

2019 PARKS DIVISION PESTICIDE REPORT

POLICY REGARDING PEST MANAGEMENT ON CITY PROPERTY

Policy Adopted 5/18/2004

1. The purpose of this policy is to eliminate or reduce pesticide use to the greatest possible extent. The City of Madison agrees with the US EPA that “all pesticides are toxic to some degree, and the commonplace, widespread use of pesticides is both a major environmental problem and a public health issue.” For this reason, all departments will evaluate and give preference to non-pesticide management practices and use reasonably available alternative pest control methods, will minimize their pesticide use through Integrated Pest Management, and will use least risk pesticides as a last resort.
2. Definitions of terms used in this policy.
 - a. Integrated Pest Management (IPM) is a decision making process. The essential parts of IPM are monitoring, setting threshold levels for pests, identifying the causes of the pest problem, addressing the cause of the problem, and using the most effective, least harmful, methods to control the problem, before using chemical controls. IPM develops ways to change the conditions that cause the pest problem, so that pests will be prevented in the future or minimized. Preventive maintenance using pesticides for pest problems does not adhere to IPM. Prevention of pests should be managed with non-toxic methods.
 - b. Biological Controls – support or introduction of natural predators or parasites of the pests to be controlled.
 - c. Cultural Controls - practices that can reduce pests by making the environment less favorable, such as improved sanitation or horticultural practices.
 - d. IPM Coordinator – Department staff person who is responsible for developing and implementing the pest management plan for the Department.
 - e. Mechanical Controls - direct measures that either kill the pest or make the environment unsuitable for their entry, dispersal, or survival, such as tilling the soil to expose insects or hand pulling weeds.
 - f. Physical Controls - practices that physically keep pests from places where they're not wanted, such as window screens and sealing cracks and crevices.
 - g. Pesticides – substances that destroy or repel pests. For the purpose of this document, they include herbicides, insecticides, fungicides, and rodenticides.
3. Chemical pesticide may be considered if:
 - a. The non-toxic methods of pest control, such as Cultural Controls, Physical Controls, Mechanical Controls, and Biological Controls have been shown to be ineffective; and,
 - b. Monitoring has indicated that the pest will cause unacceptable health or safety hazards, or an unacceptable reduction in the intended use of the property.
4. All departments will maintain appropriate records on pest monitoring data collected, pest control actions attempted (both non-chemical and chemical), and results of pest control activity. All departments will submit by February 1st an annual report to the Public Health Commission. This report will contain the following information:

- a. Completed Pesticide Application Summary for all pesticide applications made in the previous year. Application data must include: purpose, location, and amount of each pesticide product applied, including the amount of active ingredient.
 - b. Annual summary of non-chemical pest control activities.
 - c. Estimated size of the total area managed for each pest problem in a given year. The area managed will likely exceed the area treated.
 - d. A summary of any complaints received regarding use or the perceived need for use of pesticides, including the date complaint(s) was (were) received and the nature of the complaint(s).
 - e. A pest management plan for the coming year. The plan will contain the following information for each type of pest problem:
 1. Definition of Roles. Identify who will: serve as the IPM Coordinator, perform pest monitoring, evaluate pest control alternatives, decide which pest control alternative to use, and implement pest control measures.
 2. Pest Management Objectives. Identify the action thresholds (i.e., pest population levels) to be used to decide when some type of action should be taken to control the pest problem.
 3. Monitoring Plan. Describe the methods to be used to monitor the pests and the frequency of monitoring.
 4. Control Method Selection. Describe the types of pest control methods to be evaluated and the criteria used to choose the appropriate control method. IPM control methods may include:
 - i. Modifying the environment to increase the effectiveness of biological, mechanical, cultural, or physical controls such as blocking mouse holes, keeping areas clean where insects may be attracted, improving soil health, etc.
 - ii. Destroying pests breeding, feeding, or shelter habitat.
 - iii. Using pest resistant varieties of seeds, ornamentals, trees, etc.
 - iv. Using chemical control strategies as a last resort only after a mix of other strategies is shown to be ineffective.
 - v. Using mechanical methods and biological methods (parasites, predators, disease).
 - vi. Spot-treating pest problems when chemical methods are used.
 - f. Parks Division Pesticide Report A standard notification plan that provides, at a minimum, readily visible posting for a period of 24 hours prior to a pesticide application (when possible) and a minimum of 48 hours following the application. These time intervals may be extended based on health or safety concerns. For areas that receive pesticide applications on a regular basis, permanent signs will be posted
5. Annual evaluation of pest management activities on City property will be performed in the following manner:
- a. Public Health Department staff will summarize pest management activities. This summary and individual Department reports and plans will be provided to the Pest Management Advisory Subcommittee of the Public Health Commission and the oversight commission of each department applying pesticides.
 - b. The Pest Management Advisory Committee, a commission of experts to be recommended by the Public Health Department and appointed by the Mayor's office, shall review the annual report and make recommendations to the Public Health Commission, will:

1. Review the available data and make recommendations concerning compliance with this Policy to the Public Health Commission.
 2. Following review of the available data a list of pesticides acceptable for use on city property will be generated.
 3. Report any contractors that are not complying with this policy to the Public Health Commission.
- c. The Public Health Commission will submit recommendations and concerns to each commission charged with oversight of a department that applies pesticide on City property. The public Health Commission will also forward to the Purchasing Supervisor of the Comptroller's office the names of any contractor that does not comply with the City's pesticide policy.
- d. The oversight commission of each Department with a need to manage pests on City property will have the following responsibilities:
1. Review the Department's pest management activities and plans,
 2. Consider recommendations and concerns from the Public Health Commission, the Common Council, and the public.
 3. Take appropriate action to ensure that the Department's pest management activities and plans are in compliance with this Policy
6. All Departments with a need to manage pests on City property will assign a staff person to serve as IPM coordinator. This person will be responsible for developing and implementing the Department's plan.
- a. IPM Coordinators from all Departments will be required to meet annually to discuss past experiences and recent advances in pest management practices. The group may choose to meet more frequently as needed.
- b. IPM Coordinators will receive IPM training.
7. All Departments will report any complaints regarding health effects possibly related to pesticide applications to the Public Health Department at the earliest opportunity.
8. Any unusual amount of pesticide use due to unusual circumstances will be reported to the Director of Public Health or his/her designee at the earliest opportunity.
9. The IPM Coordinator and all supervisors having responsibility for the handling, application, disposal or storage of pesticides shall be State certified under the Department of Agriculture, Trade and Consumer Protection's Pesticide Applicator Certification Program for the appropriate type of pesticide application engaged in. All employees and volunteers applying pesticides shall be State certified or working under the direct supervision of a certified applicator. All employees having any involvement with pesticide handling, application, disposal or storage shall receive basic training in pesticide safety.
10. All Departments storing, using and disposing of pesticides and pesticide containers will do so safely, according to label directions and any State and Federal regulations where applicable.
11. If the pest control program is performed through a private contractor, the contracts for these services will require the contractor to comply with this policy. The contractor must furnish the IPM Coordinator for the Department served with the following for each pesticide applied:

- a. Date, purpose, location, amount of product, and amount of active ingredient for each application.
- b. Product labeling and material safety data sheets for each product applied,
- c. Documentation of applicator certification and conformance with other Federal and State laws.

