Training Pesticide Control Operators (PCO's) and PCO companies in Urban Pyrethroid Applications

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Final Report

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Principal Investigator
Lorence R. Oki, Ph.D.
UC Davis Plant Sciences & UC Agriculture and Natural Resources – Cooperative Extension

Co-Principal Investigator
Karey Windbiel-Rojas
UC Agriculture and Natural Resources – Statewide Integrated Pest Management Program

Report prepared by
Jared A. Sisneroz - UC Davis Plant Sciences

Project Collaborators ("Project Team")

Mike Ensminger – DPR Environmental Monitoring

Dave Fujino – California Center for Urban Horticulture

Alicia Scott – DPR Enforcement

Rick Strider – DPR Enforcement

Andrew Sutherland – UCANR SF Bay Area IPM Advisor

Darren Van Steenwyk – Clark Pest Control

Introduction

The information in this report is a summary of the activities completed under agreement 15-C0056. This report focuses on the work performed by public agency and industry collaborators, University of California (UC) researchers and staff under the direction of Lorence R. Oki and Karey Windbiel-Rojas pertaining to the deliverables of this agreement from the initiation of the project in August 2016 to the end of the contract in December 2018.

Background & Goals

The impetus behind the project is the continued numerous detections of pyrethroid pesticides in urban runoff, at concentrations that may be toxic to aquatic organisms, in monitoring by California Department of Pesticide Regulation (DPR) and UC researchers. Often, several types of pesticides are detected in each water sample, potentially resulting in synergistic toxic effects to aquatic organisms. Mitigation strategies include increasing irrigation efficiency to reduce non-storm runoff, altering pesticide application techniques, implementing nonchemical integrated pest management (IPM) tactics when controlling pests, and bioremediation efforts. For the pyrethroid class of insecticides, of the aforementioned strategies, applications have been modified via label changes and regulations in attempt to reduce pyrethroid content in urban runoff.

The project goal is to support awareness and adoption of label changes occurring in Title 3 California Code of Regulations (CCR) §6970 ("surface water regulations") through outreach to pest control operators (PCOs), also referred to during this project as pest management professionals or PMPs, with long-term intentions of reducing pesticide content in urban runoff. Primary deliverables include development of a pyrethroid application training program targeting PCOs, implementation of the training program at a minimum of three workshops, and measurement of knowledge gained by attendees from the course using pre/post workshop surveys. Remaining deliverables include the acquisition of continuing education units (CEUs) for workshops from DPR and the Structural Pest Control Board (SPCB), the board regulating

pesticide applications to habitable structures; conducting quarterly administration group meetings; and the development of a list of PCO's in the Sacramento Metropolitan Area (SMA). Final reporting requirements include presentation of project efforts at a seminar and a final report at the completion of the project.

Project Tasks and Deliverables

Task 1 Identify PCO's active in the SMA

Project team obtained a list of PCO's working in the study area from the County Agricultural Commissioners of Yolo and Sacramento counties and DPR staff. The lists were refined, filtering out businesses not meeting project criteria, e.g., agricultural or aerial applicators, resulting in a list of potential clientele of outreach efforts in the Sacramento Metropolitan Area (SMA). In 2016, project team created a list of PCO's working in the SMA. Project team expanded the list by collecting additional contact information including email, secondary telephone, and web addresses to facilitate future advertisement of workshops. The final version of the list was sent as an Excel spreadsheet to the contract manager via email on 12/29/2016.

Task 2 Conduct a Survey of PCO's

Discussions between project team and DPR determined that Task 2, hereafter referred to as the "pre-survey", should occur at the beginning of workshops before training activities occur. A pre-survey of participants was conducted at the outset of all workshops with results are located in Appendix B.

Task 3 Develop a Curriculum/Training Program on Proper Pyrethroid Application

Development of an initial curriculum occurred in 2017. This curriculum was implemented at the pilot (initial) workshop. The project team revised the curriculum in late 2017 to incorporate feedback from pilot workshop participants, expanding the amount of material discussed regarding calibration and calculations. A copy of the revised curriculum is located in Appendix A.

Task 4 Obtain DPR and SPCB CE Units for Workshop/Training Sessions

3.0 (1 Laws & Regs., 2 Other) DPR and 4.0 (3 Rules & Regs, 0.5 IPM, 0.5 General) SPCB CEUs were obtained for the pilot workshop held on 10/19/2017.

