

Appendix M  
Revised Integrated Pest Management  
Plan



# **INTEGRATED PEST MANAGEMENT PLAN**

**Salem Hunt Residential Development  
June Road  
Town of North Salem, New York**

Lead Agency: Town of North Salem Planning Board  
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**Salem Hunt**  
**Integrated Pest Management Plan**

***Table of Contents***

	<u>Page</u>
1.0 Objectives and Goals	1
2.0 Policy Statement	2
2.1 Definitions / Roles and Responsibilities / Participants	3
3.0 Chemical Use	4
3.1 Deicer Use in Winter Operations	4
3.2 Fertilizer and Soil Amendment Use	4
3.3 Weed Control and Herbicides	5
3.4 Pesticide Selection and Turfgrass	5
3.5 Pesticide Use	5
4.0 Record keeping	7
5.0 Program Evaluation / Quality Control	9
6.0 IPM Education and Training	10
7.0 Conclusion	11
Appendix A Background of Integrated Pest Management	12
Appendix B Resources and References	32
Appendix C IPM Information Sheet for Residents and Tenants	35
Appendix D Sample Pesticide Application Notice	36
Appendix E Sample Pesticide Application Registry Notice	36



## **1.0 OBJECTIVES AND GOALS**

The overall objective of Integrated Pest Management (IPM) Plan for the Salem Hunt project is to reduce environmental impacts, and to optimize and diversify, rather than maximize, pest control. The selection of optimal management strategies will vary depending on site requirements and will change as new practices and products become available.

The Salem Hunt Homeowners Association will be responsible to: maintain the integrity of the buildings and grounds, protect the health and safety of the residents and general public, maintain a viable living environment and reduce impacts to the watershed. Following are the goals of the IPM Plan:

- minimize pesticide exposure to residents and the watershed.
- manage pests and the environment so as to balance costs, benefits, public health, and environmental quality.
- reduce the use of pesticides through proactive application of non-chemical management practices; by maximizing spot treatments and eliminating broadcast treatments; by making applications only where development of a pest has exceeded an established tolerance threshold as determined by routine monitoring; by replacing the use of conventional pesticides through favoring products that minimize risks to human health and safety and are least-toxic to the watershed and the environment in general.
- reduce phosphorus pollution caused by the excessive use of fertilizers and roadway deicers containing phosphorus.

## **2.0 POLICY STATEMENT**

The Salem Hunt Homeowners Association recognizes that (1) pests can pose a significant risk to health and property, (2) that there may be significant risks inherent in using chemicals in a residential environment, and, (3) that there are alternatives to conventional treatments. Therefore, policies of the Salem Hunt Homeowners Association will be as follows:

- implement and practice a comprehensive IPM program for all properties contained within and under the jurisdiction of the Homeowners Association;
- control pests within and on those lands and facilities under the regulation of the Homeowners Association by-laws. Pests can pose hazards to human health, damage property, and create unappealing visual blight;
- reduce potential exposure to pesticides to residents and to the watershed. Exposure to pesticides can pose a health risk to residential families, which can be minimized by practicing IPM;
- Prohibit regularly scheduled broadcast applications of pesticides; and,
- Prohibit use of phosphorus laden deicers.

## **2.1 DEFINITIONS/ROLES & RESPONSIBILITIES/PARTICIPANTS**

### **Integrated Pest Management:**

Integrated Pest Management is a systematic approach to managing pests that focuses on long-term prevention or suppression with minimal impact on human health, the environment and non-target organisms. This approach incorporates all reasonable measures to prevent pest problems by properly identifying pests, monitoring population dynamics, and utilizing a combination of cultural, physical, biological and chemical pest population control methods to reduce pests to acceptable levels.

An effective IPM program includes monitoring of pest populations; establishment of tolerance thresholds; a concerted effort to eliminate sources of food, water, shelter, and entry; utilization of chemical controls only when necessary; keeping of records; and, evaluation of performance on an ongoing basis. Integrated Pest Management practitioners seek to integrate various pest control tactics in the context of the associated environment of the pests in ways that complement and facilitate the biological and other natural controls of pests to meet economic, public health, and environmental goals.

Integrated Pest Management is a strategy that combines accurate documentation with the judicious use of various pest monitoring and control tools and tactics to exclude, prevent, and manage pest problems. While these tools and tactics differ with each pest species and with the characteristics of each specific site, the IPM strategy is constant. The site is inspected, pests are identified and monitored, pest habitat is modified to discourage or exclude the pests, existing infestations are managed in ways that complement and facilitate the biological and other natural controls of pests, results are evaluated through follow-up, and those results are used to adjust and improve the tactics employed at the site.

For the purposes of this document, at its most basic, IPM is a common sense pest control strategy based on two simple tenets:

- 1) treat only when necessary, and,
- 2) use the safest available alternative to do the job.

Thus, in practice, IPM involves careful monitoring for pests, and the use of a wide range of methods to exclude, remove, drive away or kill pests with the least possible hazard to people, property, the watershed and the environment in general.

### **Homeowners Association:**

The Homeowners Association is an organization comprised of all owners of the units in the residential development. The Homeowners Association is organized and operated through an elected board of directors and officers.

The Homeowners Association collects fees, fines, and other assessments from homeowners; maintains the common areas of the development; and, enforces the association's governing documents and by-laws. These may include detailed rules regarding construction and maintenance of individual homes in addition to this IPM policy. The common areas maintained and governed may include landscaping, common buildings (e.g., clubhouses) and recreational facilities such as swimming pools, and infrastructure such as streets, mailboxes, sidewalks, and

parking lots. While the Homeowners Association is ultimately responsible for the implementation of the IPM policy, the duties and responsibilities will fall to the IPM Coordinator / Contractor.

**IPM Coordinator / Contractor:**

The IPM Coordinator/Contractor is a qualified individual or company designated (hired) by the Homeowners Association to oversee the IPM program and perform notification duties. The IPM Coordinator/Contractor will be responsible for making decisions regarding pest control and should have an understanding of the pest control needs of the Homeowners Association. This person / company should also partake in continuing education and have access to Integrated Pest Management resources. The IPM Coordinator/Contractor shall have primary responsibility for ensuring that this IPM policy is carried out. Duties shall include:

- Reporting IPM activities to the Homeowners Association;
- Accurate identification of pests, and research and development of suitable and cost-effective IPM methods to enable continued reduction of pesticide use;
- Coordination with grounds and maintenance staff and independent contractors to carry out procedures for consideration of pest control implications of new construction and building or site modifications;
- Coordination with Homeowners Association members and staff to gather current information on pesticide or pest-related health and safety issues;
- Coordination with custodial, building and grounds maintenance staff and service providers to ensure implementation of pest prevention measures;
- Oversight of contractors and staff engaged in monitoring of pest problems and pest management actions;
- Carrying out posting and notification, record keeping, education and IPM training provisions of this policy;
- Oversee the use of approved deicing methods and materials for snow and ice removal;
- Implement methods and procedures to be used for identifying sites of pest shelter and access, and for making objective assessments of pest population levels; and,
- Establishing population levels that constitute unacceptable levels of pest presence in and on Homeowners Association regulated facilities and grounds.

**Action / Tolerance Threshold:**

The action threshold is the population level of a pest, above which it becomes necessary to actively manage its population. Action thresholds are unique to both specific pests and specific locations, and reflect the priority that is attached to controlling a particular pest. High priority pests are considered a threat to human health and immediate action is warranted (e.g., wasps, roaches, rodents, or filth flies in close proximity to human habitations). Those that do not pose such a threat have lower priority, and treatment or removal can be delayed. The Homeowners Association in cooperation with the IPM Coordinator/Contractor will establish pest tolerance thresholds to indicate pest population levels at which control measures will be undertaken. The

IPM Coordinator/Contractor will modify action thresholds as the IPM program molds to fit the site requirements.

### **Monitoring**

Monitoring is the regular inspection of the buildings, grounds and facilities throughout the year, allowing pest managers to detect pests early before they reach damaging levels. By monitoring, a trained employee or contractor can assess the need for action, evaluate how well control tactics have worked, and develop site history information that helps in anticipating future problems. This act is the crux of IPM and distinguishes it from conventional pest control programs. Monitoring identifies those areas that are most likely to need treatment. If pesticides are necessary one can spot-treat the problem area. Monitoring allows the IPM Coordinator/Contractor to pinpoint the time when a pest is most vulnerable to treatment. Treatment can then be timed to have the maximum effect. While comprehensive, the monitoring aspect of the program should be as simple as possible.

Monitoring procedures are further described in Section 4.0 Record keeping, below. While it is crucial to maintain detailed records regarding pesticide application and use, it is also important to maintain records on other aspects of pests and pest control. For example: the location and time of when pests are observed, numbers and concentrations, physical setting and conditions, and temperature and precipitation. These records can assist the IPM Coordinator/Contractor to utilize non-chemical pest control methods, including cultural, physical and biological methods.

### **Pest**

Article 33 of the New York State Environmental Conservation Law defines a pest in part as: (1) any insect, rodent, nematode, fungus, weed, or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except bacteria, viruses, or other micro-organisms on or in living man or other living animals) which the commissioner declares to be a pest.

### **Pesticide**

Article 33 of the New York State Environmental Conservation Law defines a pesticide as (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. Commonly, pesticides are known as insecticides and herbicides.

## **2.2 Non-Chemical Pest Control**

As described above, Integrated Pest Management is a strategy that combines accurate pest monitoring and control tools to exclude, prevent, and manage pest problems. Following the identification of specific pests, an initial assessment will be made by the IPM Coordinator/Contractor whether non-chemical methods can be used to exclude, prevent or manage pests. Non-chemical methods may include the following:

### **Cultural**

A complaint of a pest problem by a homeowner may be addressed by educating the homeowner about a specific pest and methods to discourage that pest. For example, in order

to discourage attracting wasps to patios in summer, covering food or beverages can be encouraged.

