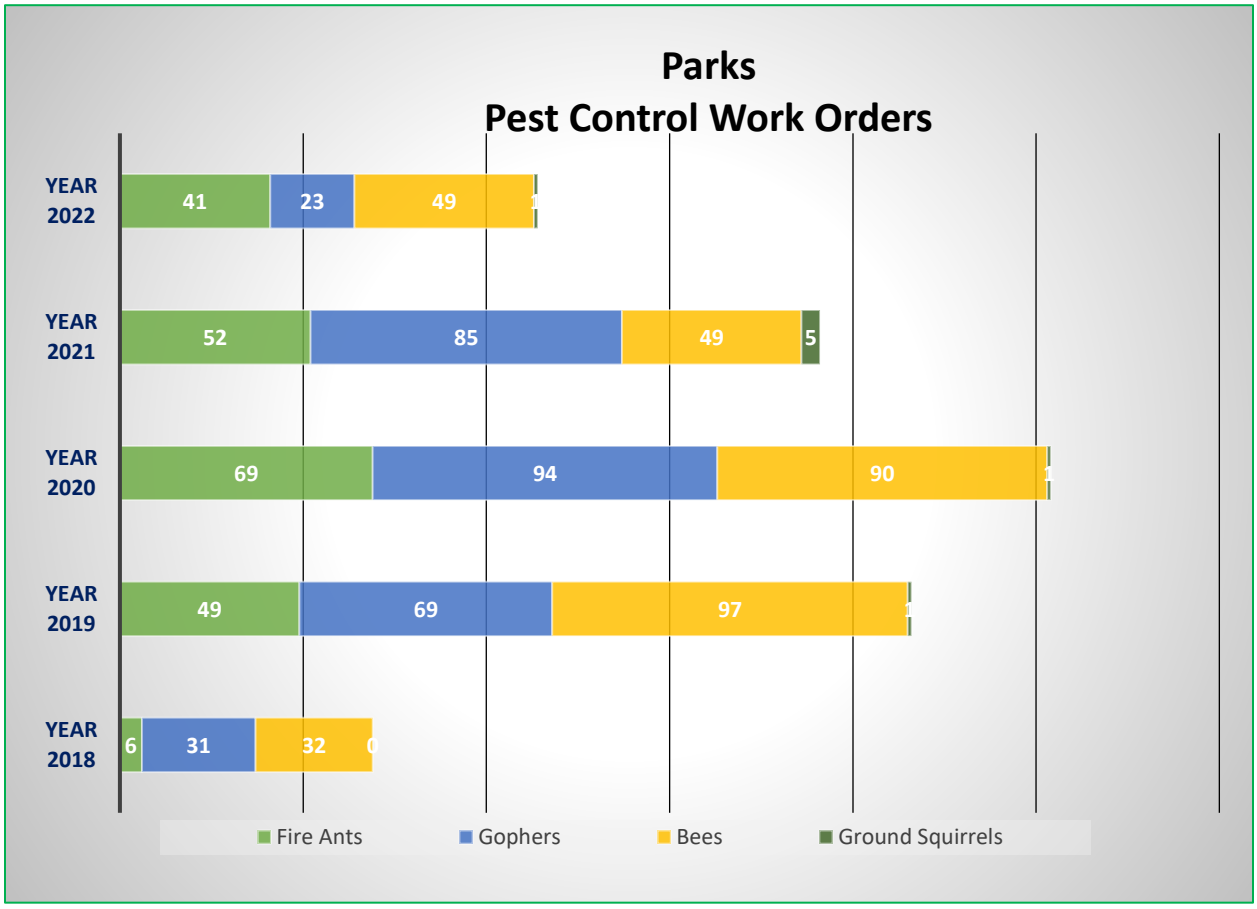
Fire ants continue to be a problem throughout City parks. In 2022, there were 41 work requests for fire ants. The use of the organic product Entrust provided adequate control after three consecutive daily treatments if the fire ants were detected early on in mound formation. The three consecutive treatments are labor intensive and costly, but the practice is an example of the City's commitment to the organic first approach to pest

management. For large scale infestations, staff will continue to work with Orange County Vector Control to apply synthetic baits to protect the public health though no applications were necessary in 2022. Table 5 lists the products used for insect control in parks and City right-of-way.

