Health Impact Review of SB 6529

Protecting agricultural workers and community members from pesticides
(2017-2018 Legislative Session)

Additional resources related to improving pesticide application safety

State Board of Health staff completed a Health Impact Review of the original version of Senate Bill 6529, Protecting agricultural workers and community members from pesticides. During the course of the literature review and key informant interviews, staff heard about resources related to best practices to improve pesticide application safety. This document provides a summary of safety-related comments from key informant interviews, potential individuals to contact for additional information, and available resources identified as part of the literature review.

COMMENTS

As part of the Health Impact Review, staff conducted key informant interviews to gather additional supporting evidence. In total, we conducted 18 key informant interviews, including 11 informants from pesticide regulatory and state agencies in California, Oregon, and Washington; 4 informants representing pesticide applicators and growers; 2 informants representing academia; and 1 informant representing farmworkers. Although the primary intent of key informant interviews was to gather supporting evidence, many interviewees also offered suggestions about how to improve pesticide application safety in Washington State. Interviewees felt that communication and education were the main ways to improve safety.

- **Increase communication:** Many interviewees recommended improving communication channels, including ground-to-air, applicator-to-grower, and neighbor-to-neighbor communication. One interviewee also recommended improving communication with companies that contract farmworkers. In addition, some interviewees had specific suggestions about topics that need specific messaging. Interviewees recommended standardizing the definition of "incident" between Washington State Departments of Agriculture (WSDA), Health (DOH), and Labor and Industries (L&I); using rates (not just numbers) to talk about changes in pesticide illness trends; and developing messages for the public to help explain chemicals of concern and varying risks of exposures, the relationship between decreased product toxicity and more frequent or additional application events, and the relationship between odor and health.

- **Increase education**: Many interviewees recommended expanding educational opportunities for growers and applicators through WSDA and Washington State University (WSU) training programs. Some suggested specific topics, such as equipment calibration, equipment maintenance, aerial application practices, and overall best application practices. Multiple interviewees suggested expanding the calibration training provided by the Benton County WSU extension program to growers and applicators statewide. Interviewees also recommended providing training on and expanding the use of WSU's Decision Aid System, which helps growers and applicators identify the best times to apply pesticides. One interviewee recommended including companies that contract farmworkers in training opportunities. Lastly, one California interviewee recommended developing wallet cards for farmworkers explaining their rights and providing contact information to report potential exposure incidents.

For more information contact:
(360)-236-4109 | hir@sboh.wa.gov
or go to sboh.wa.gov

WASHINGTON STATE BOARD OF HEALTH
Working for a safer and healthier Washington since 1889
HEALTH EQUITY
Governor's Interagency Council on Health Disparities

- **Implement U.S. Environmental Protection Agency's Agricultural Worker Protection Standard (WPS) updates (2015):** Many interviewees felt that the updated WPS would help to improve application safety in Washington. WSDA implemented these standards in 2018 and L&I is in the rulemaking process for implementation in 2018.

- **Modernize equipment:** A few interviewees stated that old equipment may be responsible for some drift events. For example, one interviewee explained that, because older equipment was designed for use under different crop structures and agricultural practices, it has the potential to result in drift events. One interviewee felt that providing incentives or "cash-for-clunkers" programs could help growers and applicators modernize their equipment, improve application safety, and reduce drift events and exposure.

CONTACTS

As part of key informant interviews, we asked interviewees who we should talk to about pesticide use reporting or application-specific notification systems. A few interviewees also mentioned individuals who would be able to provide information about pesticide application safety more generally, including:

Carol Black, Pesticide Education Specialist
Washington State University
Department of Entomology
Urban IPM and Pesticide Safety Education Program
ramsay@wsu.edu
509-335-9222

Richard Fenske, Professor and Associate Chair
University of Washington, School of Public Health
Department of Environmental and Occupational Health Sciences
Director, Pacific Northwest Agricultural Safety and Health Center
rfenske@uw.edu
206-543-0916

Gwen Hoheisel, County Director
Benton and Franklin Counties
Washington State University, Extension
ghoheisel@wsu.edu
509-735-3551

Edward Kasner, Senior Fellow
University of Washington, School of Public Health
Department of Environmental and Occupational Health Sciences
Pacific Northwest Agricultural Safety and Health Center
ejkasner@uw.edu
612-388-7918

Health Impact Review of SB 6529

Protecting agricultural workers and community members from pesticides
(2017-2018 Legislative Session)

RESOURCES

Below are resources identified through the literature review for the Health Impact Review of SB 6529 that addressed ways to improve pesticide application safety. Since staff were not specifically researching best practices or ways to improve pesticide application safety, this list provides only an example of available published research and should not be considered comprehensive.