### **Physical**

Often simple physical methods can be utilized to reduce or eliminate pest infestations. Ensuring that garbage is properly sealed and contained will reduce ant and fly problems. Certain caterpillar infestations can be reduced by physically collecting and destroying nests or individuals. Wasp nests can also be physically removed, rather than utilizing chemicals.

### **Biological**

Depending upon the nature and species of pest infestation, certain biological methods can be utilized to reduce or eliminate pests. For example, ladybugs can be utilized to rid plants of aphids and other pests. Bat houses can be erected to reduce mosquito populations.

In summary, non-chemical methods should be evaluated by the IPM Coordinator/Contractor prior to the use of chemicals. The goal of the IPM is to minimize the use of chemical pesticides, to the extent practical.

## **3.0 CHEMICAL USE**

### **3.1 Deicer Use in Winter Operations**

Certain winter time roadway deicer products have been identified by the State of New York as significant sources of phosphorus pollution. Based upon the desire to minimize phosphorus, no chemical, or salt based deicers will be used on property under the jurisdiction of the Homeowners Association, by residents, staff, or contracted winter maintenance operators. Sand will be used for vehicle and pedestrian traction. The Homeowners Association shall require documentation that this policy is adhered to.

### **3.2 Fertilizer and Soil Amendment Use**

When nutrients are added, care must be taken to apply only what the plants will use. Too much fertilizer can damage plants and can impair water quality. However, it is not necessary to choose between having a healthy, attractive landscape and protecting water quality. The key is to determine proper nutrient applications for each landscape. Soil properties, types of nutrients, plant needs, fertilizer types, application methods, and application timing need to be considered in a comprehensive IPM program.

### **3.3 Weed Control and Herbicides**

To preserve aesthetics, it is necessary to manage weeds in landscape areas. Weeds can mar the color patterns of annual or perennial flower beds. Weeds also compete with desirable vegetation for water, nutrients, and space, and may prevent landscape plants from achieving maximum growth and health. Effective weed management requires a combination of Integrated Pest Management approaches including cultural and mechanical practices as well as chemical control.

### **3.4 Pesticide Selection on Turfgrass**

Pesticides are sometimes necessary to keep pests at tolerable levels. These chemicals will continue to be an integral part of any IPM program. However, sole reliance on chemical control can no longer be justified because of rising chemical costs, increased resistance to pesticides, and environmental concerns. Some pesticides can also enter surface or groundwater either from leaching or runoff.

The selection of pesticides to be used on the turf area should be based on many criteria including the pest to be controlled, the turfgrass species the pest is infesting, the season and growth stage of the pest, the level of control desired, the application method required for the pesticide, the duration of control from the pesticide, the possibility of environmental contamination, and the need for frequent rotation of pesticides of different modes of action for the targeted pest to discourage pesticide-resistant plants, insects, and diseases. After all factors are considered, there may be two or three possible choices of pesticides for the control of the pest.

Leaching potential is only one of many considerations in selecting a pesticide. There will be some instances where a pesticide exhibits low leaching potential, but because of its high potential toxicity to wildlife such as fish, extra precautions may be necessary around water. These precautions should be mentioned on the label.

Pesticides currently available for use on agricultural, turfgrass, horticultural and residential pests in New York State have been thoroughly tested by the pesticide manufacturer and approved by the United States Environmental Protection Agency (EPA) before registration and release to the public. Pesticide applicators should be aware that the pesticide label is an official and binding contract between the chemical manufacturer, the EPA, and the purchaser of the product. If the label directions are not followed, the applicator may be subject to prosecution resulting in penalties which may include fines and imprisonment.

### **3.5 Pesticide Use**

A qualified individual or contractor shall be responsible for application of pesticides according to the label. All pesticides used by the individual or contractor must be registered with the U.S. Environmental Protection Agency (EPA) and by the State of New York. Transport, handling, and use of all pesticides shall be in strict accordance with the manufacturer' label instructions and all applicable federal, state and local laws and regulations.

#### **Pesticide Products and Their Use**

When it is determined that a pesticide must be used in order to obtain adequate control, the individual / contractor shall employ the least hazardous material, most precise application technique, and minimum quantity of pesticide necessary to achieve control. Containerized and other types of crack and crevice-applied bait formulations, rather than sprays, shall be used for cockroach and ant control wherever appropriate.

As a general rule, liquid, aerosol, or dust formulations shall be applied only as crack and crevice treatments with application devices specifically designed or modified for this purpose. "crevice treatment" is defined in this document as an application of small amounts of insecticides into cracks and crevices in which insects hide or through which they may enter a building.

Application of pesticide liquid, aerosol, or dust to exposed surfaces, and pesticide sprays (including fogs, mists, and ultra-low volume applications), shall be restricted to unique situations where no alternative measures are practical. The qualified applicator shall obtain the approval of the IPM Coordinator/Contractor prior to any application of pesticide liquid, aerosol, or dust to exposed surfaces, or any space spray treatment. The qualified applicator shall take all necessary precautions to ensure public safety, and all necessary steps to ensure the containment of the pesticide to the site of application.

### **Pesticide Use Recommendations**

- The intent of the policy is to minimize the use of pesticides.
- Pesticide application shall be according to need and not by schedule. As a general rule, application of pesticides in any inside or outside area shall not occur unless visual inspections or monitoring devices indicate the presence of pests in that specific area. Preventive pesticide treatment of areas where surveillance indicates a potential insect or rodent infestation are acceptable on a case-by-case basis, as approved by the IPM Coordinator/Contractor.
- Pesticides should be used only when other pest prevention and non-chemical control measures are unavailable, impractical, ineffective, or are likely to fail to reduce pests below tolerance thresholds.
- All pesticides must be applied by commercial certified pesticide applicators in ways that are consistent with label restrictions and use directions.
- Routinely scheduled (e.g., seasonal, monthly, or weekly) pesticide applications should be avoided whenever possible, unless such applications may reasonably be expected to result in an overall reduction in pesticide use when compared with all other practical alternatives.
- Pesticides should be applied when no building occupants are in the treatment area, and when these areas will remain unoccupied for the reentry time span specified on the pesticide label. Building use and occupants must be considered prior to any pesticide application.
- When more than one option exists, pesticides and application methods should be chosen that reduce exposure:
  1. Low volatility formulations should be preferred.
  2. Application methods that place pesticides into inaccessible locations (tamper-resistant bait stations, void, and crack and crevice treatments) should be preferred over fogging or space spraying.
  3. Spot treatments should be preferred over area-wide treatments.
- Use pesticides which have a low pesticide leaching potential index, when possible.
- Determine the size of the area of application and mix only the quantity of pesticide needed in order to save money, avoid disposal, and protect the environment.
- Spot treat whenever possible.
- Note groundwater advisories on the label.

- Pesticides may be used only when their application is a necessary component of an IPM prescription;
- All IPM prescriptions, including those that involve pesticide use, will be reviewed and approved by the IPM Coordinator / Contractor before implementation and periodically thereafter as long as they remain part of the IPM program;

### **Posting**

Prior to applications, Homeowners Association announcements shall be made reminding residents of any pesticide applications with warnings to avoid posted and flagged areas until signs are removed. Outdoor application areas should be posted in accordance with New York State Laws and Regulations as set forth in Article 33, Title 10 of the Environmental Conservation Law. This regulation requires that: markers must be affixed within or along the perimeter of the area where pesticides will be applied, markers must be clearly visible to persons immediately outside the perimeter of the area to be treated and be at least twelve inches above the ground and at least four inches by five inches in size, markers must be in place on the day during which the pesticide is being applied, and shall instruct persons not to enter the treated area and not to remove the signs for a period of at least twenty-four hours. The instructions must be printed boldly in letters at least three-eighths of an inch in height.

### **4.0 RECORD KEEPING**

An Integrated Pest Management program's database is one of its major assets and requires a collection and processing system so this information can be used effectively for implementing pest management activities, for evaluating the program, and for developing program improvements.

Accurate records are essential for the success of an Integrated Pest Management program. During the growing season, day-to-day pest management decisions are based on monitoring information. Effective record keeping greatly increases the long-term value of this information by providing the IPM Coordinator/Contractor with historical, site-specific knowledge of pest activity. This information can be used to predict when certain pest problems are most likely to occur later in the season and in subsequent seasons. In addition, records call attention to patterns and associations that may be overlooked during a pest outbreak. Examples include particular turf areas or cultivars that are chronically infested or insect activity coinciding with drought or disease stress.

The IPM Coordinator/Contractor shall be responsible for maintaining a pest control logbook or file for all applicable grounds and buildings. At a minimum the logbook shall contain the following items:

- **Pest Control Plan:** A copy of the Contractor's approved Pest Control Plan for that facility or grounds, including labels and MSDS sheets for all pesticides used, brand names of all pest control devices and equipment used in the application, and the Contractor's service schedule for the area.
- **Service & Complaint Logs:** A logbook for recording service visit activities, complaints from residents concerning pest sightings or pesticide applications. Forms should show times in and out and should be signed by the contractor at each service visit.

- Service Report Forms: Homeowners Association copies of the Service Report Form, documenting all information on pesticide applications, pest sitings, sanitation and environmental status, and building and ground maintenance needs.
- Quality Control File: A quality control file shall contain a record of all inspections conducted by the contractor and any corrective actions taken.

Pest management records should be as complete as possible. The IPM Coordinator/Contractor should record the kinds and numbers of pests present, when and where they were found, and exact locations and extent of any turf damage or abnormalities observed. Information on the turf species and cultivar development, turf health, and current environmental conditions is also valuable. When recording, monitoring or other management information be as quantitative as possible. Record the actual number of insects per unit area and assign damage ratings to injured turf (e.g., 1= severe damage, 3= moderate damage, 5= no observable damage). Avoid vague designations such as high or low, or heavy or light. It is often useful to divide turf areas into pest management units that can be considered individually when making pest management decisions.

