

2024 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 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 2024

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 Parks Division is happy to report that their 2023 Annual Report was reviewed by Public Health of Madison and Dane County. The 2023 report was also reviewed by the Habitat Stewardship Subcommittee in 2023, and 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 more than 4,000 acres.

Parks is thankful to all 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. Volunteers in both general and conservation parks provided several thousand hours of labor for mechanical and cultural control in 2024!

The Parks Division uses several 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 (i.e., 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.

WOODY SPECIES CONTROL

Targeted Species: Amur maple, Asiatic bittersweet, buckthorn, honeysuckle, Norway maple, boxelder, black locust, poison ivy, porcelain-berry, sumac, privet, elm, mulberry, Oriental bittersweet, maple, multi-flora rose, willow, ash, hawthorn, and euonymus. Certain black locust and walnut were also targeted as part of oak woodland restoration efforts.

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: Apple Ridge, BB Clark, Bear Mound, Door Creek, Droster, Elver, Flagstone, Goodman, Hiestand, High Crossing, Hill Creek, Ice Age Ridge, Indian Springs, Kingston-Onyx, Nakoma, Nesbitt, Olin, Orlando Bell, Quann, Warner, Woodland Hills

Pesticides Applied for Exotic Woody Species Control:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Pathfinder II Element 4	Triclopyr	19.3178 pounds
Glyphosate Pro	Glyphosate	0.0313 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, bird's-foot trefoil, motherwort, pampas grass, crown vetch, Japanese hedge parsley, Lamium, 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 exotic and invasive species in newly established managed meadow plantings from threatening native species diversity.

Locations:

Acewood, Aldo Leopold, Apple Ridge, Baxter, Bear Mound, Blackhawk, Brentwood, Brittingham, Burrows, Cardinal Glenn, Carpenter-Ridgeway, Cherokee North, Door Creek, Eagle Trace, Elvehjem, Elver, Filene, Flagstone, Galaxy, Garver, Goodman, Hawthorne, Heritage Heights, Hiestand, High Crossing, Hill Creek, Honeysuckle, Hudson, Huegel, Ice Age Ridge, Indian Springs, Junction Ridge, Kennedy, Kingston-Onyx, Kingswood, Lake Edge, Manchester, Marshall, Mayfair, McClellan, McGinnis, Monona, Nesbitt, North East, Olbrich, Olin, Orchard Ridge, Pennsylvania, Portland, Raymond Ridge, Reindahl, Reservoir, Reston Heights, Richmond Hill, Sandburg, Secret Places, Skyview, Sycamore, Tenney, Thousand Oaks, Valley Ridge, Veterans Memorial, Vilas, Walnut Grove, Warner, Wexford, Whitetail Ridge, Woodland Hills, Worthington

Pesticides Applied for Herbaceous Weed Control:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Ranger Pro Roundup Custom Aquaneat Makaze	Glyphosate	55.2741 pounds
Polaris AC	isopropylamine salt of Imazapyr	0.0024 pounds
Intensity	Clethodim	0.0738 pounds
Method	aminocyclopyrachlor	0.0018 pounds
Garlon 3A	Triclopyr	1.3781 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: Bowman, Country Grove, Demetral, Door Creek, Dominion, Elver, Garner Goodman, Hiestand, Midtown Commons, Marlborough, North Star, Odana Hills, Olbrich, Penn, Raymond Ridge, Reindahl, Rennebohm, Sycamore, Walnut Grove, Warner, Wexford, Whitetail Ridge, Wingra

Pesticides Applied for Broadleaf Weed Control in Turf:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Horse Power	2-Methyl-4-Chlorophenoxyacetic Acid	37.7031 pounds
	3,5,6-Trichloro-2-Pyridinyloxyacetic Acid	3.7703 pounds 3.7703 pounds
Snapshot	trifluralin	0.375 pounds
Ranger Pro	glyphosate	10.2772 pounds

This year saw a marked reduction in pesticide use for the control of broadleaf weeds in turf of approximately 45%. This was due to an increase in selectivity of spraying both in terms of parks that were sprayed as well as only selectively spraying within fields. These practices will be further improved in the future along with a combination of increased overseeding, consistent fertilizer application, and increased cultivation practices.

