ORGANIC TURF MANAGEMENT AT TUFTS

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A project of the Tufts Institute for the Environment (TIE)
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I. Introduction

This report was developed as part of a pilot project to introduce organic lawn care practices on the Tufts University Medford campus. Contributions from students, landscape professionals and staff affiliated with IPM programs at other universities have helped guide this endeavor at Tufts.

The principal aims of organic land care include avoiding pollution in landscape care, as well as encouraging and enhancing biological cycles within landscapes.[1] Tufts has embarked on an organic land care project, covering approximately 2 acres, setting measurable goals that are attainable through the use of land care methods that support turf health and reduce dependence on chemicals. The larger, long-term goal of the project is to create a combination organic turf management (OTM)/integrated pest management (IPM) policy for the campus as a whole.

This report presents some of the useful resources assembled to date, a project narrative, and suggestions about the future scope of the agenda. Our goal is to provide an informative resource for those continuing to work for organic turf management at Tufts and on other college campuses.

[1] http://www.organiclandcare.org/standard/aims.htm

II. Organic Turf Management: Background

The Organic Turf Management (OTM) project is intended to cultivate a landscape that reflects a healthy, natural ecosystem. Principal goals include:

- Minimizing or eliminating use of synthetic chemical pesticides;
- Minimizing or eliminating use of synthetic fertilizer products;
- Use of cultural methods, such as aeration and overseeding; and
- Planting species that are less susceptible to pests and diseases and well adapted to the environmental conditions of this region.

What is a pesticide?

Pesticides are chemicals designed to kill living organisms, including microorganisms, insects, plants, and mammals. Herbicides, insecticides, fungicides, and rodenticides all fall within the broad category of pesticides.

A pesticide, by definition, is designed to kill living organisms, be they plants, animals, or fungi. The term "pesticide" is used broadly to refer to herbicides, insecticides, fungicides, and rodenticides.

Many people associate pesticide use primarily with agriculture, but Americans actually use more pounds of pesticides per acre in and around their homes than farmers use in their fields.[2] Pesticide use in areas where people spend time every day presents special concerns for human health, because pesticides are implicated in a range of human illnesses and disabilities. Many pesticides are suspected carcinogens or endocrine disrupters; pesticide exposure can induce or exacerbate asthma; and even low levels of pesticide exposure during critical periods of fetal, infant, or child development can have devastating long-term developmental consequences. In addition to these health effects, pesticides often have adverse effects on soil and groundwater.[3] These problems persist over the lifecycle of pesticides, during production, use and disposal.

Pesticide labeling

The U.S. Environmental Protection Agency (EPA) assigns pesticides to one of four toxicity categories.[4] The classifications are based on the greatest acute toxicity from oral or dermal exposure, inhalation, and eye or skin irritation.[5] Category I products are the

[2] Pimentel in Dower, Ditz, et al. 1997

[3] For a recent overview of the health and environmental effects of pesticides commonly used on lawns, see John Wargo et al., *Risks from Lawn-Care Pesticides* (North Haven, CT: Environment and Human Health, Inc., 2003), available at http://www.ehhi.org/reports/lcpesticides/lawnpest_full.pdf.

[4] http://www.epa.gov/pesticides/health/tox_categories.htm

[5] The onset of an acute effect is rapid following short-term exposure and lasts briefly. Chronic effects, from "prolonged repeated exposures" are longer in duration and typically refer to cancer, birth defects and

most toxic and must be labeled with the word “DANGER” and poison, in some cases. Category II products are labeled “WARNING,” while products from either category III or IV bear a “CAUTION” label.

Undisclosed or "inert" ingredients

Pesticides include "active ingredients" and so-called "inert ingredients." The active ingredient of a pesticide is the ingredient that is specifically meant to kill the target organism. The "inerts" are all other ingredients: anything that is not an active ingredient is considered an inert ingredient. Many so-called "inerts" are as toxic as, or more toxic than, the active ingredient. These ingredients are often considered confidential business information, so users of pesticides cannot find out what "inert" ingredients they contain.

The EPA maintains four lists for inerts:

- List 1 = inerts of toxicological concern;
- List 2 = potentially toxic inerts;
- List 3 = inerts of unknown toxicity; and
- List 4 = inerts of minimal concern.[6]

Because inert ingredients are considered proprietary information, their identity does not have to be disclosed unless they are on List 1.

Scientific evidence has accumulated steadily on the dangers of pesticides, making it clear that they can pose severe health hazards even when they are applied according to label instructions. Glyphosate, for example, is the active ingredient in RoundUp, a non-selective weed killer used on the Tufts campus around paved or sidewalk areas. Glyphosate was registered with the EPA in 1994 as toxicity category III. A variety of inert ingredients are used in glyphosate-containing compounds which have greater toxicity alone or in combination with glyphosate than just the active ingredient. For example, glyphosate-containing products were found to be more toxic in subchronic tests than glyphosate.[7]

Applying the Precautionary Principle

Minimizing pesticide use on campus is an example of a precautionary approach to pest control products. The Wingspread Statement of the precautionary principle says that

> when an activity raises threats of harm to the environment or human health, precautionary measures should be taken, even if some cause and effect relationships are not yet fully established.

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mutations. Tests for chronic effects, while not reflected in the toxicity category scheme, are required as part of registration. For more information on tests required of pesticide manufacturers before submitting their product for registration: http://www.epa.gov/pesticides/regulating/data.htm.

[6] http://www.epa.gov/opprd001/inerts/lists.html

[7] For a complete review of the human and ecological effects of Roundup see the Herbicide Factsheet in the Journal of Pesticide Reform, Fall 1998, updated 4/03 at http://www.pesticide.org/gly.pdf

Pesticide reduction at Tufts is a form of insurance based on preliminary rather than conclusive evidence of the effects from exposures to toxic lawn care chemicals. Tufts campus is an especially appropriate context for this stance given the presence of children as well as adults of childbearing age who use the grounds for sports and recreation. The Tufts Environmental Policy states that the University will strive to:

> conduct affairs in a manner that safeguards the environmental health and safety of students, faculty, staff and communities; reduce the use of toxic substances and the generation of wastes and to promote strategies to reuse and recycle those wastes that cannot be avoided; [and] exercise whatever control is reasonable and necessary to avoid harm to public health and the environment, whether or not such control is required by regulations.[8]

In the face of increasing scientific information on pesticide hazards, a range of municipalities have adopted pesticide-free management of grounds and buildings, including Newton, Wellesley, Stoneham and Marblehead in the Boston area. Several universities, i.e. Connecticut College, University of Colorado, Harvard University, have followed suit to some degree, using organic management or pesticides only as a measure of last resort. These approaches are discussed in detail in section V.