Recording information pertaining to control methods and their results are as vital to a successful IPM program as are the monitoring records. The combined pest and control information forms the basis for judging efficacy and cost as well as making future plans. Pesticide use records must be complete, up-to-date and as detailed as possible.

Records should be maintained regarding the location and physical conditions related to pest observations, including: the location and time of when pests are observed, numbers and concentrations, physical setting and conditions, and temperature and precipitation. These records can assist the IPM Coordinator/Contractor to utilize non-chemical pest control methods, including cultural, physical and biological methods.

If physical or biological methods are employed, then routine inspections will be made and the results of the non-chemical pest control methods will be recorded. Therefore, the effectiveness of these methods will be documented for future reference and use.

If pesticides are used, the IPM Coordinator/Contractor should record:

- 1) Date of pesticide application
- 2) Name, classification, and amount of active ingredient
- 3) Amount of material and water mixed for the application
- 5) How much of the pesticide was actually applied
- 6) Where the pesticide was applied
- 7) Size of the area
- 8) Type of application method (spray, granular, etc.)
- 9) Applicator' name
- 10) Labor hours.

Keeping good records enables the IPM program to ascertain important pest and control trends. For example, have there been reductions in total amounts applied, or has there been a shift to pesticides of a higher or lower toxicity? Comparing annual information points out recurrence and trends of pests.

## **5.0 PROGRAM EVALUATION/QUALITY CONTROL**

The IPM Coordinator/Contractor will continually evaluate the progress of the Integrated Pest Management plan in terms of effectiveness and safety, and will recommend such changes as are necessary. The contractor and grounds crew shall take prompt action to correct all identified deficiencies.

Assessing the effectiveness of cultural and pest control practices is an important yet often overlooked component of an IPM program. In most cases, the same sampling techniques used to detect the original pest infestation can be used to ascertain the success or failure of a control strategy. However, when evaluating the efficacy of a control measure, sampling can be limited to only a few previously infested areas. The IPM Coordinator/Contractor can use the evaluation process to determine management approaches that were effective and those that need to be modified. At the end of the season, this information can be reviewed in order to plan and prioritize monitoring and management activities for the future.

These evaluations are used to analyze the effectiveness, costs, and benefits of the program and its components to highlight opportunities to adjust the program to better serve its intended implementation goals and objectives.

Time frames of program evaluations vary from short-term (e.g., effectiveness of a specific direct pest control treatment) to long-term (e.g., analysis of program institutionalization). Likewise, the scope of evaluations varies from review of site specific pest management practices, to examination of program components that involve the entire pest management system (e.g., the record-keeping system), to analysis of the program as a whole.

Too often, the focus of evaluation rests on pesticide use. While this is frequently an important public issue and also a critical factor in an IPM program, it can overshadow and seriously detract from the development and evaluation of other key components of the program. Evaluation of an IPM program should include at least the:

- monitoring system,
- record keeping system,
- communication system,
- management system,
- decision making and evaluation system,
- operational system, and
- overall Integrated Pest Management program.

Key aspects of these evaluation requirements include:

- development of an Integrated Pest Management reference library,
- development, implementation, and refinement of pest management prescriptions and treatments,
- training of grounds and maintenance staff,

- education of policy makers,
- communication with the residents and building occupants, and
- budgeting,

In developing an IPM program so that it will facilitate evaluation of the pest management system and its components, it is useful to outline objectives or criteria by which the success of implementation can be measured. These milestones can be developed initially as part of a strategy for implementing the IPM program and include short, intermediate, and long-range goals and objectives. In preparing such a strategy, it is important to use timelines that accurately reflect the requirements and constraints of implementing each component and the program as a whole. Setting unrealistic expectations for "success" may jeopardize a fair evaluation of the program.

## **6.0 IPM EDUCATION AND TRAINING**

Education and communication are important not only in facilitating program implementation but also in developing program support throughout the community in which the integrated pest management system must operate.

A commitment to educating and training of all stakeholders to function within an Integrated Pest Management context is important to the success of an IPM program. This includes the residents and especially the people responsible for the pest management. Continuing education and training must be an objective of the IPM program. The IPM program should require that the IPM Coordinator / Contractor and subcontractors partake in continuing education and training that focuses on pest recognition and agronomic factors to assure that participating parties will have the knowledge to make sound management decisions.

The Homeowners Association should develop as a part of this Integrated Pest Management a policy to:

- issue periodic information bulletins for residents, tenants as appropriate, to inform them of important issues relating to the Homeowners Association IPM policy, their respective roles in pest prevention and sanitation, and pesticide use guidelines,
- annually review its Integrated Pest Management program to evaluate how well its pest prevention and control objectives are being met and to identify areas where more work is needed
- ensure contractor and staff who apply pesticides are trained and certified applicators

## **7.0 CONCLUSION**

Too often people are unwilling to change, secure in the methods they follow for pest control. They believe new techniques to be risky, time consuming, and ineffective in the long-term. When a Integrated Pest Management program is started you will find out that IPM is neither risky nor time consuming. Practitioners say IPM is only common sense and really not that difficult. Start small and develop a pilot monitoring program. Keep an open mind and give it a chance. When you make monitoring a normal Homeowners Association management practice performed through the IPM Coordinator/Contractor, you will be pleasantly surprised with the

results. The primary goal of Integrated Pest Management is improved safety and quality of life with minimal adverse impacts to the watershed and environment.

In providing leadership for the development and implementation of an Integrated Pest Management program, the Homeowners Association should select an IPM Coordinator/Contractor that is skilled not only in IPM and the diversity of residential pest management requirements but also an individual that is also good at educating and communicating with people.

## Appendix

### A. Background on Integrated Pest Management

#### **Integrated Pest Management vs. Conventional Program**

Integrated Pest Management employs all available pest control methods. While permissible, pesticide use is minimized through development and application of other pest management methods. In addition, careful evaluation and selection of pesticide materials is done to promote maximum utilization of products that are least toxic to non-target organisms the watershed and the environment in general. Conventional pesticide-based programs have relied principally on only one method of treatment for effective pest control without due regard for the environment.

Integrated Pest Management mitigates negative environmental impacts. IPM minimizes pesticide use and other environmentally disruptive pest control treatments to promote environmental quality, preserve the natural ecosystem, and reduce undesirable effects on non-target organisms. Conventional pesticide-based programs have emphasized treatment timing and equipment technology to minimize non-target impacts.

Integrated Pest Management requires appropriate standards for pest control. IPM promotes tolerance of non-damaging pest populations and appropriate thresholds for pest control that reduce unnecessary treatments. This enhances program efficacy and minimizes the application of undesirable treatments (e.g., pesticide use). Conventional pesticide-based programs emphasize treatment as soon as potential pests are observed or preemptive chemical treatments in anticipation of potential pest problems. Tolerance thresholds for the presence of pests or pest damage are very low; frequently thresholds are set at zero tolerance levels (i.e., one is too many and requires direct treatment).

Integrated Pest Management emphasizes prevention of pest problems. Effective utilization of IPM design and site modification practices reduces the need for pest control treatments, helping minimize pesticide use requirements and making resources available for other maintenance priorities. In turn, these benefits promote environmental quality and facilitate improvements in the aesthetic quality of the resource system. It also reduces the life-cycle maintenance costs of specific landscape features (i.e., costs of maintenance over the entire service life of a facility or feature: e.g., shrub bed, sports field, or fence line). Conventional pesticide-based management programs only provide short-term control of pest problems. Pest populations continue to develop on previously treated sites or features (and must be treated again) because no action has been taken to prevent their recurrence. Repeated applications of pesticides are a burden on the maintenance of environmental quality. In addition, expenditure of maintenance resources without attempting to prevent the recurrence of pest problems is inefficient. In analyzing the costs and savings involved with pest management, it is essential that all costs be valued over the life of the feature and grounds being maintained.

Integrated Pest Management promotes the use of methods that provide long-term pest control. Like IPM practices that prevent pest problems, those methods which provide long-term pest control benefits also enhance program efficacy, promote environmental and specifically watershed quality by reducing the need for undesirable treatments such as pesticide use, and enhance the aesthetic quality of resource system components. Conventional pesticide-based management programs provide only short-term pest control and, in the long-term, potentially involve negative impacts on program efficacy and environmental quality.

For many organizations, a clearly written policy is the first step in developing this documentation. Included should be: the purpose of the policy (to implement IPM); the guiding principles of the policy (ecosystem approach, minimum pesticide use, maintenance of environmental quality and human health, etc.); a clear definition of IPM; components of the IPM program(s) that will be implemented (monitoring system, IPM prescriptions, record-keeping system, etc.); and, special roles and responsibilities required for implementing the policy.

### **Integrated Pest Management Approach**

The Integrated Pest Management approach essentially involves: the practice of prevention, treating only when necessary, and use of the safest available alternative to do the job. The key to IPM is accurate pest identification and the knowledge of the pest's life cycle and vulnerability.

Integrated Pest Management involves careful monitoring for pests, and the use of a wide range of methods to exclude, remove, drive away, or kill pests with the least possible hazard to people, property, and the environment. A combination of cultural, mechanical, biological, and other techniques is used; chemical controls are a last resort.

An important aspect of the IPM approach involves planning ahead to avoid or minimize future pest problems. Decisions made during maintenance of a turf area can significantly influence pest development. Among these key decisions are selection of turfgrass species and cultivar for establishment or overseeding, weed and disease control strategies, irrigation, fertilization, thatch management and other cultural practices which affect the health and vigor of the turfgrass. As a general rule, stressed or poorly maintained turf will exhibit pest damage sooner than healthy turf, and will be slower to recover following insect or mite injury.

