

REDUCING ENVIRONMENTAL RISKS FROM PESTICIDES IN URBAN LANDSCAPES: METRO-ATLANTA AS A CASE STUDY

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Abstract. Little definitive data is available on pesticide use in metropolitan areas. Questionnaires on pesticide use and pest management practices were mailed to landscape maintenance/lawn care firms in the metro Atlanta area; 350 firms responded. Of these firms 159 provide pest management services for turfgrass or ornamentals or both. Responding professionals purchased 13,210 kg AI of insecticides, 93,447 kg AI herbicide, and 3,867 kg AI of fungicides during 1993. Total area serviced by these firms was 14,770 ha.

Insecticides were most frequently applied to ornamentals (65%), while herbicides were primarily used on turf (93% preemergence, 79% postemergence). Fungicides were more evenly distributed. Prescheduled applications determined timing of application for 32% of respondents, while 46% report that monitoring of pest populations influences treatment decisions. Only 8% of respondents incorporate monitoring of beneficial arthropods into this decision-making process. Although practices reported by the industry include many principles of integrated pest management, more education of maintenance professionals and consumers to include greater incorporation of pest resistant plant materials and biological control agents is warranted.

INTRODUCTION

A concerned landscape management industry is currently experiencing an increased transition toward integrated pest management. Garber and Bondari (1996), for example, report a trend toward greater usage of non-chemical pest control measures among landscape maintenance firms in Georgia from 1988 to 1993. The usage trend for chemicals during that period as reported by firms responding to a survey was an increase for fungicides/bactericides and herbicides and a decrease for insecticides, with growth regulator use remaining steady.

Estimates of quantities of active ingredients of pesticides applied to landscape turf and ornamentals are not, however, readily available. The present study was undertaken to obtain definitive data concerning pesticide use and pest management practices currently utilized in Atlanta, one of the fastest growing metropolitan areas of the country. These data will support the development of educational programs to facilitate implementation of integrated pest management within the landscape management industry.

MATERIALS AND METHODS

An extensive questionnaire was mailed to landscape maintenance and lawn care (LM/LC) firms within the 20 county Atlanta Statistical Reporting District. This area was selected because of the high concentration of commercial activity and high population density. The list was developed using business license records and membership lists from the professional associations Metro Atlanta Lawn and Turf Association, Professional Lawn Care Association of America, Georgia Green Industry Association, and the Professional Grounds Management Society. The gross return rate of 25.4% yielded a total of 350 usable questionnaires.

The industry was characterized by a disparity in stability (age of firm) and size. A relatively young age (less than ten years old) and limited size characterize the majority of firms in the densely populated metro-Atlanta area (Florkowski et al. 1996). Most firms generated no more than \$100,000 in sales during 1993 and provided services for no more than 25 residential accounts. A few respondents, however, represented major firms with more than 25 years of experience, annual gross sales exceeding \$1,000,000 and servicing more than 500 clients.

Survey respondents identified which services their firm provided on turf and ornamentals. Those firms that provided pest management services were asked to indicate the amounts of various herbicides, insecticides, fungicides, and growth regulators that they purchased during 1993. To determine seasonal application rates, respondents were asked to estimate what percentage of the total annual distribution of each of the classes of chemicals was applied during each of four 3-month periods. Finally, respondents were asked how their firm determines when to treat for diseases, insects or mites.

RESULTS AND DISCUSSION

Services Offered. Lawn care and landscape maintenance firms provide a variety of services in the metro-Atlanta area. Fifty to 75% of responding firms are involved with plant selection, landscape design, turf and/or ornamental installation, and plant maintenance once plants are in place. Pest management services were provided for turf and ornamental plants by about 48% of responding firms. The remainder of the discussion refers to those respondents who indicated that they provided pest management services for turf or ornamentals or both.

Types of Pesticides and Amounts Applied. Respondents purchased more than 40 different product formulations for insect and mite control during 1993, resulting in a combined purchase of 13,210 kg AI of insecticides by the 159 firms that provide pest management services. A similar array of pre- and post-emergence herbicides and more than 25 fungicidal products were purchased for a combined total of 93,447 kg AI of herbicide and 3,867 kg AI of fungicidal products purchased during 1993. Only six plant growth regulator products (157 kg AI) were reported as purchased by responding firms during this time.

Total area of serviced accounts for firms which provided pest control services was 14,770 hectares. About 45% of this area was categorized as residential, 51% as commercial, and 4% as utility or right of way areas. Therefore, the amount of active ingredient of pesticides per hectare from professional use is estimated as 6.3 kg/ha for herbicides, 0.9 kg/ha for insecticides, and 0.3 kg/ha for fungicides in the metro-Atlanta area. These estimates do not include homeowner use which may exceed that of landscape professionals. Nationally, only about 15% of residential properties are serviced by professional lawn care/lawn maintenance firms.

