

CEAC Report 2005-04

Report to: Mayor and Members of Council

From: John Abbott, Chair, Caledon Environmental Advisory Committee (CEAC)

Prepared By: HHL By-law Sub-group: John Abbott, Scott Lunau, Neil Morris, Bryon Wilson

Date: September 28, 2005

Re: **Towards a More Effective Healthy Horticultural Landscapes By-law**

RECOMMENDATIONS

The Caledon Environmental Advisory Committee (CEAC) recommends to the Corporation of the Town of Caledon:

1. That Council receive CEAC report 2005-04.
2. That Council consider the following recommendations regarding the future enhancement and enforcement of the HHL By-law:
 - a) That, to facilitate IPM program evaluation, Council adopt a definition of IPM consistent with that recommended in this report, that is:

Integrated Pest Management (IPM) is a strategy in which a variety of control methods may be applied in cases when and where populations of pest organisms have reached levels that warrant control. The determination of the requirement for control, and decisions as to how, where and when to apply control measures, are based on regular monitoring of pest prevalence. Non-chemical (cultural, biological, physical/mechanical) controls are to be prioritized, and chemical control options may be considered only in instances where it can be demonstrated that non-chemical alternatives are ineffective or impractical. Any application of chemical controls within the IPM strategy must use the appropriately registered product that poses the lowest risk to the environment and non-target organisms.
 - b) That Council consider a further amendment to the existing by-law to specify the requirements of an IPM program, as outlined in this report, with particular emphasis on record-keeping and reporting.
 - c) That Council continue to initiate and strongly support education and enforcement efforts, as they relate to the HHL by-law.

- d) That Council establish a process to evaluate IPM programs and/or accreditation processes proposed by any proponent.

INTRODUCTION

The Healthy Horticultural Landscapes By-law No. 2003-81 (HHL By-law) came into effect for all public and privately held properties, except agricultural land holdings and golf courses, on May 1, 2004. The by-law came into effect for golf courses on May 1, 2005. The purpose of the by-law is to regulate, and ultimately reduce, the use of pesticides for cosmetic purposes in order “to mitigate the injurious impacts of pesticides on health and the environment”¹.

Integrated Pest Management (IPM) accreditation, within the context of the by-law, is the cornerstone for the regulation and ultimate reduction of the use of pesticides for cosmetic purposes within the Town of Caledon. For golf courses, IPM accreditation was called for in conjunction with certification under the Audubon Cooperative Sanctuary for Golf Courses² (the Audubon Program).

On May 3, 2005, Council passed an amendment to Subsection 4.1.1 of By-law 2003-81³ which essentially allowed golf courses the option of becoming IPM accredited OR being certified in IPM under the Audubon Program.

This action on the part of Council, and several uncertainties which have arisen over the past year regarding what constitutes an effective IPM program, has given rise to the need to ensure that the IPM process is effective and transparent, will result in actual pesticide reduction, and is adopted and implemented as intended.

BACKGROUND

The process of developing a by-law that would regulate the use of pesticides for cosmetic purposes was started in 2002, and was initiated with the establishment of a Pesticide Advisory Group (PAG) made up of representatives from all stakeholder groups: lawn care providers, lawn and garden supply retailers, horticultural association members, golf course/association managers, environmental organizations, Landscape Ontario, the then current mayor and a number of councilors, and the Town’s legal counsel. The PAG met monthly and ultimately produced a document that met with the “approval” (not perfect from any group’s point of view, but the best compromise that could be achieved) of the group and was signed into law on April 28, 2003 after extensive consultation with the general public.

¹ The Corporation of the Town of Caledon, By-law No. 2003-81

² See Subsection 4.1.1 of By-law No. 2003-81

³ Refer to The Corporation of the Town of Caledon, By-law No. 2005-82

Concurrent with the activities of the PAG, CEAC submitted report 2002-05 to Town Council entitled *Best Management Practices of Golf Courses*, dated August 28, 2002. That report made a number of recommendations including the need to have all golf courses located within the Town IPM accredited and, as well, to be “certified by either the Audubon Cooperative Sanctuary Program or Green Links, or both”⁴. The final HHL by-law included the requirement for golf courses to be IPM accredited as well as certified under the Audubon program.

The first full year of implementation of the by-law commenced May 1, 2004. Staff of the By-law Enforcement Department submitted Report 2005-006, entitled *Public Education Strategy and Enforcement Update on Healthy Horticultural Landscapes By-law 2003-81*, prepared April 13, 2005. In it, the Department outlined the results of the 2004 Public Education/Enforcement Program including the enforcement initiatives, the planned Public Education /Enforcement Initiatives for 2005, and made specific comment regarding golf course requirements which went into effect on May 1 of this year.

Regarding golf courses, Department staff recommended to Council that the by-law “be amended to require only one of the two qualifications by golf courses but not both”⁵, i.e. either IPM accreditation through the IPM-PHC Council of Canada or certification for golf courses through the Audubon Cooperative Sanctuary System of Canada. The departmental report was presented to Council on May 3, 2005 and Council passed an amendment to the by-law on that day adopting the staff recommendation noted above. This was done without further consultation with any of the stakeholders involved.

REPORT OBJECTIVES

The objectives of this report are:

- To provide a clear and detailed basis of understanding of IPM and the IPM-PHC Council accreditation process,
- To review other options that would lead to IPM accreditation (or its equivalent) other than through the IPM-PHC Council,
- To identify factors that could limit the effectiveness and practicability of any one accreditation source or IPM provider,
- To provide a detailed outline of the specific elements of IPM that the Town of Caledon should require for any party subject to requirements for IPM,
- To recommend a process that enables the Town to effectively address IPM accreditation for any given proponent, and
- To recommend a process that will allow the By-law Enforcement Department to implement and enforce the by-law more effectively with the objective of monitoring and reducing the use of pesticides for cosmetic purposes within the Town.

⁴ Refer to CEAC Report 2002-05, dated August 28, 2002

⁵ Refer to Building and By-law Enforcement Department Report 2005-006, date prepared April 13, 2005

DISCUSSION

1. History and Origin of IPM

The concept of Integrated Pest Management (IPM) was originally conceived about 4 decades ago. The intent at the time was to establish a new approach to pest management in agricultural settings. It was developed in response to rising costs and deteriorating efficacy of standard control practices of the day, which were based almost exclusively on the use of chemical pesticides. Owing to high rates of use of chemical controls for pest management, problems of resistance and natural predator depletion were greatly limiting the effectiveness of those same chemicals. The IPM approach focused on the use of ecological principals to reduce the frequency and overall rate of application of chemical controls so that such problems were ameliorated.

In the current context, it is important to realize that IPM was not developed to make pest management more difficult. Rather, the intent (and ultimate result) of IPM development and implementation was to improve pest-control efficacy and to reduce costs. Equally, IPM was recognized at its inception as a means to reduce the environmental impacts that were the subject of increased attention and concern at the time.

