

Reducing Residential Pesticide Use

Submitted to:
Southwest Florida Water Management District

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Background

Late in the afternoon of April 1, 1990, a 3-year-old girl playing in front of her trailer home in California's San Joaquin Valley suddenly lost control of her body and began foaming at the mouth. By the time the girl arrived at the local emergency room, she was near death. She recovered eventually.

-Matt Crenson, the Associated Press, December 9, 1997

A tractor carrying pesticides was parked in front of the little girl's play area. A report filed with the California Department of Pesticide Regulation concluded that the child had been poisoned by a highly toxic insecticide that works like a nerve gas to kill unwanted organisms—bugs, not children. Such confirmed incidents of acute pesticide poisoning are rare or, at least, rarely reported. Experts are more concerned with long-term, low-level damage that can show up decades after a child has been exposed to dangerous pesticides.¹ Such side-effects of pesticide exposure include neurological dysfunctions, cancer, reproductive problems, reduced growth and development, and birth defects.²

America's obsession with the perfect lawn is a dangerous one. In 1996, the American Association of Poison Control Centers reported 97,278 calls regarding pesticide poisonings.³ Although this high number of calls seemingly indicates that pesticide poisonings are regularly reported, the number may be an underestimation of the actual number of poisonings, as pesticide poisonings are not always easily identifiable. In a review of the medical records of 20 children with pesticide poisoning, sixteen were originally misdiagnosed with such conditions as pneumonia, whooping cough, head trauma and brain hemorrhaging.⁴ Five of the twenty children, all infants, were poisoned from home application of pesticides and an older child was poisoned after having mowed a lawn recently sprayed with an organophosphate.⁵

Children and infants are at greater risk of developing health problems due to pesticide exposure because of their unique circumstances.⁶ Fetuses, infants and children are growing rapidly, with dividing cells and developing organ systems that can be compromised by chemical hazards. Also, a child's higher skin area to body weight ratio means that, on a relative basis, children eat more, drink more and breathe in more than adults. In addition, children can be exposed to pesticides in breast milk and formula, through skin contact with treated areas while crawling and playing, and through incidental ingestion such as from hand-to-mouth transfer.⁷ For similar contact reasons, pets are also at greater risk.

Skin-to-surface contact and indirect hand-to-mouth ingestion are not the only means of coming in contact with pesticides. When pesticides are applied to suburban and urban lawns, rainwater washes the dangerous toxins into storm drains where the pesticide-contaminated water runs through drains and storm pipes, eventually running into streams, lakes and rivers.⁸ Pesticides may also seep down through soil and into groundwater systems that may be used for drinking water.⁹ In the U.S., approximately one billion pounds of pesticides are used yearly.¹⁰ Some of these pesticides end up in

surrounding bodies of water. The United States Geological Survey's National Water-Quality Assessment reports that 90% of water and fish samples from all sampled streams contained at least one pesticide.¹¹ High pesticide levels in waters have also been linked to low sperm count in men, the decline of amphibians, harmful disruptions to aquatic ecosystems and endocrine disruption in fish.¹²

Reducing residential pesticide use will not only protect humans, and especially growing children, from coming in contact with harmful toxins through eating food, drinking water and playing, but it will save money for both homeowners and municipalities in the long run. Cleaner water and healthier people mean a better economy, and switching to organic alternatives, while perhaps more costly up-front, is more economical for homeowners over time because organic alternatives are less expensive than pesticides.¹³ While there are compelling economic reasons for switching to organic alternatives, no monetary value can be placed on either health or life.

Numerous studies have identified the dangers of residential pesticide use. In some areas of North America, however, pesticides continue to be used at an alarmingly high rate. Why, despite the accumulating evidence that pesticides are damaging to our health, do they continue to be used? Like all other environmental behaviors, there are unique sets of barriers and benefits to both reducing residential pesticide use and to encouraging safer alternatives.