Asterisks (*) denotes articles that were referenced in the full Health Impact Review.

Adusumilli Naveed, Wang Hua. Analysis of soil management and water conservation practices adoption among crop and pasture farmers in humid-south of the United States. *International Soil and Water Conservation Research.* 2017;2018.*

Authors use data from the 2016 Nutrient Management Survey, conducted by the Louisiana Master Farmer Program, to examine the factors affecting adoption of Best Management Practices (BMPs) to conservation. Explanatory variables analyzed include farmers' belief about the relationship between farming practices and water quality, type of farm operation, percent of land owned, number of acres farmed during the most recent cropping year, participation in federal programs, source of technical assistance (i.e., support from Louisiana State University AgCenter Research or Extension and/or Natural Resource Conservation Services), number of years in farming, annual gross farm revenue, education level, and age of the farmer. Analysis of the soil management practices equation found that farmers' attitudes concerning conservation, crop only farm, and previous enrollment in a federal conservation cost-share program have a positive and significant effect on the likelihood of BMP adoption. The analysis also found landowners were statistically significantly less likely to adopt conservation practices than those who farmed leased-land. Previous studies have shown mixed results as to whether land ownership has a positive, negative, or neutral influence on conservation practice adoption. Additionally, those who had been farming for less than 15 years were less likely to adopt BMPs. An analysis of water management practices found having crops only, previous enrollment in a conservation cost-share program, and higher educational attainment were positively and and significantly associated with likelihood of adopting conservation practices. Findings indicate that farmers' perceptions regarding practices and the suitability of the practice to current farming methods strongly influenced adoption. Authors recommend strengthening institutions to accelerate adoption among farmers renting land for farming and suggest that policymakers should consider the attributes and characteristics of farmers as they define their strategies for an effective conservation policy.

Alarcon WA, Calvert G. M., Blondell J.M, et al. Acute Illnesses Associated with Pesticide Exposure at Schools. Journal of the American Medical Association. 2005; 294(4): 455-466.*

Alarcon et. al. analyzed data related to pesticide-related illness at schools from three sources: National Institute for Occupational Safety and Health's Sentinel Event Notification System for Occupational Risk (SENSOR), California Department of Pesticide Regulation, and Association of Poison Control Center's Toxic Exposure Surveillance System (TESS). Authors determined incidence rates and severity of acute pesticide-related illness among 2,593 students, parents, and school staff at daycares, elementary and secondary schools between 1998 and 2002. They found that the incidence of acute pesticide-related illness among children increased significantly from 1998 to 2002, with an overall incidence rate of 7.4

cases per million children. However, the authors note that these databases likely underreport cases of pesticide illness in children. Most cases (89%) were of low severity, which included symptoms such as skin, eye, or upper respiratory tract irritation. Approximately 31% of cases were associated with pesticide drift from nearby agricultural land, and most of these cases resulted from insecticide and fumigant applications. A higher proportion of children were exposed from drift events as compared to adults (40% versus 25% respectively). The authors note that there are no federal requirements limiting pesticide exposures at schools, and that states with regulations addressing pesticide application on school property do not protect from drift. They offer five recommendations to reduce exposure to pesticide drift at schools: 1) Reduce or eliminate application methods that cause drift; 2) Shift application to times when students and staff are not on school property; 3) Ensure applicators comply with existing regulations related to pesticide application; 4) Require pesticides only be applied by trained applicators; and 5) Establish pesticide spray buffer zones around school.