Two of the earliest and most frequently cited definitions of IPM (originally referred to simply as “integrated control”) are as follow:

1. Integrated control has been defined as: "Applied pest control which combines and integrates biological and chemical control. Chemical control is used as necessary and in a manner which is least disruptive to biological control. Integrated control may make use of naturally occurring biological control as well as biological control affected by manipulated or induced biotic agents". (Stern, V. M., R. F. Smith, R. van den Bosch, and K. S. Hagen. 1959. The integrated control concept. *Hilgardia*, 29: 81-101), and
2. “Integrated control is a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economic injury". Food and Agriculture Organization (FAO) of the United Nations. 1967. Report of the first session of the FAO Panel of Experts on Integrated Pest Control, Rome (Italy), Sept. 18-22, 1967.

From these early definitions, it is clear that IPM was developed first and foremost as a means to address the occurrence of pest organisms. In its subsequent evolution, IPM increasingly conveyed the added benefit of reducing the potential environmental and human health impacts of excessive applications of chemical pest control products.

Since the early days, there have been many adaptations of the IPM process, and many modified definitions, depending on the specific application or interest. Appendix A provides examples of frequently encountered definitions assigned by government agencies, NGOs, agricultural associations, and other stakeholder groups. In reviewing these various definitions, major aspects of IPM become apparent, and several consistent elements of an IPM program can be identified. Notably, the definitions in Appendix A share with the early definitions the intent for IPM to serve as a means to deal with pest organisms. Other key elements of IPM, and their implications in the current context, are discussed in the following section.

Part of the current concern surrounding IPM and its role in the HHL by-law reflects the high degree to which the definition, and ultimately the intent, of IPM has been redefined by differing groups. In the adaptation of IPM as a means to reduce the rates of use of chemical control agents, it is important that IPM not be considered simply as a process through which to justify continued application of pesticides at standard rates and frequencies.

2. Key Elements of IPM

In the simplest sense, and for current purposes, the key elements of an IPM program are:

- Monitoring of pest prevalence and impacts,
- Decision-making based on monitoring results and established thresholds for acceptable levels of pests,
- Consideration and informed use of multiple control alternatives,
- Targeted applications of controls, only when and where deemed necessary
- Record-keeping that facilitates ongoing evaluation and improvement of the program.

In order for any IPM program to be effective in terms of both pest management and pesticide reduction, these key elements need to be part of the program.

To facilitate the effectiveness and evaluation of the HHL by-law, record-keeping is perhaps the most critical part of an IPM program. From the pest management perspective, record-keeping is a necessary component to allow continual tracking of pest population dynamics, locations of occurrence, response to controls, etc., which in turn allows for effective decision-making. From the by-law perspective, record-keeping enables the review of any individual IPM program to determine if key elements are in place, and whether or not appropriate activities and decision-making are practiced. From both perspectives, proper record-keeping should track and record the following:

- site characteristics (nature of site, total area, surrounding conditions)
- monitoring efforts (methods, frequency, area covered, monitoring personnel and their qualifications)

- pest occurrences (pest species, pest abundance, time, location, recurrence, ambient conditions)
- responses (control justification, method, specific control product, timing, applicator)
- response effectiveness (follow up monitoring of pest population following control effort)

Importantly, if chemical pesticides are selected as the control response, with documented justification, detailed records of the specific product and formulation, and the rate and total amount of application are critical data. Cumulative records of this nature allow for an assessment of trends in pesticide use. In the context of the HHL by-law, records of this nature will provide feedback as to whether rates of pesticide use are actually decreasing, as intended.

Thresholds are a very important element for consideration in the current context. In the most general sense, threshold levels reflect the population level of a pest at which the costs associated with damage (or other impairment) exceed the cost of control. The threshold is specific to the pest, and also specific to the endpoint of concern (e.g. crop loss). In the application of IPM in the agricultural setting, considerable scientific research and field trials have served as the basis for highly defensible and widely accepted thresholds for crop protection. Typically, thresholds for agricultural purposes do not discriminate with respect to the control method to be applied. The occurrence of any pest at levels greater than the relevant threshold only implies that some form of control is warranted.

In the context of turf management (lawn care or sport turf), thresholds are difficult to establish and relatively few have been firmly established for specific turf pests, particularly weeds and disease organisms. Aesthetic concerns do not lend themselves to the establishment of quantitative thresholds of this nature. Decisions to engage in pest control on the basis of aesthetics are inherently subjective, unless there is substantial damage to turf or impairment of its use such that costs of turf replacement are incurred. An aesthetic basis does not negate the validity of any decision to apply pest controls, but it does essentially prevent the establishment of well-defined thresholds as part of an IPM program for lawn care. In absence of such thresholds, an IPM program may not be fully effective in preventing excessive use of chemical pesticides.

From the perspective of the HHL by-law, the threshold-related limitations may be addressed in establishing the position (a qualitative “threshold”) that pesticides are simply not warranted solely for cosmetic purposes, and are only to be used in instances where other obligations are triggered. For example, the application of pesticides may be necessary where *noxious weeds* (as defined under the **Weed Control Act, O. Reg. 1096**) are present and their control cannot be achieved through non-chemical methods. The threshold in this instance would be of a “presence-absence” nature, likely necessitating control efforts at any level of occurrence of the designated pest species (*i.e.*, noxious weeds). In cases of cosmetic concerns only, the decision to apply non-chemical controls could be purely subjective, but any decision to use chemical pesticides would not be

justified in absence of other concerns (e.g. the likelihood of future turf replacement, noxious weed presence).

Ultimately, the effectiveness of an IPM program for the intended purpose is largely dependent on the defined thresholds. In the context of the HHL by-law, the issue of thresholds should receive considerable attention. If the intent is to reduce the use of pesticides for cosmetic purposes, the IPM process needs to embody criteria that reflect this intent. Since thresholds in IPM are traditionally species-specific, and generally based on considerable research focused on quantifiable parameters, it is not considered practical to establish thresholds of this nature for all pests of concern in lawn care and turf management. Rather, IPM programs implemented with the intent of reducing pesticide use for cosmetic purposes should include clear principles regarding justification of pesticide applications of this nature.

3. Comparison of IPM (or equivalent) Delivery Programs

In making recommendations regarding best management practices for golf courses, CEAC report 2002-05 cited several programs of IPM certification and/or accreditation, including the programs of GreenLinks, the Audubon Society, and also ISO Standard 4001.

Despite some attempts to establish copyrights related to IPM or IPM accreditation programs, the IPM concept is not subject to exclusive use by any organization. In addition to the accreditation options identified in CEAC report 2002-05, there are many organizations and service providers that could potentially develop and implement IPM programs on behalf of golf courses in Caledon, or alternatively provide IPM accreditation to those golf courses. For example, the IPM Institute of North America Inc. offers practice-based IPM certification to IPM professionals, organizations, and pest management service and product providers.