HERBICIDE APPLICATIONS BY CONTRACTORS

Targeted Species:

Woody species include autumn olive, bittersweet nightshade, black locust, buckthorn, mulberry, honeysuckle, Japanese barberry, multiflora rose, Siberian elm, sumac, Asian bittersweet, and porcelain berry. Fire intolerant native species were also targeted as part of canopy thinning efforts for oak woodland restoration at Owen and Knollwood.

Herbaceous species targeted include bird's-foot trefoil, burdock, cattail, crown vetch, dame's rocket, daylily, garlic mustard, Himalayan pokeweed, Japanese hedge parsley, motherwort, reed canary grass, and non-native thistles.

Purpose:

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

Locations:

Glacier, Indian Springs, Demetral, Garner, Harvey Schmidt, Meadow Ridge, North Star, Warner

Pesticides Applied by Contractors:

Product(s) Used	Active Ingredient (a.i.)	Total Amount of A.I. Used
Element 4 Garlon 4 Vastlan	triclopyr	17.35 pounds
Intensity	clethodim	1.1367 pounds
Milestone	aminopyralid	1.5801 pounds
RoundUp Custom, Aquaneat	glyphosate	52.0438 pounds
Escort	Metsulfuron methy	0.0023 pounds
Transline	clopyralid	0.7195 pounds

EXOTIC PLANT (woody & herbaceous) CONTROL APPLICATIONS BY VOLUNTEERS IN PARKS

Targeted Species: Bird's-foot trefoil, Canada thistle, Japanese knotweed, 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: 1000 Oaks, Eagle Trace, Hiestand, Hoyt, Hudson, Junction Ridge, Warner, Woodland Hills

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	0.1241 pounds
Ranger Pro, Aquaneat	glyphosate	7.5022 pounds
Element 4, Pathfinder II	triclopyr	2.0081 pounds
Intensity	clethodim	0.0206 pounds

Non-Chemical Means of Pest Control

Staff-controlled weeds by mowing and string trimming. Additionally, 165 hours were spent by volunteers pulling weeds in various locations throughout general parks. 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, and fertilizing to help decrease weed populations.

Complaints

Two complaints were received regarding pesticide use in parks this year. One concern was from a resident regarding pesticide use and the effects on staff health when applying pesticide in managed meadows near flagstone park. Staff responded by assuring the resident that proper PPE has been used by staff and that pesticides are not a primary management method when planning work in parks. An additional complaint was written to the mayor's office regarding pesticide uses impact on worker and environmental health. This concern was addressed in a similar manner citing this document as well as city policy regarding the use of pesticides in parks while reassuring the resident that appropriate measures are taken when planning pesticide applications.

Plan for 2025

General Parks will continue to reduce their pesticide use to only necessary locations for the betterment of the community experience. The return of parks to their native ecosystems by clearing invasive species will continue with guidance from the ecology team. Additionally, turfgrass applications will continue to be completed only when necessary for the upkeep of athletic fields. The organic pilot program completed in since 2021 and will continue this year at Flagstone and Olbrich parks, with the focus on creating cost comparisons for the potential expansion of the program to other parks in 2025 and beyond.

FOREST HILL CEMETERY

Plunketts Pest Control was contracted in 2024 for insect and rodent control in and around the mausoleum.

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Phantom (termite)	Chlorfenapyr	2 pounds
Advion (insect)	Indoxacarb	0.0005 pounds
Suspend Polyzone	Deltamethrin	0.84 pounds
Demand CS, Demand G	Lambda-cyhalothrin	4.56 pounds
Taurus SC	Fipronil	0.8 pounds

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 2024.

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 2024 for pesticide use in Mall/Concourse Maintenance.

Plan for 2024

The Mall Concourse maintenance plan for 2025 is the same as that of 2024.

WARNER PARK COMMUNITY RECREATION CENTER (WPCRC)

Primary pest pressures at WPCRC are due to rodents.

Pesticides Used by Plunkett Pest Control

Product Used	Active Ingredient (A.I)	Amount Used	Purpose
Firststrike	defathialone	60 blocks	Rodent control
Weatherblok XT	Brodifacoum	252 blocks	Rodent Control
Contrac All Weather-Blox	Bromadiolone	24 blocks	Rodent Control
Alpine WSG	Dinotefuran	28 blocks	Insect 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 2024 for pesticide use in at WPCRC.