Monitoring should not be solely performed by the contractor hired to treat the pest problem. The IPM Coordinator should oversee the monitoring.

- 12. If a private contractor is found to be out of compliance with this policy by the Pest Management Advisory Subcommittee, this non-compliance will be considered grounds for terminating an existing City contract with the contractor and the contractor will not be allowed enter into a contract with any City department for 1 year after the date that non-compliance was determined.
 - a. A list of non-compliant contractors will be kept by the Purchasing Supervisor. The Purchasing Supervisor shall notify all IPM coordinators of non-compliant contractors.
- 13. This policy does not apply to disinfectants used in the routine maintenance of city facilities.
- 14. The City shall NOT USE pesticides to control dandelions and other broadleaf weeds on general parklands, median strips, street terraces, roadsides, general lawn areas, and athletic fields that are not reserved, nor are fees paid for their use.
 - a. Guidelines for Pesticide Use
 - 1. Cosmetic use of lawn and garden areas (including medians) will be managed using non-toxic methods. These methods can be sought out and used on all city properties.
 - 2. Because of concern over the health of children with repeated exposure to pesticides when playing sports, lower priority athletic fields in particular should have a much higher tolerance for weeds and should use non-toxic weed management methods if desired.
 - 3. Golf courses have the opportunity for pesticide reduction by incorporating more cultural method and increasing weed tolerance of golfers through educational efforts, following guidelines set forth by the Audubon Golf Sanctuary Program.
 - 4. Olbrich Gardens and other city property managing large garden areas ought to continually seek out resources for non-toxic garden management.
 - 5. An Integrated Pest Management professional ought to be used as a resource by the city to help coordinate and integrate non-toxic pest management methods.
 - 6. All use of pesticides for conservation purposes for the control of invasive species, must be managed by the conservation supervisor and comply with all other aspects of the pest management policy including reporting and posting requirements. No pesticide will be used for conservation management in areas dedicated for use by children.
- 15. Any use of a pesticide under EPA Special Review is prohibited.

Pesticide Report – Parks Division 2019

The I.P.M. Coordinator for the Parks Division is Assistant Parks Superintendent, Lisa Laschinger. She can be reached at 608-266-9214. The Parks Division consists of several Sections with each Section Supervisor being responsible for complying with the City's Pesticide Policy. The Section Supervisors are also responsible for following the guidelines of Integrated Pest Management, establishing thresholds, considering alternative control measures, the application of any pesticide, and all record keeping as required.

The Park Division is happy to report that their 2018 Annual Report was reviewed by both Habitat Stewardship Committee and Public Health and that Parks is compliant with the policy and regulations.

GENERAL PARKS

General Parks, divided into Central, East and West Parks, is comprised of a wide variety of properties with various uses. This includes small neighborhood parks, area parks, community parks, regional parks, natural areas, medians, bike paths, and specialty areas such as tennis courts, disc golf, football, soccer, baseball and softball fields. Total land managed by General Parks is in excess of 4,000 acres.

Parks is thankful to all of the volunteers that assisted us in our non-pesticide control efforts throughout the year. The list of groups and organizations that provides this valuable stewardship assistance is far too great to list without missing critical partners. The projects included flower gardening, natural area restoration, prairie maintenance and establishment, as well as removal of invasives, such as buckthorn, honeysuckle and garlic mustard, etc., from many park areas. Though complete hours have yet to be compiled, approximately several thousand hours of labor for mechanical and cultural control was provided by volunteers in both general and conservation parks in 2019!

The Parks Division uses a number of practices to maintain our parks year-round. We are conservative in our use of pesticides and aim to use them only where reservation fees are collected (ie. athletic fields, shelters and immediately adjacent spaces) and in natural areas to control invasive species. In some cases, we use pesticides to control weeds in our highest use areas because heavy landscaping makes hand weeding very time-consuming and less efficient. We continue to work to enhance the surfaces of our athletic fields, as use and consequently wear of the fields continue to increase each year. We constantly strive to balance competing needs and demands of diverse user groups, constituents and policy makers in all services provided. Any staff applying herbicides are trained and certified in the appropriate State of WI Commercial Pesticide Applicator category, as are any volunteers that apply herbicides. When contractors are hired for Land Management projects, they too must be licensed and certified in the appropriate category.

EXOTIC WOODY SPECIES CONTROL

Targeted Species: Buckthorn, honeysuckle, boxelder, black locust, poison ivy, sumac, privet, elm, mulberry, Oriental bittersweet, maple, willow, ash, hawthorn and euonymus.

Purpose: To control invasive woody species growing in landscaped beds, managed meadows, overgrown natural areas, park borders athletic fence lines, and natural shoreline buffers.

Locations: Applied as cut stump treatments or spot foliar treatment. Blackhawk, Demetral, Elver, Garner, Hudson, Sauk Creek, Strickers Pond, Woodland Hills, Olin, Brittingham, Tenney, Wingra Creek Parkway, Henry Street End

Pesticides Applied For Exotic Woody Species Control:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Pathfinder II Garlon Garlon 3A Garlon 3 Garlon 4 Element Trycera	Triclopyr	4.9262 pounds
Crossbow	Triclopyr 2,4-D	0.0154 pounds 0.0289 pounds

HERBACEOUS WEED CONTROL

Targeted species: Weedy grasses and broadleaf annual and perennial weeds, including teasel, burdock, Japanese knotweed, tansy, dame's rocket, garlic mustard, Canadian thistle, birdsfoot trefoil, crown vetch and wild parsnip.

