IMPLEMENTATION OF BMPS IN CRANBERRY FARMS TO REDUCE SURFACE WATER TMDL FROM PESTICIDES

Kim Patten, Washington State University Long Beach Research and Extension Unit, 2907 Pioneer Rd., Long Beach, WA 98631, 360-642-2031, pattenk@cahe.wsu.edu

INTRODUCTION

Cranberries, a native North American crop, have been grown in coastal counties in Oregon and Washington for over 100 years. They are subjected to the depredations of numerous pests (Patten et al, 2000). Organophosphate (OP) compounds have been found in surface water collected from ditches near cranberry bogs in Grayland, Washington (Anderson and Davis, 2000, Davis and Anderson, 1997, US Environmental Protection Agency, 1997). Levels were above the LC_{50} for selected aquatic invertebrates and have resulted in a 303d listing of the impaired waters. The area impacted is eight square miles of drainage (84 miles of drainage ditches contained within 27 micro-watersheds) around Grayland that flow both south into the Willapa Bay estuary and north into the Elk River estuary. These estuaries are among the most pristine in North America. The surrounding coastal communities are economically desperate areas, with some of the highest unemployment rates and lowest average income levels in the state (Smith, 2000). The cranberry industry, along with fishing and timber, has been the mainstay of the community for the past 100 years. Up until two years ago, the cranberry industry was one of the last remaining economically viable natural resource industries in the area; however, in 1999 the price of cranberries plummeted from $0.60/lb to $0.10/lb ($0.25/lb below the cost of production). It has remained below the cost of production.

Resolution of the water quality problem has been complicated by this seriously depressed crop price that has caused numerous farm bankruptcies, expensive BMP implementation costs, a lack of cost-effective replacements for OPs, and numerous political, ecological, biological and legal (regulatory) issues. Over the past eight years, Washington State University and numerous stakeholders (cranberry growers, Ocean Spray Inc., Natural Resource Conservation Service (NRCS), Pacific Conversation District (PCD), Shoalwater Bay Indian Tribe (SBIT), and the Washington State Department of Ecology (WDOE) have engaged in various activities, ranging from BMP research, educational outreach and technical assistance, monitoring and regulatory imperatives and BMP implementation, to watershed mapping and modeling. This paper addresses the success and failures of that process and makes recommendations on how to better assure implementation of on-farm BMPs that help growers comply with TMDLs.

METHODS AND RESULTS

Stakeholders' Engagement

Key to solving the issues is the engagement of stakeholders. There are three major groups of stakeholders in this problem: local growers, the neighboring Native American tribe, and regulatory agencies (WDOE). Because their livelihoods depended on it, local growers have been very proactively addressing the problem. Starting in 1994, they initiated a process through the State Conservation Commission to codify a set of cranberry BMPs. These were finally certified

by WDOE in 1999 (Pacific Conservation District and Pacific Coast Cranberry Research Foundation, 1999). The industries at both the local and corporate level (Ocean Spray Inc., and the Cranberry Institute) have funded BMP research for reducing surface water pollution. In the past six years, the Washington Cranberry Alliance and other grower task forces have met many times with state and federal regulatory agencies, the Shoalwater Bay Indian Tribe, environmental groups, and industry leaders to develop collaborative solutions. The growers have been involved with local and state conservation districts to help secure funding for government cost-share programs such as the Environmental Quality Incentive Program (EQIP). In the past five years, numerous growers have implemented BMPs without cost-share dollars, and many have also used the USDA conservation programs to implement BMPs.

The Shoalwater Bay Indian Tribe has used this issue to help fund a laboratory for monitoring pesticide contamination issues. Their laboratory has provided in-kind analysis for BMP research and monitoring. The major regulatory stakeholder, WDOE, has continued its own independent monitoring on an annual basis. Its additional roles have included education, encouragement and the threat of enforcement.

BMP Research

The bulk of data evaluating BMPs for surface water quality has been limited to traditional agronomic or horticultural crops. These BMPs are not very useful for cranberries. Therefore, a research effort was implemented by the cranberry industry (Ocean Spray) and several universities to evaluate a series of BMPs for their effectiveness in reducing water pollution (DeMoranville, et al. 1996; Patten and Booth 2001). These research efforts have focused on switching from conventional to biorational pesticides, methods to ameliorate pesticides in surface water, and methods to avoid pesticides reaching surface water. No cost-effective silver bullet has been found to easily solve this problem, and, consequently, WSU has continued with this research effort.

Funding BMP Implementation

Once research indicated that certain BMPs could be effective, a program was needed to implement and monitor them on growers' beds. This was initially done on a trial basis with several growers using Ocean Spray, PCD and Centennial Clean Water funding to install and monitor ditch covers and other BMPs. Once those sites proved effective, growers got engaged with the local conservation districts and NRCS to help secure funding for the government cost-share program - Environmental Quality Incentive Program (EQIP). In the past five years, numerous growers have implemented BMPs with and without EQIP cost-share dollars. The number of EQIP dollars has not kept up with the number required to solve the problem. Changes in the way EQIP monies have been allocated have been problematic, and have resulted in a complete loss of funding to the industry. With the current crop prices, few growers can even afford the 25% cost-share match the program requires. The cost to implement ditch coverings on all the remaining farms would be over several million dollars. Additional sources of monies and less expensive BMPs are being investigated.

