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Assessing Extension Educators' Needs for Homeowner Pesticide Use and Safety Information

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Abstract: *The study evaluated Extension educators' viewpoints on homeowner pesticide education needs, information availability, and the format and delivery of information that best meets those needs. Homeowner pesticide information requests are made most frequently when assistance is needed to select the proper product, determine the correct use rate, and understand differences in formulations and label*

directions. Homeowner pesticide education materials are easy to locate, but frequently are not in a format likely to be used by this audience. Homeowners often need additional information to make safe and effective pesticide applications, in addition to the specific product and rate information typically requested.

Introduction

Recent studies point to the importance of educating homeowners on proper pesticide stewardship. Farmers and commercial pesticide applicators who apply pesticides on a regular basis receive continuing education on proper pesticide handling and use through Extension, professional association, and company programs. However, homeowners who have no formal training in pest management or pesticide handling may unknowingly put themselves, others, and the environment at risk when making unnecessary and unsafe pesticide applications.

In 1992, a national survey published by the U.S. Environmental Protection Agency (EPA) estimated that 85% of all households in the U.S. had at least one pesticide in storage, while most had between one and five pesticides in or around the home. The survey also reported that when disposing of concentrated pesticide products, 67% used the regular trash; 16% used special collections; and 17% gave it away, poured it down the sink or toilet, or on the ground, street, or sewer (EPA, 1992).

More recent EPA reports indicated that 78 million households (74%) in the U.S. were using pesticides in 2001, compared with 941,000 farms, 33,100 commercial pest control firms, and 421,730 licensed commercial pesticide applicators. The most commonly used pesticides by homeowners were insecticides followed by herbicides. The active ingredients in the five most commonly used pesticides were paradichlorobenzene (moth control), naphthalene (moth control), 2, 4-D (herbicide), glyphosate (herbicide), and DEET (insect repellent) (Kiely, Donaldson, & Grube, 2004).

The National Water Quality Assessment (NAWQA) Program of the U.S. Geological Survey (USGS) conducted an assessment from 1992-2001 of pesticide occurrence and concentrations in the nation's streams and groundwater. The researchers compared water quality of streams and shallow groundwater in areas identified as agricultural, to those in urban areas and those in undeveloped, forested areas. Urban areas represented primarily residential land use, typically with low to medium population densities. Studies were also conducted in major rivers and in aquifers commonly used for drinking water. The study concluded that insecticides were found

more often and in higher concentrations in urban streams and rivers than in streams in agricultural areas. Herbicides were also frequently found in urban streams and shallow groundwater (USGS, 1999). More than 20% of urban stream and river samples had insecticide concentrations that exceeded aquatic life guidelines. Additionally, 100% of fish samples, 99% of stream samples, and 49% of shallow groundwater samples in urban areas contained one or more pesticides, compared with 85% of fish, 92% of streams, and 59% of shallow groundwater samples in agricultural areas (USGS, 1999).

The Georgia Cooperative Extension Service surveyed urban Atlanta homeowners in 1999 to learn more about homeowners and their choice of gardening information sources. The study compared homeowners' use of: 1.) free and convenient information sources (friends, radio, television); 2.) paid and convenient sources (magazines and newspapers); 3.) free sources requiring search (Extension, libraries, and nurseries); and 4.) paid sources requiring search (botanical gardens and the Internet). The researchers found the majority of homeowners used all sources fairly equally, except for paid sources requiring search. However, the vast majority of participants selected free sources requiring search as their preferred information source, followed by paid and convenient sources. The study also found that women preferred more sources than men and that young, educated homeowners preferred the most information sources over various age groups, suggesting that campaigns or educational materials might target these groups. The researchers concluded that to effectively reach homeowners, gardening information should be delivered through free or low cost and convenient sources (Varlamoff, Florkowski, Latimer, Braman, & Jordan, 2002).

In 2001, participants at the Philadelphia Flower Show were surveyed to assess consumer knowledge of plant health care and integrated pest management (IPM) practices. Survey responses revealed that 71% of respondents identified insects on their plants before treating them, and 74% regularly monitored their landscape plants for problems. The researchers concluded that the survey findings suggest that Extension educators and specialists are positively affecting home landscape management by influencing consumer knowledge and preferences. However, the number of partial correct survey answers indicates that the continued education of home gardeners is still necessary (Sellmer, Kelley, Suchanic, & Barton, 2003).