Purpose: To control weed populations in areas that park users rent and reserve, which include athletic fields, ball diamonds and areas of park shelters, fence lines, adjacent parking lots, basketball and tennis courts, and landscaped planting beds. Also to control invasive species in newly established managed meadow plantings.

Locations: Spot treatment and foliar applications were made at Blackhawk, Bringham, Burke Heights, Burr Jones, Burrows, Demetral, Eastmorland, Elver, Eken, Elvjhem, Garner, Glacier Crossing, Glacier Hill, Glenway Woods, Haen Family, Heistand, Heritage Heights, Honeysuckle, Huegel, Kennedy, Maple Prairie, Mayfair, Monona, North Star, Northport/Packers Ave., Orchard Ridge, Odana Golf, Olbrich, Onyx, Orchard Ridge, Portland, Raymond Ridge, Reindahl, Sauk Creek, Secret Places, Sycamore, Warner, Goodman, BB Clarke, Kerr McGee, Law, Olin, Brittingham, James Madison, Beld St., Cypress, Hudson, Warner, Wingra, Woodland Hills, Vilas, Forest Hill, Marshall, Rennebohm, Hoyt, Waunona, Paunack, Edward Klief, Orton, Penn, Bowman, Indian Hills, Kingswood

Pesticides Applied For Herbaceous Weed Control:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Ranger Pro Kleenup Pro Cropsmart Makaze Round-up Journey Aquaneat	Glyphosate	36.028 pounds
Milestone	Aminopyralid	0.4694 pounds
Trimec:	2,4,D	1.4167 pounds
	Propionic Acid	1.1295 pounds
	3,6 dichloro-o-anisic acid	0.155 pounds
Dimension 2EW	Dithiopyr	0.4562 pounds
T-Zone	Triclopyr	0.018 pounds
	Sulfentrazone	0.0022 pounds
	2,4-D, 2-ethylhexyl ester	0.063 pounds
	Dicamba Acid	0.0072 pounds
Escort	metsulfuron methyl	0.5238 pounds
Intensity	Clethodim	0.6774 pounds
Method	potassium salt of aminocyclopyrachlor	0.0086 pounds
Polaris AC Habitat	isopropylamine salt of Imazapyr	0.5988 pounds

BROADLEAF WEED CONTROL IN TURF

Targeted species: Broadleaf annual and perennial weeds

Purpose: To control weed populations on playing surfaces of designated playing fields and fenced field spaces, to improve health of turf and user experiences.

Locations: Badger, Blackhawk, Bordner, Bowman (1 and 2) , Brittingham, Cardinal Glenn, Country Grove, Elver, Everglade, Flad, Flagstone, Garner, Goodman, Greentree, Haen Family, High Point, Hill Creek, Hoyt, Junction Ridge, Kingswood, Leopold, Lucia Crest, Manchester, Maple Prairie, Midtown Commons, Odana Hills, Olin, Penn, Pilgrim, Quann, Raemisch Homestead, Raymond Ridge, Raywood/Waunona, Reindahl (cricket), Rennebohm, Reynolds, Sandstone, Sauk Creek, Sauk Heights, Sun Ridge, Thut, Valley Ridge, Walnut Grove, Waltham, Warner, Westhaven, Wexford, Woodland Hills

Pesticides Applied For Broadleaf Weed Control in Turf:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Trimec:	2,4-D Propionic Acid 3,6 dichloro-o-anisic acid	28.01 pounds 7.49 pounds 2.97 pounds
Dimension	Dithiopyr	2.0 pounds
Millenium Ultra 2	2,4-dichlor-phenoxyacetic acid Monoethanolamine Salt of 3,6-Dichloro-2-Pyridinecarboxylic Acid Dichloro-o-Anisic Acid	61.65 pounds 3.76 pounds 7.70 pounds
Speed Zone	2,4-D, 2-ethylhexyl ester Mecoprop-p Acid Dicamba acid Carfentrazone-ethyl	42.91 pounds 13.46 pounds 3.92 pounds 1.4 pounds
T-Zone	Triclopyr Sulfentrazone 2,4-D, 2-ethylhexyl ester Dicamba Acid	0.7617 pounds 0.09 pounds 2.67 pounds 0.30 pounds
Drive XLR8	Quinclorac	3.75 pounds

Adopt-A-Park Tree Program

The Parks Division allows interested parties to contract with pre-qualified contractors to inject approved trees with insecticide. This is intended to protect the ash trees against the Emerald Ash Borer, and the application must be repeated every 2-3 years as long as the insect remains a concern (likely for the remaining life of the tree).

Targeted species: Emerald Ash Borer

Purpose: To control insect populations in Ash trees and help prolong the life of trees by preventing harmful infestation.

Locations: Applied as trunk injections by certified/licensed contractors to trees in the following parks: Wirth Ct, Heritage Heights, Westchester Gardens, Yahara Place Park and River section, Wingra, Orton, Brittingham, Midland, South and West Shore, BB Clarke, Bordner, Indian Hills, High Point, Hoyt, Lucia Crest, Merrill springs, Norman Clayton, Orchard Ridge, Rennebohm, Slater, Spring Harbor, Stevens Street, Sunridge

Pesticides Applied to Park Trees:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
ArborMectin Mectinite	Emamectin Benzoate	1.8757 pounds

Non-Chemical Means of Pest Control

Numerous hours were spent by staff and volunteers hand-weeding in general park areas. In addition, staff controlled weeds by mowing and string trimming. Other methods used to improve the quality of turf grass and allow it to out-compete weeds and withstand heavy traffic included core aeration, over-seeding, fertilizing, as well as returning mulched leaves and clippings to the turf. Mulch was used in areas to help decrease weed populations. Staff and volunteers removed seed heads from invasive species and mechanically removed woody invasives.

Complaints Received

We received no complaints in 2019 for pesticide use in general park areas.

Plan for 2020

The overall land management and pesticide plan for 2020, in accordance with our approved Land Management Plan, is the same as that of 2019. We do intend to continue increasing our efforts on natural and prairie areas as well as continuing work on athletic fields. We will do this through a combination of cultural practices and, when necessary, judicious use of herbicide, when cultural and mechanical methods are not effective or efficient. We will continue to refine athletic field management program by combining herbicide and fertilizer applications along with proper mowing, aeration and overseeding, and will explore the feasibility of organic chemical options.