[8] http://www.tufts.edu/tie/environmental_policy.html

III. Grounds Management at Tufts: Baseline

The Tufts Medford campus is a patchwork of athletic fields, manicured lawns, flower beds and other general purpose areas. Grounds management is tailored to the specific land uses in each area of the campus. In the spring of 2004, Tufts ground management divided the campus into three major zones: athletic turf, non-athletic turf and ornamental plantings. All areas are susceptible to the pests that have historically been problematic on campus. These include broadleaf weeds (chickweed, cover, crabgrass, knotweed and dandelions) and insects (Japanese beetles and European chafers). The following is a basic overview of the typical grounds management plan *prior* to the initiation of the OTM pilot project.

Entire campus

The campus grasses are a mixture of cool season species: bluegrass, ryegrass and fescue.[9] The varieties within each species and the percent of the total mixture vary depending upon location. Athletic fields, for example, have a higher content of bluegrass, which spreads readily. Non-athletic areas have a greater percent of ryegrass. This variety has only one blade per root, so it is less likely to grown into pavement cracks and ornamental plantings.

Broadleaf weed control: An outside contractor, Prescription Turf Services (PTS) of Middleton, Massachusetts, carries out one to two applications of broadleaf weed killer annually. The product Tru-Power was applied twice in May and August 2003.

Fertilizer: There are three applications of synthetic methylene urea each year. (See Section IV for a detailed discussion of fertilizer.) In 2003 there were 2 applications of fertilizer, coinciding with the weed control treatment.

Athletic Fields

The athletic fields are managed more intensively than most of the campus grounds.[10] In addition to the insecticides and herbicides applied by the contractor, the maintenance regimen consists of aeration, overseeding and topdressing with compost.[11] These last three practices foster a sustainable system in which the healthy soil is the main source of plant nutrition and health rather than regular doses of lawn care products.

Simulating the action of earthworms, aerators mechanically pull cores of soil, leaving them on the surface to allow air and moisture to reach below the ground. This is

[9] The ryegrass varieties are endophytic cultivars. These plants host a beneficial fungus that increases resilience and boosts resistance to diseases and insects (UMASS Extension Professional Guide for IPM Turf for Massachusetts, 2003-2004).
[10] The lawn surrounding the president's house on the main campus also receives special care.
[11] Prescription Turf Services (PTS) applies chemical fertilizer, broad-leaf weed killer, and insecticides to control Japanese beetle and grubs on the athletics fields each season.

especially helpful where there is excess thatch, a layer of dead and decomposing grass just above the soil, which can prevent nutrients from reaching plant roots.[12] Overseeding involves spreading seed on top of existing grass. The purpose may be to thicken the lawn or introduce a new variety which will green as the existing grass goes dormant.

Topdressing with compost is a form of supplemental fertilization used after overseeding or aeration to speed growth. Good quality compost may bring ample benefits including improving soil structure, disease suppression of some soil borne pathogens, modifying soil pH and encouraging favorable soil microbes.[13]

Campus Lawns

There are subcategories within this division as some areas of campus receive greater attention due to their visibility. For example, the academic quad receives more attention than steeply sloped areas near residence halls or on the edge of campus. Aside from regular clipping, the fertilizer and pesticide applications are the only maintenance these grounds receive each year. Just before graduation, a one-time application of a hydro-seed product (a combination of seed, fertilizer and water) is used to make the grounds green quickly for a short period.

Non Grass/Turf Areas

In areas not covered by grass, such as concrete and mulch beds, herbicides are used for weed control.

- Round-up has been used for concrete and mulched areas to kill weeds that could not be completely pulled manually.
- Additionally, Bromacil has been used on the edges and fence area, to prevent the growth of tall weeds. This herbicide, used for weed and brush control, is usually sprayed or spread dry just before or during active turf growth. Liquid formulations are more toxic than dry formulations.[14]
- Insecticides may be used against pests such as gypsy moths.

Trees

Trees do not receive routine applications, but if needed a Doggett's fertilizer product (www.doggettcorp.com) may be used.

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[12] Thatch is prone to excessive buildup from heavy fertilization, compaction, poor drainage and acidic soils. http://www.gardening.cornell.edu/lawn/lawncare/thatch.html

[13] http://www.cce.cornell.edu/~niagara/hort-news-spring-99.html

[14] In the context of acute toxicity, the active ingredient falls into category IV for dermal and category III for skin and eye irritation and inhalation. For chronic toxicity, Bromacil is considered a possible carcinogen. Adverse developmental and reproductive effects were also observed in laboratory animals, but according to the EPA, human exposures will not reach levels producing those results. Some Bromacil formulations contain more harmful inert ingredients, such as Hyvar X-L which contains ethylene glycol, a List 1 inert. See http://infoventures.com/e-hlth/pestcide/bromacil.html.

IV. Shifting Grounds Management Practices

Beginning in Spring 2004 the grounds management plan expanded to include organic management within pilot project areas: the Huskins baseball diamond, a two acre plot of land surrounding South Hall, Latin Way Apartments, Haskell Hall, Tilton Hall, and Lewis Hall on the southern edge of campus and the triangle field (known among undergraduates as the "Tufts Beach") which abuts Powderhouse rotary, Powderhouse Ave. and College Ave (see map in appendix). In this zone the major changes include:

- A shift to non-synthetic organic fertilizers;
- Use of intensive methods such as aeration (new to the non-athletic areas), topdressing with compost, and overseeding; and
- No pesticide applications.

Across the entire campus, measures include:

- Using a less toxic alternative to RoundUp across the entire campus and
- Developing a formal, written IPM plan, including a procedure for reporting pesticide use on campus.

These measures are discussed in detail below.

1. Pesticide Use

The most important change is a reduction in the volume of pesticides used, specifically RoundUp, Tri-Power and Bromacil, following the launch of the organic treatment pilot project. The ultimate goal is the greatest possible reduction of pesticide applications, by eliminating routine use with exceptions for extreme circumstances.[15] Progress will advance at different rates across campus following improved levels of organic content and soil health. An important aspect of this reduction program is the recognition that every time pesticides are used for a short term improvement, they set back the eventual goal of building the long-term health of the soil. Pesticide use can harm beneficial insects and microorganisms, reducing the ability of the plants to withstand threats and increasing dependency on the chemicals for protection.