Monitoring

Water quality monitoring of the watershed to assure regulatory compliance and progress toward reducing TMDLs has been done by WDOE and the Shoalwater Bay Indian Tribe on a regular basis. Monitoring timing was done during periods of peak pesticide use by the industry and focused on the industry and watershed as a whole. To date there has been no focus on individual farms. Results have shown consistent and significant progress, but not to a level to that satisfies regulatory agencies.

Mapping

To obtain a more complete understanding of the problem, progress to-date, and the watershed as a whole, a GIS mapping system was developed. All farms, all surface water and ditches, all BMPs (by type and status – completed, in progress, contracted), water flows and water quality data were included. Many sources of data were used to develop these maps and the final data was ground-truthed numerous times. All stakeholders were given opportunities to provide input and comments on the GIS BMP watershed maps. GIS models will be used to predict monitoring data based on progress made in BMP implementation and other pest management scenarios.

Assessing Limiting Factors for BMP Implementation and Successful TMDL Reduction

Numerous surveys have been given to growers over the years asking them what limits their ability to implement BMPs and thus comply with TMDL. These surveys asked questions about what BMPs are practical and cost-effective. Survey results indicate that growers are more than willing to implement BMPs if they have been proven to be effective and do not constitute a severe economic hardship. Conversely, few growers (<4-10%) would implement costly ditch covering or subsurface drainage projects (>$5-13/linear foot of drainage ditch) without >75% cost- sharing (cost to the average farmer ranging from >$10,000-50,000). Key to getting additional BMPs implemented is documenting the cost saving that can occur to them as growers in terms of increased yield or labor savings. Anecdotal reports from growers suggest that this might be the case and data are currently being gathered on these aspects of the BMPs.

SUMMARY

Immense effort and resources have been directed toward this problem by all the stakeholders. Although the problem remains, considerable progress has been made. Several inferences can be made from what has transpired over the past 9 years.

1) Progress takes money. If growers are losing their farms to foreclosure, it is difficult for them to find the incentive to implement BMPs to reduce their TMDL. Without programs like EQIP to help implement the cost of BMPs, solving these types of problems would be impossible.

2) Progress takes time. 35 miles of drainage ditches have been implemented with BMPs in 9 years. Most of the remaining 50 miles of ditch are scheduled for BMP implementation with the NRCS, but are pending EQIP monies for cost-sharing.

3) Progress takes research. Without resources spent on research to develop and test cost-effective BMPs, there would be no way to resolve the problem. Research to do this also takes many years to develop, evaluate and implement on-farm. If agencies are interested in real solutions, it is prudent that some resources be allocated to finding solutions, not just monitoring.

4) The problem must be perceived as real, and the ideal solutions must make economic, not punitive, sense. Temporarily (1-2 weeks) exceeding the surface water quality standards for aquatic invertebrates by a very small amount (< 1ppb) is conceptually difficult for an industry to perceive as a real problem, when they are losing the family farms. To achieve a win-win solution, BMPs implemented to solve the problem should also help growers achieve greater returns.

REFERENCES

Anderson, P. and D. Davis. 2000. Evaluation of efforts to reduce pesticide contamination in cranberry bog drainage. *Washington Department of Ecology, Sept. 2000, Publication No*. 00-030-041

Davis, D. and P. Anderson, 1997. Assessment of cranberry bog drainage pesticide contamination - results from chemical analyses of surface water, tissue, and sediment samples colleted in 1996, *Washington Department of Ecology, July 1997, Publication No.* 97-329.

DeMoranville, C., H. Sandler and T. Bicki. 1996. Best management practices guide for Massachusetts cranberry production- insect management. Univ. Mass. Cranberry Exp. Station.

Pacific Conservation District & Pacific Coast Cranberry Research Foundation. 1999. BMPs for cranberry agriculture. *Washington State Conservation Commission*

Patten, K., S. Booth and C. Daniels. 2000. Cranberry crop profiles http://www.tricity.wsu.edu/~cdaniels/profiles/cranberr.pdf).

Patten, K. and S. Booth. 2001. Biorational Based Cranberry Pest Management: Efficacy, Economics and Grower Implementation. Hort Science (July 2001, abstract).

Smith, G. 2000. Selected economic indicators. http://niip.wsu.edu/cgi-bin/broker.exe.

U.S. Environmental Protection Agency. 1997. The Shoalwater Bay Reservation - a limited environmental assessment: 1994-1995, *EPA Region 10*. 910/R-96-013, January 1997.