FOREST HILL CEMETERY

Forest Hill Cemetery again contracted with Plunkett Pest Control in 2019 to address an historical phorid fly infestation in the mausoleum.

Product Used	Active Ingredient (A.I)	Total A.I. Used	Purpose
Maxforce Granular	Imidacloprid Z-9 Tricosene	0.01 pounds 0.002 pounds 0	Insect control

Non-Chemical Means of Pest Control

Forest Hill Cemetery uses a variety of cultural practices to control or manage cemetery grounds as an alternative to chemical use. These mechanical and cultural control practices include, but are not limited to, the following: regular mowing to maintain height of 3" or higher, string trimming around trees and more than 30,000 headstones, hand removal of volunteer trees, suckers and weeds between markers and in flower/shrub beds, mechanical trapping of rodents in buildings, installation of door sweeps, cleaning gutters to deter interior insect issues.

THE MALL CONCOURSE

No pesticides were used on the Mall Concourse service area in 2019.

Non-Chemical Means of Pest Control

Numerous hours were spent hand-weeding landscaped beds, and cracks in sidewalks. In addition, staff controlled weeds by mowing and string trimming. Other methods used to improve the quality of turf grass and allow it to out-compete weeds and withstand heavy traffic included core aeration, compost topdressing, over-seeding, fertilizing, as well as returning mulched leaves and clippings to the turf. Mulch was used in areas to help decrease weed populations.

Complaints

We received no complaints in 2019 for pesticide use in Mall/Concourse Maintenance.

Plan for 2020

The Mall Concourse maintenance plan for 2020 is the same as that of 2019

WARNER PARK COMMUNITY RECREATION CENTER (WPCRC)

Primary pest pressures at WPCRC are due to rodents.

Pesticides Used by Plunkett Pest Control to Control Pests in Conservatory

Product Used	Active Ingredient (A.I.)	Amount Used	Purpose
Firststrike	defathialone	34 packets	Insect control
Weatherblok XT	3-(3-(4'bromo[1,1'- pipehnyl]-4-yl)-4- hydroxy-2h-1- benzopyran-2-one	99 blocks	Rodent Control

Non-Chemical Means of Pest Control

Trash is removed and facilities cleaned daily to reduce insect issues, such as ants. Trash is removed from building and stored in exterior dumpsters. Door sweeps and vents are kept in good working order to prevent pests from entering.

Complaints

We received no complaints in 2019 for pesticide use in at WPCRC.

Plan for 2020

The WPCRC maintenance plan for 2020 is the same as that of 2019

FORESTRY SECTION

Forestry manages approximately 96,000 street trees across the city. Approximately 12,000 Ash trees are in a 3-year rotation to prevent infestation of Emerald Ash Borer (EAB).

Targeted species:

Emerald Ash Borer (*Agrilus planipennis*)

Purpose:

Inject ash street trees to provide 3 years of protection

Locations:

Forestry Tree Districts 1, 2, 4, 6, 8, 10, 12, 14, 16, and 20

Pesticides Applied to Street Trees:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
TREE-age	Emamectin Benzoate	42.20 pounds

Non Chemical Control Measures

Diversity is the key to ensuring a healthy and sustainable urban forest. Forestry currently uses 20 different families and 57 species of trees. In addition, staff utilizes the “right tree for right location” approach for selecting trees for each site. Operations staff adheres to ANSI standards when pruning. Approximately 1,700 ash trees were preemptively removed in 2019.

Plans for 2020

Forestry's pesticide plan for 2020 is identical to that of 2019. As of January 1, 2020, the Forestry Section operations were moved under the direction of the Streets Division. While pre-emptive Ash removals will be complete by spring 2020, pesticide injections of remaining trees will continue for the foreseeable future.

CONSERVATION PARKS

WOODY PLANT CONTROL APPLICATIONS BY STAFF

Targeted Species: Buckthorn, burning bush, honeysuckle, Kentucky coffee-tree, Norway maple, privet, Asiatic bittersweet, porcelain-berry, white mulberry, white poplar, multi-flora rose. Certain ash, black cherry, elm, and hickory were also targeted as part of oak woodland restoration efforts.

Purpose: The purpose of herbicide applications is to reduce the presence of these species in Conservation Parks in order to preserve the native diversity of plants and animals. Controlling woody vines is becoming an increasing point of emphasis as these species are spreading rapidly. Trail improvement projects also require herbicide to prevent re-sprouting.

Locations: Cut stump treatment, spot foliar, and basal bark applications were made at Cherokee Marsh - South Unit, Edna Taylor, Heritage Sanctuary, Knollwood, Owen, and Prairie Ridge Conservation Parks.

Pesticides Applied by Staff For Control of Woody Species

Product(s) Used	Active Ingredient (a.i.)	Total Amount of A.I. Used
2,4-D	2,4-dichlor-phenoxyacetic acid	0.33 pounds
Vanquish	3,6-dichloro-o-anisic acid	0.01 pounds
Makaze	Glyphosate	1.22 pounds
Escort XP	metsulfuron methyl	0.08 pounds
Garlon 3A Garlon 4	Triclopyr	3.8 pounds

EXOTIC HERBACEOUS PLANT CONTROL APPLICATIONS BY STAFF

Targeted Species: Astilbe, bird's-foot trefoil, burdock, crown vetch, cut-leaf teasel, dame's rocket, garlic mustard, hybrid cattail, reed-cannary grass and wild parsnip.

Purpose: To control aggressive exotic plant species while populations are small. They threaten native plant diversity if left unmanaged.

Locations: Cherokee Marsh (North & South units), Edna Taylor, Heritage Sanctuary, Owen, and Prairie Ridge Conservation Parks.

Pesticides Applied by Staff for Control of Exotic Herbaceous Plants:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
2,4-D	2,4-dichlor-phenoxyacetic acid	0.69 pounds
Milestone	aminopyralid	0.02 pounds
Aquaneat	glyphosate	3.00 pounds
Escort XP	metsulfuron methyl	0.07 pounds
Garlon 3A	triclopyr	0.16 pounds
Intensity	clethodim	2.02 pounds

EXOTIC PLANT (woody & herbaceous) CONTROL APPLICATIONS BY VOLUNTEERS

Targeted Species: Bird's-foot trefoil, buckthorn, crown vetch, honeysuckle, Japanese barberry, and reed canary grass.