In spring/summer 2004, the director of facilities approved a plan to eliminate the use of Round-up weed control for non-turf areas such as concrete walkways and mulched areas, including flower beds. In July 2004 the grounds management staff acquired and began using an alternative product, Burnout II. The active ingredient in Burnout is clove oil and the inert ingredients include vinegar, citric acid and mineral oil. The

[15] Of note, a reduction in the total amount of chemicals used on campus in the future will be partly attributed to the completion of a synthetic turf field which is located near the baseball field and will be ready for use by fall 2004.

product is fast acting and non-selective, intended for sidewalk, border, fence and driveway areas.[16]

The head of grounds management has initially reported Burnout to be a successful substitute for RoundUp. Burnout does, however, cost significantly more than RoundUp. The 2.5 gallon ready-to-use container is $50.00 vs. $15.00 for the same quantity of RoundUp. The frequency of application remains to be determined.

Reporting

An accurate account of pesticide use on campus is important for establishing a frame of reference. A profile of the identity, amount and reason for use of pest control products can help track progress in curbing applications and give an overview of the total exposures at a given time.

In a spring 2004 meeting, David Gaspar of PTS agreed to submit reports on campus pesticide applications. None have been received for spring 2004, but the grounds supervisor has stated that no pesticides were applied this year due to good turf health.

The Massachusetts Pesticide Control Act, 333 CMR 1.00-13.00, mandates that pesticide applicators provide the following information to the entity with which they have entered into a contract:

1. The name and license/certification number of the applicator;
2. The name of the pesticide(s) that were applied to the property and for what purpose;
3. Any precautions indicated on the labeling relative to any post-application requirements;
4. The date and time of application.
5. "The signs should remain posted for a period of 72 hours unless otherwise recommended by the Department of Food and Agriculture".

In addition, the pest control contractor must retain records on each application of a pesticide for 2 years.

Thus, a system for reporting pesticide use on campus should be created with specifications for what information is needed (e.g. type of pesticide used, reason for use, amount applied, identifying a repository for reports and submission schedule).[17]

[16] Although Burnout II is considered safer than Roundup, it is not a harmless product. The acetic acid is highly corrosive and applicators are the most vulnerable/likely to experience harm from inhalation, skin contact or ingestion if the product is not handled with caution (The Material Safety Data Sheets are provided online by the manufacturer, St. Gabriel Laboratories; www.milkyspore.com).

[17] The University of Oregon has a Pest Control Treatment record which could be adapted as a template for the same use at Tufts.

A written IPM plan would outline the process by which pesticides could be used as a last resort when circumstances demand this level of control. The quantity of pesticides can also be managed by only using it in the warranted locations – PTS has already agreed to cooperate in this capacity. In order to curtail pesticide use, action thresholds must be set according to the amount of damage that could be sustained and remediated through alternative methods. Pesticides use thus becomes a reaction to evidence of damage, rather than serving as a primary tool for grounds management.

2. Fertilizer

Fertilizers vary in their environmental impact. Some types are readily flushed from soil and can overload waterways, while others actually help to build healthy soil over time.

The rate at which nitrogen becomes available for plants is the basis for the two main categories of fertilizer, slow- and quick-release.[18] Plants require nitrate or ammonium, which may be obtained through ammonium nitrate, urea or through conversion by microorganisms.

Slow-release fertilizers can be natural organic materials (e.g. agricultural or municipal waste), which need to be broken down to a usable form by soil microorganisms, or a concentrated nitrogen source enhanced with chemical or physical barriers that reduce water solubility. The length of the activation period depends upon the amount of microorganism activity, which increases with higher soil temperatures and moisture content. Through use of slow-release fertilizers, it is possible to extend the flow of nutrients over greater intervals producing a deeper, more substantial root system of turf grass that absorbs water more efficiently over time. [19] Quick-release fertilizers (ammonium nitrate, urea) are manufactured forms of water-soluble nitrogen which are immediately available to the plant upon application.

A newer category of fertilizers, referred to as bridge products, are formulated with both organic and synthetic sources of nitrogen, and have slow and quick release rates.[20] Harmony Products Inc., for example, has patented a bridge fertilizer for landscape and turf which chemically combines organic (composted poultry manure) and synthetic (methylene urea) types of slow-release nitrogen with a quick release form (ammonium sulfate). The ammonium sulfate is immediately available for plant use, while the methylene urea and organic nitrogen are gradually activated microbially and chemically.

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[18] The main nutrients required by plants and provided by fertilizers in the greatest amounts are Nitrogen, Phosphorus and Potassium (NPK). Most of the environmental concerns surrounding fertilizer use are directed at the first two. When the rates of application exceed the needs of the plants the excess nutrients can leach/run off from the site and contribute to reduced oxygen in waterways.

[19] According to Chip Osborne, Tufts could expect to experience up to a 50% reduction in water demand from the organically fertilized areas, due to the more complete root system.

[20] Bridge products are used, though not exclusively, at Harvard as per conversation with Wayne Carbone.

The slow release fertilizers composed of natural organic materials are preferable from an environmental standpoint. The addition of organic materials can lend multiple benefits to the soil which can improve the health and quality of the grass to help withstand pressures from diseases and pests. Organic materials can enrich the microorganism populations in the soil and help protect plants from diseases or competitive plant growth.

It is worth noting, though, that fertilizers based on organic materials are not always safe. It is important to note that fertilizers containing *organic materials* do not necessarily meet the standards for *organic food production.* In some cases, fertilizers can contain toxic substances. Biosolids, for example, are the solid waste residuals from municipal waste which may be applied to land as fertilizers after the completion of certain treatments designed to reduce levels of pathogens and 9 other compounds. Land treated with sludge may *not* be used to raise certified organic food crops. Thus, it is important to examine possible fertilizer products with care to determine their quality. [21]

Tufts uses a controlled release fertilizer in which nitrogen is supplied as methylene urea. The reaction between urea and formaldehyde during manufacturing produces compounds of various lengths for a combination of quick and slow release forms. This is intended to provide quick greening with sustained nitrogen release over a longer time interval.

