COOPERATIVE EXTENSION
Washington State University

Agrichemical and Environmental News

A monthly report on pesticides and related environmental issues

In This Issue

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Approaching FQPA: An EPA Perspective

Sandra Halstead, EPA FQPA Specialist

The Food Quality Protection Act (FQPA) is the strongest law ever enacted to protect the public from the potential risks posed by pesticide residues in food. These reforms were designed to provide a health-based standard for pesticide residue in foods, a standard that took into consideration the exposure of infants and children as well as adults. Under FQPA (enacted 1996), the Environmental Protection Agency (EPA) will be reassessing allowable residues on food for nearly 10,000 pesticide uses. Older pesticides will be reevaluated to meet the new standards, and safer substitutes will be approved in an expedited registration process.

RA Strategies for OPs

EPA is evaluating the risk assessment (RA) process for the organophosphate (OP) class of pesticides. These chemicals are perceived to pose the greatest potential risk to public health and the environment. Under FQPA mandates, the EPA must consider the exposure to OPs via drinking water, home and schools, and occupational routes as well as the dietary route. Risk assessment must include cumulative exposure for all chemicals in the OP class over all commodities.

The regulatory process is transparent. In consultation with stakeholders, EPA is working to develop new policies, procedures, and programs, with a goal of reasonable transition to new pest management strategies. The agency is using the guiding principles of sound science in supporting its decisions, relying on actual data generated by the registrant, other agencies, peer-reviewed scientific literature, growers, and other pesticide users. Only in the absence of such data are default values based on worst-case assumptions used. EPA expects to have all of its science policies finalized before OP risk assessment decisions are completed. Simultaneously, as EPA develops the RA process for the OPs, compounds with less complex risk management issues are proceeding through risk assessment.

Implementation and Transition

EPA and the United States Department of Agriculture (USDA) are coordinating efforts to ensure that risk assessment and transition strategies balance the need for safety standards with adequate pest

...continued on next page

EPA Perspective on FQPA, cont.

Sandra Halstead, with Lora Lee Schroeder, Barbara Naess, and Paul Augie Feder

control options for producers. EPA and USDA created the Tolerance Reassessment Advisory Committee (TRAC), which includes representatives from producers, consumers, public health, and environmental groups. TRAC recommendations have reinforced the issues of consistency and transparency in the risk assessment process. Products of the TRAC forum include an EPA website (**www.epa.gov/pesticides**) devoted to posting up-to-date information on the OP tolerance and risk assessments, continued outside peer and public review of science policy issues, a 60-day public comment period, and briefings with key stakeholders as the process is developed. In addition to the website, information is published in the Federal Register.

Regional Activities

EPA is conscious of the potential impacts of FQPA on growers of minor crops. Using crop profiles, the USDA and EPA will identify the crops and uses that contribute most to exposure risk, and will explore potential OP alternatives for pest control. Working with USDA and stakeholders, the agency will continue to focus attention on those situations with limited crop protection alternatives toward the goal of devising real and sensible solutions. To further this effort, EPA created four regional positions designed to provide outreach and education on FQPA implementation. These positions were created for Region 4 Southeast, Region 5 Great Lakes, Region 9 California-West, and Region 10 Alaska-Idaho-Oregon-Washington. The following pages outline the status of these regions' activities.

Region 4 Activities

Submitted by Lora Lee Schroeder

Region 4 represents Mississippi, Tennessee, Alabama, Georgia, Florida, Kentucky, South Carolina, and North Carolina.

The primary goal of Region 4's Agricultural Initiative (AI) project is to assist in FQPA implementation through an extensive and effective communication effort with the regional/local pesticide user community that

1) promotes understanding of FQPA and its potential impacts,
2) fosters stakeholder involvement, and
3) encourages stakeholders to provide pesticide use data/information.

Additionally, the goal of the region's AI is to cultivate partnerships that draw together affected regulatory agencies, industry, and the agricultural community to develop a clear understanding of regional pest management concerns and priorities, and develop pest management strategies that address these concerns, FQPA impacts, and other environmental quality issues. Region 4 is integrating its AI activities with its existing Pesticide Environmental Stewardship Program (PESP) activities, which also seek to achieve pesticide risk reduction through various partnership efforts and initiatives (e.g., IPM in Schools, Regional PESP Grants, Urban Initiative), since these have the same concepts and principles.

Region 4 recruited Lora Lee Schroeder, former Director of Georgia's Division of Pesticides, to fill the AI position. She coordinates the region's activities and has developed an FQPA update/newsletter, *Alphabet Soup.*

The $200K AI funding for Region 4 is committed to three priority areas:

◆ multimedia agricultural pollution prevention,
◆ pesticide risk reduction practices and IPM utilization (which may contribute to development of alternatives to OPs, carbamates, and other high risk pesticides), and
◆ minor crop issues.