Barriers and Benefits

Aceti & Associates reported the following factors as being related to pesticide use by homeowners:

- Perceived low environment and health risks
- A narrow standard regarding acceptable lawn appearance
- A perceived need for pesticides over organic alternatives
- Limited sources of lawn care information and, therefore, a lack of knowledge on the dangers posed by pesticides
- Social pressure to maintain lawns
- Higher property values that are associated with attractive lawns
- The cost, time and knowledge needed to change one's lawn care practices¹⁴

Similarly, in a survey of residents of Fredericton, New Brunswick, social pressure to maintain an attractive lawn, low perceived risks and a high value put on the appearance of one's lawn were identified as barriers to reducing pesticide use.¹⁵ Negative attitudes toward pesticide alternatives and the belief that the perceived benefits outweigh the perceived risks were also identified as additional barriers to reducing pesticide use.¹⁶

In the FTP 2004 Healthy Lawns Homeowner Survey Report, the belief that pesticides are easier to use than alternatives parallels the transition difficulties identified as

barriers in the Aceti & Associates report.¹⁷ In addition, the survey found that a further barrier was residents being unaware that they were using synthetic pesticides when using “weed and feed” products.¹⁸

Lawn care companies are up against many of the same barriers to reducing pesticide use as homeowners, such as low perception of risk and lack of knowledge. In addition to those barriers, however, these companies have demanding customers to please who want results for their lawns.¹⁹ Retailers find high-volume sales of pesticides a barrier to attempting to promote organic products, as well as a lack of knowledge about organic alternatives or less toxic pesticides.²⁰

The following are motivations (benefits) identified by Aceti & Associates for homeowners to reduce residential pesticide use:

- reducing health risks of children, pets and other wildlife
- preventing contamination of well water and waterways
- saving money over time
- pleasing one’s friends and neighbors²¹

In the Healthy Lawns survey, over half of participants in municipalities with pesticide bylaws use pesticide-free or reduced-pesticide use programs, while over one-third of people surveyed in municipalities that have not passed pesticide bylaws, use a regular lawn care service from their lawn care company.²² This suggests that one particularly strong motivation for reducing pesticide use is a municipal restriction that enforces one to do so. Therefore, complying with a bylaw is a benefit to reducing residential pesticide use.

Summaries of Programs

Seattle and King County, Washington—Natural Yard Care Neighborhoods (NYCN)

In Seattle and King County, Washington (combined population of 2.2 million), there is an educational outreach program called Natural Yard Care Neighborhoods. For seven years, King County has been attempting to persuade the general public to change their lawn care practices, but four years ago their expensive advertising campaign stagnated. The campaign’s efforts could not extend beyond 40% of the target population, indicating awareness of lawn care issues. One and a half million U.S. dollars were expended during the campaign. To reach more homeowners, NYCN revamped their program to include community-based social marketing techniques to combat the barriers to reducing pesticide use. Such techniques include social diffusion, effective communication, norms and commitment. The NYCN program uses a neighborhood workshop approach to educate people about pesticides. In 2005, 16 neighborhoods in 13 cities offered NYCN workshops.²³ On average, 113 residents signed up for the three-part workshops in each neighborhood in 2005, a 64% increase from 2003.²⁴ However, a much lower average of 43 participants per neighborhood workshop actually

attended.²⁵ The program was supported from incremental funding from the cities for an average of \$8,200 USD per community.²⁶

With participating cities, NYCN developed the “Five Principles of Natural Yard Care” to create a clear and effective message.²⁷ The five steps are: build healthy soil, plant right for your site, practice smart watering, think twice before using pesticides and practice natural lawn care.²⁸

The concept behind the workshop method is that social contact with friends and neighbors will help spread knowledge gleaned from the workshops. In 2005 a total of 1,058 attendees at the three workshop trainings were estimated to talk to an average of five other people, thus workshop communications were thought to reach a total of 5,280 people.²⁹ Also at the 2005 workshops, 78% of participants signed a pledge to adopt NYCN practices, thus motivating people to put to practice their new expertise.³⁰ The neighborhood technique hopes to forge norms among neighbors that pesticide-free is the acceptable norm.