To be able to assess the suitability of IPM programs proposed for any given golf course (or other purposes), the Town may encounter a need to review the IPM programs or accreditation processes of numerous origins. For the purpose of this current CEAC report, the programs identified in CEAC Report 2002-05 are reviewed and assessed in terms of their suitability in context of the needs associated with the HHL by-law. In addition, the IPM accreditation program developed and implemented by the Integrated Pest Management – Plant Health Care (IPM-PHC) Council is also reviewed herein. The IPM-PHC accreditation process is supported by many members of the lawn care industry and likely to be a popular means to demonstrate compliance with Caledon's HHL by-law.

Table 1 provides a summary of the status of the programs reviewed herein, specifically with respect to the key components identified above. The information in Table 1 is presented to provide a very general indication of the status of each program considered and is not meant to serve as a basis for endorsement of any one program. It is also important to note that the information conveyed in Table 1 is derived solely from the

documentation of the content and structure of the respective programs that were available for review. This report has not directly considered any records that might exist that provide an indication of performance in the actual *implementation* of any of these programs.

Table 1: Summary of Attributes of Selected IPM Programs

Key Element	Audubon	IPM-EHC	IPM-PHC	
			Lawn-care	Golf
Pest Monitoring	yes	yes	yes	yes
Alternative Control Use	yes	yes	yes	partial
Thresholds	yes	uncertain	uncertain	uncertain
Record Keeping	partial	partial	yes	yes
Ongoing Evaluation	uncertain	yes	yes	yes

yes - the program, as described, includes this IPM component

no - the program, as described, does not appear to include this component

partial - some aspects unknown, unsatisfactory or missing

uncertain - available information is insufficient to fully determine status

Beyond the review of specific programs, this report also later provides recommendations as to how the Town may assess IPM programs or accreditation processes of multiple origins.

Audubon Cooperative Sanctuary Program

The Audubon Cooperative Sanctuary Program (ACSP) has been developed by Audubon International as an overall program for environmental management in numerous settings, including municipalities, schools, businesses, parks, and golf courses. All programs are developed on a site-specific basis, taking into account the local environment and conditions at the site.

The program for golf courses is divided into six components. Each component is based on a series of goals and environmental management practices to achieve those goals. The specific ACSP component of relevance to this CEAC report is entitled “Chemical Use Reduction and Safety”. The stated purpose of this component of the Audubon program is “to ensure safe storage, application, and handling of chemicals and reduce actual and potential environmental contamination associated with chemical use”. To fulfill this purpose, there are five Goals established under this section. Under the goal of “General Knowledge”, the program includes the training of all maintenance staff in the basic tenets of IPM, including: (1) scouting and monitoring; (2) selecting thresholds; (3) making

decisions based on treatment options; (4) proper timing and spot treatment; (5) documenting and evaluating results.

From an IPM perspective, the most relevant Goal established under the Chemical Use Reduction and Safety component is *Goal 2: Cultural Practices and IPM Techniques*. The goal is to “maintain turfgrass in a vigorous and healthy state through sound cultural practices and integrated pest management techniques”. The specific practices identified are listed in Appendix B of this report.

Audubon International offers certification of the ACSP. This designation is achieved once environmental practices are implemented in all core aspects of the program, including IPM. Details of the certification process were unavailable for the preparation of this report. It is unclear whether or not the ACSP certification is subject to ongoing review and audit to ensure continued good practices in IPM and other core areas.

Notwithstanding the uncertainty regarding continued review and audit, the relevant components of the ACSP program appear to embody the key elements of IPM, and the program should provide for record-keeping that would facilitate enforcement and evaluation of the HHL by-law.

GreenLinks

At the time of preparation of this report, all attempts to contact GreenLinks or obtain information on their IPM programs suggested that this organization is no longer operating. This demonstrates one of the potential limitations of recognizing any specific program as required or accepted under the HHL by-law. If support ceases for any program specifically-identified in the By-law (as has apparently occurred with GreenLinks), the By-law will likely require an update.

IPM-PHC Program

Members of the IPM - PHC Council include the Professional Lawn Care Association of Ontario, Landscape Ontario, Ontario Parks Association, Ontario Vegetation Management Association, International Society of Arboriculture, Structural Pest Management Association of Ontario, Ontario Golf Superintendents Association, and members of various industries with turf management needs, such as Hydro One. Representatives of the Ontario ministry of Environment (MOE) and the Ontario Ministry of Agriculture and Food (OMAF) also serve in a technical advisory capacity to the council.

The IPM - PHC Council of Ontario oversees an IPM Accreditation Program (IPMAP). This voluntary program has been developed by the IPM-PHC Council of Ontario to recognize landscape companies, park systems, and golf courses who demonstrate their knowledge of and commitment to the principles of IPM through a process of certification, audit, and professional development.

The IPMAP recognizes lawn care professionals, golf clubs and their superintendents, and other interested institutions, who demonstrate their knowledge of and commitment to the principles of IPM through a process of certification, audit, and professional development.

Ridgetown College (part of the University of Guelph) administers this program through a contract with the IPM-PHC Council. In this role, the College is responsible for the delivery of the IPM program on behalf of the IPM-PHC Council, administering associated exams, tracking continuing education credits, and tracking associated audits.

The IPM Accreditation process is intended to help reduce reliance on pesticides through the application of IPM and Plant Health Care principles, with particular emphasis on:

- Cultural practices that promote optimum plant health
- Pest prevention
- Application of pesticides only when necessary
- Use of reduced risk products

The accreditation process requires the completion of an accreditation exam, continued education, and independent follow-up audits (desktop and on-site) to verify compliance in the site management of IPM, as defined by the IPM-PHC Council. There are three levels of accreditation (“Registered”, Accredited- Level 1, and Accredited- Level 2). Full accreditation is not conferred until the final on-site audit is complete. Accreditation is only maintained through time upon demonstration of continuing education (or equivalent) and subject to continued on-site audits at specified time intervals. Appendix C provides more details of the IPM program and accreditation process.

Ongoing audit is required to maintain “accredited” status under the IPM-PHC process. There are two levels of audit associated with the accreditation process. An annual “Desk Review Audit” is completed to demonstrate compliance with the IPM-PHC Council standard for pesticide usage, pesticide reduction where appropriate, employee training and management, and appropriate customer education and mass marketing materials. The desk review audit is conducted by an approved environmental auditor, and audits are submitted to and coordinated by Ridgetown College. At least once every three years, an “On-Site Audit” is also conducted. The On-Site Audit is conducted by an independent auditor, contracted by the IPM-PHC Council for this purpose. Auditors must be registered with the Canadian Environmental Auditing Association and have a minimum designation of Certified Environmental Auditor (CEA).