Pesticides Usage in Parks and Public Facilities for Rodent Control

In 2022, work orders for gophers in parks and public facilities decreased from 85 to 23 work requests. Carbon Dioxide remains the preferred method by the pest control contractor to control gophers. The organic products ContraPest and Terad3 were used to provide adequate control for rats and ground squirrels. Table 4 lists the products used for rodent control in parks and City right-of-way.

Example of a City pest control contractor using Carbon Dioxide



The graph details the pest activity in parks over the last five years.

Pesticides Usage in Parks and Public Facilities for Disease Control

At the Great Park, organic fungicides are used in combination with synthetic fungicides to provide professional quality athletic fields at the Soccer Complex Stadium and Baseball Complex Stadium.

Pesticides Usage in the Right-of-Way for Weed Control

For right-of-way weed control, the City's landscape maintenance contractors were effective at controlling a majority of the weeds using organic products. For approximately 100 acres of non-landscaped areas (concrete medians and sidewalks), biweekly treatments of Suppress EC at 9 percent concentration provided satisfactory control.

Suppress EC works best on newly-emerged weeds and at temperatures greater than 60 degrees; when the water in the spray tank had a neutral to slightly acidic pH before the addition of Suppress EC.

For approximately 940 acres of landscaped medians and parkways, manual hand weeding and organic herbicides still remains the primary practice. The City's contractors have shown a preference to Suppress EC compared to the other products. Table 6 lists the pesticides used to control weeds in the right-of-way since 2018.

The presence of perennial weeds, nutsedge, field bindweed, and Bermuda grass equates to a small percentage of the weed population not successfully controlled by the current maintenance practice. These weeds have extensive vegetative root systems that require systemic activity to control not only the top growth, but the aggressive underground roots as well. In 2022, selective and systemic synthetic products were applied to adequately control perennial weeds in limited areas not readily accessible to the public, primarily street medians. Selective and systemic weed killer products only affect the weed and not the desirable plant material surrounding the weed. The weed killer enters the plant through the leaf and moves throughout the weed for complete eradication. Organic products available for use at this time are neither selective nor systemic. The organic products burn down all foliage they come in contact with, including desirable plants.