Two types of natural organic biologically activated fertilizers have been selected for use in the pilot areas. On the baseball field, PTS has applied Milorganite which is derived from processed municipal sewage sludge from Milwaukee. Grounds management has ordered a different fertilizer, made of bird guano/composted poultry manure, for the other pilot areas.[22]

3. Composting

[21] Questions may also be raised about whether pathogens, hormones and antibiotic residues could be transferred to land, although this primarily pertains to raw manure. The Agricultural Resource Service of the USDA is pursuing research into this area, specifically for food cropped lands. Michael Jenkins, Ph.D., a microbiologist and principal investigator of several relevant studies responded to these issues explaining that pathogens are killed during composting when the temperature of the pile reaches 50 C. However, there is ambiguity or no information for the persistence and fate of sex hormones and antibiotics.

[22] Before these products were selected, we investigated several additional options. We sought recommendations for pelletized or granular organic fertilizer products from a variety of sources including the Ecological Landscaping Association, the UMASS Extension Turf Management Team, the Boston Tree Preservation Society and the Marblehead Living Lawn project website. Based on information from these sources, we compiled a list of four options that seemed reasonable for use at Tufts: Sustane, NatureSafe, North Country Organics and Harmony. Sustane and NatureSafe offer products which have been approved for use in USDA certified organic food production by the Organic Materials Review Institute (OMRI). With the exception of North Country Organics, all the above fertilizers contain composted poultry litter which consists primarily of poultry manure and bedding materials. This material is a good source of nitrogen, phosphorus, potassium, minerals and micronutrients and is commonly the main ingredient of organic fertilizer for agricultural, forestry, lawn and athletic field applications.

Currently, Tufts University spreads compost top-dressing around the athletic facilities. Partially for this reason, the athletic fields are much closer than the rest of campus to an organically sustainable level. Composting with an organic product helps to build the content of the soils. While implementing an effective composting regime throughout the entire campus grounds might be cost prohibitive, a system of spot composting in trouble spots throughout campus would help to prevent the invasion of undesirable weeds. The grounds supervisor reported that the Spring 2004 compost application on non-athletic campus grounds was unsuccessful due to difficulties in getting an even coverage around trees with the cyclone spreaders. These trailer mounted spreaders throw the contents from a rotating container for uniform coverage, but are only practical for open turf areas.

4. Intensive Maintenance (Over-seeding, aeration)

The athletic fields have been managed using overseeding, aeration and compost. Our findings suggest that incrementally building a program of more intensive maintenance of other areas would help to offset the effects of compaction and low organic content in the soils. The two most readily available methods to begin with would be to overseed and aerate certain sections of the campus grounds on a rotational basis. This process can be done in-house with already available seeders and aerators, thus keeping additional costs to a minimum.

The following recommendations were not part of the initial proposal. However, further research into the merits of these practices and available resources at Tufts demonstrates that they deserve a significant role.

5. Native Species Plantings

Native plants are considered those which originated or naturally adapted over time to this agricultural zone. Because of their historical presence, their genetic makeup has enabled survival given the soil conditions, rainfall, temperatures and presence of other flora and fauna. “Exotic” species require more care to withstand threats to which they have no resistance. Moreover, they may carry “exotic” pests to an area which endangers the native species.

The planting of native species on the Tufts campus offers promising collaborations with the OTM project. These efforts are coordinated by Jeff Licht, a lecturer in the University College of Citizenship and Public Service. Each semester he teaches a course on sustainable landscaping with a hands-on component in which students cultivate areas of campus with native species. Currently there are sites outside of Hill Hall and Tisch Library. The expertise offered by Dr. Licht and the interest and enthusiasm of his students are valuable resources for expanding OTM. By increasing the capacity of sustainable landscaping efforts, Tufts can gain an in-house source of native species which are more expensive in the marketplace.[23] In addition, student

[23] Dr. Licht and his students currently work out of two small greenhouses for plant propagating near the community garden on the south campus area. The Grounds Supervisor has been willing and responsive to

learning to propagate and plant native species provides tangible skills as they become vested stewards of campus property.

requests to extend the reach of these efforts. Four raised beds are being constructed and a wide swath of sloping land adjacent to Boston Ave. will be planted in highbush blueberries. There is also the possibility of expanding to the Grafton campus and constructing a much larger greenhouse facility.

V. Model Integrated Pest Management policies

To reduce pesticide use throughout campus, a written integrated pest management policy will establish a framework for enacting pest control in which safer alternatives are attempted before conventional pesticide treatments. The organic management pilot project would be a component of IPM, helping to guide grounds maintenance towards practices that decrease reliance on pesticides. According to grounds manager John Vik, Tufts currently uses IPM to some degree even though the campus does not yet have a written policy. The development of an IPM policy will therefore involve documenting current practices and expanding the plan to cover all situations.

Several examples of IPM policies adopted by colleges and municipalities can serve as models for the Tufts program. These model policies are informative for illustrating the central components of an IPM policy regarding the intentions/goals, procedures and administration. The basic structure includes:

a. Environmentally sound commitment to use certain practices to prevent or curb pest damage, resorting to chemical controls only as a last resort after a problem is evident;
b. Methods that will be used to prevent and detect pest outbreaks;
c. Action thresholds setting maximum population levels at which pests (insects, weeds) can exist without pesticide treatment;
d. Some IPM plans list criteria for the acceptable pesticides or the individual products that may be used when other treatment options have been exhausted; and
e. Mechanisms for enforcing the IPM policy.

Campus Plans

The University of Colorado adopted an IPM plan in 2002 with an emphasis on understanding pest lifecycles to target economically feasible treatments that exert the most harm while minimizing residual effects to humans and other wildlife.[24] Thus once an action threshold has been exceeded methods of pest control should be chosen to fit the following criteria:

- Least hazardous to human health;
- Least damaging to the environment;
- Effective at controlling the target pest;
- Has minimal negative impacts to non-target organisms;
- Within available resources.

As decisions about pesticides use are fairly decentralized, given the size of the university, adherence to the IPM plan hinges on the campus IPM coordinator. This individual is designated to monitor progress by receiving requests for pest control and mandatory reports on pesticide use, monitoring for compliance, tracking costs and program status

[24] http://www.colorado.edu/ecenter/greening_cu/policies/ipm_policy.pdf

and dispensing information about IPM, such as promoting the advantages and issuing an annual report. The UCB plan is helpful in that it clarifies the responsibilities of each party, i.e. facilities management, other departments, IPM coordinator, contractors and applicators. In addition, the reporting requirements for regulatory compliance are spelled out. There is some ambiguity however, regarding the extent of IPM enforcement. Requests for pest control applications require pre-approval via the IPM coordinator, but it is unclear what recourse can be taken for noncompliance and what weight a denial would carry.