Plan for 2020

The WPCRC maintenance plan for 2025 is the same as that of 2024.

MALLARDS STADIUM GROUNDS

The Mallards organization contracts pest control in and around the buildings on the stadium grounds as well as contracting the field turf areas.

Pest control performed by 1st American Pest Control

Product Used	Active Ingredient (A.I)	Amount Used	Purpose
Demand CS	Lambda-cyhalothrin	26.4 mL	Insecticide
Demon EC	Cypermethrin	0.03475 pounds	Insecticide
Suspend	Deltamethrin	2.0303 pounds	Insecticide
Contract Blox	Bromadiolone	290 blocks	Rodent Control

Turf areas performed by Maple Leaf

Product Used	Active Ingredient (A.I)	Amount Used
T-Zone	Triclopyr	0.325 pounds
	2-4D	0.039 pounds
	Sulfentrazone	1.1375 pounds
	Dicamba	0.13 pounds
13-0-0 Fertilizer with 0.1% Dimension	Dithopyr	0.00615 pounds

CONSERVATION PARKS (2024)

WOODY PLANT CONTROL APPLICATIONS BY STAFF

Targeted Species: Amur maple, buckthorn, honeysuckle, Norway maple, privet, Asiatic bittersweet, porcelain-berry, multi-flora rose. Certain black locust, and walnut 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: Acewood, Bitzer, Cherokee, Edna Taylor, Heritage Prarie, Knollwood, Odana, Owen, Prarie Ridge, Strickers, Turville

Pesticides Applied by Staff for Control of Woody Species

Product(s) Used	Active Ingredient (a.i.)	Total Amount of A.I. Used
Aquaneat	glyphosate	1.6875 pounds
Milestone	aminopyralid	0.3973 pounds
Pathfinder II, Vastlan, Element 4	triclopyr	61.0587pounds

HERBACEOUS PLANT CONTROL APPLICATIONS BY STAFF

Targeted Species: Burdock, crown vetch, dame's rocket, garlic mustard, pampas grass, tansy, motherwort, Japanese knotweed, Japanese hedge parsley, and Lamium.

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

Locations: Bitzer, Cherokee, Edna Taylor, Elvehjem Sanctuary, Heritage Prairie, Knollwood, Owen, Prairie Ridge, Stickers, Turville

Pesticides Applied by Staff for Control of Exotic Herbaceous Plants:

Product(s) Used	Active Ingredient (A.I.)	Total Amount of A.I. Used
Transline	Clopyralid	1.8867 pounds
Aquaneat	glyphosate	6.2031 pounds
Garlon 3A, Vastlan	triclopyr	22.8632 pounds
Milestone	aminopyralid	0.5746 pounds

WOODY AND HERBACEOUS PLANT CONTROL APPLICATIONS BY VOLUNTEERS

Targeted Species: Buckthorn, burning bush, honeysuckle, Japanese barberry, Phragmites, porcelain-berry, and sumac.

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, Hartmeyer Natural Area, Owen, Prairie Ridge, Quarry, and Strickers 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
Garlon 4, Pathfinder II	triclopyr	3.3649 pounds
Aquaneat	Glyphosate	1.1405 pounds

HERBICIDE APPLICATIONS BY CONTRACTORS

Targeted Species: Woody species include autumn olive, bittersweet nightshade, black locust, buckthorn, mulberry, honeysuckle, Japanese barberry, multiflora rose, Siberian elm, sumac, Asian bittersweet, and porcelain berry. Fire intolerant native species were also targeted as part of canopy thinning efforts for oak woodland restoration at Owen and Knollwood.

Herbaceous species targeted include bird's-foot trefoil, burdock, cattail, crown vetch, dame's rocket, daylily, garlic mustard, Himalayan pokeweed, Japanese hedge parsley, motherwort, reed canary grass, and non-native thistles.

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

Locations: Bitzer, Cherokee Marsh, Elvehjem, Kettle Pond, Knollwood, Owen, Sandburg, Stricker's Pond, Turville Point

Pesticides Applied by Contractors:

Product(s) Used	Active Ingredient (a.i.)	Total Amount of A.I. Used
Clash	dicamba	0.2709 pounds
Escort	metsulfuron methyl	0.2269 pounds
Element 4 Garlon 4, Trycera	triclopyr ester	11.8538 pounds
Milestone	aminopyralid	0.9597 pounds
Aquaneat, Roundup Pro RoundUp Custom	glyphosate	11.6697 pounds
Vastlan	triclopyr choline	13.7125 pounds

NON-CHEMICAL PEST CONTROL MEASURES SELECTED AS PART OF IPM PROGRAM

The level of effort devoted to mechanical weed control methods continued to increase in 2024.