In addition to the workshops, King County has used radio and television advertising and the publication of reports and declarations from other governmental agencies and research institutions to promote the adoption of natural yard care techniques.³¹ King County developed a “spokesfish,” Bert the Salmon, to emphasize the message that salmon endangerment is linked to pesticide pollution in waters.³²

King County’s NYCN program and previous advertising efforts were measured and were found to have resulted in over a 20% reduction in pesticide use—a low to medium reduction. The program costs, per capita, \$0.19 USD annually. No solely educational outreach efforts have so far resulted in the same reductions in pesticide use as the combined educational/bylaw approach. However, if effecting a bylaw is not within a municipality’s jurisdiction (as is the case in the U.S.),³³ this is an attractive educational outreach program that other municipalities may wish to use as a starting model.³⁴

Hudson/ St. Lazare/ Notre Dame, Quebec³⁵

Hudson, St. Lazare and Notre Dame de L’Ile Perrot are three small communities in Quebec, Canada, with populations of 4,800, 13,000 and 9,000 respectively. The province of Quebec has a population of 7,500,000. These three communities used a combination of bylaw and educational outreach approaches to garner successful programs. Hudson was the first municipality in Canada to implement a bylaw regulating the use of residential pesticides. St. Lazare followed suit the following year, and Notre Dame passed theirs between 2001 and 2002. The bylaws were enforced similarly by the three communities, with fines ranging in price from \$90–\$900 USD for first-time offenders, between \$180–\$1,800 USD for repeat offenders, and upwards to \$2,700 USD for third-time offenders. Hudson has enforced its bylaw on a complaints basis only, while St. Lazare and Notre Dame have used a combination of education, warnings and fines sustained over a few years to enforce their bylaws. St. Lazare’s bylaw began to be enforced more strongly when the firm Alternative Solutions (AS) was hired to assist them. AS determined that most previous requests for permits to apply banned pesticides were unnecessary. From then on, permits had to be requested by residents

rather than by lawn care companies. This reduced the number of requests made and also gave AS an opportunity to visit residents one-on-one to educate them about organic alternatives.

In addition to the bylaws passed by these communities, educational outreach methods were used. In Hudson, outreach has always remained low-key, but St. Lazare increased its outreach efforts in 2001, and Notre Dame has had a strong educational outreach with home patrolling and visits, as well as horticultural telephone consulting since the pesticide bylaw was passed in 2002. Additional communication approaches were also used, such as two-hour weeknight gardening talks, weekend workshops, articles in the municipal bulletin and newspaper, leave-behind information packages for those visited and a focus on creating municipal pride in being pesticide-free. St. Lazare, for instance, erected a large sign boasting of their city's natural beauty. As well, a pesticide-free campaign identity, featuring a child with a flower and a "no pesticides" symbol, was used on community paperwork in St. Lazare and Notre Dame for several years.

To save money, St. Lazare and Notre Dame partnered with each other to save costs of developing shared newspaper articles and partnered with AS for training and patrolling/visiting residents. The bylaws and educational outreach methods cost each municipality from \$4,500 USD–\$13,500 USD, depending on the size of the community, at \$0.45 USD–\$0.90 USD per capita. All three communities have experienced high reduction levels, between 80%–90%. To keep costs to a minimum, community partnerships were developed, and communities combined education and enforcement through home patrolling/visits. This program is considered by those that implemented it to be very cost-effective.³⁶

Chesapeake Bay, Pennsylvania³⁷

Chesapeake Bay conducted a one-year pilot project promoting the purchase of less toxic lawn care products in the Harrisburg area of Pennsylvania (population 48,950). The surrounding Dauphin and Cumberland counties added to the target population for a total of 450,000 people. The program worked to overcome the barriers involved in reducing sales of pesticide use at the retailer level by partnering with nine retail outlets to train staff in integrated pest management. As well, "shelf-talkers," prompts used to identify safer products, and accompanying literature for consumers to make wiser purchases were utilized. In addition to these community-based social marketing techniques, the project was promoted through public service announcements on television and radio, advertising in print at trade and garden shows, and a campaign whereby people on mailing lists of supporting organizations were mailed post cards about the program.

Initial analysis of the program's effectiveness at the end of its season revealed a 25%–50% decrease in sales of toxic products. However, a follow-up phone survey a couple of months later revealed that reductions had fallen to a lower level of 10%–24%. The cost of the program was estimated to be a modest \$0.24 US per capita. The Alliance believes that their program could have been made stronger with more volunteer help by involving more local partners and retailers. Also, advertising expenditures were quite

high initially due partly to costs for developing the ads, and if the program continued for several years, the advertising portion of the budget would be lowered. To that end, the Alliance and participating retailers believe that it may take more than a year for a program of this nature to achieve its desired results at the desired cost.³⁸

Pesticide Reduction Pilot

An effective pesticide reduction strategy must discourage pesticide use as well as encourage the adoption of alternative lawn care practices that will result in a healthy, pesticide-free lawn. Failure to engage homeowners in alternative lawn care practices is likely to lead a significant percentage of those who initially elect to eliminate or reduce pesticide use to revert to their use when their lawns are not as attractive as they would like.

