

Alfalfa and Water Quality: Meeting the Challenge

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Abstract

Beginning in 1988, water quality surveys have consistently found organophosphate pesticides in the surface waters of the San Joaquin Valley and Sacramento Delta. These pesticides include alfalfa insecticides leaving the fields after Spring rains. With reduced water supply and a national commitment for pesticide use reduction, the nineties herald a new era for California alfalfa production. Producers and government must collaborate more closely to create agricultural systems which are economically and environmentally sustainable.

Water Quality Concerns

Agricultural drains and natural waters of the Central Valley contain numerous organophosphate pesticides at levels of great ecological concern. While it is difficult to identify the source of the widespread pesticide contamination, there is a lot of evidence suggesting that alfalfa pesticides are a significant contributor to the problem.

Since 1988 when the Central Valley Regional Water Quality Control Board (Central Valley Board) began testing for pesticides in the San Joaquin River and Delta Regions, a predictable pattern of pesticide contamination has emerged. The worst pesticide contamination follows winter dormant spray applications on orchards and early spring insecticide applications on alfalfa. Because the highest pesticide concentrations coincide with rain storms, the mechanism of off-site movement is thought to be rain-induced runoff. These findings have been corroborated by the U.S. Geological Survey (USGS), the California Department of Pesticide Regulation, and the California Department of Fish and Game.

The extent of the contamination from alfalfa pesticides varies greatly and appears to be highly dependent on rainfall patterns. The highest pesticide concentrations were detected after the heavy spring rains of 1991. That spring, the USGS identified a

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suite of alfalfa pesticides moving through the San Joaquin River and Delta. These pesticides included: diazinon, diuron, chlorpyrifos, trifluralin, and carbofuran. Carbofuran was found exceeding California's performance goal (0.13 parts per billion) by more than two times. The following year, with less spring rain, carbofuran was found at approximately one tenth of that concentration.

Unlike carbofuran, however, many of the individual pesticides of concern have no established water quality standards. While EPA and the State and have not yet established these pesticide-specific criteria, California does have legally enforceable "narrative" water quality standards. Instead of providing specific numerical limits for individual pesticides, California's narrative standard states that "all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in ... aquatic life." To determine whether this standard is being met, water quality studies are performed using what are called bio-toxicity tests. Bio-toxicity tests measure the survival rate of aquatic indicator, or "test," species placed in a water sample.

Using this bio-toxicity testing, the Central Valley Board has found that long stretches of the San Joaquin River and Delta are routinely toxic and in violation of the state's water quality objectives. A small but significant percentage of these toxicity violations are being directly attributed to alfalfa pesticides. It is very difficult, however, to single out specific pesticides and then trace them to back particular fields and/or practices. For this reason and because it very sensitive politically, state and federal agencies have not yet addressed the legal or ecological consequences.

It is only a matter of time, however, before the regulatory agencies respond to these water quality problems. By working cooperatively to create viable solutions now, we can circumvent the unnecessary burdens of future regulation. Furthermore, by taking a preventative approach (ie. reducing pollution at the source through use reduction) we can simultaneously address emerging environmental issues such as air quality. While air quality is not yet a hot issue, fog and rain in the Central Valley and as far away as fifty miles from aerial pesticide applications are showing surprisingly high pesticide concentrations.

This is not intended to be alarmist. It is intended as a warning and as a plea for cooperation

from the agricultural community in pro-actively addressing environmental concerns. The rest of this article will explore trends in agricultural policy and exciting opportunities to further cooperation between agricultural and environmental interests.

The Central Valley Agriculture Initiative

The Agriculture Initiative of the U.S. Environmental Protection Agency (EPA) Region 9 is an exciting new program designed to work cooperatively with the agricultural community in the Central Valley. The Initiative's overall goal is to promote sound agricultural practices that are economically and environmentally sustainable. The primary focus in our first year has been to promote pesticide use reduction through integrated pest management (IPM) and other alternative agriculture practices.

The Initiative is promoting a new, cooperative approach that recognizes farmers -not bureaucrats- as the source of innovation and change in agriculture. The traditional bureaucratic approach is reflected in a recent article on orchard/alfalfa pesticide contamination in the Bay-Delta *ESTUARY* newsletter. The article states the need for "more research before regulators can suggest best management practices for farmers to combat Estuary contamination." Instead of waiting for regulatory involvement, we have begun building a relationship of dialogue and cooperation in which issues can be addressed pro-actively before the problems get out of control.