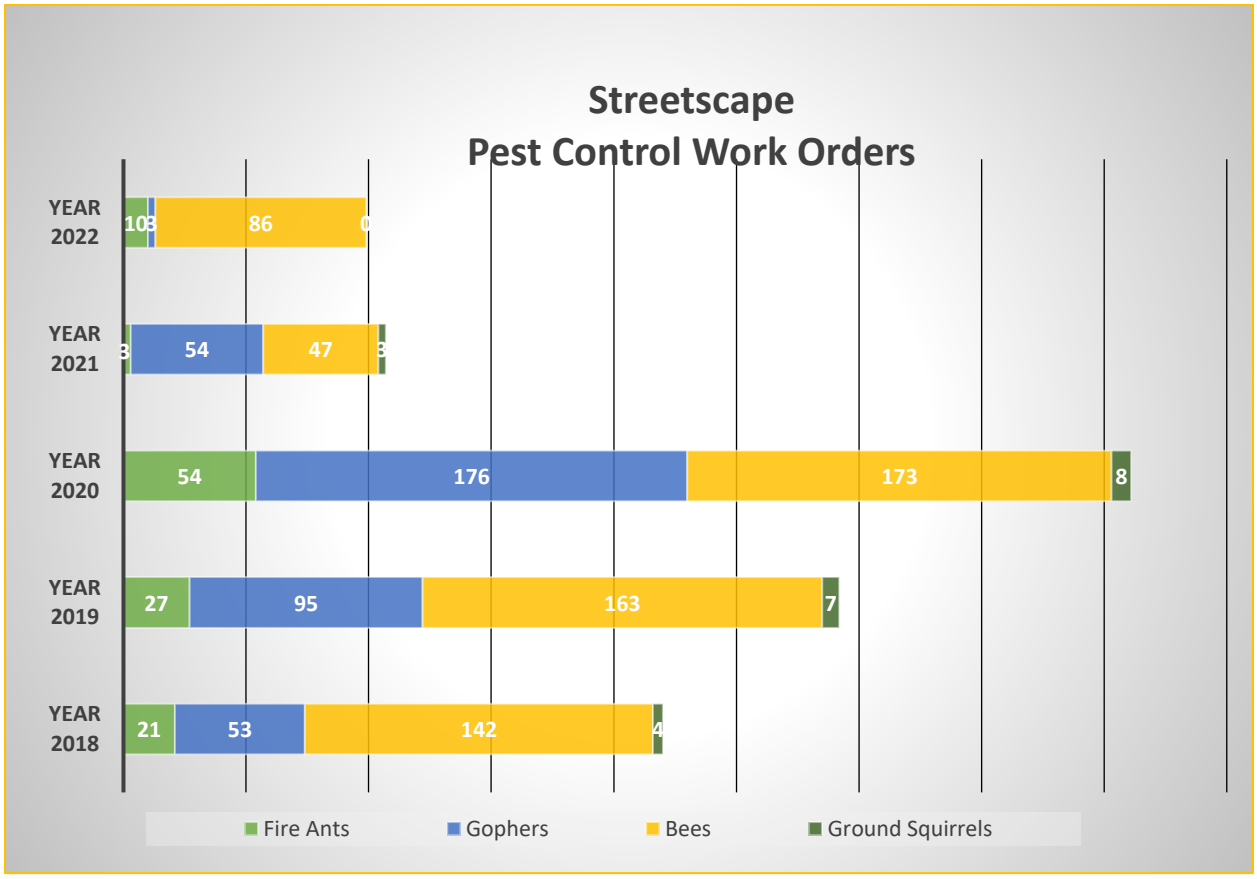
Example of an organic herbicide application by the City's landscape contractor.

Pesticides Usage in the Right-of-Way for Insect Control

Insect work requests are difficult to manage with repeat organic treatments due to the vastness of the Citywide right-of-way landscaping exceeding 900 acres. This has modified the Landscape Division's practice to use synthetic products in medians and areas where no public interacts to control the pests more effectively without additional required treatments. This is especially targeted for ant control since they have a propensity to invade irrigation controller cabinets and cause electrical problems.

Pesticides Usage in the Right-of-Way for Rodent control

In 2022, work orders for gophers in the streetscape right-of-way decreased from 54 to 8. The decrease in work orders can be attributed to the modified practice to use synthetic products in medians and areas where no public interacts to control the pests more effectively without the additional required treatments needed with organic products. The graph below demonstrates the pest activity the City has experienced the last five years.



IPM Program Impacts

All City landscape maintenance contracts provide the necessary contract staff and organic products to fulfill the mission of an organic first approach to pest management. Alternative methods and organic pesticides require the use of more labor and product, and an increase in the frequency of applications to provide a similar result as compared to past pesticide practices. The City Pest Management Guiding Principles have been successful for the City of Irvine because of our commitment to provide safe, non-toxic landscapes for the residents as the primary treatment. Though there is still a need for synthetic pesticides in the program, it is only for a small percentage of pests not controlled. After 7 years, organic products have demonstrated they can be utilized as part of an effective pest control program. The ability to operate solely with organic products has not been possible to maintain the same high-quality landscape and athletic fields prior to the policy implementation. With that said, the organic first approach significantly reduces the City's reliance on synthetic products specifically in the areas the public uses, such as parks. The feedback from residents has been overwhelmingly positive for the organic first approach and we expect continued success using the tiered approach of the City's Integrated Pest Management Policy. Even with the success of the program, City staff will continue to evaluate new non-toxic options and refine practices to provide the most effective, non-toxic solution to pests in the landscape, facilities and open space.

