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Agricultural BMP's to Reduce Sediment and Pyrethroid Insecticides in Irrigation Runoff

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Abstract Text:

Pyrethroid insecticides have been shown to attach to suspended sediments in agricultural field runoff, enter receiving waters, and sometimes accumulate to levels toxic to aquatic species that inhabit sloughs, streambeds, and riverbeds. Management practices that minimize soil loss from irrigated fields are now recommended to complement integrated pest management and safe use of pesticides. Such practices include use of anionic polyacrylamide (PAM) as a water amendment and soil flocculent, sediment traps, and vegetated drainage ditches. While often recommended, research to support these techniques is relatively limited in California agriculture. In 2006 and 2007, the University of California conducted collaborative studies in the Sacramento and Salinas Valleys. Various strategies for using PAM, sediment traps, and vegetated tailwater ditches were evaluated in three different agricultural settings. These management practices were evaluated for effectiveness to control sediment and pyrethroid insecticide load in field runoff and for toxicity of runoff to aquatic indicator species. Findings showed that PAM emulsion formulations applied to the source water supply were highly effective at reducing sediment and insecticide load in irrigation runoff but toxicity to aquatic species due to constituents in the PAM emulsion was a concern for some, but not all, of the PAM formulations. Granular and tablet formulations of PAM also reduced sediment and pyrethroid loads in runoff but not to the extent of emulsions. Aquatic toxicity was not observed with granular and tablet forms of PAM. PAM applied to sediment laden tailwater was not effective. Vegetated tailwater ditches proved to be effective filters of sediment and sediment-bound insecticides. Sediment traps were less effective at reducing sediment and pyrethroid loads in field runoff.

Impact Statement:

These research findings help understand the extent that anionic polyacrylamide water amendments and soil flocculants, vegetated tailwater ditches, and sediment traps can help control sediment and pyrethroid insecticides in agricultural runoff. The findings provide insights on how to adapt these general practices to specific farm settings. When used in combination with integrated pest management and safe pesticide use practices, they lessen the risk of agricultural related water quality degradation and help retain the availability of effective and affordable crop protection products.