The projects selected for funding are

1) B.F. Smith Foundation Delta FARM Project, a multi-partner and multimedia pollution prevention project designed to evaluate farms and farming practices in the Delta region of Mississippi,
2) North Carolina Peanut Project, fostering on-farm research on pesticide alternatives in peanut production and methods of implementation, and
3) Florida Minor Crop Profile Project, a multi-partner

...continued on next page

EPA Perspective on FQPA, cont.

Sandra Halstead, with Lora Lee Schroeder, Barbara Naess, and Paul Augie Feder

project to compile information on pesticide use and pest management practices for selected minor crops in Florida not addressed by NAPIAP.

Questions about EPA's role in FQPA implementation in Region 4 can be directed to Lora Lee Schroeder, EPA FQPA Specialist for Region 4, at (404) 562-9015 or schroeder.lora@epa.gov.

Region 5 Activities
Submitted by Barbara Naess

Region 5 represents Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

Region 5 recently hired Barbara Naess to coordinate FQPA activities. Naess' background includes research on bean resistance to nematodes in California, agroforestry and community gardening extension in Africa, and on-farm research on the use of cover crops to improve soil fertility in Guatemala.

A principal Region 5 activity has been developing and managing a grant with Michigan to develop information on crops, collect residue data, and develop alternatives to OPs and carbamates. This multifaceted, multi-partner project brings together Michigan State University, federal and state regulatory agencies, research groups, commodity and processor organizations, and pesticide registrants. Having focused on actual commodities and pesticides, the project will ultimately provide specific pesticide use data, residue data, and information on alternatives. It can establish a prototype for other states to follow in supplying EPA with consistent and structured information on which to base informed decisions.

On February 26, 1999, Michigan Department of Agriculture's Brian Rowe and Michigan State University's Mark Whalon briefed EPA representatives on the project and presented drafts of grapes and asparagus crop profiles. On May 11, 1999, EPA received a complete report on the residue study, which included pesticide residue analyses for apples, asparagus, blueberries, cucumbers, grapes, peaches, potatoes, and tart cherries. Information may be added to the report as additional data become available and the results are analyzed in different ways.

Region 5's goals include providing outreach to FQPA stakeholders and working with them to support FQPA implementation. Information is disseminated via public talks, answers to inquiries, and a quarterly regional update beginning this month. Region 5 plans to work with stakeholders to identify pesticides at risk, provide useful data to EPA, research alternatives to high-risk pesticides, and develop risk management and transition strategies.

Questions about EPA's role in FQPA implementation in Region 5 can be directed to Barbara Naess, EPA FQPA Specialist for Region 5, at naess.barbara@epa.gov or (312) 886-4347.

Region 9 Activities
Submitted by Paul Augie Feder

Region 9 represents Arizona, California, Hawaii, and Nevada.

Region 9 has begun an FQPA Transition Project to develop a comprehensive overview and analysis of the grape pest complex, pesticide usage, and alternatives to FQPA-targeted pesticides for California's wine grape, table grape, and raisin industries. The program is being conducted in partnership with the grape industry and the University of California Sustainable Agriculture Research and Education Program, with an advisory team representing governmental, agricultural, and environmental interests. Like the Region 5 project, this collaboration could serve as a model for transitional strategies under FQPA.

The region completed the first draft of its Crop/Pest Profile and Alternatives Analysis, conducted its first full team meeting in February, and hired Dr. Artie Lawyer of Technology Sciences Group, Inc., as a project consultant. Plans for the immediate future

...continued on next page

EPA Perspective on FQPA, cont.

Sandra Halstead, with Lora Lee Schroeder, Barbara Naess, and Paul Augie Feder

include completion of the Crop/Pest Profile and the hiring of a new full-time specialist. Final steps for these activities were underway at this writing.

Next steps for Region 9 include matching industry dollars for

1) implementation of key pest management strategies identified in the Crop/Pest Profile and Alternatives Analysis (including bio-intensive IPM strategies);
2) promotion of key research needs;
3) communication with environmental groups, USDA, OPP, and the general public on key pest management challenges;
4) documentation and promotion of a model for collaborative transition strategies; and
5) beginning new partnerships with one to three other key commodities in California.

Questions about EPA's role in FQPA implementation in Region 9 can be directed to Paul Augie Feder, Agricultural Policy Specialist for Region 9, at (415) 744-2010 or feder.paul@epa.gov.