Hand-pulling, digging: Staff spent approximately 300 hours hand pulling and digging invasive species this year – triple the amount of effort with this method in 2024. Target species included garlic mustard, dames rocket, Japanese hedge parsley, and Himalayan pokeweed. Sites included Cherokee Marsh, Edna Taylor, Heritage Sanctuary, Knollwood, Owen, Prairie Ridge, and Turville Point Conservation Parks. Of note, this is an equal amount of time as staff spent on herbicide treatments.

The Friends of Cherokee Marsh, Friends of Edna Taylor, Friends of Owen, and other volunteers spent **more than 275 hours** hand-pulling garlic mustard, dame's rocket, Japanese hedge parsley, and sweet clover, and digging burdock, star of Bethlehem, and wild parsnip. An undetermined (un-recorded) number of hours were also spent by volunteers pulling garlic mustard at Acewood Pond, Kettle Pond, and Sandburg Woods, where casual efforts were encouraged by posting of designated weed compost/collection sites for target plants pulled in these parks.

Prescribed Fire: Fire is an integral component of the ecology of the Midwest. Regular burning is necessary to maintain the structure and species composition of native plant communities such as oak woodlands, tallgrass prairies, and sedge meadows. Properly timed prescribed burns can help suppress non-native and invasive species (e.g., late spring burns harm cool season weeds such as garlic mustard seedlings but promote native warm season plants). Fire can also cause mortality to small diameter woody species like buckthorn and honeysuckle. Parks continues to expand its prescribed fire program by training and supporting volunteers, hiring contractors, and increasing intra-departmental cooperation. A total of **408 acres were burned in parklands in 2024**. This includes 352 acres within designated conservation parks, as well as 56 acres across 15 sites that included managed meadows and other native plantings. This is more than 4 times the acres burned in general parks in 2023.

Prescribed grazing: Goats **grazed 69 acres** at eight sites in 2024 to control woody invasive species and brambles. These included Acewood, Cherokee Marsh, Door Creek, Edna Taylor, Knollwood, Owen, Prairie Ridge, and Turville Point.

Mowing: Considerable time (**approximately 130 hours**) was spent spot-mowing crown vetch, Japanese hedge parsley, sweet clover, and wild parsnip, as well as invasive brush. Mowing was used at Cherokee Marsh, Heritage Prairie, Knollwood, Owen, Prairie Ridge, and Turville Point.

PLAN FOR 2025

Conservation's IPM Program will be implemented in 2025 **sim**ilarly to how it was in 2024 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. We also have begun to adopt the practice of making an initial herbicide treatment to dense populations of herbaceous invasive species, then following up with hand pulling for target plants that were missed, rather than conducting a second herbicide treatment. These initial treatments are made as early as possible to limit collateral damage to native species that have not yet emerged.

Large-scale restoration efforts will continue at Cherokee Marsh, Kettle Pond, Knollwood, Moraine Woods, Owen, Sandburg Woods, Stricker's Pond, and Turville Point. Contractors will be hired to make cut-stump and basal bark applications to buckthorn and honeysuckle, as well as foliar applications to bird's-foot trefoil, burdock, crown vetch, garlic mustard, dame's rocket, Himalayan pokeweed, and reed canary grass. Some forestry mowed areas will be grazed, while others will receive foliar herbicide treatments to control re-sprouts.

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, prescribed grazing, mowing, and hand-pulling will continue to be used as management tools in 2025.

GOLF ENTERPRISE PROGRAM (GEP)

The Madison Parks' Golf Enterprise Program (GEP) consists of 72 golf holes at four facilities (Yahara Hills, Odana Hills, Monona, The Glen Golf Park 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 2024 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, cranes etc.) feeding on these grubs is being reported on areas of rough and near teeing areas that we currently do not treat with insecticides. Should damage continue to increase in these non-treated areas it may necessitate making preventative insecticide applications to rough areas. Additional future insecticide treatments will follow best management practices for protecting pollinators in turf settings. Recently published guidelines are available; (<http://ncipmc.org/action/bmpturf.pdf>) and will be implemented in our pest management programs.