The University of Oregon adopted an IPM policy in 1999, as required by state law, with the intent to "maintain pest populations below the action threshold" through methods that are least threatening to humans and the environment.[25] This program, administered by the Environmental Health and Safety Department, illustrates the flexibility embedded in similar policies by allowing pre-approved exceptions for pesticide use. Rather than focusing on the practices to deter pests and pesticide use this written policy focuses on the precautions that should be taken if pesticides must be used, such as notification, prohibitions on applications in the presence of people and open foodstuffs, and post treatment posting/quarantine. The plan does include a valuable tool, posted on the website, which is a spreadsheet documenting pest problems on campus and the acceptable treatments when populations are both below and above threshold levels.[26]

Connecticut College has used IPM for 11 years on its 120 acres. During this time the lawn areas have not been treated with any pesticides and 99% of the trees and shrubs are also maintained free of pesticides.[27] The written policy focuses solely on the land care methods which have enabled them to avert pesticide use which is only for "life or death situations" and even then allowing judicious use of the least toxic. IPM on this campus is defined as a "system in which two or more methods are used to control a pest" emphasizing actions which are directed at creating a healthy plants and trees. This information is helpful in that it lists methods that have been successful for lawn areas, trees and shrubs and perennial beds. Of note, this plan emphasizes the need for support from the administration which waned in recent years with personnel changes. In response to complaints from coaches about athletic fields, which had also been maintained without chemicals, an outside contractor was hired to maintain these areas using pesticides.

Another approach, embraced by Oberlin College, is the creation of a comprehensive environmental policy including a section on grounds. Recognizing the value of the landscape for both beauty and function the policy articulates that responsible care serves as an instructive model for students and reflects values of the curriculum. While including a general list of practices to encourage and avoid, the policy calls for the involvement of the Oberlin community in creating new landscape installations and maintaining existing ones through a summer student internship, course on grounds

[25] http://oehs.uoregon.edu/policies/ipm/policy.html
[26] http://oehs.uoregon.edu/policies/ipm/ipm1.html
[27] This information was provided through personal email contact with the grounds supervisor, Jim Luce. A brief bio-sketch and information about the Connecticut College campus, which is an arboretum, is available at http://www.conncoll.edu/ccrec/greennet/arbo/staff.html

management and establishing a Campus Landscape Advisory Group with faculty representation to make recommendations to grounds staff and administration.

Several municipalities in the Boston area, including Wellesley and Newton, have also enacted IPM plans. Motivated by concern for the toxicity to the environment and human health, mainly through contaminated drinking water, the Wellesley policy states that aside from certain exemptions and emergency waivers toxic chemical pesticides are prohibited in certain areas. If needed control products should be selected based on the Northeast Organic Farmers' Association's acceptable list, or the Organic Materials Review Institute certification or comply with similar standards. The policy also recommends that workers receive yearly training in organic landscape management.

The breadth of the above IPM policies/plans provides Tufts with a menu of various tools and approaches that could be adapted to this campus. The following discussion provides some specific ideas for elements to be incorporated into the Tufts IPM program, as well as challenges that are likely to arise.

VI. Conception for a Tufts IPM policy

The following is an overview of the areas that should be covered in a Tufts IPM policy.

Intent

The goals of organic and integrated pest management on the Tufts campus are enhancing or doing no harm to human health and the natural environment. These practices would be an educational resource to students and an opportunity for them to participate in the stewardship of their surroundings. Proposed language follows:

> Tufts University believes that a balanced and healthy ecosystem is vital to the health of its students, faculty, staff, and visitors. Furthermore, the University recognizes that it is in the best interest of public health to introduce and promote natural, organic cultural and management practices to prevent and, when necessary, control pest problems on University-owned land. In response to growing scientific information on the health and environmental effects of pesticides, the Tufts Medford campus has made a commitment to investigate alternatives to toxic pesticide use on campus grounds.
>
> More active turf and grounds management can be used to achieve a twin set of goals: (1) Making the grounds more attractive and aesthetically pleasing and (2) reducing potentially harmful toxic pesticide use.
>
> The University is taking this action considering the precautionary principle – that safer alternatives should be used whenever possible.
>
> Thus, wherever and whenever possible, the employees of Tufts University will take all financially and physically reasonable actions to avoid the use of pesticides in the grounds management on campus.

Allowable pesticides

As there are no certified organic horticultural products the University could adopt the criteria used by organizations that evaluate products for use in organic agriculture as done in Wellesley. The USDA National Organic Program established standards for the production and handling of organically raised foods, including a National List to specify materials that are approved or prohibited in certified organic farming. The Organic Materials Review Institute (OMRI) checks generic and brand name substances for compliance with the NOP National List and maintains a database of approved products which could be used to guide the selection of products for campus use. The Environmental Protection Agency has a labeling system which takes into account the toxicity of both the active and inert ingredients.[28] Three categories include: caution, warning and danger; low and very low toxicity products correspond with a caution label; moderate toxicity corresponds to a warning; and high toxicity with the danger. These lists

[28] http://npic.orst.edu/factsheets/inerts.pdf

and labels could provide some parameters to tailor a permissible list to the l needs of Tufts. The allowable pesticides should also be reviewed on a case by case basis in regards to what it is being used for and whether the effects pertain mostly to acute or chronic toxicities.

Action thresholds for weeds and insects

Will preventive pesticide treatment be permitted or only when the presence of a pest population reaches the action threshold? Are there special circumstances in which post-emergent pesticide applications are ineffective? Agreement on these aspects and damage tolerances, i.e. president's lawn versus, Boston Ave. embankments and athletic fields, have to precede the creation of thresholds. Per conversation with the grounds supervisor some action thresholds have been set and should be incorporated into the written document. Establishing levels for when more draconian measures, i.e. pesticides, can be used implies that there will be routine monitoring for the presence of target pests in relation to the thresholds. The labor required and scheduling for this activity has to be considered. Tufts has begun a process of dividing grounds into management categories. This plan will divide the campus into grounds and turf of various degrees of importance, both aesthetic and use. Each category of importance will then be assigned a different management scheme, including the previous recommendations, and also the appropriate weed tolerance before PTS must come in and spray. The goal of this differentiation is for the immediate reduction and then a phased out elimination of pesticide use over the entire campus.