The Integrated Pest Management approach stresses less emphasis on traditional pesticide (insecticide, herbicide, fungicide, etc) use. Less pesticide use and disposal by homeowners and commercial applicators also means less pesticide to make its way into streets, storm drains, streams and eventually, into the reservoirs of watersheds. In urban and suburban areas even a small reduction in the use of pesticides by individual homeowners can have a significant impact on the reduction of pollutants that make their way into the watershed.

The Integrated Pest Management approach goes beyond routine applications of pesticides. Rather, the IPM Coordinator/Contractor tries to determine why a pest outbreak has occurred, and whether cultural practices can be adjusted to reduce damage and the risk from future problems. All appropriate management options are considered. Pesticides are only applied when necessary.

### **Cultural Management**

Cultural methods are often overlooked in conventional pest control programs. They provide many ways to reduce the amount of pesticides used in the home and garden. Here are some examples:

- Remove and destroy over-wintering or breeding sites of pests.
- Select disease and insect resistant plant varieties.
- Cut turfgrass at the correct mowing height.
- Use the appropriate amount of water for irrigation of flowers, trees, shrubs, and turfgrass.

- Mulch landscape-planting areas. Mulches can be very useful for the suppression of weeds, insect pests, and some plant diseases. If heavy enough, mulch can also conserve water and prevent germination of many annual weed seeds.
- Cultural control: Crop rotation, cultivation, proper site selection, use of native plant species, and early/late harvesting.

### **Mechanical Management**

Examples of mechanical (physical) controls are barriers and traps to exclude pests, hand picking of insects, hand pulling or hoeing of weeds, and the use of sod for turfgrass establishment. Although some of these methods may not always be practical on a large scale, they can generally be used in small or localized situations. Some examples:

- Mechanical Control - Use of traps, screens, nets, tar-paper discs, and sticky paper to serve as physical barriers to pest entry/attack.
- Sanitation - Clean up and removal of pest food sources and harborages and removal of the pests themselves represent the use of sanitation methods to subdue pest populations.

### **Biological Management**

Biological control is the use of living organisms such as parasites, predators, or pathogens. They may occur naturally or be applied. Biological control results when naturally occurring enemies maintain pests at a lower level than would occur without them. Birds, bats, insects, fungi, and bacteria all play a role as predators or parasites in the web of life. Employing biological control can involve the purchase and release of natural enemies into an area as well as the conservation and support of natural enemies already present. Some examples:

- Predators, such as lady beetles, green lacewing larvae, spiders, fly larvae, damsel bugs, and predatory mites
- Parasites, such as parasitic wasps and flies
- Pathogens, such as bacteria, viruses, fungi, nematodes, and protozoa
- Weed feeders, such as weevils, leaf beetles, caterpillars

### **Chemical Management**

The decision to use chemical controls should be made only when other measures, such as biological or cultural controls, have failed to keep pest populations from approaching damaging levels. When chemical pesticides must be used, it is to the advantage of the applicator to use the lowest labeled rate of the least toxic pesticide that will manage the pest. Always read the product label: signal words concerning toxicity such as CAUTION, WARNING, and DANGER (restricted) can be found there. For the product to be used legally, the target pest and target site must be listed on the label. The contractor shall follow label directions for correct use, storage, and protective clothing is to be worn during application.

## Alternatives to Synthetic Chemical Pesticides

### *Botanical pesticides*

Because botanical pesticides are derived from natural plant material, they are perceived to be safe. However, "natural" does not mean "nontoxic." It is important to be aware that they are still pesticides and fall under the same federal and state regulations as synthetic or chemical pesticides. All pesticides require an EPA pesticide registration number that can be found on the product label. Some examples include ryania, sabadilla, rotenone, neem, pyrethrum, and pyrethrins.

### *Microbial insecticides*

These products combat insects with microscopic living organisms: viruses, bacteria, fungi, protozoa, and nematodes. Most affect a single species or group of insects, often with minimal impact on beneficial insects and other nontarget organisms. One example is *Bacillus thuringiensis* (Bt), a bacterium that is used to kill the larval stage of the gypsy moth. Another example is *Beauveria bassiana* (Naturalis-O", Botanigard") a fungus used to control aphids, whiteflies and other pests.

### *Insecticidal soap*

Similar to other soaps, insecticidal soap is generally considered to be among the least toxic pesticides available. Soaps are used to control soft-bodied pests such as aphids and mealybugs. Soaps are effective only against those insects that come in direct contact with the spray before it dries. Once the spray has dried, walking over the soap residue will not harm a moving insect.

### *Horticultural oil*

Horticultural oil has gained wide acceptance in recent years in pest management programs because of its environmental safety and effectiveness in controlling many types of insect and mite pests. Dormant and summer oil applications interfere with the pest's respiration and membrane function. For oil to be effective, it must come in direct contact with the pest or egg; therefore, thorough coverage is essential for proper control. Some plants may be sensitive to horticultural oil, particularly when under stress.

## **Methods for Monitoring**

Integrated Pest Management decisions depend on detailed information about a variety of important factors such as: pest life cycles, site conditions where pests are located, the maintenance history of individual sites or features, previously applied pest control techniques, the presence of predatory agents; these factors make up the resource complex.

Monitoring involves routine observations of the resource complex to determine current conditions and the need for pest management treatments. While pest populations and their damage are the primary concern of monitoring, it is important to review all factors that influence the need for pest management to establish action plans for appropriate maintenance activities.

Monitoring is a critical element of IPM programs. It involves regular inspections of areas and features where pest problems might occur to provide information for determining if, when, where, and how pest management practices should be implemented. Once treatments have been applied, monitoring is done to record the results of those treatments. Over time, as monitoring results accumulate, patterns in the occurrence of pests and the results of applied pest management practices become evident. This information can then be used to evaluate and then improve the integrated pest management program.

Of primary importance is the need to identify key pests - generally considered to be those that: create unacceptable safety hazards, cause the most economic or aesthetic damage, require the most labor and material resources, involve the largest amount or routine application of pesticides, generate chronic complaints by the public. Key pests can be identified using contractor's and staff experience and records of past management practices. This process and the baseline information collected by monitoring will highlight data gaps in knowledge that is needed to develop effective IPM strategies and practices for key pests, and it will indicate what labor and material information is necessary to facilitate evaluation of the cost-effectiveness of applied management practices.

A monitoring system should be designed to collect only the amount and type of information that is necessary and useful for the IPM program. Gathering unnecessary information is not cost-effective or practical for managing pest problems or for the collecting, recording, and handling of monitoring data. Depending on the resource being monitored (e.g., sports field, pavement, shrub bed, tree), monitoring may only need to involve information about the location, type, and extent of a pest population and its impacts (for example, weeds in pavement cracks). On the other hand, extensive information may be valuable to obtain - for example, monitoring of weevil problems on rhododendrons might include information about adult pest population levels, the extent of notching on leaves, condition of the plants involved, amount and types of debris or ground cover under the plants, the extent to which lower branches touch the ground, depth of mulch, soil moisture and temperature, the effects of pest control treatments (such as sticky traps on the stems), and the occurrence of natural predators and opportunities to enhance their presence. As the "memory" of the pest management system becomes well developed through the accumulation of historical information about pest problems, site conditions, and applied management practices, the monitoring program can be refined and focused.

During the early phases of an IPM program, when pest management histories are being developed, monitoring may need to be intensive. As the program matures, the level of monitoring can usually be reduced since a great deal of information about the biophysical nature of the resource system will be on record. Still, there may always be program needs that require intensive monitoring. Examples include: wherever important pest problems are potentially very dynamic (such as in a greenhouse operation); wherever maintenance of high quality site conditions are essential (as in ornamental displays which receive intimate daily public viewing); or where there is minimal allowance for a response time to applied pest management treatments (this occurs when pest populations increase very rapidly and a slight delay in response can result in a significant amount of damage, such as turf disease levels on golf course greens). Ultimately however, the monitoring program should be as simple as possible. The Integrated Pest Management monitoring program should utilize careful observations, written records, and quantitative descriptions, with the timing of monitoring practices varying from carefully scheduled, perhaps even frequent, site visits, to inspections that are completed during the course of implementing other routine maintenance activities, such as mowing or weeding.

Successful management of most turf insects depends on the early detection of pests before they reach damaging levels. This can best be accomplished through frequent turf inspections to detect early signs of insects and their damage. Monitoring is a systematic method of inspecting turf for pests and cultural problems, and should be the backbone of the pest management program. Its primary goal is to detect, identify, delineate, and rank pest infestations and turfgrass abnormalities. All turf areas should be monitored on a regular basis during the growing season. Among the more common symptoms of insect-damaged turf are a general thinning of the grass, spongy areas, irregular brown patches and/or plants which easily break away at soil level. Substantiating the insect origin of the problem may be difficult, however, because many of the symptoms described above could also have been caused by non-insect factors such as heat or drought stress, nutritional deficiencies, turf diseases, soil compaction, chemical burns from gasoline, fertilizers, herbicides or insecticides, scalping during mowing operations or even excrement spots left by pets. If the problem is insect related, a close visual inspection of the damaged area should reveal either the presence of the pest or indirect evidence that an insect infestation has been present. Bird and animal feeding activity often indicate potential insect problems. Starlings, robins, moles, skunks, and raccoons are well-known insectivores. However, confirmation of the insect origin of a problem requires close examination of the injured area. Look for signs of skeletonized leaves, clipped grass blades, fecal pellets, sawdust-like debris, stem tunneling, silken tubes or webbing. If no evidence of insects or their feeding is found, the condition is probably due to another cause, and use of insecticides or other insect control measures would be ineffective.