Purpose: To control aggressive exotic plant species while populations are small. They threaten native plant diversity if left unmanaged.

Locations: Cherokee Marsh (South and Mendota Units), Owen, and Stricker's Pond Conservation Parks.

Pesticides Applied by Volunteers For Control of Exotic Plant Species:

Product(s) Used	Active Ingredient (a.i.)	Total Amount of A.I. Used
Milestone	aminopyralid	0.01 pounds
Intensity	clethodim	0.80 pounds
CropSmart	glyphosate	0.66 pounds
Garlon 3A Garlon 4	triclopyr	0.844 pounds

HERBICIDE APPLICATIONS BY CONTRACTORS

Targeted Species: Applications made as part of large scale Oak Woodland, Prairie and Wetland restoration projects to control Woody species including autumn olive, bittersweet nightshade, black locust, buckthorn, mulberry, honeysuckle, Japanese barberry, multiflora rose, Siberian elm, sumac, Asian bittersweet, and porcelain berry. Herbaceous species targeted include bird's-foot trefoil, burdock, crown vetch, daylily, garlic mustard, dame's rocket, Himalayan pokeweed, Japanese hedge parsley, motherwort, and reed-canary grass.

Purpose: To control aggressive exotic plant species while populations are small. They threaten native plant diversity if left unmanaged.

Locations: Cherokee Marsh (North, South and Mendota Units), Edna Taylor, Kettle Pond, Owen, Prairie Ridge, and Turville Point Conservation Parks.

Pesticides Applied by Contractor:

Product(s) Used	Active Ingredient (a.i.)	Total Amount of A.I. Used
Milestone	aminopyralid	1.08 pounds
Intensity	Clethodim	6.20 pounds
Aquaneat	Glyphosate	6.11 pounds
Escort XP	metsulfuron methyl	0.12 pounds
Garlon 3A Garlon 4 Garlon XRT Vastlan	Triclopyr	27.92 pounds

NON-CHEMICAL PEST CONTROL MEASURES

Hand-pulling: Staff spent a total of **330 hours** hand pulling garlic mustard and Japanese hedge parsley at Cherokee Marsh, Edna Taylor, Elvehjem, Heritage Sanctuary, Owen, and Prairie Ridge.

The Friends of Cherokee Marsh, Friends of Edna Taylor, Friends of Owen, and other volunteers spent 182 hours hand-pulling garlic mustard, collecting dame's rocket seed heads, and spading burdock and wild parsnip at Acewood Pond, North and South Cherokee Marsh, Edna Taylor, Owen, and Stricker's Pond.

Prescribed Fire: The use of fire is an important land management practice which helps promote native species over exotics. The timing of burns can help set back exotics (e.g., late spring burns harm cool season weeds but promote native warm season plants). Burns can also cause mortality to small woody exotics like buckthorn and honeysuckle. If the timing is perfect, fire can even kill entire cohorts of first year garlic mustard seedlings. Unfortunately, the number of days suitable for burning is limited by both weather conditions and staffing levels. Conservation staff burned approximately **124 acres** in the Conservation parks in 2019.

Mowing: Considerable time (**approx. 120 hours**) was spent spot-mowing bird's-foot trefoil, crown vetch, Japanese hedge parsley, sweet clover, teasel and wild parsnip, as well as invasive brush. Mowing was used at Cherokee Marsh, Edna Taylor, Elvehjem, Owen, Prairie Ridge, and Turville Point.

PLAN FOR 2020

Conservation's IPM Program will be implemented in 2020 similarly to how it was in 2019 in accordance to the Parks Division's Adopted Land Management Plan. Staff will continue to target priority invasive species, striving for complete control, in priority management units. These efforts will be complemented by volunteer-led efforts in adjacent management units. Visual estimates of canopy cover will be used to prioritize areas for brush mowing, and to determine thresholds for hand-pulling versus mowing versus foliar herbicide applications, for those invasive species that can be effectively controlled with mechanical methods only. Chemical control will be used in conjunction with mechanical methods wherever possible, in order to reduce the amount of pesticide required.

Large-scale restoration efforts are planned for Cherokee Marsh, Edna Taylor, Knollwood, Owen, and Turville Point. Contractors will be hired to make cut-stump applications to buckthorn and honeysuckle, as well as foliar applications to bird's-foot trefoil, burdock, crown vetch, daylily, garlic mustard, dame's rocket, Himalayan pokeweed, and reed canary grass. Some areas will be forestry mowed, and woody re-sprouts sprayed early in the growing season while they are still small.

Following invasive species control efforts, native grasses, forbs, shrubs, and trees will be seeded or planted to complement recovery from the natural seed bank as part of the restoration process.

Prescribed fire, mowing, and hand-pulling will continue to be used as management tools in 2020, and we will be piloting prescribed grazing within the system for the first time at Acewood Pond.

OLBRICH BOTANICAL GARDENS

PEST CONTROL IN EUGENIE MAYER BOLZ CONSERVATORY

Since the Bolz Conservatory opened to the public in November of 1991, the insect control program has strived to use the least toxic methods of insect and pest control. No pesticides are used on the plant collection within the Conservatory.

Pesticides Used by Orkin Pest Control to Control Pests in Conservatory

Product Used	Active Ingredient (A.I)	Total A.I. Used	Purpose
Talstar Professional	Bifenthrin	35 ounces	Insect control
Cy-Kick CS Crack and Crevice Residual	Cyfluthrin	34 ounces	Insect control

Non Chemical Pest Control Measures in Conservatory

Several beneficial insects have been used to control the plant damaging insects. Over the years some target insect species have been all but eliminated while new pests continue to appear at various intervals. Some of the beneficial insects that we have released into the conservatory have a broad diet of target insects while others control a single insect. The control of plant damaging insects has not been as simple as releasing large numbers of ladybeetles. Some of the “good bugs” are actually parasitized by other insects so that timing of the release of the beneficial insects is very important. In addition, specific climatic conditions of temperature and humidity are needed for a successful release. Following is a list of the beneficial insects that are released into the conservatory from time to time as the situation warrants.