The purpose of the study reported here was to assess the primary pesticide education needs of homeowners, availability of pesticide education information, and the preferred format and delivery of information as viewed by Extension educators.

Survey Methodology

Survey Design & Methods

County Extension educators were surveyed to assess their views of the need for and the availability of pesticide information for homeowners. IRB exemption was granted for the study. The survey asked respondents how often they received information requests on 27 pesticide related topics (Table 1) and how difficult it was to retrieve reputable, current information on the same topics.

Table 1.

Homeowner Pesticide Education Needs Survey Topics

Application equipment	Spray drift	Impacts on water quality
Equipment calibration	Mixing and application	Impacts on air quality
Pesticide formulations	Storage requirements	First aid procedures
Product shelf life	Disposal procedures	Contaminated clothing
Inert and other ingredients	Container recycling	Protecting pets
Pesticide regulation	Transportation	Protecting children
Selecting the correct product	Personal protective equipment	Chemical toxicity information
Applying the proper amount	Spills and clean up procedures	How to recognize poisoning
Understanding the label	Impacts on wildlife	When others use pesticides

Survey participants were also asked to list the topics they viewed as the primary concerns with homeowner use of pesticides, and from their experience, what formats of information best meets the educational needs of this group. Space was provided for respondents to list any additional pesticide use information requests they receive

from homeowners.

Survey Distribution, Response & Analysis

In July 2007, a paper survey was mailed to all North Carolina Extension educators with consumer horticulture responsibilities (N=55). These educators respond to homeowner pesticide information requests for their county. Thirty-six of the 55 surveys were completed for a response rate of 65%.

In August 2008, an electronic version of the same survey was made available to agricultural Extension educators across the country through the National Association of County Agricultural Agents electronic mail list of 3,160 active members to broaden the scope and reach of the study. An email providing the survey link was sent to this mail list, and Extension educators who receive pesticide information requests from homeowners were asked to respond. The national survey received 510 responses, and all submissions were made anonymously. The number of Extension educators on the mail list eligible to respond to the survey is not known.

Survey participants were asked to rate how often they receive information requests from homeowners on the 27 pesticide related topics listed in Table 1. The rating scale responses were: never, rarely, sometimes, often, and very often. Survey participants were asked to rate how difficult it is to retrieve reputable, current information for homeowners on the 27 pesticide related topics listed in Table 1. The rating scale responses were: very easy, easy, somewhat difficult, difficult, and very difficult.

The North Carolina Extension educator survey responses were tallied by hand. The electronic survey tool is equipped with a counting mechanism to tally survey responses.

Results & Discussion

Information Needs & Availability

The number and percentage of educators who responded "often" or "very often" to the question regarding how often they receive information requests from homeowners are provided in Tables 2 (for North Carolina) and 3 (for the U.S.). Similarly, the number and percentage of educators who responded "difficult" or "very difficult" to the question regarding how difficult it is to retrieve reputable, current information for homeowners are provided in Tables 2 (for NC) and 3 (for U.S.).

North Carolina Extension educators identified selecting the correct product,

understanding the label, applying the proper amount, protecting pets, and mixing and application as the five most frequent homeowner pesticide information requests. Contaminated clothing, first aid procedures, storage requirements, how to recognize poisoning, and spills and cleanup procedures were reported to receive the fewest information requests by this group.

North Carolina Extension educators identified product shelf life, impacts on air quality, impacts on wildlife, inert and other ingredients, and protecting pets as the five most difficult topics to locate information for homeowners. Personal protective equipment, storage requirements, understanding the label, and contaminated clothing were reported to be the easiest topics to locate homeowner information.

Selecting the correct product, applying the proper amount, pesticide formulations, understanding the label, and mixing and application were reported as the five most frequent pesticide information requests received by United States Extension educators from homeowners. The five topics identified as receiving the least amount of information requests by homeowners were transportation, first aid procedures, spills and cleanup procedures, how to recognize poisoning, and contaminated clothing.