#### Monitoring Techniques

Insect sampling techniques provide an important complement to visual monitoring by aiding in the detection and identification of insects and assessing their damage potential. Sampling should be initiated when an insect infestation is suspected; at appropriate times in a pest's life cycle; in historically infested areas; or when a post-treatment analysis of pesticide efficacy or other control measures is desired. Since insect and mite pests rarely distribute themselves evenly throughout turf, it is essential that the entire area be sampled in a consistent, uniform pattern. Enough samples must be taken to assure a reasonably accurate estimate of pest numbers in the sampled area. If turf damage is evident but no pests are detected, examine the turf for other causes of injury such as disease, excessive thatch, improper mowing, heat or moisture stress. When examining turf, be on the lookout for beneficial natural enemies, such as lady beetles, big-eyed bugs, lacewings, ground beetles, spiders and parasitic wasps that may be reducing pest populations. Sampling techniques for detecting surface and soil inhabiting insects are described below.

Disclosing (Irritant) Solution— insects can be flushed from the turf with disclosing solution. Mix 2-4 tablespoons of liquid dishwashing soap into 2 gal. of water and pour the mixture over a square meter of turf. Insects such webworms, cutworms, army worms, mole crickets, billbug adults, as well as earthworms, will come to the surface within five to ten minutes. There they can be easily collected, identified and counted. Treatment thresholds based on this sampling method are available for some insects, are described in their respective sections. Because detergents vary in their concentrations and components, they should always be tested to determine the soap to water ratio that will irritate target insects, yet not be phytotoxic to the turfgrass.

Floatation— insects will float to the surface when submerged in water. This phenomenon can be exploited by inserting a metal cylinder (preferably 8-9" diameter) into ground (1-2" depth). A

large coffee can with both ends removed is suitable. Fill the can with water and replace any water that escapes until the turf has been underwater for 3-5 minutes. Insects will float to the water surface where they can be collected, identified and counted. Alternatively, remove a large soil core with a golf-course cup cutter (4, 6, or 8 in. diameter) and place it in a bucket of water for the same amount of time. These techniques are ideal for detecting chinch bugs and many of their natural enemies.

Soil Examination (Cup Cutting and Soil Diggings)— soil-inhabiting insects, such as scarab grubs, cannot be sampled by the methods previously discussed. These insects must be sought in the root and thatch zones where they feed. One sampling method involves cutting three sides of a square turf area (1/4-1 sqft) with a shovel or knife, and peeling back the sod layer to expose white grubs, billbug larvae and other soil dwellers. It is important to examine the entire root zone, including both the sod cap and the upper 1-3 inches of soil. Several samples should be taken to determine population levels throughout the area.

A second method for sampling soil-inhabiting insects utilizes a standard golf course cup-cutter that removes 4.25 in. diameter soil cores. Cores can be rapidly inspected for insects as soil is discarded back into the original hole. If the sod cap is then replaced and the area irrigated, damage to the turf will be minimal. Record the number of each insect species found and its predominate life stage (instar) on a data sheet or map. Inspecting soil samples in a grid pattern across any turf area will help delineate areas with insect infestations. Minimum intervals of 60-100 feet between samples in large turf areas should be sufficient. Ultimately, the number of samples taken will depend on the time and labor available. Sampling time will vary depending on insect density, soil type, thatch thickness, and other factors.

Traps— activity can be monitored using a variety of trapping methods. Most traps utilize an attractant (lights, pheromones, and/or food scents) that lure insects to the trap. Upon reaching the trap, insects are captured by mechanical means such as sticky surfaces, or killed with insecticides (although not a preferred method). Typically, these traps are hung from trees or stakes in or near the turf area. Light traps collect a wide variety of flying insects, including scarab beetles, and cutworm, webworm and army worm moths. The sheer abundance and diversity of insects collected can be a disadvantage to this approach because of the extensive sorting and identification time required. Pheromone traps are highly selective and normally capture only one sex (usually males) of a single species of insect. Pitfall traps, are placed in the ground so that the top is flush with the turf surface. These traps capture insects as they move along the ground. Arthropods such as mole crickets, billbug adults, ground beetles, and winter grain mites can be monitored using pitfall traps. Insect traps are useful monitoring devices that provide important information confirming the presence and timing of a particular pest in an area. For example, peaks in adult activity can be tracked and used to predict when damaging larval activity will occur later in the season. Traps should not be relied on to reduce or eliminate pest infestations. It is important to fully understand the capabilities and limitations of any trapping method before use. Also remember that to be effective, traps must be checked on a regular basis. Insect monitoring traps can be obtained from most pest management supply companies.

Visual Inspection— insects are most easily detected by visual inspections. Billbug adults, for example, can be monitored as they stroll on paved areas and sidewalks in hot weather and a treatment threshold is associated with this activity. Annual bluegrass weevils can be detected by inspecting the clippings in mowing boxes from close-cut turf, and chinch bugs can sometimes be found by separating grass plants with the thumb and forefinger and examining the base of the plant. While visual inspection can be used to detect most insects, it is rarely as

efficient as other sampling techniques. Other Detection Methods— insect sweeping nets are useful for collecting flying insects in turf areas. Mole crickets in flight have been monitored using sound-trapping stations that broadcast recordings of males. Their damage can be assessed by placing a square frame (76 x 76 cm), divided into nine equal sections, over damaged turf. Turf is then rated from 0 to 9 by the number of sections containing mounds or tunnels.

**Disease Sampling-** Follow general monitoring procedures for disease monitoring. Look for irregularities and differences in the color of the turf and examine these areas for signs and symptoms of diseases. Search for lesions on turfgrass leaves, and the presence of mycelia and other fungal growth. Record the type, location and severity of the diseases found. Pay special attention to areas with a history of disease problems. Use these locations as indicator sites. Send a sample to a diagnostic lab if you are unable to identify the problem. Combine the disease monitoring information with past and future weather information to determine when and if control action is required.

**Weed Sampling-** Inspect for weeds in the spring (late April or early May), early summer (mid- to late June), and again in late summer or fall (mid-August to late September). Record the species, where they occur, the intensity of the infestation, and if there are patterns of occurrence (spotty, throughout, etc.). In the spring look for perennial broadleaf weeds or winter annuals not controlled in the fall. Decide if a May herbicide application will be necessary. Also, evaluate turf density. Are there thin areas where summer annual weeds will be a problem? If so, repair these areas or plan for pre or post emergent summer annual weed control. In early summer inspect for summer annual weeds such as crabgrass, oxalis, spurge, and prostrate knotweed. Make post emergent applications for these weeds while they are still young and more easily controlled. In late-summer or early fall look for summer annuals which escaped control, perennial dicot weeds, seedling winter annual weeds, and thin spots in the turf. This is the best time of year to repair thin turf, control perennial and winter annual broadleaf weeds, and to assess the overall effectiveness of the weed management program.

### **Tolerance Thresholds**

Tolerance thresholds are flexible guidelines that are usually defined in terms of the level of pest abundance or damage that can be tolerated before taking action. They are typically based on a number of variables including pest species, abundance, and life stage; variety, vigor and value of the impacted resource; relative effectiveness and cost of control measures; and time of year. Treatment thresholds are not hard rules that apply to every situation, but when used conscientiously they should help IPM Coordinators make effective pest management decisions.

Five factors should be considered in setting tolerance thresholds: economic concerns, health and safety concerns, aesthetic concerns, public opinion, and legal concerns. The cost of preventative treatment versus potential cost in damage is an economic threshold. Tolerance of pests varies also by whether or not they are a health hazard (low tolerance) or merely a cosmetic damage (high tolerance in a non-commercial situations). Personal tolerances also vary - many people dislike any insect; some people cannot tolerate dandelions in their yards.

The Homeowners Association in cooperation with the IPM Coordinator/Contractor will establish pest tolerance thresholds to indicate pest population levels at which control measures will be undertaken. These thresholds will be consistent with the Homeowners Association goals of maintaining the integrity of buildings and grounds, protecting the health and safety of residents and tenants and maintain a viable living environment. Thresholds will not be set based on

aesthetic criteria alone. These thresholds may be numerical or narrative descriptions of pests or pest damage. Control measures will not be undertaken if pest damage or populations are below these levels.

Note that when thresholds are exceeded, some pest management action would be necessary, but not necessarily chemical application. And even though pests may be below threshold correction levels, it is still important to monitor and maintain records, correct sanitation problems and conduct preventative measures.

The following are examples of tolerance thresholds: while reasonable, these are only examples:

**Ants (common house-infesting)**

Public areas: 5 ants/room; kitchen: 3 ant/room; maintenance and storage areas: 5 ants/100 square feet in two successive monitoring periods; outside grounds: 2 field ants mounds/square yard.

**Ants (carpenter)**

Public areas, maintenance areas: 3 ants/room; kitchen: 2 ant/room; immediate action if ant colony suspected inside or within 25 feet of any building.

**Bagworms**

Control on conifers when 2 or more large bags/tree or bush. In light infestations, hand pick and destroy; in heavy infestations, spray with B.t. between June 15 and July 15, or spray residual insecticides after July 15.

**Bees (honey)**

Kitchen and public areas: 1 bee; maintenance areas: 3 bees; outdoors: no action unless public are threatened.

**Bees (bumble)**

Kitchen and public areas: 1 bee; maintenance areas: 3 bees; outdoors: action necessary if communal nests are present in common areas. Also action whenever public is threatened.

**Bees (carpenter)**

Kitchen and public areas: 1 bee; maintenance areas: 3 bees; outdoors: 1 carpenter bee/5 linear feet if susceptible, unfinished wood. Also action whenever the public is threatened.

**Cockroaches**

Public areas: 2 cockroaches/room. If 2-10 cockroaches per room, apply cockroach bait. If 10 or more, track down infestations, review sanitation, trash handling, clutter, etc.; open equipment, check inaccessible areas; vacuum and otherwise clean room, and apply baits or other insecticides as necessary. kitchen: 1 cockroach/room; maintenance areas: 5 cockroaches/room; outside grounds: no action unless noticeable infestation.

**Crickets**

Public areas: 3 crickets/room; kitchen: 2 crickets/room; maintenance areas: 10 crickets/room; outside grounds: no action unless causing problems.