Beneficial Insect	Target Pest
Amblyseius cucumeris (predator)	Thrips, Mites
Aphidius colmani	Aphids
Phytoseiulus persimilis	mites
Chrysoperla spp. (predator)	Several Insects
Cryptolaemus montrouzieri (predator)	Mealybugs, Scales, Aphids
Encarsia formosa (parasite)	Whitefly
Delphastis pusillus	Whitefly
Orius spp. (predator)	Thrips, Aphids, Mites

Birds, specifically Quail (*Coturnix coturnix*), have been effective at controlling the nuisance palmetto bugs found in the conservatory. Assorted frogs, toads, and geckos living in the conservatory also use the palmetto bugs as a food source. Populations of these animals are maintained as part of the pest control program.

Vigorous daily or weekly washing of the plants in the conservatory has also proven to be very effective at controlling unwanted insects. This practice will continue as part of the pest control program.

The conservatory insect control program will continue to evolve as new beneficial insect species and additional control methods are carefully trialed. It is obvious from past success that it is possible to maintain a healthy plant collection while relying on least toxic and non-traditional methods of insect control.

PEST CONTROL IN PRODUCTION GREENHOUSES

In September of 2018, Olbrich began construction of a new production greenhouse range, which required plants to be moved offsite until November 2019, to a non-city affiliated property. Staff managed pests with the help of the greenhouse landlord/owner at that location. Pesticide usage on city property is low for 2019 due to greenhouse production taking place for just over a month. Since some of production and collection material has a threshold of zero tolerance we must resort to stronger chemicals. The mode of action and class of chemicals that are used are monitored as part of the chemical rotation control plan. The least toxic material available that will provide adequate control is selected for use.

Pesticides Used to Control Pests in Production Greenhouses

Product Used	Active Ingredient (A.I)	Total A.I. Used	Purpose
SuffOil-X	80% Mineral Oil	0.32 pounds	Spray oil emulsion fungicide, insecticide, and miticide.
Zerotol 2.0	27.1%Hydrogen Peroxide 2.0%Peroxyacetic Acid	0.645 pounds	Fungicide, Bactericide, and Algaecide for pest prevention and suppression

Non Chemical Pest Control Measures in Greenhouses

Use of Rootshield Plus®, a non-chemical product that is composed of beneficial soil organisms, continues to be successful in reducing the need for traditional chemical-based soil fungicides. Beneficial insects are also released as the situation warrants for specific pest control. Following is a list of the beneficial insects that were released into the greenhouses as the situation warranted, with an increase in use on a regular basis.

Beneficial Insect	Target Pest
<i>Amblyseius cucumeris</i> (predator)	Thrips, Mites
<i>Aphidius colemani</i> (parasite)	Aphids
<i>Chrysoperla spp.</i> (predator)	Several Insects
<i>Cryptolaemus montrouzieri</i> (predator)	Mealybugs, Scales, Aphids
<i>Encarsia formosa</i> (parasite)	Whitefly
<i>Hypoaspis miles</i> (predator)	Gnats, Thrips, Soil Insects
<i>Orius spp.</i> (predator)	Thrips, Aphids, Mites

Some plant material is washed with water or pruned to control the problem. Other times manual removal or a treatment with oil, soap, hydrogen peroxide solutions or isopropyl alcohol is used for insect control.

FACILITY RODENT CONTROL

Rodent control is practiced only in areas where there is a known problem. This may include many sites throughout the facility. The material is contained in bait stations which are concealed and tamper proof and are not accessible to the public. Some of the stations are used within the Conservatory. Orkin Pest Control, a commercial pest control company, routinely checks and services the stations.

Pesticides Used by Orkin Pest Control to Control Pests in Conservatory

Product Used	Active Ingredient (A.I)	Total A.I. Used	Purpose
Final All-Weather Blox EPA# 12455-89	Brodifacoum	214 blocks	Rodent control

PEST CONTROL IN OUTDOOR GARDENS

Olbrich Botanical Gardens is committed to gardening for the environment, as well as our visitors that expect to see gardens maintained at a high aesthetic standard. In addition, horticulturists continue to face new disease and insect attacks, some of which may be tied to our changing climate. As always, the principles of Integrated Pest Management (IPM) are applied to gardening practices

Pesticides Used to Control Pests in Outdoor Gardens:

Product Used	Active Ingredient	Total A.I. Used	Purpose
Horticultural Vinegar	Acetic acid	4.0 pounds	Weed control
Garlon EPA Reg. No. 62719-527	triclopyr: (2-[(3,5,6-trichloro-2-pyridinyl)oxy] acetic acid, butoxyethyl ester)	0.188 pounds	Control of invasive woody plants
Reward EPA Reg. No. 100-1091	Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c)pyrazinediium dibromide]	0.105 pounds	Weed control
K-Tea EPA Reg. No. 67690-24	copper triethanolamine	0.05 pounds	Algae control
Lontrel EPA Reg. No. 62719-305	clopyralid	0.035 pounds	Weed control
M-Pede EPA Reg. No. 62719-515	potassium salts of fatty acids	0.077 pounds	Insect control
Bt EPA Reg.No 70051-106-54705	<i>Bacillus thuringiensis</i> (subspecies <i>kurstaki</i> strain)	0.039 pounds	Insect control
Tzone SE EPA Reg. No. 2217-976	triclopyr BEE, butoxyethyl ester Sulfentrazone 2,4-D, 2-ethylhexyl ester Dicamba acid	0.123 pounds 0.0105 pounds 0.467 pounds 0.035 pounds	Bulb removal
3336F EPA Reg. No 1001-69	thiophanate-methyl	0.0015 pounds	Fungus congrol
Glyphosate Pro EPA Reg. No. 72112-4	glyphosate	3.33 pounds	Weed control
Round Up Quik Pro EPA Reg. No. 524-535	Glyphosate diquat dibromide	0.275 pounds 0.011 pounds	Weed control
BotaniGard 22 WP EPA Reg. No. 82074-2	<i>Beauveria bassiana</i> Strain GHA	0.088 pounds	Insect control
Suffoil-X EPA Reg. No. 48813-1-68539	Mineral Oil	0.256 pounds	Insect control

Non Chemical Measures Taken in Outdoor Gardens

Continuing a program that began in the 2011 season, a contractor was engaged that specializes in applications of compost tea, a product that inoculates the soil with a multitude of beneficial microorganisms. This leads to healthier soils and more resilient plants, minimizing the need for synthetic fertilizers and pesticides. Multiple areas were given season long applications last year. These locations continue to be monitored for long term results.