Administration

The project is likely to require supportive staff to monitor progress and compliance, maintain records and act as a liaison between the administration, advisory committee and maintenance staff. Annual or bi-annual meetings of a Joint committee including members of the student body, facilities and TIE would be needed. The job of this committee will be to look at the results of the previous 6 months' IPM plan, check available research and practice for possible improvements and make decisions for the proceeding season. This committee will receive annual reports from PTS as to the amount of toxic pesticides that are used on campus in that particular year. This data must be saved for a long-term evaluation of the effectiveness of this program.

Progress Assessments for IPM/OTM

A prerequisite for measuring the IPM activity is having a baseline evaluation of the conditions of the grounds and the amount of pesticides used. This data will continually be collected and tracked specifically for the OTM and other campus areas. The first collection date was July 30, 2004 in which three random plots within a control and sample area were examined for color, uniformity, cover (% turf, weeds, bare ground) and safety (footing).[29] Color for example was assessed on a scale of 1 to 5; 1 = brown, dead

[29] These variables were used in a New York State IPM program study. www.nysipm.cornell.edu/reports/cipm_rpt01.pdf

and 5 = deep, dark green. This assessment should be repeated in the same areas 2-3 times during the spring and summer and once during Fall and Winter. Due to the extensiveness of the campus grounds, it would also be beneficial to have a "campus walk" at regular intervals to record general overall impressions, and specific notable features. The results are reported in the appendix. This survey was done prior to the full implementation of OTM and cannot be used to compare the effectiveness of different methods at this stage.

Additional ecological data could be gathered through soil testing which would involve sending samples to the UMASS Extension service soil testing laboratory. These tests would have to be done less frequently as soil properties range from sensitive, likely to have significant change in less than 10 years, to non-sensitive, unlikely to change significantly over 100 years. Therefore, the standard soil test with organic matter, which measures pH, available nutrients, and heavy metals ($13.00) and the total soil nitrogen test ($10.00) would serve the purpose of this project.[30]

Tracking pesticide use, as mentioned in the reporting section, is an integral component of IPM providing opportunities for assessing where applications could be decreased, how exposures could be minimized, knowing the timing and location of the applications.

[30] http://www.umass.edu/plsoils/soiltest/services1.htm

VII. Agenda for 2004-2005

A. Research less expensive products that are comparable to Burnout. Based on a conversation with John Vik who expressed concern about the costs of Burnout it seems a reversion to RoundUp is imminent. There may be other products that could be cheaply concocted, i.e. the University of Colorado reported a vinegar and soap solution was being used on weeds in sidewalk and asphalt cracks with good results.

B. Determine the technicalities of the IPM plan create spreadsheet with inventory of products that have been used on campus and will continue to be used campus in the short-term and why they are used. Create another spreadsheet showing the preferable ways to stem the problems using methods consistent with IPM. Transitioning from the first spreadsheet to the second will require administrative coordination.

C. Appoint a person to serve as a coordinator for IPM transition process. This person would equally serve and responsive to facilities/grounds management, outside contractors and campus environmental groups and institutes and the joint committee.

D. Map out progression of IPM, i.e. extending intensive maintenance practices to entire campus.

Appendix A: Project Narrative

Caleb McClennen, a graduate student in the Fletcher School of Law and Diplomacy, worked in the spring of 2004 as a TIE student intern, in conjunction with staff sponsor Rachel Massey (Global Development and Environment Institute). Shannon Nally, a 2004 graduate from the Agriculture, Food and Environment program at the School of Nutrition Science and Policy, succeeded Caleb in June.

The initial phase of work involved gathering information and making contacts both within and outside the university. Caleb and Rachel met with key staff on the Medford campus including Nick Magliano, Environmental Health and Safety Manager; Ron Esposito, Director of Facilities; John Vik, Grounds Supervisor; and Jesse Carreiro, Grounds Support Services Supervisor. We ascertained in these conversations that a full examination of pesticide use on campus had not been carried out in the past, and would be of interest. In addition, grounds and facilities staff expressed interest in learning more about pesticide hazards and alternatives. Grounds and facilities staff expressed interest in pursuing environmentally sustainable grounds management both as a means to protect students and staff, and as a means to improve the over-all appearance of the campus grounds through more intensive management.

In March, an event, cosponsored by TIE, GDAE, and the undergraduate environmental group ECO, galvanized efforts for implementing the Tufts pilot program. Pat Beckett and Chip Osborne of the Marblehead Pesticide Awareness Committee (MPAC) presented information on options for organic management of campus lawns and playing fields. Chip Osborne manages all of Marblehead's playing fields organically, and thus was able to present a detailed account of the relevant soil biology as well as the challenges and rewards of such an approach. Tufts graduate students and undergraduates, grounds and facilities staff from both the Medford and Grafton campuses, and a grounds staff person from Harvard, attended the event.

Because the March event sparked significant interest in organic turf management options at Tufts, we narrowed the scope of Caleb's work to focus primarily on developing a pilot project to reduce pesticide use on campus lawns, landscaped areas, and playing fields. Between March and May, Caleb met regularly with Ron Esposito and John Vik to develop a practical, specific plan for implementing alternative pest management on campus.

In a post-presentation meeting with David Gaspar, Head of Prescription Turf Services, the contractor that currently treats lawns, playing fields, and landscaped areas on the Medford campus, he strongly supported the development of a written IPM plan for the Tufts Medford campus, noting that most of his clients do have such plans. He was also open to discussing the possibility of managing Tufts grounds organically, but quoted an estimate of about 6 cents/square foot of organic treatment or a total of $60,000 per session of fertilizing, aeration, over-seeding, and compost top-dressing over the entire 20 acre campus. A later conversation with Chip Osborne helped to reset the goals of the

project by focusing on a less costly maintenance method on a smaller portion of the campus as a trial run. Tufts facilities staff also worked with Caleb to arrange for Prescription Turf Services to provide regular reports on the total quantity of pesticides used on campus grounds; this will allow the University to track changes in chemical use over time. This proposal was agreed to by Grounds Supervisor, John Vik, and resulted in the initial management plan for Spring 2004.