TABLE 1 ORGANIC PESTICIDES USED IN 2022			
PRODUCT	**ACTIVE INGREDIENT**	**TARGET PEST**	**EPA CATEGORY**
Finalsan	Ammoniated soap of fatty acids	Weeds	Warning
Suppress EC	Caprylic acid	Weeds	Warning
Scythe	Pelargonic acid	Weeds	Warning
Axxe	Ammonium Nonanoate	Weeds	Warning
Fireworxx	Caprylic acid	Weeds	Caution
Terad3 Blox	Cholecalciferol	Rodents	Caution
Solentra	Cholecalciferol	Rodents	Caution
ContraPest	4-Vinylcyclohexene diepoxide- 0.09604% Triptolide- 0.00118%	Rodents	Caution
Carbondioxide	Carbon Dioxide	Gophers	N/A
Eco Via EC	Thyme oil, rosemary oil, 2 phenethyl proprionate	Insects	Caution
Entrust SC	Spinosad A & B	Insects	Caution

TABLE 2 CITYWIDE PARKS AND OPEN SPACE						
PRODUCT	**PEST**	**TOTAL USE IN 2018**	**TOTAL USE IN 2019**	**TOTAL USE IN 2020**	**TOTAL USE IN 2021**	**TOTAL USE IN 2022**
Whack Out Weeds*	Weeds	0	0	18,779 oz.	11,941 oz.	0
Glyphosate 4 Plus	Weeds	0	0	0	0	0
Round Up Custom	Weeds	0	0	0	0	0
Speed Zone	Weeds	0	0	0	0	0
Suppress*	Weeds	0	0	0	3,019 oz.	30,046 oz.
Revolver	Weeds	0	0	0	220 oz.	0
Stonewall 4L	Weeds	0	0	0	0	2,057 oz.
Esplanade	Weeds	0	0	0	0	33.6 oz.

**Whack Out Weeds and Suppress are an organic weed killer product.*

TABLE 3 CITY OF IRVINE PESTICIDE USAGE SUMMARY GREAT PARK						
PRODUCT	**PEST**	**TOTAL USE IN 2018**	**TOTAL USE IN 2019**	**TOTAL USE IN 2020**	**TOTAL USE IN 2021**	**TOTAL USE IN 2022**
Actinovate*	Disease	0	0	1,422 oz.	252 oz.	54 oz.
Companion Maxx*	Disease	0	0	10,304 oz.	2,800 oz.	0
Insignia SC	Disease	0	0	200 oz.	0	0
Banner Max II	Disease	0	0	329.5 oz.	0	200 oz.
Clearys 3336F	Disease	0	0	1,395 oz.	2,000 oz.	0
Heritage TL	Disease	0	0	0	400 oz.	0
Chipco Signature	Disease	0	0	0	1,408 oz.	0
Glyphosate 4 Plus	Weeds	0	0	0	0	0
Arrow 2 EC	Weeds	0	0	2,830 oz.	3,763 oz.	40 oz.
Sedgehammer	Weeds	0	0	0.14 oz.	0.86 oz.	0
Speed Zone	Weeds	0	0	0	0	0
Phycomycin*	Algae	9,200 oz.	3,200 oz.	12,000oz.	8,800 oz.	4,800 oz.
Finalsan*	Weeds	16,097 oz.	18,304oz.	26,428oz.	20,627 oz.	0
Suppress EC*	Weeds	311,204 oz.	30,781 oz.	30,312oz.	18,203 oz.	28,558 oz.
Scythe*	Weeds	0	0	31,416oz.	17,079 oz.	0
Power Zone	Weeds	0	0	0	352.5 oz.	3,087 oz.
Barricade 4FL	Weeds	0	0	0	399 oz.	0
Revolver	Weeds	0	0	0	0	235 oz.
Primo Maxx	Growth Regulator	0	0	0	0	256 oz.