Pesticides Used for Control of Insect Pests

Product(s)	Active Ingredient	Total A.I. Used	Areas Treated
Merit Lesco fertilizer with Merit Prokoz Zenith 75 WSP, 2F	Imidicloprid	48.8 pounds	tees, fairways, Rough
Aloft	Bifenthrin Clothianidin	2.4864 pounds 0.616 pounds	greens, tees
Award Fertilizer with Chlorantraniliprole and Dithiopyr	Chlorantraniliprole	0.348 Pounds	Rough
Bayer Tetrino	Tetraniliprole	1.83 pounds	Tees

Turf Disease Management

The 2024 golf season was lightly to medium challenging in terms of disease management. Turf diseases such as Pythium Blight, which was absent last year, were more common this season. We experienced a 6-8 week stretch of heavy rains and 2 one-week windows of high heat and humidity combined. 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. We are collaborating with the University of Wisconsin and offering them fairway turf for them to study control products/strategies for this particular disease and will continue to work with the University in this regard. The only disease spotted this season in any volume was Dollar Spot.

Fungicides Used for Control of Turfgrass Disease

Products	Active Ingredient (A.I.)	Total A.I. Used	Areas Treated
AMVAC Previa, Lesco Manicure Ultrex	Chlorothalonil	503.741 pounds	greens, tees, fairways
Bayer Chipco 26019, Lesco 18-Plus, Armor Tech IP 238, Quali-Pro Ipro 2	Iprodione	197.64 pounds	greens, tees, fairways
Armor Tech FluZoxy-T	Fluazinam Tebuconazole Azoxystrobin	92.045 pounds 31.824 pounds 28.886 pounds	greens, tees, fairways
Omni Tebuconazole 3.6 Foliar Fungicide, Quali-Pro Tebuconazole 3.6F,	Tebuconazole	79.632 pounds	greens, tees, fairways
Prime Source PPZ 41.8 Select	Propiconazole	32.4 pounds	greens, tees, fairways and trees in rough
BASF Insignia	Fluxapyroxad Pyraclostrobin	1.599 pounds 1.64 pounds	greens
Artavia 2 SC,	Azoxystrobin	18.1584 pounds	greens, tees
Quali-Pro Mefenoxam 2AQ	Mefenoxam	14.4 pounds	Greens Glenway
Armor Tech Rotator Atticus Detour 4 SC	Fluazinam	55.8892 pounds	greens, tees, fairways
Sharda Ruby	Boscalid	6.955 pounds	greens, tees
BASF Xzemplar	Fluxapyroxad	2.337 pounds	greens, tees
Syngenta Posterity	Pydiflumetofen	0.551 pounds	greens

Plant Growth Regulation

Ethephon, trinexapac-ethyl, and prohexadione-calcium are plant growth regulators that slow down the growth of turfgrass and are used to suppress seed head formation on Poa Annuua. They are being further implemented into our IPM programs. They are useful for their plant health attributes and reduces mowing frequency. Reducing mowing saves the city money in fuel, labor and equipment maintenance, and reduces golf's carbon footprint.

Chemicals Used to Regulate Plant Growth

Product(s)	Active Ingredient	Total A.I. Used	Areas Treated
Atticus Pramaxis MEC	Trinexapac-ethyl	11.441 pounds	greens, tees, fairways

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 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. The main reduction in overall active ingredients was achieved largely by a significant decrease in glyphosate. This was attributable to a labor shortage and the lack of ability to make treatments to landscape areas, tree circles, bunker edges etc. However, this should not be expected to continue going forward. In 2025 we anticipate glyphosate use similar to 2021 and prior years. The treatment of moss and algae on the greens increased in 2024 and these treatments should be expected to remain consistent in 2025.