National survey participants reported that product shelf life, impacts on air quality, inert and other ingredients, container recycling, and transportation were the five most difficult topics to locate information for homeowners. Applying the proper amount, personal protective equipment, understanding the label, selecting the correct product, and first aid procedures were identified as the five easiest topics to locate information for homeowners.

Table 2.

North Carolina Extension Educators' Responses on Frequency of Homeowner Requests for Pesticide Education Information and Difficulty Extension Educators Have Locating Information

Topics	Requested "Often" or "Very Often"		"Difficult" or "Very Difficult" to Locate	
	Pct. ¹	Resp. ²	Pct. ¹	Resp. ²
Selecting the correct product	94.4	34	5.4	2
Understanding the				

label	75.0	23	2.7	1
Applying the proper amount	69.5	25	5.4	2
Protecting pets	47.2	17	27.7	10
Mixing & application	47.2	17	5.4	2
Pesticide formulations	41.6	15	11.1	4
Impacts on water quality	30.5	11	22.2	8
Protecting children	30.5	11	19.4	7
Impacts on wildlife	25.0	9	30.5	11
Pesticide regulation	25.0	9	5.4	2
Reducing exposure from other's use	22.2	8	22.2	8
Chemical toxicity information	22.2	8	16.6	6
Spray drift	19.4	7	19.5	7
Product shelf life	13.9	5	44.4	16
Disposal procedures	13.9	5	13.9	5
Application equipment	11.1	4	19.5	7
Equipment calibration	11.1	4	11.1	4
Container recycling	11.1	4	8.3	3
Personal protective equipment	11.1	4	0	0
Impacts on air quality	2.7	1	41.6	15

Inert & other ingredients	2.7	1	30.5	11
Transportation	2.7	1	19.4	7
Spills & cleanup procedures	2.7	1	19.4	7
How to recognize poisoning	2.7	1	13.9	5
Storage requirements	2.7	1	0	0
First aid procedures	0	0	5.4	2
Contaminated clothing	0	0	2.7	1
¹ percentage of respondents ² number of respondents				

Table 3.

United States Extension Educators' Responses on Frequency of Homeowner Requests for Pesticide Education Information and Difficulty Extension Educators Have Locating Information

Topics	Requested "Often" or "Very Often"		"Difficult" or "Very Difficult" to Locate	
	Pct. ¹	Resp. ²	Pct. ¹	Resp. ²
Selecting the correct product	87.2	444	5.6	28
Applying the proper amount	64.8	329	3.0	15
Pesticide formulations	40.0	203	6.1	31
Understanding the label	34.8	176	4.6	23

Mixing & application	31.3	159	6.2	31
Protecting pets	27.1	137	10.9	55
Pesticide regulation	23.9	121	6.0	30
Impacts on water quality	20.7	105	16.1	81
Protecting children	20.0	102	8.3	42
Spray drift	19.6	100	13.2	66
Impacts on wildlife	18.3	93	16.4	82
Disposal procedures	11.2	57	16.3	82
Product shelf life	11.0	56	28.0	141
Equipment calibration	10.2	52	11.7	59
Chemical toxicity information	9.0	46	10.1	51
Application equipment	8.4	43	10.7	54
Impacts on air quality	6.7	34	25.7	128
Reducing exposure from other's use	5.5	28	16.6	83
Container recycling	5.3	27	19.0	95
Personal protective equipment	4.5	23	4.0	20
Storage requirements	4.3	22	9.5	48
Inert & other ingredients	2.9	15	23.5	118
Contaminated				

clothing	1.4	7	10.6	54
How to recognize poisoning	1.0	5	10.5	53
Spills & cleanup procedures	0.8	4	14.6	73
First aid procedures	0.8	4	5.6	28
Transportation	0.6	3	18.3	91
¹ percentage of respondents ² number of respondents				

Information Formatting

Survey respondents were asked to list the formats of information that best meet the pesticide education needs of homeowners. Respondents from both survey groups overwhelmingly indicated that information formats should be visually stimulating, specific, easy to understand, and concise (Tables 4 and 5). Photos and bulleted statements in the form of short fact sheets or one- to two-page publications were the overall recommendation for homeowner pesticide education materials. Extension educators indicated that they preferred fact sheets or publications to provide an information format that homeowners can take and use as a reference. Other prevalent format suggestions included interactive, easy-to-follow websites; video, especially for younger homeowners; and one-on-one or face-to-face assistance through phone calls, personal visits, and workshops.