4.5 (1.5 Laws & Regs., 3 Other) DPR and 4.5 (3.5 Rules & Regs, 0.5 IPM, 0.5 General) SPCB CEUs were obtained for workshops held in Folsom (3/9/2018) and Roseville (3/14/2018).

Task 5 Conduct a minimum of 3 Workshops/Training Sessions for PCO's

The project team conducted a total of 3 workshops: a pilot (initial) workshop in Davis on October 19, 2017, followed by workshops in Folsom and Roseville on March 9th and 14th 2018, respectively.

Task 6 Conduct a Follow-up Survey of PCO's to Evaluate Workshop Effectiveness

Discussions between the project team and DPR determined that Task 6, hereafter referred to as the "post-survey", will occur at the end of the workshop to gauge knowledge learned by the participants. A post-survey of participants was conducted after all workshops and the results are located in Appendix B.

Task 7 Project Administration

Project team disseminated project information, including meeting arrangements, agendas, and minutes with collaborators and DPR using a closed communication system developed and hosted by UC ANR called "Collaborative Tools." (https://ucanr.edu/collaborate/posts.cfm?cluster=10336, restricted).

Task 8 Dissemination of Data

Karey Windbiel-Rojas presented project results on behalf of project team to DPR staff on 12/17/2018. Project team have submitted annual reports to the contract manager. This report fulfills the final reporting requirement.

Summary of Activities

This project was initiated in 2016 with the first meeting between the project team and DPR occurring in May 2016. The project team began meeting in midsummer 2016 and consisted of public agency and industry collaborators, UC researchers, and other UC staff. During these meetings, the project team began to define the project goals, discuss details for conducting the workshops, and define the training curriculum. The project team decided to hold a pilot (initial) workshop in autumn 2017 to evaluate the proposed curriculum, which would then be followed by up to three more workshops in spring 2018.

The project team successfully held the pilot workshop on Thursday, October 19, 2017 at the UC Agriculture and Natural Resources (UC ANR) building in Davis, California. The workshop was held from 7:30 am to 12:00 p.m. and featured three presentations by different speakers and a hands-on demonstration activity. Using contact information gathered from the PCO list created in 2016 (Task 1), the workshop was advertised to SMA PMPs via email. Twenty-one PMPs from 12 pest control companies attended. A detailed agenda and materials from the workshop are attached in Appendix A. Per Task 4, 4.0 SPCB CEUs and 3.0 DPR CEUs were obtained for the workshop.

At the pilot workshop, participants were surveyed before instruction began (pre-survey; Task 2) and at the completion of instruction (post-survey; Task 6). In all workshops, the pre-survey was conducted using Turning Point® "clickers" with audience participation software. Participants were asked 11 questions; the first seven questions assessed participant demographics, while the last four questions assessed participant knowledge of pyrethroid practices and regulations.

These last four questions were repeated in the postworkshop quiz taken to obtain SPCB CEU's to assess the efficacy of the curriculum. Participants seeking only DPR CEU's were not obligated to take the exam. Participants also had the option of not responding via clicker to the pre-survey. These actions resulted in uneven *n* between pre/post survey questions at all workshops.

In the pilot workshop, overall participant knowledge as measured by the repeated pre/post survey questions was high (see Analysis section). For each the four repeated questions, increases in participants selecting the correct answer was observed in the post-survey. Survey questions and responses, along with selected participant feedback is in Appendix B. The project team used the responses to the pre/post surveys along with participant feedback to adjust curriculum to include more information on calibration and calculations and increase the frankness of the survey questions. Due to these changes, the workshop duration increased by 30 minutes to five hours, and the project team obtained additional CEU's to reflect the change. The project team planned for workshops to occur in in Elk Grove, Folsom, and Roseville, CA during February and March of 2018. Due to several factors, including difficulty locating a venue, and successfully promoting the event, the tentative workshop in Elk Grove was abandoned. The project team advertised the workshops by directly emailing PMP's on the list, cold calling PMP's on the list, and asking PMP associations/vendors to distribute the workshop flyer to their members. The latter was the most successful in driving attendance at the workshops. However, through cold calling, the project team were able to determine there was a need to convert the material to an online training format.

Successful workshops were held in Folsom and Roseville on March 9th and 14th 2018, attracting 21 and 25 participants, respectively. Overall the results from the pre/post workshop surveys indicated that the curriculum and workshop format was successful as measured by the answers from the pre/post workshop surveys. Based on participant demand and discussions with PMP's, future outreach efforts will seek to transform the different pieces of the workshop into stand-alone sections and migrate the workshop content to online training. This will allow the workshop content to reach a larger audience beyond the current five hour workshop format.