The IPM-PHC will reportedly maintain a province-wide database of the submissions and record-keeping associated with the ongoing accreditation process.

The available information guides for the IPM-PHC accreditation process indicate that the maintenance of pesticide use records is part of the general program, but it is not specified as a component for the program tailored specifically for golf courses. This is considered

to be a key limitation in the suitability of this program in context of enforcement and evaluation of the HHL by-law.

Aside from concerns identified above, the IPM program and accreditation process of the IPM-PHC Council appear to embody most of the key elements of IPM, and the program should generate record-keeping that would facilitate enforcement and evaluation of the HHL by-law

IPM-EHC Program

The Pesticide Industry Regulatory Council (PIRC) of Ontario is administered through the Ontario Integrated Pest Management Association (OIPMA). The PIRC has developed and supports a voluntary program to recognize lawn care companies, golf courses, etc. who are committed to the principles of integrated pest management – environmental health care (IPM-EHC). The program confers certification subject to education, training, professional development, and also an audit process. An outline of the PIRC accreditation process and the IPM code of conduct are outlined in Appendix D.

All OIPMA member companies have an accredited IPM agent registered on the PIRC database. The database lists all registered agents and their education and training records.

The information from the PIRC website does not describe the exact process through which accreditation of the IPM agent is initially obtained. The available information suggests that the PIRC program initially recognizes companies who are in compliance with existing relevant legislation (Ontario Regulation 914 and the federal Pest Control Product Act) as IPM practitioners.

To maintain an *on-going* accreditation status, the IPM agent annually submits to the PIRC IPM-EHC Council the following:

- Requested IPM marketing materials,
- IPM training reports, and
- IPM pesticide usage reports,

The agent must also obtain eight (8) continuing education credits (CEC's) to maintain Company IPM accreditation. Each certified company is also subject to an annual Desk Review Audit, which currently includes the following:

- Review and evaluation of company IPM marketing and consumer educational materials,
- Review and evaluation of the degree to which the company practices the principles of IPM (Regulatory, Cultural, Pest Identifications, Monitoring, Treatments, Prevention Controls, etc.),
- Review and evaluation of company Pesticide Technician Program (PTP) and IPM training activities, and
- Review and evaluation of company pesticide usage records.

The desk review audit is conducted by a “qualified” auditor. There is no indication in the available program descriptions that any level of *on-site* audit is required as part of the certification process.

Overall, the PIRC-EHC program relies, at least in part, on adherence to existing legislation of relevance, noting that the IPM agent is responsible to ensure that all company personnel are updated and in compliance with Ontario Regulation 914, Pest Control Products Act (PCPA), the Health Canada Action Plan for Urban Pesticides, and to promote IPM principles and practices to clients. In coupling this with other aspects of the IPM program, the accreditation process of the PIRC-EHC appears to embody most of the key elements of IPM.

It should be noted that the information currently available in the preparation of this report is not considered sufficient to ascertain whether or not the IPM-EHC Program would facilitate the implementation and/or evaluation of the HHL by-law. However, cursory examination of the website material and a brief discussion with a member of the Pesticide Industry Regulatory Council (PIRC) suggests that the proposal put before Council on September 6, 2005 by the PIRC Chair should not be dismissed out of hand.

4. The Significance of the Golf Course Amendment

The proposed amendment to the HHL by-law calls for golf courses to have either IPM accreditation through the IPM-PHC Council of Canada or certification for golf courses through the Audubon Cooperative Sanctuary Program (ACSP) of Canada, but not both. As discussed, both programs appear to be reasonably structured to foster the implementation of effective IPM practices. The ACSP is broader in its scope of environmental considerations, and from an overall environmental standpoint would be a preferable alternative. From the strict perspective of IPM and the HHL by-law, however, the two programs do not appear to differ significantly. Accordingly, the adoption of either program would serve the needs of the HHL by-law.

5. How to Improve the IPM Accreditation and Monitoring Process

The implementation of IPM has the potential to help reduce the overall rate of pesticide use in Caledon, thus serving the intent of the HHL by-law. However, there are number of potential limitations associated with IPM and its delivery that could prevent the realization of any significant reductions in pesticide use. The limitations are chiefly as follow:

- An absence of a firm definition of IPM that is consistent with the intent of the by-law.
- An absence of clear thresholds and definitions of conditions under which the use of chemical pesticides may be deemed necessary within the IPM construct.

- Limited capacity to verify the integrity and effectiveness of IPM programs developed and administered by various parties.

There are other less critical issues that might limit the contribution of IPM to the intent of the by-law, but these three are considered to have the greatest impact. The following actions are suggested to offset the potential limitations.

First, it is considered necessary for the Town to establish a clear and detailed definition of IPM, and require that any and all practitioners demonstrably meet this definition. In moving forward with the HHL by-law, the requirements and expectations associated with IPM as a strategy to reduce pesticide use could be based on the following definition:

IPM is a strategy in which a variety of control methods may be applied in cases when and where populations of pest organisms have reached levels that warrant control. The determination of the requirement for control and decisions as to how, where and when to apply control measures are based on regular monitoring of pest prevalence. Non-chemical (cultural, biological, physical/mechanical) controls are to be prioritized, and chemical control may be considered only in instances where it can be demonstrated that non-chemical alternatives are ineffective or impractical. Any application of chemical controls within the IPM strategy must use the appropriately registered product that is poses the lowest risk to the environment and non-target organisms.

With respect to the absence of thresholds, there is a limited capacity to establish rigorous quantitative thresholds for most turf pests, especially when considering aesthetic concerns (see Section 2). However, the Town could consider the adoption of qualitative statements that would serve as the basis for justification of control responses in the IPM framework. For example, an IPM program could contain a statement as follows:

“The application of chemical pesticides should only occur when the following conditions are met;

- records of monitoring are available to confirm the presence of the pest organism at levels of concern (i.e., pests could cause damage requiring replacement of significant portions of existing turf)
- that non-chemical alternatives have been applied or effectively considered and found to be ineffective or inappropriate (as documented in records of response decisions)
- all chemical control agents registered for control of the pest of concern have been reviewed and the lowest risk option has been selected, with appropriate safety measures identified.”

At the very least, an IPM program should require detailed record-keeping and submission, which should include records of all pest control measures and their supporting rationale. Such record keeping is a key element of IPM. In describing IPM

requirements, the Town should include the requirement for record-keeping which in turn will serve to demonstrate the other key elements, as identified in Section 2 of this report.

6. Continuing Emphasis on the Education of the Public and on Effective Enforcement Is Essential to the Successful Implementation of the HHL By-law

Public education of the content and scope of a by-law, such as the HHL by-law, is difficult and time consuming and may take place only over a period of time and based on experience and ultimate acceptance of the intent of the by-law.