**Grain and flour pests**

Found in food for human consumption: 1/package or container; pet food: 1 if escaping from packaging; if found in pheromone traps: 2 of any one species (total of all traps)

**House flies**

Public areas: 3 flies/room; kitchen: 1 fly/room; maintenance areas: 5 flies/room; outside grounds: 5 flies around any one trash can or 10 flies around a dumpster.

**Landscape plants (general)**

Whenever pest damage approaches 10 percent/plant.

**Lawn pests (insects, nematodes, disease)**

Whenever visible damage approaches 10 percent in any 100 square foot area.

**Mice**

Indoors: any mouse sighting or evidence of mice (such as new mouse droppings, tracks, etc.) triggers pest management action; outdoors: any noticeable burrows or activity in student areas.

**Pigeons**

Roof ledges: 10/building for 3 consecutive inspections; public area or roof: whenever droppings accumulate more than 1-inch or nests obstruct gutters or equipment.

**Poison ivy**

Common areas: 1 plant; wooded areas: no control necessary unless near path or common area.

**Rats**

Indoors: any rat sighting or evidence of rats (such as new droppings, tracks, etc.) triggers pest management action; outdoors: any active burrows or activity.

**Silverfish**

Wherever books, paper, files are stored: 1/room; other indoor areas: 2/room

**Spiders**

Take immediate action if a brown recluse is suspected in any area; other spiders—  
classrooms: 1 spider/room; kitchen/cafeteria: 1 spider/room; hallways: 2 spiders/hallway; maintenance and unoccupied areas: 3 spiders/room; outdoors: only if in large numbers or causing problems.

**Tent caterpillars**

Desirable ornamental plants: 1 tent or egg mass/tree; woodland trees, non-ornamental trees: if potentially damaging or aesthetically intolerable, or after two complaints in two weeks (to prevent repeated infestations, remove wild cherry hosts).

**Ticks**

Outdoor common areas: 3 tick, any species; outdoor wooded and other areas of low activity: keep grass and weeds trimmed; if any blacklegged ticks found, treat wood edges; for other species, take action if moderate to heavy populations.

#### Weeds

Lawns: whenever weeds approach 15 percent in any 100 square foot area; ornamental plantings: whenever competing with ornamental plants or whenever aesthetically displeasing.

#### Yellow jackets/hornets

Public areas: 1 yellow jacket or hornet; outdoors: action necessary if nests are present in or near student activity area; 10/10 minutes at trash can or dumpster; 1 yellow jacket or hornet anywhere if public is threatened.

### **Soil Testing**

Soil characteristics determine how well plants are able to use nutrients. A soil test indicates what nutrients are in the soil and what nutrients are needed. A soil analysis lists the amount of nutrients in the soil and gives recommendations for improving the nutrients for landscape plants. A county Cooperative Extension Center can provide instructions on how to take soil samples and send them to a qualified laboratory. After the initial soil test, soil should be tested every three to five years to make sure the fertilizer program is on target and in compliance with the Integrated Pest Management Policy.

### **Adjusting Soil Properties**

The effectiveness of fertilizer applications depends on soil properties such as texture, organic matter content, drainage, and pH.

Soil particles are grouped by size and designated as sand, silt, or clay. Sand is the largest particle size, and clay is the smallest. Soil texture varies with the different proportions of sand, silt, and clay on each location. In general, soils with a greater portion of silt and clay retain more water and nutrients than those soils composed mostly of sand particles.

Soil organic matter also influences soil productivity. In general, organic matter increases both the water and nutrient holding capacity of a soil. Organic-matter additions to soil may also provide nutrients as they decompose, or they may increase the tilth of the soil by amending or modifying the soil structure to promote water infiltration and root penetration.

Soil drainage is critical to plant health. The soil's ability to hold water must be balanced with its ability to retain enough oxygen for plant growth. If soil becomes saturated for a prolonged period of time, the oxygen trapped in soil pore space can be depleted rapidly by the plant and soil organisms. When roots cannot get oxygen, the plant's ability to get nutrients and grow is impaired. Poor drainage causes more problems for landscape plants than any other factor.

### **Soil Acidity**

Soil pH, a measure of acidity, has a significant impact on the plant's ability to use nutrients. The scale of pH ranges from 0 to 14. Seven is considered neutral; values below 7 are considered acidic, and values above 7 are considered alkaline.

Decay of plant residue, the addition of organic matter, and the widespread use of nitrogen fertilizer increases soil acidity.

Most landscape plants grow well in soil with a pH range from 6.0 to 7.0. Within this range, the essential nutrients are available to most plants, and soil organisms can carry out their beneficial functions. If the soil is too acidic (low pH), the pH can be raised by adding lime. If the soil is too alkaline (high pH), the pH can be lowered by adding sulfur.

A soil test analysis includes determination of the pH.

### Types of Fertilizer

The analysis, or grade, of a fertilizer refers to the minimum amounts of nitrogen (N), phosphorus (in the form  $P_2O_5$ ), and potassium (in the form  $K_2O$ ) in the fertilizer. The analysis is always printed on the fertilizer label. A fertilizer with a 10-10-10 analysis contains 10 percent nitrogen, 10 percent  $P_2O_5$ , and 10 percent  $K_2O$ . For example, in 100 pounds of 4-8-12, there are 4 pounds of N, 8 pounds of  $P_2O_5$ , and 12 pounds of  $K_2O$ . Conversion equations for the amounts of phosphorus and potassium are given for quantities of  $P_2O_5$  and  $K_2O$ .

#### Common Nutrient Conversions

$$P_2O_5 \times 0.43 = P$$

$$P \times 2.29 = P_2O_5$$

$$K_2O \times 0.83 = K$$

$$K \times 1.20 = K_2O$$

Fertilizers may be divided into two broad categories: natural and synthetic. *Natural fertilizers* generally originate from unprocessed organic sources such as plants or animals. *Synthetic fertilizers* are man-made or processed. Synthetic fertilizers can be organic (for example, urea) or inorganic (for example, superphosphate).

Natural fertilizers commonly misnamed "organic" also can contain inorganic ores such as rock phosphate. Most nutrients from living or once-living organisms are not readily available for plant growth, because they are bound in organic molecules such as proteins and amino acids and in structures such as cell walls. These nutrients are released only when microorganisms decompose the organic matter.

Slow-release fertilizers may be synthetic or natural. Because nutrients are released over an extended period of time, slow-release fertilizers do not have to be applied as frequently as other fertilizer types. Also, higher amounts of slow-release fertilizer can be added at each application without risking injury to plant roots. Slowly released nitrogen is used more efficiently because a higher percentage is absorbed by plants. The higher efficiency of slow-release fertilizers means less nitrogen is available to contribute to pollution of streams and subsurface water.

The primary disadvantage of slow-release fertilizers is higher initial cost. When an analysis is done to determine the cost of nitrogen that is actually absorbed by the plant, however, the unit cost is actually *lower* for slow-release materials.

Several categories of slow-release nitrogen fertilizers are available. *Water-soluble* or *liquid fertilizers* are applied either to the soil or foliage. Many water-soluble formulations are available for almost any specific need, from high-nitrogen plant starter fertilizers to minor element formulations.

*Chelated iron* is used extensively for prevention and control of iron deficiency in azalea, rhododendron, and other popular ornamentals.

### Application Rates

The rate of application of nitrogen depends on the plant species and its stage of development. General recommendations may range from 2 to 6 pounds of nitrogen per 1,000 square feet (about 90 to 260 pounds per acre) per year. To convert from actual nitrogen to fertilizer, divide the amount of actual nitrogen desired per 1,000 square feet by the fertilizer analysis or grade. With an 18-6-12 fertilizer, for example, to apply 3 pounds of nitrogen per 1,000 square feet would require 17 pounds of fertilizer ( $3 \text{ lbs}/0.18 \text{ N} = 17$ ).

Nitrogen needs also vary with stage of plant growth:

- At planting time, nitrogen needs are relatively low, but sufficient nitrogen should be supplied to support the new root generation and top growth of the plant. High rates should be avoided because they will trigger excessive top growth that cannot be supported by a limited root system.
- Maximum growth of landscape plants is usually desired during the first few growing seasons after establishment. To achieve maximum growth, constant rates of nitrogen are needed.
- As the plant begins to mature and the rapid growth rate is no longer needed or desired, lower levels of nitrogen are sufficient to maintain plant vigor.
- Plants growing where the root zone is restricted (containers, parking lots, etc.) should not receive large amounts of nitrogen, because restricted roots cannot support excessive top growth.

Some plants, once established, may not need additional fertilizer to perform well. Silver maple, willow, and forsythia are good examples. The fibrous root systems of some ornamentals such as azalea, dogwood, hemlock, and rhododendron are easily damaged by fertilizers. Split applications of water-soluble nutrients or slow-release formulations are recommended for these plants.

### Timing Fertilizer Applications

The best time to improve soil fertility is before planting. Nutrients can be mixed thoroughly into the soil where the plant roots will grow. Phosphorus is the most important element in this category, because it moves slowly. Lime or sulfur, if needed to correct pH levels, is most effective when incorporated the season before planting. This allows time for the chemical reactions that change pH to take place. Particular care must be undertaken to ensure that fertilizing operations does not cause phosphorus loading, increasing the potential for phosphorus laden runoff or leachate to enter the water resources.

Nitrogen can also be added before planting. Inorganic forms, however, are not recommended at this time, because they leach easily, and at high levels, they may injure the fine roots of newly-planted ornamentals. The best sources of nitrogen in organic forms are composted materials or fish emulsion. Roots absorb nutrients most efficiently when they are growing actively in late winter/early spring or fall. The best time to apply fertilizer is about two weeks

before these periods so that the nitrogen can move into the root zone in time to be available for plant use.