Region 10 Activities
Submitted by Sandra Halstead

Region 10 represents Alaska, Idaho, Oregon, and Washington.

Region 10 is using a community-based approach to encourage dialogue, identify needs, and promote integrated pest management (IPM) strategies in Pacific Northwest crop production. EPA will support community and commodity decisions that are designed to improve human and environmental health.

REGION 10			
Reseacher/Contact	**Proposed Project**	**FQPA Funds**	**Other Funding Sources**
TC Alway Consulting P.O. Box 385 Peshastin, WA 98847 (509) 548-9404 altiz@rightathome.com	Pear "soft chemical" IPM, involves improved scouting manual	$9K	$25K (EPA PSPM and WA Tree Fruit Res. Comm.)
Gary L. Piper, Carol A. Sheppard, John J. Brown WSU, Pullman, WA 99164-6382 (509) 335-5505 brownjj@mail.wsu.edu	Staff to rear biological control agents on artificial media for noxious weed control	$28K	WSU facility and faculty
Jay F. Brunner WSU Tree Fruit Research & ExtensionCenter 1100 N. Western Ave. Wenatchee, WA 98801 (509) 663-8181, ext. 238 jfb@wsu.edu	Yakima Tree Fruit IPM School, 3-part series of IPM short courses	$15K	Student fees, WSU faculty
J. Scott Cameron Assistant Dean, CAHE, WSU 14204 NE Salmon Creek Ave. Vancouver, WA 98686-9600 (360) 576-6030 cameron@wsu.edu	Industry-wide raspberry IPM	$27K	Ongoing program
Andrew Kahn Northwest IPM, Inc. Wenatchee, WA (509) 662-4345	"Attract and spray" stinkbug pheromones in mating disruption orchards	$7.5K	PIK apple producers
Richard Zack WSU Entomology Pullman, WA 99164-6382 (509) 335-3394 zack@mail.wsu.edu Peter Landolt USDA-ARS 5230 Konnowac Pass Rd. Wapato, WA 98951 landolt@geleb.wolfenet.com	Corn earworm pheromones, develop chemical & trap specific to true corn earworm pest	$18K	$15K Columbia Veg Growers, USDA-ARS equipment and personnel, WSU facility and faculty
Keith Pike WSU Prosser, Entomology 24106 N. Bunn Rd. Prosser, WA 99350 (509) 786-9269 kpike@tricity.wsu.edu	"Soft" IPM in potatoes, managing beneficials, improved scouting and thresholds for Green Peach Aphid	$8K	$44K WA Potato Comm., WSU facility and faculty
Tom Unruh USDA-ARS 5230 Konnowac Pass Rd. Wapato, WA 98951 unruh@varl.gov	Pear Psylla IPM in mating disruption orchards, improved scouting, spatial distribution of overwintering adults	$38K	USDA-ARS facility, PEW/EPA IPM Project
Doug Walsh WSU Prosser, Entomology 24106 N. Bunn Rd. Prosser, WA 99350 (509) 786-9287 dwalsh@tricity.wsu.edu	Minor crop commodity support	$2K	WSU faculty, EPA personnel
Frank Young USDA-ARS Room 161, Johnson Hall Pullman, WA 99164-6421 (509) 335-4196 youngfl@wsu.edu	Weed Seeker equipment, infrared site-specific herbicide application	$17.5K	USDA-ARS equipment, personnel

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EPA Perspective on FQPA, cont.

Sandra Halstead, with Lora Lee Schroeder, Barbara Naess, and Paul Augie Feder

Region 10 FQPA specialist Sandra Halstead
◆ serves as a technical specialist for FQPA and IPM projects;
◆ cooperates in research and field demonstration projects using IPM techniques;
◆ acts as community liaison in communicating local needs, issues, and solutions to EPA;
◆ works to increase awareness in agricultural communities of methods and production systems that provide better protection to human and environmental health; and
◆ coordinates programs across local, state, university, and federal agencies and commodities.

Halstead's office is located at Washington State University's Irrigated Agriculture Research and Extension Center (WSU IAREC) in Prosser, Washington. Her background includes degrees in agricultural science and agronomy, as well as over 15 years of agricultural research experience.

This spring, EPA Region 10 FQPA grants, administered by WSU's Center for Sustaining Agricultural and Natural Resources (CSANR), are funding a wide array of education and on-farm research and demonstration projects across a range of fruit and vegetable crops. These projects were identified by commodity representatives, consultants, and researchers as "weak links" in current IPM programs or as having the potential to further the adoption of IPM strategies. The table on page 4 briefly describes the projects and lists their lead investigators. Details of the individual projects' proposals and significant findings generated in the research are available on Halstead's web site at **www.tricity.wsu.edu/htmls/iarec/Faculty/Halstead.html**.