News releases; public service announcements on radio and television stations; providing pesticide safety factsheets at point of purchase locations, such as garden centers and hardware stores; training the employees that assist homeowners at point of purchase locations; and better product labeling also appeared as recommendations. Other format suggestions included slide sets, podcasts, and posters.

Table 4.

North Carolina Extension Educators Evaluation of the Effectiveness of Information Formats in Meeting Pesticide Education Needs of Homeowners

Information Formats	Effectiveness of Formats	
	Pct. ¹	Resp. ²
Bulleted text with photos	51.5	17
Publications/fact sheets	21.2	7
Video (including YouTube)	18.2	6
Web based material	9.1	3
One-on-one assistance	6.1	2
¹ percentage of respondents ² number of respondents		

Table 5.

United States Extension Educators Evaluation of the Effectiveness of Information Formats in Meeting Pesticide Education Needs of Homeowners

Information Formats	Effectiveness of Formats	
	Pct. ¹	Resp. ²
Bulleted text with photos	50.0	191
Publications/fact sheets	31.7	121
Web based material	12.0	46
Video (including YouTube)	5.0	19
One-on-one assistance	4.7	18
¹ percentage of respondents ² number of respondents		

Stated Concerns

Extension educators from both survey groups identified several primary concerns related to homeowner pesticide applications, including:

- Proper pest or problem identification
- Correct product selection

- Proper application rates
- Appropriate use of personal protective equipment
- Effective product labeling
- Review and adherence to the label.

Survey participants indicated concerns about homeowners' attitudes toward pesticides. These attitudes were at both ends of the spectrum, from total reliance on chemical pest control to the belief that all pesticides are bad. They included zero pest tolerance; the belief that, if a little chemical is good, then more is better; and a general lack of concern or knowledge of the risks to the environment, other's property, and one's self. Survey participants also stated that simple, basic safety education of homeowners was needed to address issues such as leaving pesticides in the original container, storing pesticides out of reach of children, never pouring spray mixtures down sinks and storm drains, and avoiding exposure.

Other topics that survey participants stated should be addressed were organic alternatives; integrated pest management; impacts on beneficial insects and pollinators; different types of pesticides; resistance management; converting measurements; proper cleanup of spray equipment; reentry intervals and harvest restrictions; multiple brand names for same active ingredient; indoor versus outdoor products; record keeping; household pest management; pesticide licensing; environmental contamination; and protecting children and pets.

Conclusions & Recommendations

Homeowner pesticide information requests are made most frequently when assistance is needed to select the proper product, determine the correct use rate, understand differences in formulations, and understand label directions. Homeowner pesticide education materials are easy to locate for most of the topics listed in Table 1; however, they are often not formatted appropriately to reach this audience. Homeowner pesticide education materials with information on product shelf life, impacts on air quality, and inert and other ingredients are considered the most difficult to locate. In addition, to make safe and effective pesticide applications, homeowners often need more information than the specific product and rate information typically requested.

Most homeowners lack training in pest management and pesticide handling. They

often do not have a complete understanding of the risks associated with pesticide use and precautions that must be taken for safe use. Pesticide safety information should be readily available for homeowners and in formats that are visually stimulating, concise, specific, and easy to understand. Proactive homeowner pesticide education programs are also needed to target this audience and deliver information they are not seeking out on their own, such as the importance of personal protective equipment, reading and following the label, and correct product storage and disposal.

The information gathered in the survey reported here will be used to direct the content and formatting of the homeowner module of the Pesticide Environmental Stewardship website <<http://pesticidestewardship.org>>. This website is supported financially by the National Science Foundation Center for Integrated Pest Management and is being developed to serve as a national information resource for pesticide safety.

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