Baumgart-Getz Adam, Prokopy Linda Stalker, Floress Kristin. Why farmers adopt best management practices in the United States: A meta-analysis of the adoption literature. Journal of Environmental Management. 2011;96(2012):17-25.*

Baumgart-Getz et al. present a meta-analysis of 46 studies (a combination of published and unpublished) from 1982-2007 addressing the adoption of agricultural Best Management Practices (BMPs) in the United States. It summarized "the influence of 31 social factors assessed over 25 years of BMP adoption." The study provides a quantitative summary of available adoption literature and determines the effect size and confidence interval for those social factors of adoption commonly researched. Included studies met the following criteria: 1) focused on adoption of BMPs – rather than willingness to adopt or likeliness to adopt; 2) were conducted in the United States; and 3) had enough information to calculate an effect size. The review of 46 studies from 1982 to 2007 found that extension training (e.g., 1-day training events), information, local networks, and environmental awareness programs and knowledge had statistically significant positive influences on BMP adoption. While extension training (e.g., 1-day training efforts) has a positive influence on adoption of BMP [effect size = 0.0844; 95% Confidence Interval (CI): (0.0371-0.1318); p = 0.0016], the overall education category and formal education are insignificant. Meanwhile, both capital and information positively influenced adoption of BMP and were statistically significant [effect size = 0.1192; 95% CI: (0.0688-0.1696); p<0.0001; and effect size = 0.186; 95% CI: (0.0529-0.3191); p=0.0088, respectively]. Additionally, “both agency and local networks have relatively large impacts (0.3178 and 0.334 respectively) and heterogeneity below 50%.” While researchers found tenure to be a positive predictor of BMP adoption, they found that heterogeneity accounts for 90.8% of the variation in this variable and recommend future studies standardize how it is collected and interpreted. Authors found the farmers' attitudes towards risk, adoption payments, and perceived quality of a local ecosystem variables were insignificant. Finally, environmental awareness sub-categories program and knowledge were positive, significant predictors of adoption. "This suggests that rather than addressing how agriculture, in general, can degrade water bodies, efforts should focus on how the actions of individuals on their farm impact water quality (knowledge)." Researchers found that "having specific familiarity of program goals and efforts has the largest impact and is an important step preceding BMP adoption." Authors also suggest that effective BMP adoption efforts should "combine complementary social factors to increase their overall impact." For example, “using networks to implement extension

efforts and disseminating information presents a logical way to combine and extend the reach of factors found to have a significant effect on BMP adoption." Overall, authors concluded that findings suggest policymakers can use a two-tiered approach to BMP adoption: tier-one would have an implementation focus, targeting growers most likely to adopt and tier-two would continue to increase individual capacity and awareness by using networks to inform other growers about the benefits to adoption.

Galvin Kit, Krenz Jen, Harrington Marcy, et al. Practical Solutions for Pesticide Safety: A Farm and Research Team Participatory Model. Journal of Agromedicine. 2016; 21(1): 113-122.*

This article summarizes the participatory research model used to develop the "Practical Solutions for Pesticide Safety" guide, which contains 26 solutions and additional practical information tailored to the needs of farm managers and farmworkers. Project principles were: "(1) workplace chemicals belong in the workplace, and (2) pesticide handlers and farm managers are experts, with direct knowledge of production practices." The Expert Working Group (EWG) met two to four times a year for five years and included managers and handlers, English and Spanish speakers, and representatives from small and large operations. Additionally, per the EWG's suggestion, 26 farms (79% response rate) agreed to host a site visit during which they shared pesticide handling and safety measures with the research team. Practical solutions were identified and evaluated based on five criteria: practicality, adaptability, health and safety, novelty, and regulatory compliance. A Regional Advisory Committee (RAC) was formed to review the format and content of the guide for the target audience of farm owners and managers, and "production of the final guide benefited from mulitple reviews and edits in each language." The guide is available online in Spanish and English and has been disseminated at industry trade conferences, education sessions, and through a Pacfic Northwest-based worker's compensation company.

Galvin, K., J. Krenz, P. Palmandez, M. Harrington. Practical Solutions for Pesticide Safety: Protecting Agricultural Pesticide Handlers. Pacific Northwest Agricultural Safety and Health Center, University of Washington; 2012.