Herbicides Used to Control Turf Weeds

Product(s)	Active Ingredient	Total A.I. Used	Areas Treated
Award Fertilizer with Chlorantraniliprole & Dithiopyr	Dithiopyr	2.28 pounds	Rough
Confront	Triclopyr Clopyralid	3.87 pounds 1.29 pounds	Rough
Dimension Lesco Fertilizer with Dimension	Dithiopyr	30.21 pounds	tees, fairways, rough
Quicksilver	Carfentrazone-Ethyl	1.068 pounds	greens
Lesco 3-Way, Quali-pro 3-D	2-4D Propionic Acid Dicamba Acid	122.451 pounds 32.413 pounds 11.319 pounds	Rough, Fwys
Helena Vision	Dicamba Acid	0.792 pounds	Rough

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. Generally, 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 moisture levels and irrigates to ensure the turf is not drought stressed. A semi-regular fertilization program is utilized to promote a healthy lawn. Regular aeration promotes a healthy water, soil, air mix that allows the turf to grow vigorously and withstand traffic and pests. Topdressing with sand provides smooth putting surfaces, increases drainage, and dilutes out organic matter, which allows the turf to 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

The Golf Department did not receive any complaints in 2024 related to pesticide usage.

Plan for 2024

The Integrated Pest Management plan and pesticide use for 2025 is expected to be similar to that of previous years with a slight increase versus 2024. A larger focus will be placed on a curative program at Yahara Hills as opposed to the previous preventative program. As always pesticide use in the golf division will be highly dependent on budgetary constraints, managing the expectations of customers and seasonally evolve due to unforeseen factors such as increases/decreases of play/traffic and weather conditions.

Olbrich Botanical Gardens

Pest Control in Olbrich Botanical Garden’s Facilities

Rodent and Insect control is conducted throughout and around the facility (including the Bolz Conservatory and Production Greenhouses). Rodent/Insect control is practiced only in areas where there is a known problem. The material is contained in bait stations which are concealed and tamper proof and are not accessible to the public. Orkin Pest Control, a commercial pest control company, routinely checks and services the stations around the property.

Product Used	Active Ingredient (A.I)	Total A.I. Used	Purpose
Final All-Weather Blox EPA# 12455-89	Brodifacoum 0.005%	213 ounces	Rodent control
Phantom Termiticide EPA# 241-392	Chlorofenapyr 21.45%	34 ounces	Insect control
Alpine WSG EPA# 499-561	Dinotefuran 40%	6 ounces	Insect Control
TC-327 EPA# 499-569	Alpha-cyhalothrin 0.05%	4 ounces	Insect Control

Complaints Received

There were no visitor complaints regarding rodent/insect control in Olbrich’s Facilities in 2024.

Pest Control in the 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 chemical pesticides are used on the plant collection within the Conservatory. Our Integrated Pest Management strategy within the Conservatory relies primarily on biological, mechanical, and removal as means of controlling insect pests. Orkin (pest control company) maintains several boxed traps discreetly placed throughout the premises to aid in insect and rodent control (These numbers are provided in the Facilities Reporting section above). Among the myriad of biological controls we use, beneficial insects are routinely released to target plant-damaging insects. Some of the beneficial insects used in the conservatory have a broad diet of target insects while others control a single insect. Following is a list of the beneficial insects that are released into the conservatory 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 and toads 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.

Pesticides Used to Control Pests in Production Greenhouses

Product Used	Active Ingredient (A.I.)	Total amt. of A.I. applied
Akari 5 SC	Tert-Butyl	0.0252 pounds
Aria	Flonicamid	0.07375 pounds
Azaguard	Azadirachtin	0.0476 pounds
Botanigard ES	<i>Beauveria bassiana</i> Strain GHA	0.311 pounds
Cease	Strain of <i>Bacillus subtilis</i>	0.221502 pounds
Cleary 3336	Thiophanate-methyl	0.6 pounds
Conserve SC	Spinosad	0.013 pounds
Decathalon WP	Cyfluthrin	0.0105 pounds
Distance IGR	Pyriproxyfen	0.0258 pounds
Enstar AQ	S-Kinoprene	0.028125 pounds
Flagship 25WG	Thiamethoxam	0.014375 pounds
Kopa Insecticidal Soap	Potassium Salts of Fatty Acids	4.7212 pounds
Marathon 1% granular	Imadacloprid	0.0074375 pounds
Mavrik Aquaflow	Tau-fluvalinate	0.08 pounds
Molt-X	3.0% Azadirachtin	0.00084 pounds
RootShield Granular	<i>Trichoderma harzianum</i> strain T-22	0.02875 pounds
Rootshield Plus WP	Trichoderma harzianum Rifai strain T-22 0.61% Trichoderma virens strain G-41	0.00646875 pounds
Safari 20 SG	Dinotefuran	0.158375 pounds
Suffoil - X	Mineral Oil	14.96848 pounds
Talstar P	Bifenthrin	0.033 pounds
Talus 70 DF	Buprofezin	0.014 pounds