In 2019, the horticulture staff began a program in the Rose Garden (*Rose Garden Scouts*) which aimed to identify and survey resident beneficial insects and the pests they control, increase that control with the release of native beneficial insects, monitor populations of pest and beneficial insects, and to research and plant perennials that attract and support beneficial insects. For example, parasitic *Trichogramma* wasps were released as a control of rose budworm, to replace the effective and organically-approved pesticide *Spinosad* - which research has found to be harmful to bees.

Select disease and pest resistant varieties. One good example is the collection of ornamental crab apples, prone to fungal diseases, which was eliminated from the gardens reducing the need for fungicide use.

Assess damage thresholds. When possible, staff tolerate pest damage, both aesthetic and pathological. For instance, powdery mildew on ornamental plants is usually ignored as are a number of insect problems that we encounter in the gardens. Pesticides are applied only if the health of the plant is severely compromised or the visual attraction of the plant is greatly affected. Turf weeds are tolerated within the aesthetic standards of the Garden. Minor localized problems may be pruned out rather than treating the entire plant with a chemical, for instance a single branch on a fruit tree with tent caterpillars.

Manual/cultural controls. The great majority of weed control in the gardens is accomplished by manually pulling and preventing them in the first place by liberal and frequent applications of leaf and wood mulches. Olbrich's many volunteers help make this possible.

Let nature help. When gardens are healthy, there is a natural balance between predator and prey that helps keep plant collections and gardens protected from visible damage. When the gardens function as an ecosystem, there are natural checks and balances that minimize the amount of chemical inputs required. Birds and beneficial insects help keep pest insects in check and resident foxes, red-tail hawks and mink have helped reduce rodent and rabbit problems. Rabbits are live trapped and relocated when their population reaches damaging levels. A cyclical increase in the population causes an increase in efforts in this area, which continues into the winter.

Training:

Two members of the horticulture staff attended the American Public Gardens Association's Sentinel Plant Network Training at Green Bay Botanic Garden in May of 2019. They networked with other professionals in the industry will learn from and provide information to them to further everyone's knowledge of best practices to deal with pests and diseases. In addition, a production greenhouse staff member attended the American Horticulture Society's Plug and Cutting Conference in Charlotte, NC to advance her knowledge of pests and alternative control measures within greenhouse production. The grant funded *Scouts* program encourages garden staff to get volunteers involved and to help teach others about better environmentally sound ways to manage insect and disease programs in their gardens.

Complaints Received:

There were two inquiries by citizens regarding the use of glyphosate in an area where turf was being removed to prepare for a planting of native grasses. Parks staff responded to the inquiries, listened to their concerns and explained the treatments and why they were used.

Pesticide Management Plan for the 2020 Season

The garden staff will continue to work with an Integrated Pest Management (IPM) program. Staff will monitor the Garden's indoor and outdoor plant collections for optimum health and vigor, strive to improve the cultural and biological environment, provide mechanical eradication if possible, use resistant plant varieties, eliminate the plant if the problem persists and, as a final option, use pesticides to control plant pests. This past year saw a continuation of the use of beneficial insects in the Bolz Conservatory with satisfactory results. Canopy birds and ground quail also assist in keeping pest populations low in the Bolz Conservatory. The outdoor garden staff will continue to seek out less toxic pesticides that will provide control of pests while providing a safe environment for visitors. Staff will continue to experiment with alternatives to the use of traditional pesticides, including the use of beneficial insects in the greenhouse.

GOLF ENTERPRISE PROGRAM (GEP)

The Madison Parks' Golf Enterprise Program (GEP) consists of 72 golf holes at four facilities (Yahara Hills, Odana Hills, Monona, Glenway golf courses) encompassing approximately 750 acres of city owned property. GEP's Integrated Pest Management (IPM) philosophy is a multi-faceted approach that integrates all beneficial measures into a comprehensive program that controls pests in golf settings. Through the implementation of comprehensive Integrated Pest Management strategies that include establishing pest thresholds, monitoring for pests, cultural practices (mowing, rolling, irrigation, fertilization) and judicious use of pesticides the City of Madison golf division balances the expectations of our customers/golfers and manages our sites and golf courses in an environmentally sustainable and responsibly manner.

Turf Insect Management in GEP

The 2019 golf season saw little in the way of major insect problems at our facilities. Some white grub damage, primarily resulting from secondary damage caused by animals (skunks, raccoons etc.) feeding on these grubs is being reported on areas of rough that currently we do not treat with insecticides. All insecticide treatments follow best management practices for protecting pollinators in turf settings. A once per year insecticide application is made for the control of white grub species (Japanese beetle, Black Turfgrass Ataenius).

Pesticides Used for Control of Insect Pests

Product(s)	Active Ingredient	Total A.I. Used	Areas Treated
TREE-age	Emamectin Benzoate	0.1 pounds	Ash trees in rough
Merit Lesco fertilizer with Merit Prokoz Zenith 75 WSP, 2F	Imidicloprid	49.9 pounds	tees, fairways, Rough
Syngenta Acelepryn	Chlorantraniliprole	4.62 pounds	greens, tees
Aloft	Bifenthrin	0.22 pounds	greens
Arena Aloft	Clothianidin	0.83 pounds	greens, tees
Provaunt	Indoxacarb	0.375 pounds	fairways

Turf Disease Management

The 2019 golf season was extremely challenging in terms of disease management. Turf diseases such as Pithium Blight, which are rarely observed made appearances again this season and necessitated fungicide treatments (mefenoxam and metalaxyl). Persistent and heavy rain falls led to increased disease pressure and necessitated the application of fungicides to combat these pathogens. Despite preventative and curative fungicide use we did experience a fair amount of turf loss and thinning of the turf stand due to disease and algae infestations; but we do not think it will have a significant negative impact to turf quality in the long term once those areas have been renovated. While a good percentage of our focus of disease management relates to dollar spot and preventing the snow molds; increasing incidence of anthracnose on poa annua is becoming problematic. Some of the diseases spotted this season were pithium blight, brown patch, dollar spot, anthracnose (both foliar and basal rot), necrotic ring spot and fairy ring.