To build this relationship, we have increased our ties to the U.S. Department of Agriculture, farmers, Resource Conservation Districts, U.C. Cooperative Extension, and other critical players in the agricultural community. We have hired Tim Hatten, a USDA, Soil Conservation Service employee to work with us and have initiated some demonstration projects to highlight the positive changes that farmers -given the opportunity- are willing to make.

Dixon Pilot Project For Pesticide Use Reduction

One example of an innovative demonstration project sponsored by the Agriculture Initiative is the Dixon Pilot Project for Pesticide Use Reduction. In cooperation with the Dixon Resource Conservation District (DRCD), the project goal is to refine and demonstrate alternative pest management on tomatoes and alfalfa. Project cooperators include: Rachel Freeman, alfalfa farm advisor for Yolo and Solano counties; the

SCS; area farmers; pest management consultants; the Solano County Agricultural Commissioner's office; and others.

For project facilitation and expertise in pest management, we are utilizing the services of the Bio-Integral Resource Center (BIRC). BIRC is a non-profit pest management consultant with twenty years of experience providing education and research on integrated pest management (IPM). After interviewing farmer cooperators and doing an extensive literature search, BIRC is now developing custom integrated pest management (IPM) plans for on-farm demonstration. As the project develops and based on farmer needs, money will be made available for applied research and further involvement by U.C. Cooperative Extension and/or SCS.

Thanks to the cooperation of the Agricultural Stabilization and Conservation Service (ASCS), we have been able to get eligibility in the Integrated Crop Management (ICM)/Special Practice 53 (SP53) program extended to Solano county. SP53 is a cost share program implemented by SCS that will give growers up to \$14 per acre for implementing IPM practices on field crops. Furthermore, with the cooperation of the Federal Crop Insurance Corporation (FCIC), we are working to incorporate IPM transition coverage into the package of financial support available to farmer participants.

IV. Changing Agricultural Policy

The Agriculture Initiative is a regional example of a much greater shift which is occurring in our national agricultural policy. While many of the specifics are still being developed, we are building toward national consensus on a policy of pesticide use reduction and sustainable agriculture.

The institutions of American agriculture are finally recognizing that we have focused too long on chemical management rather than on redesigning farming systems to prevent pest problems and nutrient shortages from occurring in the first place.

One sign of these changing times is the new alliance and food safety policy jointly announced by the U.S. Department of Agriculture, the Food and Drug Administration, and the U.S. EPA. The policy is responding to public concern about pesticide residues in food and highlights the opportunity for unprecedented inter-agency collaboration.

As part of these changes, USDA is now going

through a radical reorganization that will heighten its focus on environmental issues through the creation of a natural resources protection agency. Changes in the USDA Commodity programs are expected as well. For the EPA's part, they have stated a goal of having IPM implemented on 75% of America's farmland by the year 2000.

Most of these changes are expected to be voluntary in nature, however, several important regulatory changes are underway as well. Major changes are underway for EPA's pesticide law, the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). These changes will make it easier for EPA to ban pesticides and will put the burden of proof for pesticide safety back on industry.

Another important regulatory change that will occur in the next year or two, is the reauthorization of the Clean Water Act (CWA). The CWA is EPA's main regulatory tool for protecting surface and ground water. The current CWA explicitly exempts agricultural return flow and gives EPA very little authority to address water quality issues in the Central Valley. One of the likely outcomes of the Act's reauthorization will be an end to these exemptions for agriculture.

No one can predict what the outcome of these changes will be, but it is clear that dramatic reductions in pesticide use are needed.

Alfalfa: Maintaining Its Role in California Agriculture

While pesticide use reduction poses a major challenge for alfalfa producers, the challenge posed by California's water supply and politics is perhaps even greater. California Department of Water Resources' statistics show alfalfa as the greatest per acre water user of any crop in California. From anecdotal evidence, it appears that the price and availability of water is making farmers question the choice of alfalfa in their rotations.

If the possibility of diminishing alfalfa acreage concerns the industry, it should also concern environmental interests. Environmental interests must be made aware of alfalfa's importance not only as a soil building legume and rotation crop but also as a source for beneficial insects.

Insecticide free alfalfa fields contain vast numbers of beneficial insects. Therefore, if the industry can reduce or eliminate insecticide applications, it would not only increase biological control for alfalfa pests, but it could also potentially assist in biological control for other important crops.

To fully take advantage of these properties, however, the industry will have to further develop alfalfa's role within an integrated farming system. Could alfalfa, through the use of innovative strip plantings, border harvesting, rotations etc., become an integral part of the biological control for cash crops? Making this a reality and proving it's benefits, would ensure alfalfa's place in the biologically-based future of California agriculture.