In summer 2004 Shannon continued to address requests from the grounds management staff on selecting and procuring the materials for organic land care, as well as researching and developing a framework for a campus-wide policy to reduce the use of toxic pest control products. In regards to the short term action plan (April-September 2004) the following issues have been addressed:

SHORT TERM ACTION PLAN (APRIL – SEPTEMBER 2004)

1. Begin development of a written Integrated Pest Management (IPM) plan for the campus rooted in Organic Turf Management (OTM) principles. The initial steps in this process will be the following.

a. Prioritization of grounds into aesthetic and use categories to determine areas of campus where pesticides are not necessary in the short term.

> Grounds management treats campus areas based upon their use categorization with the major division between athletic and non-athletic turf. The athletic fields and highly visible non-athletic areas, such as the President's lawn and the academic quad, receive the most extensive treatment. Other areas which are less frequented by visitors, such as residential areas, or are difficult to access due to steep slopes are not a high priority in terms of aesthetics.

b. Definition of approach/methodology for seeding, aeration, fertilizing and possible pesticide use (possibly with action thresholds) in each category.

> Baseline and proposed maintenance practices have been described. Some action thresholds have already been established by grounds management, but need to be written down. The major pests have been identified so action thresholds can be established for each.

c. Elimination of Round-Up pesticide on campus and switch to less toxic and organic alternative such as Burn-out for edges, mulch areas and cracks in cement.

> Burnout in use as of August 2004. Organic fertilizer has been ordered for application in late summer/early fall.

d. Annual amounts of pesticide used in square feet should be reported and monitored year after year. This data can be gathered from David Gaspar.

The Grounds Supervisor spoke to David Gaspar about submitting reports on pesticide use. While none have been received for 2004, the assertion is that no pesticides were applied. Several other universities with an IPM program have a reporting system in place with a standard form that must be submitted. The submission may not necessarily prevent unnecessary applications, but is helpful for tracking.

Based on IPM plans for other universities and towns, ideas have been recorded for what specifics should be included for Tufts. The worthiness of an IPM plan was further endorsed during a meeting with Willie Lockeretz, School of Nutrition Science and Policy, who encouraged borrowing a list of acceptable products, appointing an IPM coordinator, and emphasizing native species plantings. A meeting with Jeff Licht led to encouraging prospects for melding his sustainable landscaping knowledge and materials as a major component of IPM. Indications of some of the challenges that might arise, such as lack of support from the administration and complaints from athletic coaches and alumni were provided by Jim Luce of Connecticut College and Patti Wood, parent of a current student.

2. Begin transition with fully organic conversion of a set of land parcels on campus.

Currently, this includes the Baseball Field, the area of grounds outside South Hall, Latin Way Apartments, Haskell Hall, Tilton Hall, and Lewis Hall, and the Triangle field which fronts Powderhouse Rotary between Powderhouse Blvd. and College Ave. These campus grounds will receive an in-house prescription of aeration, over-seeding and organic fertilizer. There will be zero pesticide use in the non-athletic grounds that are the subject of this initial trial period. The baseball field will be managed by PTS and Tufts according to organic principles, including composting.

The transition began in Spring 2004 as the Grounds Supervisor reported there was no broadcast application of pesticides by outside contractor or in-house staff. A report from the contractor should be obtained for confirmation.

4. Pursue research into what, if any, machinery should be purchased by the University to further facilitate this process (e.g. for aeration, seeding and composting).

Grounds management never indicated a need for additional equipment. An electric lawn tractor arrived in August as the result of a separate campus initiative. The Grounds Supervisor did mention that the compost application on non-athletic fields was unsuccessful due as cyclone spreaders are primarily for athletic turf.

5. Continue consultation with Organic Grounds Management professionals as well as current pesticide specialists to develop the most appropriate course of action to begin this transition.

Recommendations were solicited from a variety of sources for organic land care products. Contact with lawn care professionals who might provide consultations was attempted, but response was poor.

6. Create an annual IPM and pesticide use review process, to be undertaken by the Joint Committee on Pest Management at Tufts University. This committee should include at least one representative from both TIE and Buildings and Grounds, one member of the student community, to provide assistance in research and coordination.

Potential faculty members for the joint committee have been identified.

Appendix B: Sample IPM Plans

The following are two IPM plans that could serve as models for an IPM plan at Tufts. The first, from Oberlin, shows elements of an IPM plan designed specially for a college campus. The second, from the town of Wellesley, provides one example of how some Massachusetts towns approach IPM.

1. Excerpts from Oberlin College Environmental Policy

Environmental Policy Statement for Oberlin College
(adopted by the Board of Trustees, March 2004)

The core mission of Oberlin College is the education of its students. One aspect of such education is the demonstration by its actions of the College's concern for, and protection of its physical environment. Oberlin College must be a responsible steward of the environment. As such, the College will seek 1) to reduce the rate at which it contributes to the depletion and degradation of natural resources; 2) to increase the use of renewable resources; and 3) to consider other measures that can enhance the physical environment in which we live. The development of priorities and the implementation of decisions regarding energy production and use, the use and development of our grounds, facilities construction, modernization, maintenance, transportation, and materials use will be informed by the environmental impact they have. The President or delegated officials will periodically advise the community of the College's progress in this area.

II. Grounds
A. General Policy Statement

Urban landscapes address aesthetic sensitivities and more mundane issues like storm water and traffic management; they also articulate the values of people and institutions and so are instructive. Educational institutions like Oberlin College should strive to illustrate how these disparate purposes and functions can be integrated in ways that assure that built landscapes are practical, healthful for body and soul, and levy no unnecessary burdens on our planet. In essence, such spaces should foster a sense of place and the realization that nature welcomes our presence everywhere if we manage these encounters wisely.

Because built landscapes take many forms and must provide many services, opportunities to use them to demonstrate responsible use of natural resources vary. Even the most intensively managed sites--those that require substantial inputs of pesticides, nutrients, and human labor--can be managed to emulate nature more faithfully than conventional practices allow. Many circumstances determine whether a given landscape can be more or less consistent with the principles of sustainability. Determining which practices to apply to specific sites requires that we consider priorities and compromise appropriately.

Oberlin College maintains about 650 acres of land, approximately 200 of which are intensively managed. Spaces such as athletic fields and beds of bulbs and annuals present substantial challenges to sustainable practices. However, most of the central campus and all of the 450 acres that receive less regular maintenance can be managed to promote biodiversity, sequester large amounts of carbon, and reduce the likelihood of introductions of invasive plants into adjacent natural habitats. The entire campus can be maintained in ways that minimize or eliminate dependence on nonrenewable energy sources and environmentally harmful chemicals.