**Actinovate and Companion Maxx are organic products for disease control. Phycomycin, an organic product for control of algae in the ponds and basins. Finalsan, Suppress EC and Scythe are organic weed killer products.*

TABLE 4 CITY OF IRVINE PESTICIDE USAGE SUMMARY PARKS/CITY RIGHT-OF-WAY– RODENTS						
PRODUCT	**PEST**	**TOTAL USE IN 2018**	**TOTAL USE IN 2019**	**TOTAL USE IN 2020**	**TOTAL USE IN 2021**	**TOTAL USE IN 2022**
			SYNTHETICS			
Fumitoxin Tablets	Rodent	0	64 tablets	93 tablets	378 tablets	921 tablets
Rozol Vole	Rodent	0	6 lb.	0	0	0
Maki Mini	Rodent	0	2.25 lb.	0	0	0
Avalon Strychnine	Rodent	0	1 lb.	0	0.25 lb.	0
Contract Bait Block	Rodent	0	0	0	0	0
			ORGANICS			
Selontra	Rodent	0	0	0	0	6,190 oz.
Uncle Ian’s Gopher Repellant	Rodent	84.25 lb.	32.5 lb.	10 lb.	0	0
Repels-All	Rodent	6	0	0	2 lb.	0
ICI Carbon Dioxide	Rodent	0	45 lb.	84 lb.	94.75 lb.	0
Carbondioxide	Rodent	0	0	0	0	1,308 oz.
ContraPest	Rodent	0	10.08 oz.	108.24 oz.	498 oz.	1925.6 oz.
Terad3 Blox	Rodent	48.01 lb.	37.86 lb.	127 lb.	196.2 lb.	11.13 lb.

TABLE 5 CITY OF IRVINE PESTICIDE USAGE SUMMARY PARKS/CITY RIGHT-OF-WAY – INSECTS						
PRODUCT	**PEST**	**TOTAL USE IN 2018**	**TOTAL USE IN 2019**	**TOTAL USE IN 2020**	**TOTAL USE IN 2021**	**TOTAL USE IN 2022**
			SYNTHETICS			
Transport GHP	Insects	0.3 oz.	0	0	0	0
P.I. Contact	Insects	8 oz.	5 oz.	0	0	0
			ORGANICS			
Essentria IC3	Insects	20,826 oz.	0	0	0	0
EcoEXEMPT	Insects	84.25 oz.	0	0	0	0
EcoVia	Insects	379.21 oz.	183.75 oz.	444 oz.	157.5 oz.	277 oz.
WHY Spray	Insects	71 oz.	0	0	0	0
Entrust SC	Insects	2.79 oz.	392 oz.	697 oz.	228.13 oz.	263 oz.

TABLE 6
RIGHT-OF-WAY PESTICIDE USAGE - WEEDS

PRODUCT	PEST	TOTAL USE IN 2018	TOTAL USE IN 2019	TOTAL USE IN 2020	TOTAL USE IN 2021	TOTAL USE IN 2022
			SYNTHETICS			
Round Up	Weeds	0	0	0	0	0
Arrow 2EC	Bermuda grass	0	3,017 oz.	218 oz.	2,488 oz.	2,332 oz.
Speed Zone	Turf Weeds	0	0	0	0	0
Turflon Ester	Bindweed	700 oz.	0	0	0	0
Sedge Hammer	Nutsedge	4.59 oz.	20.52 oz.	0.3 oz.	0	64 oz.
Fusilade	Bermuda grass	0	0	22 oz.	158 oz.	225 oz.
Reward	Cattails	0	0	512 oz.	864 oz.	384 oz.
Poast	Weeds	0	0	0	5,857 oz.	0
Vanquish	Weeds	0	0	0	1,975 oz.	0
Clash	Weeds	0	0	0	1,833 oz.	0
			ORGANICS			
Scythe	Weeds	0	11,475 oz.	7,373 oz.	4950 oz.	474 oz.
Suppress EC	Weeds	311,204 oz.	439,502 oz.	486,872 oz.	317,833 oz.	182,880 oz.
Finalsan	Weeds	16,097 oz.	12,282 oz.	64,670 oz.	65,802 oz.	8,320 oz.
Weed Pharm	Weeds	77,952 oz.	0	0	0	0
Fiesta	Weeds	144 oz.	0	0	0	0
Weed Slayer A	Weeds	140 oz.	0	0	0	0
Weed Slayer B	Weeds	140 oz.	0	0	0	0
Axxe	Weeds	0	0	0	5,376 oz.	560 oz.
Fireworxx	Weeds	0	0	0	0	288 oz.