Questions about EPA's role in FQPA implementation or about Region 10 activities can be directed to Sandy Halstead, EPA FQPA Specialist for Region 10, at (509) 786-9225 or halstead.sandra@epa.gov.

FQPA Legislation Introduced

Dr. Catherine Daniels, Pesticide Coordinator, WSU

On April 28, 1999, Representatives Pombo (R-CA), Condit (D-CA), Boyd (D-FL), and Towns (D-NY) introduced legislation developed by the FQPA-Implementation Working Group. The bill is titled "Regulatory Fairness and Openness Act of 1999" and is identified as H.R. 1592. The current list of co-sponsors numbers seventeen, and is bipartisan. Heather Hanson, Executive Director of Washington Friends of Farms and Forests, supplied this summary, prepared by the American Crop Protection Association:

❶ Requires EPA to prepare a written "transition analysis" and report identifying various assumptions or defaults used by the Agency in making tolerance decisions and non-food use pesticide decisions issued during the ten-year reassessment period mandated by FQPA, and identify certain adverse consequences of regulatory actions.

❷ Requires EPA to use actual data and scientifically sound information when modifying or revoking tolerances. In certain cases, use of default assumptions, and anecdotal or inadequate information to implement the new requirements of FQPA would not be allowed.

❸ Requires EPA to issue, via public notice and comment, general procedures and policies as regulations, and data guidelines under FIFRA and FFDCA specifying the kinds of information required to support a new or existing tolerance.

❹ Allows EPA to issue a Section 18 emergency exemption without having to conduct a full FQPA risk assessment for other tolerances associated with the pesticide if EPA finds that incremental exposure from the Section 18 exemption would not pose a significant risk. EPA would also be required to expedite the registration of new alternative products/uses to pesticides that have been or may be removed from the market due to a tolerance review under FQPA.

❺ Requires EPA and USDA to prepare a report for Congress within six months of enactment of the bill that includes proposals to:

...continued on next page

Page 6
Agrichemical & Environmental News
June 1999
No. 158

SFI a Boon for Washington State

Dr. Doug Walsh, Agrichemical & Environmental Education Specialist, WSU

The Safe Food Initiative (SFI) passed the Washington State legislature and was signed into law by Governor Gary Locke on May 10, 1999. The College of Agriculture and Home Economics at Washington State University is extremely pleased that the funding of this measure will permit the hiring of twenty new scientists and an equivalent level of support staff. The legislature agreed to provide the additional funding of $3.25 million to fill these positions after July 1, 2000.

Additional Funding for WSCPR

The Safe Food Initiative contains legislation providing an additional $500,000 annually for the Washington State Commission on Pesticide Registration (WSCPR). This additional funding may potentially be made available for research projects this year starting with the WSCPR's meeting in Yakima on July 7, 1999. Added to the existing $500,000 funding per year and allowing for administrative expenses, nearly $900,000 will be available annually for research directed towards solving real-world, applied pest management problems.

Broadened Mandate for WSCPR

A new, broadened mandate approved by the legislature will enable WSCPR to consider, approve, and fund projects that encompass broader aspects of applied pest management and integrated pest management than before. The previous legislative mandate (approved by the legislature in 1995) under which the WSCPR had been operating permitted funding of projects directed towards the registration or registration maintenance of pesticide products, or for providing information on the registration of pesticide products. The new mandate will permit funding of projects that could include biological control, pesticide resistance management, and cultural pest control techniques—all important components of integrated pest management.

The WSCPR consists of twelve voting commissioners appointed for three-year terms by the governor. Eight of these positions are filled by representatives of recognized private statewide commodity organizations: tree fruits, hops, potatoes, wheat, vegetable and seed, berries, wine grapes, and nursery and landscape. The other four voting commissioners are appointed from the forest protection, food processing, and agrichemical industries, and from professional pesticide applicators. Five nonvoting commissioners represent the Washington State Departments of Ecology, Agriculture, Labor and Industries, and Health, and Washington State University. The Assistant Attorney General attends as well. The WSCPR is administered privately by Agricultural Development Group.

...continued on next page

FQPA Legislation, cont. from p. 5

a) revise EPA's priorities and resources to allow the Agency to promptly process and make decisions on all registration applications, Section 18s, requests for experimental use permits and requests for new inert ingredients, and
b) revise USDA priorities and resources to allow USDA to obtain and provide EPA with adequate and timely information on food consumption, pesticide residues on food and in drinking water, pesticide use and usage and to review actions proposed by EPA under FFDCA and FIFRA.