In 2004, the first full year of implementation of the HHL by-law, staff of the Town's Building and By-law Enforcement Department (the Department) launched a multi-faceted public education program supported by minimal funding. That program⁵ included:

- An information meeting with commercial applicators,
- Two public information sessions for residents,
- Strategically timed press releases which reminded residents and lawn care companies of the by-law and its fundamental restrictions,
- The development and distribution of a poster to all municipal facilities in Caledon to inform people of the HHL by-law, and
- The development and distribution of a brochure that provided information on the by-law, the importance of reducing or eliminating pesticide use, healthy lawn tips and where information on best practices for reducing pesticide use can be found.

In addition in 2004, the by-law was posted on the Town's website and included a list of IPM accredited commercial applicators, frequently asked questions, examples of warning signs, application forms, and links to other sites such as Health Canada.

Generally, given that 2004 was the first full year of implementation of the by-law, the public education program and the enforcement initiatives during that period were deemed to be acceptable.

Most of the elements of the 2004 public education program were continued in 2005. Moreover, Department staff have focussed on seeking the assistance of the retail sector located within the Town during the course of 2005. To date approximately 15 retailers, e.g. Canadian Tire and Wall-Mart, and including nurseries, have been approached and requested to hand out brochures to customers and, in the case of nurseries, to encourage customers to use natural products. Department staff intend shortly to revisit these same retailers to determine the success of this particular initiative.

One day a week of the summer student support for the Environmental Progress Officer was allocated to supplement the education and enforcement effort of Department staff.

⁵ Refer to Building and By-law Enforcement Report 2005-006, date prepared April 13, 2005

In this regard, some social marketing on a one-on-one basis was carried out with very limited success, but a suggested initiative to include by-law education as part of the Welcome Wagon package has been accepted.

Enforcement of the HHL by-law was forecast to be difficult at the outset. Such has proven to be the case, but Department staff are reporting some progress. Approximately eleven lawn care companies have been registered with the Town as IPM accredited. Of this number, there have been three problem cases which the Town is currently addressing.

Perhaps of greater significance is the fact that the IPM-PHC Council has agreed to provide Department staff with quantitative data such as acres treated, chemicals applied and the volume of such chemicals. This data would be a composite for all applicators operating within the Town during the course of 2005. The exact format and content of the report is not known at this time, but Department staff expect its submission after the completion of the current summer season. While the 2005 data will not be terribly useful in and of itself for this year, it will form a benchmark for measuring pesticide use and reduction in subsequent years.

Anecdotal evidence suggests that public education and broadly based acceptance of the by-law by both the public and all lawn care companies operating within the Town has some way to go. Furthermore, while Department staff are credited with doing an admirable job of implementing the HHL by-law with limited funding (refer to Appendix E for comparable enforcement and education costs in some other municipalities), there is a sense that more could be done, e.g. natural product use demonstrations, higher level of by-law publicity, greater emphasis on co-opting the retail sector, etc. There is no doubt that Council needs to be seen to be continuing to strongly support the public education and enforcement efforts of Department staff as they relate to the HHL by-law in order to ensure its successful implementation.

CONCLUSION

IPM is a process originally developed to address concerns about failing efficacy of standard practices of pest control that relied heavily on chemical pesticides. It is has since been recognized that IPM can play a substantial role in meeting the objectives of controlling pests while minimizing potential impacts on the environment and human health. In the latter light, CEAC Report 2002-05 (Best Management Practices of Golf Courses) recommended that the Town of Caledon should require all golf courses to become IPM accredited, similar to lawn care companies. The current HHL by-law has embodied this recommendation and relies on IPM as a means to facilitate compliance of golf courses with the by-law.

The implementation of an IPM program does not mean that pesticide use will be completely discontinued, but it can be a strategy to use less pesticide. The extent to which IPM is effective in this manner is dependent on a number of factors, including the

definition of IPM that sets the standard for what the practice ultimately becomes. For IPM to be effective in significantly reducing pesticide use, a firm definition and a list of key program components is required. Even with these in place, there is a need to ensure that IPM is being implemented as intended. Centralized certification and accreditation programs may be the means to provide both the Town and IPM practitioners a reasonable degree of assurance that IPM is being practiced effectively and in accordance with the intent of the By-law. Any IPM program or accreditation process that is proposed as a means to satisfy the Town's IPM requirement should itself be subject to review by the Town within a process that can readily determine whether or not that program suits the defined definition and key element requirements for an IPM program.

APPENDIX A

The following is a list of definitions of IPM from various stakeholder groups, including Canadian and foreign government agencies concerned with agriculture, the environment, and/or human health:

1. Canadian Pest Management Regulatory Agency (PMRA)

IPM is a process for planning and managing sites to prevent pest problems and for making decisions as to when and how to intervene when pest problems occur. It is a suitable approach, combining biological, cultural, physical, and chemical tools to manage populations of pest organisms so that the benefits of control efforts are maximized and the health and environmental risks are minimized.

IPM programs include the following elements:

- Crop management to prevent pests from becoming a threat
- Identification of potential pests
- Monitoring of environmental conditions, pest and beneficial organism populations and pest damage
- A decision process to determine whether or not treatment is required, based on pest population levels and damage levels
- The use of biological, mechanical, and behavioural control methods to reduce pest populations to acceptable levels
- The use of targeted applications of pesticides only when necessary, and
- The inclusion of a built-in evaluation process.

2. Ontario Ministry of Agriculture and Food (OMAF) – Integrated Pest Management for Turf

Integrated pest management is a broadly based method that uses all suitable control measures to reduce pest related losses to an acceptable level with the goal of respecting genetic diversity and reducing risks to human health and environment. The fundamentals of an integrated pest management program are:

- planning and managing turf to prevent organisms from becoming pests
- identification of potential turf pests
- monitoring populations of pests, beneficial organisms and all other relevant environmental factors
- establishment of damage/action threshold
- application of cultural, physical, biological, behavioural and chemical control measures to maintain pest populations below threshold levels
- evaluation of the effects and efficacy of pest control measures used

3. IPM-PHC Council (from “Healthy Lawns, Healthy Families”)

IPM is a multidisciplinary, ecological approach to the management of plant health problems based first on good horticultural practices, and when needed, a control (biological, cultural, genetic or mechanical), using chemical treatments only when necessary. IPM operates within a framework of protecting human health, respect for the diversity of ecosystems and the protection of the environment. IPM aims to reduce and control the populations of harmful organisms, rather than to eradicate them.