The University of Washington's Pacific Northwest Agricultural Safety and Health Center collaborated with Washington State Department of Agriculture, growers, managers, handlers, pesticide safety educators, and pest control consultants to develop the "Practical Solutions for Pesticide Safety" guide. It is available online in English and Spanish, and contains 26 solutions and additional practical information to protect pesticide handlers and their families from exposure to pesticides. The editors note, "most solutions originate from farms that use airblast sprayers for applying agricultural chemicals…they were selected to be practical and to protect those most at risk- pestcide handlers and their families." The guide is available at: http://deohs.washington.edu/pnash/practical_solutions.

Reimer A. P., Prokopy L. S. Environmental attitudes and drift reduction behavior among commercial pesticide applicators in a U.S. agricultural landscape. J Environ Manage. 2012;113:361-369.*

Reimer et. al. note that the adoption of drift-reducing practices among commercial applicators remains variable. They explain, "rather than pursue additional regulation, states have attempted to use

widespread education and training campaigns to curtail pesticide drift. Despite the proliferation of training and education efforts, pesticide drift continues to be an environmental and health concern and result in conflicts between applicators and neighbors." The authors surveyed commercial pesticide applicators in Indiana to further understand environmental attitudes, awareness, and concern for pesticide drift, and current adoption of best practices to reduce drift. Approximately 541 (61.5%) commercial applicators in Indiana completed the survey. Overall, they found that applicators had positive environmental attitudes, but low concern for pesticide drift. They found high adoption for equipment modifications to reduce pesticide drift, including regular inspection of equipment, increased droplet size, lowered spray boom heights, and use of low-drift spray nozzles. Applicators stated that adoption of best practices was related to operational benefits, such as satisfying customer needs, complying with regulations, and increasing effectiveness of applications (i.e. reducing drift ensures more pesticide reaches the intended crop). Overall, the authors concluded that "applicators were motivated to adopt drift-reduction practices by the desire to be a good neighbor and a desire to be a good land steward."

Tao, H., T.F. Morris, B.E. Bravo-Ureta, R. Meinert. 2014. Factors Affecting Manure Applications as Directed by Nutrient Management Plans at Four Connecticut Dairy Farms. Journal of Agronomy, Soils & Environmental Quality. 2014; 104(4): 1420-1426.

Tao et al. evaluated factors that contributed to four Connecticut dairy farms voluntarily developing nutrient management plans (NMPs). NMPs are seen as a best management practice to balance the use of manure application on agricultural land in a way that minimizes ground and surface water pollution. Implementing NMPs requires farmers to make strategic, tactical, and operational changes to their management practices. Tao et al. found that a number of factors significantly influenced whether a grower implemented NMPs, including: the distance between fields and manure storage lagoons, field ownership, field size, baseline soil nutrient levels, recommended rates for manure application, fertilizer application practices, and crops grown. They found that the distance from fields to manure storage lagoons was the most important predictor of a farmer's decision whether to follow NMPs when applying manure to fields. They found that as the distance between the fields and lagoons increased, the likelihood of applying excess manure decreased. The authors suggest this is due to transportation costs of hauling manure and the type of hauling equipment used. Farmers using tanker trucks to haul manure were more likely to follow NMPs recommendations than farmers using tractors to haul manure. The authors suggest that offering incentives to farmers to purchase tanker trucks may also help more farmers adopt NMPs. Overall, Tao et al. concluded that decisions to adopt best management practices are complex and that, "the complexity of nutrient management on farms…makes it difficult to know what public policies would motivate farmers to better manage manure to minimize environmental degradation."

U.S. Environmental Protection Agency. 2015. Agricultural Worker Protection Standard (WPS). Available at: https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps.

The U.S. Environmental Protection Agency revised the Worker Protection Standard (WPS) guidance in 2015, and the new updates went into effect in 2017. The intent of WPS is to reduce "the risk of

pesticide poisoning and injury among agricultural workers and pesticide handlers." The 2015 updates included changes related to pesticide safety, application, and hazard information; pesticide safety training; notice about application events; written and verbal notifications; equipment safety and personal protective equipment; and other topics. These changes will be reflected in Washington State rules and regulations.