Fungicides Used for Control of Diseases

Products	Active Ingredient (A.I.)	Total A.I. Used	Areas Treated
Daconil Ultrex, Lesco Manicure Ultrex	Chlorothalonil	469.5 pounds	greens, tees, fairways
Bayer Chipco 26019, Lesco 18-Plus	Iprodione	205.6 pounds	greens, tees, fairways
Torque Fungicide, Omni Tebuconazole 3.6 Foliar Fungicide, Albaugh Tebuconazole 3.6F T&O	Tebuconazole	82.86 pounds	greens, tees, fairways
Banner Maxx II Fungicide, Lesco Spectator Ultra 1.3 Fungicide, Albaugh Agri Star Propi-Star EC	Propiconazole	171.46 pounds	greens, tees, fairways and trees in rough
BASF Insignia, Lexicon brand fungicides	Pyraclostrobin	11.62 pounds	greens
Syngenta Heritage, Quali-Pro Azoxy 2SC	Azoxystrobin	3.0 pounds	greens
Syngenta Velista Fungicide	Penthiopyrad	9.375 pounds	greens
Quali-Pro Mefenoxam 2AQ	Mefenoxam	2.5 pounds	tees
Armor Tech Rotator Atticus Detour 4 SC Syngenta Secure	Fluazinam	134.73 pounds	greens, tees, fairways
Syngenta Subdue GR Prime Source Regulate Select	Metalaxyl	5.6 pounds	greens
Syngenta Posterity Fungicide	Pydiflumetofen	3.41 pounds	greens, tees
BASF Maxtima Fungicide	Mefentrifluconazole	0.34 pounds	greens
Cleary's/Nufarm 3336 Nufarm T-Methyl SPC 4.5 F Quali-Pro Enclave	Thiophanate methyl	10.0 pounds	greens
BASF Xzemplar, Lexicon brand fungicides	Fluxapyroxad	6.88 pounds	greens, tees
BASF Emerald Fungicide	Boscalid	3.0 pounds	Tees

Plant Growth Regulation

Ethephon, trinexapac-ethyl and prohexadione-Calcium are all plant growth regulators that slow down the growth of turfgrass and used to suppress seed head formation on Poa Annua. They are being further implemented into our IPM programs. They are useful for their plant health attributes, as well as, the application resulting in a reduction of mowing frequency. Reducing mowing saves the city money in fuel, labor and equipment wear and tear, and reduces golf's carbon footprint.

Pesticides Used to Regulate Plant Growth

Product(s)	Active Ingredient	Total A.I. Used	Areas Treated
Bayer Proxy, Helena Oskie	Ethephon	95 pounds	greens
Syngenta Primo Maxx, Quali-Pro T-Nex	Trinexapac-ethyl	16.22 pounds	greens, tees, fairways
Anuew	Prohexadione-Calcium	3.71 pounds	greens

Turf Weed Management

As a general rule; the necessity and application of herbicides to highly maintained turf grass stands such as found in a golf setting is significantly less than that of non-irrigated, non-fertilized turf areas. A healthy actively growing turf is fairly good at out competing lawn weeds and it should come as no surprise the golf division's reliance and application of turf herbicides is fairly limited in scope. A slight decrease in herbicide treatments was observed in 2019. This is most likely the result of the inability to make herbicide treatments because of the extreme weather patterns observed this season. It is anticipated that due to some loss of turf in 2019 from flooding, scalping, and disease that this will allow for some weed encroachment in those turf areas and similar use and or slight increases in herbicide treatments should be expected during the 2020 growing season.

Pesticides Used to Control Turf Weeds

Product(s)	Active Ingredient	Total A.I. Used	Areas Treated
Bayer/Monsanto Roundup Lesco Ranger Pro	Glyphosate	42.9 pounds	Tree circles within rough and bunkers
Lesco 3-Way Gordons Trimec Classic	2,4-D	76.71 pounds	rough
Lesco 3-Way Gordons Trimec Classic Helena Vision Herbicide	Dicamba	21.55 pounds	fairways, roughs
Dimension Lesco Fertilizer with Dimension	Dithiopyr	44.35 pounds	tees, fairways, rough
Quicksilver	Carfentrazone-Ethyl	1.19 pounds	greens
Lesco 3-Way Broadleaf Gordons Trimec Classic	MCP	20.54 pounds	rough

Contracted Pest Control of GEP Facilities

GEP contracts with KwikKill Pest Control to provide year-round pest control at Odana and Yahara, and seasonal pest control at Monona and Glenway. The contractor monitors best populations, makes applications only when necessary, uses glue and spring traps, fills holes to prevent rodent entry and makes recommendations to staff based on observations. Facilities are cleaned daily and trash is removed daily to outdoor receptacles.

Pesticides Used by Plunkett Pest Control to Control Pests in Conservatory

Product Used	Active Ingredient (A.I.)	Amount Used	Purpose
Talstar Pro	Bifentrin	.00440 pounds a.i.	Insect control
Weatherblok XT	3-(3-(4'bromo[1,1'-pipehnyl]-4-yl)-4-hydroxy-2h-1-benzopyran-2-one	419 blocks	Rodent Control
Temprid FX	Imidacloprid cyclopropanecarboxylate	0.00977 pounds a.i. 0.0043 pounds a.i.	Interior insect control
Termidor SC	fipronil	0.6 pounds	Interior insect control

Non-Chemical Means of Pest Control

Golf relies heavily on cultural practices to manage the turf stand. These cultural practices include, mowing, vertical mowing, watering, fertilizing, aerification, topdressing and rolling. Regular mowing controls many annual weed species and regular mowing promotes the rhizomatous and stoloniferous growth habitat of most turf species that crowds out many if not most weed species. Additionally, the height of cut of the turf can affect the presence and population of many weeds and pests. As a general rule; higher heights of cut promote healthier turf stands. A rough grass stand mowed at 3 inches of cut will have far less crabgrass populations than a turf cut at 1.5 inches. Furthermore, a putting green cut at 5/32 of an inch will have much less disease, algae and moss infestations than a green cut at 1/8 of an inch or less. Staff carefully monitors irrigation to ensure the turf is not stressed. A semi-regular fertilization program is utilized to promote a healthy lawn. Regular aerification promotes a healthy water, soil, air mix that allows the turf to grow vigorously and withstand traffic and pests. Topdressing with sand provides a smooth surface, increases drainage and dilutes out organic matter, which allows turf withstand traffic and pest damage, such as anthracnose. Rolling helps smooth the playing surface, reduces mowing frequency, and has been shown to directly reduce the severity and incidence of the common turf grass disease dollar spot.

Complaints

Golf did not receive any complaints in 2019 related to pesticide usage.

Plan for 2020

The pesticide plan for 2020 will be similar to that of 2019, but will be highly dependent on prices of product available and weather conditions.