4. Integrated Pest Management for Ontario Apple Orchards (OMAF)

As per OMAF Publication 310 (1999), IPM is a multi-disciplinary approach to managing agricultural pests in a manner that is environmentally sustainable and economically viable. IPM integrates cultural, biological, and chemical controls with a thorough knowledge, understanding, and use of:

- pest biology and behaviour
- monitoring techniques
- economic thresholds
- use and timing of appropriate management tools
- record keeping
- resistance management strategies"

5. Nova Scotia Ministry of Environment and Labour

- a. Pest: A pest is any harmful, noxious or troublesome organism. Pests include any insects, mites, rodents, nematodes, fungi, weeds or other organisms that are injurious to the health of human beings, plants, animals or the environment.
- b. IPM: Integrated Pest Management (IPM) is a means of keeping pest damage below unacceptable levels. This is done by routinely monitoring pest problems and managing them by using a combination of preventive practices and carefully selected control treatments. IPM is based on the principle that a combination of strategies is more effective in the long run than reliance on a single strategy.

6. British Columbia (B.C.) Integrated Pest Management Act (2005)

The Act defines IPM as “a process for managing pest populations that includes the following elements:

- Planning and managing ecosystems to prevent organisms from becoming pests;
- Identifying pest problems and potential pest problems;
- Monitoring populations of pests and beneficial organisms, damage caused by pests and environmental conditions;
- Using injury thresholds in making treatment decisions;
- Suppressing pest populations to acceptable levels using strategies based on considerations of:
 - Biological, physical, cultural, mechanical, behavioural and chemical controls in appropriate combinations,
 - Environmental and human health protection; and
- Evaluating the effectiveness of pest management treatments.”

7. New Brunswick Department of Agriculture, Fisheries, and Aquaculture

At the core of current definitions in New Brunswick are two important concepts: IPM is based on preventing pest problems, and IPM is a decision-making process for determining what actions to take when pest problems occur. In IPM programs, all available information and treatment methods are considered in order to manage pest populations effectively, economically and in an environmentally sound manner. The elements of IPM, as defined nationally, are:

- preventing organisms from becoming pest problems by planning and managing ecosystems,
- identifying pest and beneficial species,
- monitoring pest and beneficial species populations, pest damage and environmental conditions,
- using injury and action thresholds to determine when to treat pests,
- using treatments that usually include a combination of methods, such as cultural, biological, physical, mechanical, behavioural, or chemical methods, to achieve acceptable control with minimal impact on the environment, and
- evaluating the effects and efficacy of pest management strategies.

8. City of London IPM Plan

Integrated Pest Management (IPM) is a holistic decision-making process that uses all necessary techniques to suppress pests effectively, economically and in an

environmentally sound manner to sustain healthy, functional landscapes while protecting human health, especially that of pregnant women and children. IPM aims to reduce and control the populations of harmful organisms rather than to eradicate them. The elements of IPM include:

- Identifying potential pest organisms.
- monitoring pest and beneficial organism populations, pest damage and environmental conditions.
- Managing ecosystems to prevent organisms from becoming pests.
- Managing pest populations by careful attention to plant health and use of cultural practices to minimize chance of pest problems.
- In the event that tolerance levels are exceeded, IPM uses control strategies that combine biological, cultural, mechanical, behavioural solutions, and, as a last resort, chemical control.

9. United Nations (UN) Food and Agriculture Organization (FAO)

Integrated Pest Management is the careful integration of a number of available pest control techniques that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and safe for human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption of agro-ecosystems, thereby encouraging natural pest control mechanisms.

10. United States Environmental Protection Agency (EPA)

Integrated Pest Management (IPM) is the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to people, property, and the environment (<http://www.epa.gov/pesticides/food/ipm.htm>).

11. The U.S. EPA's IPM Manual for Schools

Integrated pest management (IPM) is an approach to pest control that utilizes regular monitoring and record keeping to determine if and when treatments are needed, and employs a combination of strategies and tactics to keep pest numbers low enough to prevent unacceptable damage or annoyance. Biological, cultural, physical, mechanical, educational, and chemical methods are used in site-specific combinations to solve the pest problem. Chemical controls are used only when needed, and in the

least-toxic formulation that is effective against the pest. Educational strategies are used to enhance pest prevention, and to build support for the IPM program.

12. U.S. Congress

In 1996, U.S. congress defined Integrated Pest Management (IPM) as "a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health and environmental risks."

13. The National Golf Course Owners Association of Canada

Integrated Pest Management (IPM) is a decision-making process that uses all necessary techniques to suppress pests effectively, economically and in an environmentally sound manner to sustain healthy landscapes with the goal of respecting genetic diversity and reducing risks to human health and environment.

14. Cornell University

Integrated Pest Management (IPM) is the application of an interconnected set of methods for managing pests, including pest prevention techniques, pest monitoring methods, biological controls, pest attractants and repellents, biopesticides, and pesticides. From Cornell University (New York) IPM website at <http://www.nysipm.cornell.edu/publications/whatiscomm.html>

15. The University of California, Riverside

IPM as "multiple tactics used in a compatible manner in order to maintain pest populations below levels that cause economic or unacceptable aesthetic injury without posing a hazard to humans, domestic animals, or other non-target life forms." IPM combines all available pest management methods to produce the healthiest lawn possible. It does not aim to totally eliminate pests, but to maintain pest populations at tolerable levels. Pesticides are often part of an IPM program, but are selected and applied responsibly to avoid health risks to other living organisms than those targeted.

16. IPM Almanac (<http://www.ipmalmanac.com/>)

IPM is an approach to solving pest problems by applying knowledge about the pest to prevent them from damaging crops. IPM means responding to pest problems with the most effective least-risk option. Under an IPM approach, actions are taken to control insects, disease or weed problems only when their numbers exceed acceptable levels. When considering these actions, all pest management methods should be reviewed including natural, biological, cultural and chemical.

17. The IPM Institute (<http://www.ipminstitute.org>)

IPM is an approach to solving pest problems by applying our knowledge about pests to prevent them from damaging crops, harming animals, infesting buildings or

otherwise interfering with our livelihood or enjoyment of life. IPM means responding to pest problems with the most effective, least-risk option. Under IPM, actions are taken to control pests only when their numbers are likely to exceed acceptable levels. Any action taken is designed to target the troublesome pest, and limit the impact on other organisms and the environment. Applying pesticides to crops, animals, buildings or landscapes on a routine basis, regardless of need, is not IPM. Applications of pesticides are always the last resort in an IPM program.

APPENDIX B

The following is a list of tasks implemented to achieve *Goal 2: Cultural Practices and IPM Techniques* of the Audubon Cooperative Sanctuary Program for golf courses.