Oberlin College's landscape, no less than its classrooms, laboratories, and other teaching facilities, is part of the educational apparatus of the institution. Hence, the campus grounds should be managed in ways that accord with the College's efforts to provide its students the tools they need to become responsible world citizens.

Institution of the practices and principles listed below will help the College align the message that we indirectly voice through our landscape with the call for responsibility that we so pointedly celebrate through our formal curriculum.

B. Further reduce dependence on chemicals in accordance with the principles of Integrated Pest Management (IPM)

1. Expand reliance on cultural practices (e.g., soil aeration, high cutting length) that improve the health of turf short of applying fertilizers and pesticides.
2. Landscape with pest-resistant horticultural material and native flora whenever possible.
3. Substitute compost for chemical fertilizers and purchased mulch and employ additional organic methods whenever practical.
4. Reduce the use of pesticides (fungicides, herbicides, and insecticides) to applications consistent with the principles of IPM.
5. Substitute sand or less toxic salts for sodium chloride to control ice and help reduce corrosion on equipment where feasible.

C. Utilize equipment and strategies that reduce reliance on fossil fuels

1. Replace existing equipment with machinery powered by other means than gasoline and diesel fuel.
2. Increase the extent of low-input plantings to replace turf.

D. Develop electronic databases and maps that help manage the campus landscape in an environmentally sustainable and efficient fashion

1. Employ Computer assisted design technology (CAD) to

promote ecologically sound practices for maintaining existing plantings and to plan new ones.
2. Use this CAD-mediated database to expand efforts to create native landscapes/communities and remove exotics where practical.
3. Use this database to partition the campus into zones distinguished by acceptable levels of chemical and energy use and choice of plant materials.

E. Involve the Oberlin community in grounds installations and management whenever practical

1. Expand the "dig-ins" to allow greater opportunity to involve all Oberlin community members in the campus landscape and inform them about the principles of ecological sustainability.
2. Label plants and plant communities in high-visibility areas indicating why certain plants were chosen.
3. Expand the student summer-internship program.
4. Create a course for undergraduates on grounds management.
5. Reestablish a Campus Landscape Advisory Group that includes faculty to serve as a resource for the Grounds Department and the College Administration.

F. Remain apprised of developments that allow improvements on the techniques and principles listed above

G. Ensure that all plans submitted for new and renovated landscapes conform to the principles and practices articulated above

A campus body, perhaps most appropriately the Architectural Review Committee, will examine all plans to assure compliance with grounds policy. That evaluating body will assure that it has timely input from persons familiar with grounds technology, perhaps obtained by consulting with members of the Campus Landscape Advisory Group.

2. **Town of Wellesley**

Integrated Pest Management Policy for Land Owned by the Town of Wellesley, Massachusetts

Statement on Pesticides

The Town of Wellesley Natural Resources Commission agrees with the U.S. Environmental Protection Agency that all registered pesticides are toxic and that, even at low levels, they may cause serious adverse health and environmental effects. The Town of Wellesley Natural Resources Commission recognizes that all its citizens, particularly children, have a right to protection from exposure to hazardous chemicals and pesticides

in particular. Furthermore, the Town of Wellesley Natural Resources Commission recognizes that it is in the best interest of public health to take precautionary action to protect our citizens and their drinking water supply by reducing the use of toxic pesticides in Wellesley.

Therefore, the Town of Wellesley Natural Resources Commission adopts the following policy.

Integrated Pest Management Policy

The use and application of toxic chemical pesticides, either by Town of Wellesley employees or by private contractors, is prohibited on all Natural Resources Commission lands, including school fields which shall comply with the School Children and Families Protection Act; except for certain exemptions and emergency waivers as described below. Pre-emptive turf, landscape and grounds cultural, biological and physical maintenance practices shall be undertaken to understand, prevent, and control potential pest problems. All control products used under the terms of this policy shall be in keeping with, but not limited to, those products on the preferred list of Northeast Organic Farmers' Association as stated in their Standards for Organic Land Care, and/or the Organic Materials Review Institute of Eugene, Oregon. An IPM Advisory Committee shall be formed.

Exemptions

All outdoor pest management activities taking place on Town of Wellesley land shall be subject to this IPM policy, except as follows: pesticides otherwise lawfully used for the purpose of maintaining a safe drinking water supply at drinking water treatment plants and at wastewater treatment plants and related collection, distribution, and treatment facilities; pesticides in contained baits or traps for the purpose of rodent control; pesticides classified by the United States Environmental Protection Agency as exempt materials under 40CRF 152.25, or those pesticides of a character not requiring FIFRA regulation.

Emergency Waivers
If an emergency public health situation warrants the use of pesticides which would otherwise not be permitted under this policy, the Town of Wellesley Board of Health shall have the authority to grant a temporary, one-time waiver if the pest situation poses an immediate threat to human health and viable alternatives consistent with this IPM policy do not exist.

If pesticides are used under the emergency waiver clause, then the area treated shall be conspicuously sign posted as soon as possible after application and for a period of at least 48 hours. Furthermore, the IPM committee shall be notified as soon as practical, and a specific IPM plan developed to prevent further such emergencies.

IPM Advisory Committee

An IPM Advisory Committee shall be created to oversee and assist in the implementation of the IPM policy, to develop an IPM program consistent with this policy, and to assist the Town of Wellesley Departments to achieve the full and successful implementation of this policy. In addition, their duties will include: creating a 5 year turf management plan for athletic fields consistent with this policy; compiling a registry of all pesticides currently stored on Town owned premises, with a goal of proper disposal through a Hazardous Wastes Collection program; ensuring that the Town compost be tested on a yearly basis for contaminants, including, but not limited to, heavy metals and pesticides; ensuring that Town water be tested for pesticides at least every three years based upon recommendations by the IPM Advisory Committee; ensuring that Town of Wellesley employees who work with turf, landscape, or grounds receive yearly education and training in natural, organic turf, landscape, and grounds management.

The Advisory Committee will seek broad community participation on a non-voting basis. Membership on the IPM Advisory Committee shall be comprised of a representative from each of the following: Town of Wellesley, Board of Health; Town of Wellesley, Natural Resources Commission; Town of Wellesley, School Department; Town of Wellesley, Recreation Department; Town of Wellesley, Department of Public Works Town of Wellesley, Selectmen; Town of Wellesley, Playing Fields Task Force; and up to 3 Citizen Representatives, knowledgeable about environmental toxins and/or integrated pest management techniques