Discouraging Pesticide Use

For those communities where a pesticide bylaw is not feasible, reducing use will likely necessitate: (1) informing homeowners of the risks associated with pesticide exposure, (2) making it less convenient to purchase and apply pesticides, and (3) increasing social pressure to not use pesticides.

Communicating Risks: Messages regarding the risks associated with pesticide use are best conveyed by a source that is perceived to be credible. Sources who are credible have both expertise on the topic and are perceived to be trustworthy. Prior to committing to who this individual or organization might be, it would be worthwhile to conduct focus groups or surveys in which several potential sources are presented and feedback is sought regarding their credibility. Several mutually nonexclusive methods exist for conveying messages regarding the risks posed by pesticides: personal conversations; having homeowners attend workshops; and radio, television or newspaper advertisements. Of these choices, personal conversations are likely to be the most effective in altering perceptions of the safety of pesticides. More specifically, door-to-door visits by a credible source, such as a public health care worker, may be sufficient to alter homeowners' perceptions. Face-to-face conversations are suggested because they offer two advantages over conducting workshops or utilizing advertisements. First, attendance at hosted workshops is usually low and only involves those who are motivated to attend a session. Second, personal conversations are far more likely to capture a homeowner's attention than is an advertisement. Further, the message that needs to be conveyed does not lend itself well to advertisements, since both the risks associated with pesticide use, as well as alternative lawn care practices, need to be conveyed. While workshops and advertisements might be used to complement the proposed strategy, face-to-face conversations are likely to have the greatest effect of these three alternatives.

It is envisioned that a public health care worker (or some other highly credible source) would go door-to-door in the early spring requesting to speak to homeowners about the

importance of reducing pesticide use. In traditional nuclear families, this conversation should include both male and female heads of households. While women are less likely to be involved in lawn care than are men, they may be more responsive to messages regarding health concerns, particularly as they apply to children. Messages regarding the health risks posed by pesticide use should be vivid in order to increase the likelihood that the message will be attended to and retained. That is, rather than just citing the potential health risks, discussions should provide examples of cases in which children have been poisoned due to pesticide exposures. Further, this conversation should underscore that the risks from pesticides involve exposure due to: (1) applying the pesticide, (2) coming in contact with the pesticide once it has been applied to a lawn, and (3) improper storage.

Making Pesticide Purchase and Use Less Convenient: At present, applying pesticides to a lawn is seen as more convenient than the more labor-intensive alternatives of practicing best cultural practices, such as top-dressing, aeration, etc. While little can be done to make these alternative practices more convenient, much can be done to make the purchase and application of pesticides less convenient. For example, in the spring of 2007 the Province of Prince Edward Island will require that all cosmetic pesticides are kept “behind the counter.” That is, homeowners will no longer be able to walk into a nursery or hardware store and simply pick up a bag of pesticides, pay for it and leave. They will have to request the product from a clerk and the clerk is expected to provide the purchaser with information about the health risks associated with pesticide use.

The following two additional actions can be taken to increase the inconvenience of purchasing pesticides. They are not recommended as part of the proposed pilot as they would require regulatory changes to be enacted. Nonetheless, they both significantly affect the convenience of using pesticides. In many jurisdictions, lawn care companies must send their staff to accreditation courses before they are allowed to apply pesticides to residential lawns. Similar compulsory training and/or testing could be required of homeowners wishing to purchase pesticides. To further increase the inconvenience of using pesticides, dyes can be added to pesticides that degrade at a rate similar to the degradation of the pesticide itself. Not only is the dye aesthetically unpleasing, it also acts as a visual reminder that the lawn is not safe until the dye has disappeared. Dyes are presently used in Australia to warn the public that pesticides have been applied to invasive vegetation. Such dyes could be required as a safety precaution when pesticides are applied to residential lawns either by a lawn care company or by a homeowner.