Results of our survey showed that horticultural oils are used extensively for the management of ornamental plant pests, accounting for 42% of the total active ingredient of insecticides purchased for use in the metro-Atlanta area. Insecticidal soaps account for only 2% of the total active ingredient purchased. Traditional insecticides, such as products containing chlorpyrifos, acephate, and carbaryl, were also among those most commonly purchased by LM/LC professionals. Over 20% of the total active ingredient purchased included materials like hydramethylnon and isofenphos which are used primarily for control of imported red fire ants and grubs. Synthetic pyrethroids, such as cyfluthrin, fluvalinate and the more recently registered lambda-cyhalothrin, were purchased by less than 20% of the firms which provide pest management services, but account for less than 3% of the total active ingredient. Less than 2% of firms that provide pest management purchased environmentally benign products like the neem-based products (e.g., Azatin, Bioneem, Margosan-O, Turplex).

Among the most commonly purchased herbicides were glyphosate, dicamba, MCPP, 2,4-D, and pendimethalin. The fungicides thiophanate methyl, metalaxyl, oxazoladinedione and triadimeton were each purchased by 17 to 19% of respondents while chlorothalonil was purchased by 50% of the firms supplying pest management services.

Pesticide Use for Different Plant Types. Respondents were asked to indicate whether each product was applied to turf, ornamentals or to both plant types. Insecticides were most frequently applied to ornamentals (65%) while herbicides were primarily used on turf (93% preemergence; 79% post-emergence). Fungicides were more evenly applied among plant types. Garber and Bondari (1996) reported that 55% of current pesticide usage in landscape maintenance is for turf management, while shrubs/ground covers accounted for about 33%, and 12.5% was applied to trees. Programs with the objective of reducing

pesticide use should include components for alternative management of each group of target pests; weeds, insects, and disease causing organisms. Opportunities and imperatives clearly exist for modifying public tolerance of some low to moderate levels of weed and insect presence. Defining these aesthetic thresholds and increasing public acceptance of moderate pest pressure are current critical research and education needs.

Timing of Pesticide Applications. The majority of insecticides (55%) were applied from June through August, coinciding with greatest pest activity. While 46% of fungicides were applied during that same time period, 31% of the fungicides was applied from March through May, and only 17% was applied in the fall. The proportion of total herbicides applied during any 3-month period is more evenly divided than other types of pesticides applied.

When respondents were asked "How do you determine when to treat for diseases, insects or mites?", the most often selected response was "when pests and/or damage are found to be present." Although 32% of the respondents indicated treatments were applied on a predetermined schedule, 46% reported that pest activity was monitored. Only 8% of respondents, however, indicated that beneficials are regularly monitored or influenced treatment timing. Customer requests determined timing of applications for 55% of respondents. These results suggest that incorporation of natural enemies into landscape integrated pest management has been slower than the adoption of other IPM tactics, such as the use of horticultural oils. A lack of fundamental knowledge concerning the biology and potential impact of indigenous natural enemies inhibits their incorporation into the decision-making process.

CONCLUSIONS

Pesticide use reported here for the Lawn Care/Landscape Maintenance Industry in the metro-Atlanta area parallels EPA estimates for total pesticide use in the United States with herbicide use (281 million kg) exceeding insecticide use (112 million kg) followed by fungicides (59.4 million kg) (Aspelin, 1994). Opportunities for research and educational efforts identified in the present study similarly included education of the consumer and increased incorporation of biological control agents in management decisions. These survey results also suggest the importance of designing educational programs that target both types of firms identified in the survey; small firms with relatively little experience, and relatively low sales and equipment, and large well established, highly-capitalized firms. Practices reported by the industry seem well in line with the integrated pest management concept, including fairly extensive use of horticultural oils and timing of treatments based more on monitoring of pest activity and less on predetermined applications of pesticides.

Finally, we must be cognizant of the existence of additional opportunities to reduce the need for pesticides in the landscape. For example, when landscape maintenance firms were asked to

identify ways that landscape architects could reduce the need for pesticide use (Garber and Bondari 1996), the most frequently identified opportunity was in better plant selection, particularly in the use of pest resistant plants. Since landscape architects specify about 75% of the plants used by landscape installation firms in Georgia (Garber and Bondari 1992, 1995), they have a large influence on plant material placed in the landscape. Thus, this group represents an ideal target audience for educational efforts with the goal of reducing the need for pesticide use in the landscape.

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