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Abstract

Extension educators address diverse audiences about pesticides and pesticide uses. Audience members have varying attitudes about using pesticides. A fear of pesticides has been instilled in the public via emotionally charged topics, such as child development and pet health. As a result, the use of pesticides has become taboo in some people's eyes. Legitimate reasons exist to justify the removal of pesticides from the market (e.g., extreme toxicity). However, not all pesticides have these negative characteristics. Exercises described in this article help audiences better understand pesticides and put them into proper perspective relative to other products that are used regularly.

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Introduction

Extension educators address diverse audiences about pesticides and pesticide uses (Whitford, 1993). Members of those audiences have varying attitudes about the use of pesticides. They also do not fully recognize which products are pesticides. The public is increasingly concerned about the use of pesticides and their impacts on health and risks to the environment. A fear of pesticides has been instilled in the public via emotionally charged topics, such as child development and pet health (e.g., pesticide residues in food linked to learning disabilities, 2,4-D linked to pet cancers) (Bouchard, Bellinger, Wright, & Weisskopf, 2010; Hayes et al., 1991). These concerns are further fueled by the media, loose interpretations of scientific research, and statements of overreaching conclusions (Alvarez, 2014; Gonzalez, 2013; Zerbe, 2011). Frequently these conclusions are refuted by others when the scientific research is reviewed (Katirae, 2015). Legitimate reasons do exist to justify the removal of pesticides from the market (e.g., extreme toxicity of dieldrin, environment persistence of chlordane, environmental impact of DDT). Thus, it is prudent to continue to review registered pesticides for safety of use.

The consequence of misleading interpretations of data is that pesticide usage has become taboo in some people's eyes. As a result, we see companies (e.g., lawn-care services) running marketing campaigns espousing "chemical-free" practices. Yet customers who seek these chemical-free services are likely to use household products that have greater toxicity than standard lawn-care pesticides (e.g., toilet bowl cleaner

(insecticide, fungicide, herbicide, antimicrobial, etc.) and their uses. Emphasize the importance of reading and adhering to the information on the labels of these products, and note that the safety measures required for the proper and safe usage of any pesticide are addressed in its label.

Exercise 2: Introducing Signal Words

Materials. From the items used in Exercise 1, select three products—one displaying each of the signal words *Caution*, *Warning*, and *Danger* (Figure 2).

Figure 2.

Product Labels Displaying the Pesticide Signal Words *Caution*, *Warning*, and *Danger*



Method. Indicating the three selected products, prompt the audience with the following questioning:

1. How can someone tell which of these products is more hazardous to use than another?
2. What can someone look for on a product label that quickly indicates its potential threat to the user or the environment? (Elicit or provide the following answer to both questions: Signal words.)

Discussion. Lead a discussion about the meanings of pesticide label signal words, using a resource such as the National Pesticide Information Center's Signal Words fact sheet (<http://www.npic.orst.edu/factsheets/signalwords.pdf>). Describe factors that can influence which signal word a product may be assigned, and note that products with the same active ingredient (pesticide chemical) may carry different signal words. Explain that sometimes the poison potential is a matter of dosage. For example, warfarin (also known as Coumadin) is an anticoagulant that is used as both a human medicine and a rodenticide. At low dosages, it is an important therapy treatment used to reduce the formation of blood clots in patients at high risk for stroke, heart attack, or other serious conditions; at higher dosages, it is used to kill rodents (National Pesticide Information Center, 2011). If time permits, review material safety data sheets, and explain the terms LD_{50} and LC_{50} and their relationships to toxicity levels and signal words (National Pesticide Information Center, 2008).

Include information about frequency of exposure and who may face the "riskiest" exposure (i.e., mixer vs. applicator vs. consumer). As a way of further developing appropriate perspective about pesticide use, point out how often household cleaning products are used as compared to landscape pesticide products (i.e., daily or weekly vs. once or twice a year). Additionally, explain that the level of risk to exposure and toxicity diminishes (a) the further one gets from the original concentrated product to the finished product that is

applied in the field and (b) over the length of time that passes from application to eventual exposure.

Finally, note that of all the products included in the group of general-use items from Exercise 1, the ones carrying the highest toxicity signal word *Danger* are household cleaning products and swimming pool chemicals. Insecticides and herbicides associated with landscape and gardening uses carry the lower toxicity signal word *Caution* or *Warning*.

Conclusion

These two exercises have been successfully used in initial and advanced trainings to help Ohio master gardener volunteers better understand pesticides. Informal posttraining communications with these volunteers have indicated that with a better understanding of what a pesticide is, how toxicity is determined, and how toxicity is indicated on labels, audiences become less fearful of pesticides and more comfortable with where and how they are used. Audiences also develop a greater respect for numerous household products that they did not realize were pesticides.

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