- Maintain green, tee, and fairway mowing heights at levels that can be reasonably maintained on a day-to-day basis without continually stressing turf or maximizing chemical inputs.
- Inventory soil types for all playing surfaces and assess conditions such as soil structure, nutrient levels, organic content, compaction, and water infiltration.
- Work to improve soil health. This may include: amending organic content, aerating, and
- Improve water infiltration to cultivate a diverse, living biotic soil community.
- Make decisions to apply fertilizers based upon soil test information.
- Maximize turf health and minimize resource inputs by improving turf conditions.
- Plant more pest-resistant or stress-tolerant cultivars on playing surfaces and in landscaping. Select plant species/cultivars best suited for our climate, soils, and growing conditions.
- Improve and manage plant materials for landscaped areas, gardens, and larger wildlife habitats to maximize health and minimize resource inputs.
- Have trained personnel assigned to monitor plant health and pest populations as part of the IPM program.
- Identify and record turf “hot spots” where disease or insect outbreaks first occur. Identify other areas where poor growing conditions often lead to problems.
- Use scouting forms to record the type, severity, location, and treatment of pest problems.
- Establish aesthetic and functional thresholds for major pest types (insects, fungal diseases, weeds) for all managed areas.
- Evaluate potential control measures, including cultural, biological, physical, and mechanical controls, and also chemical methods.
- Determine the environmental impact of pest control measures, e.g. leaching and runoff potential, toxicity to non-target organisms, soil absorption capacity, pesticide persistence, water solubility, effects on soil microorganisms.

- Actively work to reduce turf stresses and change cultural practices or other conditions to prevent or discourage recurrence of problems.
- Maintain records of treatments employed and their effectiveness and use them to guide future pest control decisions.

APPENDIX C

The following is a verbatim description of the IPM-PHC Accreditation process, as obtained from landscape Ontario (<http://www.landscapeontario.com/phc.php>)

Purpose:

The IPM accreditation process will help reduce reliance on pesticides through the application of Integrated Pest Management (IPM) and Plant Health Care (PHC) principles, with particular emphasis on the implementation of:

- a. Cultural practices that promote optimum plant health
- b. Pest prevention
- c. Application of pesticides only when necessary
- d. Use of reduced risk products

How It Works

- IPM accreditation accredits companies and/or organizations that demonstrate commitment to the principles of IPM.
- IPM is an approach that uses all available techniques in an organized process to suppress pest populations in effective, economical and environmentally safe ways.

Governing Body

- The PHC/IPM Council of Ontario
- Includes industry associations, government regulators and community environmental groups who are committed to introducing PHC/IPM as a method for reducing pesticide use.
- Council sets standards for the accreditation procedure and make decisions on conferring and revoking accreditation privileges.

Accreditation Process:

1. Pass an examination based on an IPM study resource package developed by the IPM Council.
2. Materials will vary by sector i.e. Lawncare, Landscape, Structural, Golf Course, and Municipal Parks etc. Training programs will be delivered in a variety of methods through Internet, college, university, private trainers or individual study
3. Commit to ongoing Professional Development by earning at least 10 Continuing Education Units (CEU) of accredited education programs per year. The IPM Council will confer accreditation on seminars run by Associations, schools or private trainers.
4. Follow the IPM Code of Practice. The Code will vary by sector
5. Submit to a company/organization audit, which would ensure that the principles of IPM are upheld. The audit for the lawn care sector may include the following items:
 - a. Evaluate marketing/education materials
 - b. Review customer education pamphlets

- c. Examine employee training activity
- d. Review pesticide reduction records (active ingredient/sq. metre)
- e. Gauge the degree to which the company/organization practices the principles of IPM and PHC (Cultural Practices, Pest Identification, Monitoring, Action Decisions, Treatments, Prevention, Controls, Evaluation).

Auditors will be third party individuals with demonstrated experience and knowledge of IPM as determined by the IPM Council.

IPM Code of Practice (Lawn Care)

1. Agree to follow the IPM/PHC Code of Practice.
2. Focus their business on the promotion and implementation of cultural practices such as using optimum soil depth and quality, suitable turf varieties, over-seeding, proper mowing heights, watering, fertilizing, aeration and/or de-thatching as components for maintaining healthy lawns and landscapes and preventing pest problems.
3. Will encourage, educate and solicit the assistance of the property owner/manager in ensuring that optimum cultural practices are followed.
4. Monitor the customers' lawn and landscape for pest infestation at regular intervals and maintain a log of observations. Will provide the collected monitoring data in support of a province wide monitoring network and database. This information will be relayed to a provincial monitoring database every two weeks from March to November.
5. Support the principles of Integrated Pest Management as defined by Health Canada.
 - o Integrated Pest Management or "IPM is a decision-making process that uses all necessary techniques to suppress pests effectively, economically and in an environmentally sound manner to sustain healthy landscapes."
 - o The elements of IPM include:
 - Identifying potential pest organisms.
 - Monitoring pest and beneficial organism populations, pest damage, and environmental conditions.
 - Managing ecosystems to prevent organisms from becoming pests.
 - Managing pest populations using strategies that combine biological, cultural, mechanical, behavioural, and when necessary chemical control.
6. Support mandatory IPM re-certification for all licensed employees.
7. Document pesticide reduction and pesticide alternative strategies through IPM and agree to monitor and keep records of pesticide use (active ingredient/ square metre) for audit purposes.
8. Offer a pesticide free alternative to customers who choose not to use pesticides.
9. Not apply pesticides unnecessarily.

10. Not sell programs that are based on numerous pesticide applications but rather encourage programs and services based on PHC/IPM.
11. Use pesticides only after examination (monitoring) and diagnosing, and in combination with additional horticultural measures.
12. Will prepare all sites for proper application i.e. remove items from the lawn etc.
13. Will apply treatments that are properly timed to maximize effectiveness. (Preventative treatments are discouraged and will only be used based on pest history as locally monitored. A province wide monitoring system will also be utilized.).
14. Utilize spot treatments for the control of weeds and insects. Blanket applications are only used if warranted.
15. Implement an effective staff training and safety procedure.
16. Apply pesticides only to target areas.
17. Implement buffer zones (where necessary) when making applications adjacent to sensitive sites.

APPENDIX D

The following is a verbatim description of the Pesticide Industry Regulatory Council (PIRC) IPM Accreditation Process and Code of Conduct, as obtained from the PIRC website (www.pirc.ca or www.oipma.ca)

IPM Accreditation Process

Process:

PIRC in its continuing efforts to promote pesticide safety for the environment and human health administers and delivers an affordable, accessible, workable and accountable company IPM Accreditation program attached to the MOE approved Pesticide Technician Program administered by the PIRC in cooperation with the IPM-EHC Council and the OIPMA.

PIRC and the IPM-EHC Council conducts and provides small business employers various processes through educational participation, (i.e., distance education, home study, online, attendance, audits, reports, oral and written examinations) to maintain their company IPM Accreditation status based on study resource packages developed and or recommended by the PIRC and IPM-EHC Council. Materials will vary by sector i.e. Lawn care, Landscape, Structural, Golf Course, and Municipal Parks etc. Training programs will be delivered in a variety of methods through the PIRC / OIPMA / IPM-EHC Council.