### **Application Methods**

Five application methods are discussed below. Each serves a specific role depending on the site and health of the plant. Regardless of the method selected, the soil should be moist at the time of fertilizing to prevent fertilizer injury to the plant.

#### Liquid Injection

Through liquid injection into the soil, fertilizer solutions are placed in the root zone. This is an excellent method for correcting nutrient deficiencies. Injection sites should be 2 to 3 feet apart, depending on pressure, and 6 to 9 inches deep. Fertilizing deeper than 9 inches may place the fertilizer below the absorbing roots and prevent the plant from using it. When using this method in summer or during periods of drought, water should be added to dry soil.

#### Drill-Hole or Punch-Bar

A major advantage of the drill-hole system is the opening of heavy, compacted soils, which allows air/moisture and fertilizer to move into the soil. Drill holes should be placed in concentric circles or in a grid system around the main stem of a tree beginning 3 to 4 feet from the main stem and extending beyond the drip line. The holes should be spaced 2 feet apart and drilled 6 to 9 inches deep. The recommended rate of fertilizer for the area should be distributed uniformly among the holes and based on the root-zone space under the tree (and not the trunk diameter). The holes can be filled either with organic materials such as peat moss or compost, or inorganic materials such as gravel, sand, or calcined clay.

#### Surface Application

Applying fertilizer to the ground surface is as effective as most other methods. It is best to apply the fertilizer and then water in slowly. It is acceptable to place fertilizer on top of mulch in landscape beds. Fertilizer stakes or spikes that are driven into the soil contain satisfactory fertilizer materials. Unfortunately, the spacing of spikes is such that very little fertilizer comes in contact with the root system. One or two stakes per inch of trunk diameter do not represent adequate fertilizer distribution, because lateral fertilizer movement is limited in soil.

#### Foliar Spraying

Spraying liquid or water-soluble fertilizer on the foliage is the most effective method of correcting deficiencies of minor elements, especially of iron and manganese. This method should not be used as a means of providing all the macronutrients required by plants. To correct chlorosis (a yellowing of plants caused by a nutrient deficiency) several applications during a growing season may be necessary.

#### Tree-Trunk Injection or Implants

The infusion of liquid or implants of fertilizer is often the best method for correcting iron and manganese problems in landscape trees. This method is especially useful in areas of adverse

soil pH, high moisture, or where other means of application are not practical. The wound caused by holes made in the trunk-root flare will close within a growing season.

### **Site Preparation**

In order to minimize the amount of post-planting weed control in landscaped areas, it is important to kill all unwanted vegetation before planting. A site that is initially weed-free will require less weed control during the first year and thereafter.

Depending upon the weed species present, it may be possible to prepare a site by mowing and then tilling to eliminate unwanted vegetation. The site should then be left undisturbed for 7 to 14 days to allow weeds to germinate. Weed seedlings should then be removed through shallow cultivation, disturbing the soil as little as possible. Too much soil disturbance brings new weed seeds to the surface where they germinate and continue the cycle of weed production.

This type of preparation works best in an area with no perennial weeds. Perennial weeds are difficult to kill through cultivation alone. Cultivation often makes a perennial weed problem worse by breaking up the reproductive structures of the plant and spreading them throughout the cultivated area.

### **Mulches**

Once existing vegetation has been removed, steps should be taken to prevent weed seed germination and growth of new weeds. Mulches will prevent weed germination and suppress weed growth within the landscape. However, if mulch is allowed to deteriorate, weeds may be able to become established. Materials such as pine or hardwood bark, leaves or needles, grass clippings, sawdust, woven polypropylene fabrics, or gravel can be used as mulch. Tree leaves, sawdust, and grass clippings, however, should be composted before use. Woven synthetic fabrics will need to be covered with a thin layer of mulch to improve the appearance of the fabric-covered area. Woven fabrics are not always effective against perennials such as yellow nutsedge or bermuda grass which can penetrate landscape fabrics.

If mulch is used without woven synthetic fabrics, it should be spread to a depth of 2 to 4 inches, which will prevent most weed seed from germinating. Mulch should not be deeper than 4 inches, as this can interfere with plant growth. In addition, deep, fine-textured mulches can support the germination and growth of weeds that may be transported into the area from outside sources.

As with plant material, mulches made from organic materials should be free of weeds and weed seeds. Organic mulches vary in their durability, with pine bark more durable than cedar chips and longleaf pine needles. These three materials are more durable than hardwood bark, which in turn is more durable than shortleaf pine needles.

In addition to providing weed control, mulches will reduce soil erosion, conserve moisture, and moderate soil temperature. Reducing the amount of sediment eroded from a site decreases the amount of sediment that reaches lakes and streams, thereby protecting water quality.

### **Cultural and Mechanical Practices**

Weeds that escape pre-emergence methods of weed control may be controlled by hand pulling or hoeing. During cultivation, the soil surface should be disturbed as little as possible so that seeds in the soil profile will not be brought to the surface where conditions are favorable for germination.

Cutting weeds at the soil surface may be better than pulling them, because removing roots may bring weed seeds to the soil surface. To interrupt the reproductive cycle, weeds should be removed before seeds are produced.

Most weeds are easiest to control when they are small, generally 2 to 4 inches tall. Tools used for cultivation should be cleaned before moving to another area to prevent spread of weed seeds or other reproductive parts. To control weeds through cultivation, an area may need to be scouted every 10 to 14 days during the spring and fall when summer or winter annual weeds are germinating. Monitoring may not be needed as frequently during hot, dry periods of the summer.

### **Chemical Practices / Herbicides**

Chemical weed control in landscape and turfgrass areas where frequent monitoring and mechanical control would be expensive and time consuming may be preferable. Selecting the correct herbicide and applying it correctly will minimize undesirable effects such as water quality degradation or over-application. Before an appropriate herbicide can be selected, the weeds in the landscape must be identified correctly so that the applicator can determine which herbicide will be most effective in controlling weeds without damaging desirable plants.

*Pre-emergence herbicides* control only those weeds that germinate after herbicide application. Thus, for best results, pre-emergence herbicides must be applied before weed seeds germinate. Keep in mind, however, that no pre-emergent herbicide will control all weeds. Pre-emergence herbicides can be used with mulches. The sediment control of mulch also reduces losses of herbicides that are bound to soil particles.

To maximize the effectiveness and to minimize losses of herbicides to volatilization and photodegradation, pre-emergence herbicides must be watered, either through irrigation or rainfall, to wet the upper 1 to 2 inches of soil. Pre-emergence herbicides lose their effectiveness several weeks to a few months after application.

*Post-emergent Herbicides* can be used to eliminate weeds that escape cultural or chemical control. Some post-emergence herbicides are nonselective and kill any vegetation they contact, whereas others are selective and kill only certain types of vegetation.

Post-emergence herbicides are usually directed to the foliage of weeds, decreasing the amount of herbicide applied to the soil, which, in turn, lessens the amount of herbicide lost in leaching or runoff. To ensure adequate weed control using post-emergence herbicides, weeds should be sprayed at the proper growth stage, usually when the weeds are about 2 to 4 inches tall. Some established perennials are best controlled when herbicides are applied at flowering. Before using any herbicide, carefully read the product label. Because post-emergence herbicides can be spot-sprayed precisely where needed, their use may decrease off-target effects. Because only infested areas are sprayed, the amount of herbicide applied will be considerably less than

if it were applied with a broadcast application. Please note, it remains the Policy of this Integrated Pest Management that broadcast applications of herbicides are not allowed.

Glufosinate is a non-selective, broad-spectrum post-emergence herbicide (available as Finale™ ; ). Uniform coverage is necessary to kill weeds. Glufosinate kills most vegetation it contacts, however, it may not be effective on perennial weeds that reproduce from underground rhizomes, stolons, or tubers such as bermuda grass and yellow nutsedge.

Glyphosate (available as Roundup™; ) is also a non-selective, broad-spectrum herbicide used for site preparation. Glyphosate is a systemic herbicide which kills weeds by interfering with biochemical pathways in plants. Glyphosate requires more time for plant kill but usually provides more effective control of perennial species. If an area is being renovated and desirable plants are already present in the landscape area, herbicides should be used with care to prevent contact with desirable vegetation. This is especially true with glyphosate, which can be quite damaging to many woody species if applied improperly.

Post-emergent herbicides require varying periods of time before irrigation or rainfall for maximum effectiveness.

### **Application Methods**

The following guidelines are not meant to provide complete information on the various aspects of herbicide application. For more information a county Cooperative Extension Center should be consulted. Also, it is important to read herbicide labels carefully before use, and follow label directions and guidelines carefully.

After selecting a herbicide, it is important to apply the correct amount properly. Liquid sprayers and granular spreaders must be calibrated in order to deliver the correct amount of herbicide to a given area. Improper calibration can result in over application of the herbicide, which may injure susceptible plant species and promote excessive losses of herbicide in leachate or runoff water, impacting the watershed. The county Cooperative Extension Center can provide information on the proper calibration of sprayers and spreaders.

Careful mixing of spray solutions helps protect groundwater and surface water. Before mixing herbicides, the size of the local area to be sprayed should be determined so that the applicator can prepare the correct amount of spray solution. The goal is to minimize the residual spray solution. Spray solutions should be prepared as far from a wellhead or other water resource as possible to prevent any spilled solution from entering the watershed. In addition, empty herbicide containers must be disposed of properly. Liquid herbicide containers should be triple-rinsed, and the rinsates should be added to the spray solution. Herbicide labels provide instructions on proper disposal of empty containers.

After local spraying is completed, the sprayer must be rinsed to prevent contamination of subsequent spray solutions, and the rinsate should be sprayed onto an area, such as the application site, where the herbicide can be safely applied.

### **Weather Conditions and Herbicides**

Weather conditions should be considered before deciding to spray. Post-emergence herbicides should not be applied just before rain or irrigation, because the herbicides could be more

susceptible to loss in surface runoff or through leaching. For maximum effectiveness, post-emergence herbicides should have at least the drying times listed above before irrigation or rainfall.