Analysis of Workshop Surveys and PMPs Knowledge of Pyrethroid Regulation

The majority of those who attended all workshops had 16-20 years of experience, comprising 40-60% of the audience. The project team noted this group of participants included company owners and/or those in positions which don't perform applications on a regular basis. Although these participants could impart their knowledge to others, which would increase the impact of the workshops, the project team would like to increase attendance among applicators. More common for applicators: PMPs with 1-5 years of experience comprised 16-30% of the attendance. Only one person per workshop had been a PMP for a year or less.

Other background information on the PMPs who attended the workshops included:

- Participants chiefly used pyrethroids to control spiders and ants (42% and 32% of the participants, respectively)
- Handcan's and backback sprayers were most commonly used to apply pyrethroids
- Granule pyrethroid application was the least common application method
- Previous experience (48%) and advice from boss/manager (29%) were the main driver of participant product selection
- Participants overwhelmingly (75%) applied most pesticides outdoors
- Participants receive training from CE classes (41%), vendors/suppliers (22%), and government and regulatory agencies (25%)

Due to time constraints, researchers only asked four replicated pre/post questions based on knowledge of the pyrethroid regulations. Question content was focused on determining basic understanding of the focus of the surface water regulations. The project team determined this to be horizontal and vertical limits to sprays around structures (impervious surfaces) for broadcast granular and liquid applications and prohibited application areas. See Appendix B for the specific questions asked.

Question 1 pertained to prohibited pyrethroid applications to impervious horizontal surfaces, as driveways and sidewalks. Pre-survey results showed that 73% of the PMPs answered correctly; however, one-fourth of the participants did not know that a band application was prohibited to these surfaces. Post-survey results showed that there was an increase to 85% of the PMPs knowing the prohibited application to impervious horizontal surfaces.

The greatest rate of change occurred with Question 2. This question pertained to a granular application buffer. In the pre-survey, 61% of the PMPs knew the correct buffer width; this increased to 92% in the post-survey. Largest increases in gained knowledge were from Folsom and Roseville, with a 29% and 43% increase in correct answers in the post survey, respectively. In the post survey Question 2 was also most frequently answered correctly by participants, Davis: 100%; Folsom: 89%; Roseville: 88%, when compared to other questions.

Question 3 asked about allowable height of pyrethroids to a vertical impervious surface. From the pre-survey, 63% of the PMPs thought pyrethroids could be applied up to 3 ft on a vertical surface if the label stated such, regardless of the regulations. Post-survey results showed that 83% of the PMPs correctly identified that regardless of the 3 ft allowance on the label, applications were only allowed up to 2 ft above grade level per regulations.

In three of the four questions, there was an increase of in the percentage of participants selecting the correct answer to the pre/post questions after attending the workshop. Question 4 was the only question that did not see an increase in correct responses in the post-survey. Project team think that this was due to where the question was placed in the quiz and the phrasing of the question. Question 3 asked participants the veracity of the statement: "pyrethroid applications can be made to vertical surfaces up to 3 ft above grade," which is false, whereas question 4 stated: "Horizontal perimeter band treatments cannot be made 3 ft or greater from the base of a building," which is true. It is possible that the wording between the questions confused participants. Language of future surveys should be more straightforward, asking "In California, horizontal perimeter band treatments using pyrethroids can be made 3 ft or greater…".

Regarding participant knowledge coming into the workshop, 82% of the participants in the pilot workshop reported that they were moderately to very familiar with the surface water regulations. This question was slightly modified for the Folsom and Roseville workshops, adding a "not familiar" category to the answer choice. Nonetheless, in Folsom, 95% of participants reported being between moderately and very familiar with the regulations. In Roseville, all participants reported being moderately or very familiar with the regulations. Yet testing in the pre/post surveys did not show such a high a level of knowledge of the regulations, although the project team realize that the number of questions asked, and participant number, was low. Nonetheless, the results from the pre/post survey indicate that PMPs lack full understanding of the regulations, and if these levels are representative of PMPs as a group statewide, PMPs are likely not completely familiar with the practical implication of pyrethroid regulations. The findings from these workshops suggest additional training pertaining to pyrethroid surface water regulations is needed to protect California's urban surface water. The findings from this work also show that the workshops were effective in increasing PMPs knowledge of the surface water regulations.