Members commit to follow the IPM-EHC Code of Practice.

Members commit to ongoing OIPMA professional development by earning at least eight (8) continuing education credits (CEC's) per year. PIRC and the IPM-EHC Council will confer accreditation on seminars and programs run by its member Associations, or private trainers. Submit to a company audit, which ensures the principles of IPM are upheld. We accomplish this through members' completed reporting submissions void of high costs and red tape too onerous for small business.

The Desk Review Audit currently includes the following items:

- Review and evaluate company IPM marketing and consumer educational materials
- Review and evaluate to what degree the company practices the principles of IPM (Regulatory, Cultural, Pest Identifications, Monitoring, Treatments, Prevention Controls, etc.)
- Review and evaluate company PTP and IPM training activities
- Review and evaluate company pesticide usage records

Qualification of IPM Auditors:

Auditors will be individuals with demonstrated professional certified IPM industry experience and knowledge who possess at least 10 years certified IPM industry field experience in at least three fields, land, water, and structural or such other persons as determined by the PIRC in cooperation with the IPMEHC Council.

PIRC / IPM-EHC CODE OF CONDUCT:

(last revised April 10, 2005)

Member in-house accredited PTP examiners and IPM agents and organizations will:

1. Agree to follow PIRC provided guidelines set out by Regulatory bodies and this IPM-EHC Code of Practice.
2. Support PIRC independent and affordable ongoing monitoring/auditing of the professional IPM small business industry who daily promote pesticide safety for the protection of the environment and human health.
3. Focus their business on adherence to Regulation 914, and support and promote the red tape free principles of Integrated Pest Management (IPM) as defined by Health Canada consistent with its Action Plan for Urban Use Pesticides. Monitor at regular interval customers' property for pest infestation and maintain a log of observations. Provide relevant collected environmental health care monitoring data in support of a province-wide monitoring network and database based on business activity, i.e., Mosquito Abatement, Emerald Ash Borer, Lawn Care, Pharaoh Ants, etc.
4. IPM is a decision making process that takes into consideration and uses all necessary technology and techniques to monitor, suppress, and control pests effectively, and economically. This, in an environmentally sound manner by IPM pest management professionals engaged in every certified field, i.e. agriculture, aquatic, structural, lawn care, and related horticultural activities to achieve healthy landscapes. The elements of IPM include: Identifying potential pests and pest organisms; monitoring pest populations; pest damage and environmental conditions; managing structural and ecosystems to prevent organisms from becoming pests; managing pest populations using strategies that combine biological, cultural, mechanical, behavioural and as necessary, prudent use of least risk chemical controls.
5. Use pesticides only after examination (monitoring) and diagnosing, and in combination with additional IPM horticultural measures or structural principles and practices. Not apply pesticides unnecessarily. Document pesticide usage and pesticide alternative strategies through IPM and agree to monitor and keep records of pesticide usage to aid in your reduction program for PIRC and its IPM-EHC council monitoring/auditing. Apply treatments that are properly timed to maximize effectiveness. Monitoring techniques will be used to discourage unnecessary treatments and to anticipate potential pest problems based on pest history in combination with local monitoring or the results of PIRC province-wide monitoring.
6. Implement effective staff pesticide safety and updating training program based on PIRC provided updates in regards to Regulatory and sustainable IPM Technology,

- and adherence to the IPM-EHC Code of Conduct. Encourage, educate and solicit the assistance of property owners and others in charge to follow optimum IPM principles, including cultural practices. Monitor the customer's premises and or property for pest identification at regular intervals and maintain a log of observations on the customer's premises and or property.
7. Offer a pesticide-free alternative to customers who choose not to use pesticides. Implement buffer zones (when necessary) when making applications to sensitive sites. Utilize spot treatment for the control of pests (i.e., insects and weeds). Blanket applications only used if warranted and following strict label directions. Determine the threshold to reduce unnecessary applications.
 8. Focus lawn care business on promotion and implementation of cultural practices where possible i.e. using optimum soil depth and quality, suitable turf varieties, overseeding, proper mowing heights, watering, fertilizing, aeration and dethatching as components for maintaining healthy lawns and preventing pest problems.
 9. Not sell programs based on numerous pesticide applications, but rather encourage programs based on Integrated Pest Management Environmental Health Care, (IPM-EHC), for turf and plants. Prepare all sites for proper application (i.e. removal of items from lawn, etc.). Not advertise more than two weed applications, prudently applied, as required, in any annual lawn care program. Support prohibition of telemarketing of pesticide services to the public between the months of November through February annually, unless an active client of the company serviced in the past 18 months and a history has been established.
 10. Support that a certificate issued by the PIRC, (without exclusiveness), that confirms annual Regulatory and IPM Technology updating is recognized to meet the Framework re-certification criteria of the Standard for Pesticide Education, Training, and Certification in Canada by the MOE to waive rewriting every five years. Additionally, a one-day seminar attendance will be mandatory in order to obtain a PIRC verification letter of updating certificate prior to one's license renewal date. (This enhanced updating training far exceeds USA re-certification and is in accordance with 1995 government and MOE policy to eliminate red tape and assist small business.)

APPENDIX E

A Comparison of Enforcement and Education Costs

Vancouver (Enforcement and Education)

\$179,120 / 545,671 = 32 cents per capita 2004

\$100,000 / 545,671 = 18 cents per capita 2005 (Year 1 - By-law)

Halifax (Enforcement and Education)

\$120,000 / 359,111 = 33 cents per capita 2001 (Year 1 - By-law)

\$197,000 / 359,111 = 55 cents per capita 2002 (Year 2 - By-law)

\$195,000 / 359,111 = 54 cents per capita 2003 (Year 3 - By-law)

Toronto (Enforcement and Education) *

\$450,000 / 2,481,494 = 18 cents per capita 2004 (Year 1 - By-law)

* includes \$225,000 Provincial subsidy from MoH

Vancouver (Enforcement Only)

\$85,000 / 545,671 = 5 cents per capita 2004

\$85,000 / 545,671 = 15 cents per capita 2005

Halifax (Enforcement Only) *

\$32,000 / 359,111 = 9 cents per capita 2001

*achieved over 90% compliance in first year (2001).

Ottawa (Education Only) *

\$400,000 / 774,072 = 51 cents per capita 2002

\$319,000 / 774,072 = 41 cents per capita 2003

* includes Provincial subsidy from MoH of \$150,000 in 2002 and \$109,000 in 2003.

Pesticide education campaign resulted in a six percent (6%) INCREASE in use of synthetic lawn pesticides

Vancouver (Education Only)

\$94,120 / 545,671 = 17 cents per capita 2004

\$15,000 / 545,671 = 2 cents per capita 2005

Halifax (Education Only)

\$88,000 / 359,111 = 24 cents per capita 2001