In contrast, most pre-emergence herbicides require 1/2 inch or greater of precipitation to bring them into contact with the soil and increase their effectiveness. If pre-emergence herbicides are watered in with irrigation, water should not be allowed to run off the site and affect the watershed.

To prevent sprays or granules from drifting into non-target areas, herbicides should be applied when winds are relatively calm. Spray nozzles that produce very fine droplets should not be used, because small droplets are much more likely to drift than coarse droplets. Similarly, herbicide granules that are fine and lightweight are more likely to drift than larger, heavier granules. Some-what volatile spray solutions, such as 2,4-D esters, should not be sprayed when the *comfort index* (defined as the sum of the temperature and the percent humidity) is 150 or more. These conditions cause the herbicide to evaporate, and the herbicide vapor can be moved by wind into off-target areas.

**Minimizing Herbicide Leaching and Runoff**

When more than one herbicide could be used to control problem weeds in a particular landscape, the potential for the herbicide to be lost in surface runoff or to leach through the soil profile should be considered in selecting the chemical to use. Herbicides that leach through the soil can contaminate groundwater, and chemicals that move with surface runoff water or eroded sediment can contaminate the watershed. The tendency for herbicides to either leach through the soil profile or to be lost in surface runoff is influenced by properties of both the herbicides and the soil.

*Herbicide properties* that influence leaching and runoff include the following:

- the amount of herbicide binding to organic matter or clay minerals in the soil;
- the solubility of the water;
- the persistence of the herbicide in the environment;
- the rate of herbicide applied;
- the amount of herbicide that reaches the soil surface; and
- the tendency of the herbicide to vaporize from plant or soil surfaces.

A herbicide that binds tightly to soil organic matter would normally be lost only by sediment erosion and is not likely to leach through the soil profile unless the soil contains little organic matter.

**Table 1. Herbicide Leaching and Runoff Potential**

<b>Chemical Name</b>	<b>Trade Name</b>	<b>Application Method</b>	<b>Leachate Potential</b>	<b>Runoff Potential</b>
Benefin	Balan	Soil	VL	H
Bensulide	Betasan	Soil	M	H
Bentazon	Basagran T/O	Foliage	M	L

**Integrated Pest Management**  
April 30, 2009

DCPA	Dacthal	Soil	L	H
Dichlobenil	Casoron, other	Soil	M	M
EPTC	Eptam	Soil	L	L
Fenoxaprop	Acclaim	Foliage	VL	M
Fluazifop	Fusilade	Foliage	VL	M
Glyphosate	Roundup,	Foliage	VL	H
Isoxaben	Gallery	Soil	L	L
Metolachlor	Pennant	Soil	M	M
Napropamide	Devrinol	Soil	L	M
Oryzalin	Surflar	Soil	L	L
Oxadiazon	Ronstar	Soil	L	M
Oxyfluorfen	Goal	Soil	VL	M
Pendimethalin	Pendulum, others	Soil	VL	H
Prodiarnine	Factor	Soil	VL	H
Pronarnide	Kerb	Soil	VL	M
Simazine	Princep	Soil	H	M
Trifluralin	Treflan	Soil	L	L

Leachate potential was taken from the *1995 North Carolina Agricultural Chemicals Manual*. Runoff potential is based on information available in the research literature. VL = very low, L = low, M = Moderate, H = high.

A highly water-soluble herbicide that does not bind tightly to soil organic matter or clay minerals has a greater tendency to leach through the soil profile. A persistent herbicide also has great potential to be lost through leaching or surface run-off, because it is present at the application site for an extended period of time. Higher rates of herbicide application can also increase losses through leaching and runoff. Herbicides may also be lost from the application site through photodegradation (breakdown by sunlight) or volatilization.

*Soil properties* that affect leaching and runoff include:

- soil organic matter content;
- clay content;
- soil texture;
- soil porosity; and
- pH.

Soil organic matter and soil clay minerals can bind various herbicides and decrease the amount of herbicide leached. Soil pH influences the amount of binding of some herbicides with soil

organic matter and soil clay minerals. A porous soil, such as one with a sandy texture, has a high rate of infiltration and drainage, increasing the probability that a herbicide will be lost through leaching rather than runoff. A fine-textured clay soil limits water infiltration and herbicide leaching, but herbicide losses in runoff can be high if sediment erodes from the site.

Applying mulch to the soil surface helps to minimize erosion and runoff. Another management practice to protect water quality is to plant vegetative buffer strips around water bodies or drainage areas. These buffer strips interrupt water flow, allowing sediment to settle out of the water stream; they also allow more water to infiltrate the soil profile. Table 1 lists the herbicide leaching and runoff potential for several commonly used landscape herbicides. The loss potential for each herbicide is based on:

- the herbicide's soil binding capacity, persistence of the herbicide,
- rate applied, and
- amount of herbicide reaching the soil surface.

When more than one herbicide option exists for weed control, the loss potential should be considered. If the application site has a very permeable soil with low organic matter content and shallow ground water, the best choice might be a herbicide that has a low leaching potential. In a situation where surface runoff and erosion are problems, but the groundwater is deep, the best choice might be a chemical with moderate leaching potential.

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Maryland Department of Agriculture

New York Coalition for Alternatives to Pesticides (NYCAP)

New York State Department of Environmental Conservation (NYSDEC)

New York State Education Department (NYSED)

New York State Office of Government Services (NYSOGS)

New York State Office of the Attorney General (NYSOAG)

Northwestern Coalition for Alternatives to Pesticides (NCAP)

Pesticide Management and Education Program (PMEP), Cornell University

Texas Agricultural Extension Service (TAEX)

United States Environmental Protection Agency (EPA)

University of Florida Institute of Food and Agricultural Sciences (UF/IFAS)

Member Organizations: New York State Urban IPM Coordinating Council:

County Associations of Cornell Cooperative Extension

Environmental Advocates

Legislative Commission on Toxic Substances & Hazardous Wastes

Long Island Pest Control Association

Nassau/Suffolk Landscape Gardeners

New York Audubon Society

New York Coalition for Alternatives to Pesticides (NYCAP)

New York Public Interest Research Group (NYPIRG)

New York State Office of the Attorney General (NYSOAG)

New York State Department of Agriculture and Markets

New York State Education Department (NYSED)

New York State Department of Environmental Conservation (NYSDEC)

New York State Department of Health

New York State Office of Government Services (NYSOGS)

New York State Turfgrass Association (NYSTA)

Program on Breast Cancer & Environmental Risk Factors in New York (BCERF)

The Integrated Pest Management Program at Cornell University

Pesticide Management and Education Program (PMEP), Cornell University

### **C. IPM Information Sheet for Residents and Tenants**

#### **Integrated Pest Management**

It is the policy of the Salem Hunt Homeowners Association to control pest problems in a way that poses the least hazard to human health and the environment. Therefore, we have adopted an Integrated Pest Management (IPM) program. IPM is a pest control program that combines prevention, non-chemical pest control methods, and the appropriate use of pesticides with preference for products that are the least harmful to human health and the environment. By addressing and correcting the root causes of pest problems, IPM can provide long-term, economical pest control while minimizing the potential risk posed by frequent pesticide applications.

#### **How Can I Help?**

We are asking for your cooperation with our IPM program! The success of IPM depends on the involvement of many individuals. Together we can help reduce pest problems and pesticide applications.

You can have a positive impact on the Homeowners Association's Goal to reduce pest problems by doing the following and encouraging others to do the same:

- Report pest sightings to the IPM Coordinator/Contractor
- Clean up leftover or spilled food and beverages immediately
- Store food, including animal food, in tightly sealed containers in designated areas
- Keep refrigerators and microwaves clean and free of spills
- Do not prop open window screens or doors that could allow pests to enter common buildings
- Remove trash daily
- Keep areas dry and report leaks
- Do not pressure staff to apply pesticides; there are other effective means of controlling pest problems
- Do not tamper with sticky traps, bait stations, bait boxes, and traps laid out to monitor or kill pests

#### **For more information...**

If you would like more information on the Homeowners Association pest control practices or IPM, please contact the IPM Coordinator/Contractor or the Homeowners Association.

**D. Sample Pesticide Application Notice**

Dear Resident / Tenant:

The \_\_\_\_\_ Homeowners Association practices Integrated Pest Management (IPM), an approach to pest control that reduces pest populations while minimizing pesticide applications.

After trying non-chemical means to control a current pest problem, a pesticide has been deemed necessary.

On \_\_\_\_\_ (date), an application of \_\_\_\_\_ (name of pesticide) will be applied at \_\_\_\_\_ (location) for the control of \_\_\_\_\_ (pest).

If you have any questions or comments, please contact \_\_\_\_\_ (name of responsible person) at \_\_\_\_\_ (phone).

**E. Sample Pesticide Application Registry Notice**

Dear Resident / Tenant:

The \_\_\_\_\_ Homeowners Association practices Integrated Pest Management, a program that combines preventive techniques, non-chemical pest control methods, and the appropriate use of pesticides with a preference for products that are the least harmful to human health and the environment.

Applications of pesticides are made only when deemed necessary to control a pest problem and after trying other means to control the problem. The term "pesticide" includes insecticides, herbicides, rodenticides, and fungicides.

The Homeowners Association is establishing a registry of people who wish to be notified prior to pesticide applications. To be included in this registry, please complete the attached form and submit it to \_\_\_\_\_ (name of responsible person).

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I would like to be notified two days before the use of pesticides on properties managed by the Homeowners Association. I understand that if there is an immediate threat to health or property that requires treatment before notification can be sent out, I will receive notification as soon as practicable.

Resident / Tenant Name \_\_\_\_\_

Signature / Date \_\_\_\_\_

Address \_\_\_\_\_