Tristar 8.5SL	Acetamiprid	0.0228 pounds
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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
Agrisel GrassOut EPA #72159-15	Clethodim	0.024 pounds	Weed Control
Certainty EPA #59639-226	Sulfosulfuron	0.0053 pounds	Weed Control
K-Tea EPA #67690-24	Copper triethanolamine	0.098 pounds	Algae control
Kopa Insecticidal Soap EPA 67702-11-59807	Potassium Salts of Fatty Acids	0.07 pounds	Insect Control
Lepitect EPA #74779-6	Acephate	0.58 pounds	Insect Control
Lontrel EPA #62719-305	clopyralid	0.015 pounds	Weed Control
Marathon 1% EPA #59807-15	Imidacloprid	0.0001 pounds	Insect Control
Mectinite EPA #74779-17	Emamectin Benzoate	0.072 pounds	Insect Control
Ornamec EPA #2217-751	Fluazifop-P-butyl	0.002 pounds	Weed Control
Safari EPA #86203-11-59639	Dinotefuron	0.028 pounds	Insect Control
RoundUp Quik Pro EPA #524-535	Glyphosate Diquat dibromide	10.77 pounds 0.43 pounds	Weed Control
Suffoil-X EPA # 48813-1-68539	Mineral oil	0.8 pounds	Insect control
Tordon RTU EPA #62719-17	Picloram	0.026 pounds	Weed Control
Xytect EPA #74779-11	Imidacloprid	0.094 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 2024 Olbrich continued its efforts to keep chemical pesticide use in the outdoor gardens as low as possible. This can be challenging, given the high aesthetic standards expected at a highly regarded botanical garden. Horticulturists continue to face new disease and insect attacks, some of which may be tied to our changing climate.

Olbrich's Garden Scouts are a volunteer team who emphasize our commitment to sustainable gardening, our discontinuation of chemical use, as well as support experimentation with natural alternatives and the creation of insect-inspired elements throughout the gardens. These volunteers help staff scout for beneficial insects, pollinators, and pests from May-October. They've participated in educational lectures, helped fill native bee houses, tagged Monarch butterflies, and planted bulbs for early spring pollinators. We look forward to continuing this team in 2024 WI DNR Plant Pest and Disease Specialist Andrea Diss-Torrance participated in a pilot moth-scouting event in the outdoor gardens.

As always, the principles of Integrated Pest Management (IPM) are applied to gardening practices. IPM stresses evaluating a wide range of criteria to decide when and what treatments are necessary for dealing with garden pests; and selecting solutions that minimize the amount and types of products used to combat them. Below is a listing of some of the strategies that fall under the guidelines of Olbrich Botanical Garden's IPM program.

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.

Staff are willing to tolerate some damage, both aesthetic and pathological. For instance, minor cases of powdery mildew on ornamental plants, while easily cured by common fungicides, are usually ignored. The same holds true for many of the minor insect problems that are present. Pesticides are applied only if the health of the plant is compromised, or the visual attraction of the plant is greatly affected. Turf weeds are tolerated within the aesthetic standards of the Garden. Less toxic solutions are utilized before selecting a more toxic product. 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. Olbrich does treat selected valuable specimen trees, and two ash trees were treated against Emerald Ash Borer in 2021.

Manual/cultural controls.

The great majority of weed control in the gardens is accomplished by manual pulling and preventing them in the first place by liberal and frequent applications of leaf and wood mulches. Vulnerable new plantings around the Learning Center and elsewhere were equipped from the start with wire cages to prevent rabbit and vole damage.

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 number 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. Once again 2024 saw a noticeable increase in raptor presence, as well as in fox and coyote presence. The outdoor gardens participate in monitoring through the UW-Urban Canid Project.

Complaints Received:

There were no visitor complaints regarding chemical use in the gardens in 2024.

Pesticide Management Plan for the 2025 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.