Increasing Social Pressure to Not Use Pesticides: As noted in the barrier and benefit review reported earlier, homeowners frequently feel social pressure to maintain an attractive lawn. Interestingly, this social pressure is enhanced by the prevalence of signs posted by lawn care companies showing that a lawn has recently been sprayed with pesticides. These signs have the inadvertent effect of indicating that other households in the neighborhood believe that lawns should be kept attractive through the use of pesticides. In contrast, when a homeowner elects not to spray pesticides on their lawn, nothing visibly portrays this conscious decision. To counteract this problem, the

Region of Waterloo asked householders to apply a sticker to the side of their recycling container that clearly demonstrated that the homeowners had elected either to not apply pesticides to their lawn or to reduce their use of pesticides. One sticker carried the message “Our Lawn Is Pesticide-Free,” while the other read “We’re Reducing Our Pesticide Use.” Both signs were made large enough that they could easily be read as motorists or pedestrians pass by.

Promoting Alternative Lawn Care Practices

As noted above, reducing pesticide use must be combined with effective strategies to encourage homeowners to adopt alternative lawn care practices. While ideally we might like homeowners to replace their lawns with xeriscaping, most homeowners will be initially reluctant to make such a large change until the practice is more widespread. For most homeowners to reduce their pesticide use, they will need to be convinced that alternative lawn care practices exist that can still provide them with an attractive lawn. This message is best conveyed by a source that is seen to be credible on this topic, such as a horticulturalist. While it may not be practical to send two people door-to-door, ideally one individual who is perceived to be credible could speak regarding the health risks, while the other could speak knowledgeably regarding alternative lawn care practices and provide specific actions that could be used in place of pesticides. When the Region of Waterloo sent trained students door-to-door to have these conversations with homeowners, they also provided the students with faucet hangers. The students encouraged each homeowner to place the hanger over their outside water tap. The hanger carried the following message: “Let’s curb pesticides: Pesticides can pose risks to human health and the environment” and provided three suggestions for curbing pesticide use: (1) Replacing weed and feed with fertilizer and spreading grass seed in the spring and fall, (2) Mowing high, and (3) Watering deeply but not often. Interestingly, the hanger carried a message regarding reducing water usage on the reverse side — allowing two goals of the Region to be met with one campaign.³⁹

Pilot Evaluation

To assess the effectiveness of the proposed strategy it is suggested that three areas of roughly 100 homes per area be selected. Random assignment cannot be used with this pilot, as the development of social norms regarding pesticide use is a key part of the methodology. As a consequence, these three areas need to be matched closely based upon factors such as property values, size of lots and social-economic data. Each area would be randomly assigned into one of three pilot conditions: (1) the proposed pilot set out above, (2) receiving information about reducing pesticide use via a direct mail or drop-off campaign, and (3) the control group, where no information is provided or contact made with households.

Several methods can be utilized to evaluate the effect of the proposed pilot strategy. First, neighborhood pretesting would be conducted in which researchers would walk through the three neighborhoods, recording the number of households that had

pesticide application lawns or that, based on visual evidence and/or smell, were determined to have self-applied pesticides. These measurements would need to be conducted for several weeks prior to implementing the pilot strategies. The same measurements would be repeated following the implementation of the pilot and differences in the use of pesticides across these three areas would be examined. This proposed form of evaluation assumes that the researcher is able to accurately assess if the homeowner had applied pesticides (e.g., in the absence of a lawn sign). To ensure that this is the case, the ability of a researcher to make reliable observations should first be established. The longevity of any observed differences should also be tested by conducting this evaluation for at least one year after completion of the pilot.

Endnotes

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- ³⁴ Program Contacts:
David McDonald, City of Seattle Public Utilities Tel: 206-684-7650 David.McDonald@Seattle.Gov
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³⁵ All information on this program taken from Kassirer, J. (2004).

³⁶ Program Contacts:

St. Lazare: Claude Larue, (450) 424-8000 x 226

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Nature Action Quebec (450) 441-2138

Alternative Solutions (AC), Micheline Levesque, President, (514) 453-2500,
(email) sae@videotron.ca

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³⁸ Contacts for Program: Brook Lenker, Director of Watershed Stewardship for the Alliance. (e-mail) blenker@abc-online.org

³⁹ Contact Tom Bird at the Region of Waterloo for further information about this program (btom@region.waterloo.on.ca or (519) 883 2008 x5181). At the time of this report evaluations of this program had not yet been conducted.