❻ Requires USDA to monitor the competitive strength of major U.S. agricultural commodity sectors in the international marketplace, with emphasis on the impact of FQPA regulatory decisions.

❼ Establishes a new, permanent Pesticide Advisory Committee to provide advice to EPA and USDA on FQPA implementation, and to assume functions currently performed by the temporary Tolerance Reassessment Advisory Committee (TRAC).

To obtain a copy of the bill from the House of Representatives web site, type in **http://www.house.gov/** and click on "Search by Bill" under the THOMAS section. Both html and pdf versions are available.

...SFI, cont.

Dr. Doug Walsh, Agrichemical & Environmental Education Specialist, WSU

Speak Up and Be Heard!

I would encourage agricultural producers, ornamental crop producers, and the citizens of Washington State with pest management problems to seek support from the WSCPR. This group is truly interested in supporting useful applied pest management research. From 1995 through December 1998 the WSCPR awarded nearly $1.57 million in support of 149 projects. Critical to the WSCPR funding process is matching support. Matching support for a research project can be direct financial support for the researcher from the affected commodity producers or in-kind support from a grower or grower group such as donated labor, land use, crop destruction, or goods and services.

WASHINGTON STATE COMMISSION ON PESTICIDE REGISTRATION

Name	Representing	Address	Phone & E-Mail
Tedd Wildman, Chair (term ends 2001)	Wine Grapes	11702 S. Griffin Rd. Prosser, WA 99350	(509) 786-4340 twild@bentonrea.com
Doug Muse, Vice Chair (term ends 1999)	Vegetables & Seeds	260 Ridge View Pasco, WA 99301	(509) 546-0379
Ann George, Treasurer (term ends 2000)	Hops	504 N. Naches Ave., Suite 11 Yakima, WA 98901	(509) 453-4749 whchgw@televar.com
Bob Berger, Past Chair (term ends 2001)	Nursery & Landscape	2634 19th Way NW Olympia, WA 98502-4181	(360) 357-6075
Pat Boss (term ends 2000)	Potatoes	108 Interlake Rd. Moses Lake, WA 98837	(509) 765-4853 wspc@televar.com
Mike Carrow (term ends 2001)	Food Processors	2005 Saint St. Richland, WA 99352	(509) 375-5811 mcarrow@lamb-weston.com
Herb Teas (term ends 2000)	Tree Fruit	1567 N. Wenatchee Ave. Wenatchee, WA 98807	(509) 662-2141 nwwherb@nwi.net
VACANT	Forest Protection		
Mary Gilmore (term ends 1999)	Agrichemicals	4903 S. St. Annes Lane Spokane, WA 99223	(509) 448-1648
Bill Harlan (term ends 1999)	Pesticide Applicators	P.O. Box 681 Kirkland, WA 98083	(425) 823-2600
Stewart Pfaff (term ends 2000)	Wheat	30121 SR 27 Garfield, WA 99130	(509) 635-1675
Bryan Sakuma (term ends 2000)	Berries	P.O. Box 427 Burlington, WA 98223	(360) 757-6611 sakumab@sos.net
William Green (nonvoting)	WA Dept. of Ecology	P.O. Box 47600 Olympia, WA 98504-7600	(360) 407-6795 vgre461@ecy.wa.gov
Dan Locke (nonvoting)	WA Dept. of Labor & Industries	P.O. Box 44610 Olympia, WA 98504-4610	(360) 902-5162
Bill Mason (nonvoting)	WA Dept. of Health	P.O. Box 47825 Olympia, WA 98504	(360) 236-3367 WDM0303@hub.doh.wa.gov
Ted Maxwell (nonvoting)	WA Dept. of Agriculture	P.O. Box 42560 Olympia, WA 98504-2560	(360) 902-2026 tmaxwell@agr.wa.gov
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Tanya Wojtowych, Secretary	Agriculture Development Group	P.O. Box 273 Genesee, ID 83832	(208) 285-0121 juliana@moscow.com
Richard McCartan	WA Assistant Attorney General	P.O. Box 40109 Olympia, WA 98504	(360) 664-4998

Request for Proposals

A new request for proposals has been drafted and is pending approval by the commissioners. When finalized it will be available on the Washington State University Pesticide Information Center On-Line (PICOL) website at **http://picol.cahe.wsu.edu** and the WSCPR website at **http://wscpr.org**. Copies can also be requested from me (509-786-9287 or **dwalsh@tricity.wsu.edu**). The next proposal acceptance deadline is June 21, with subsequent cycles at two-month intervals. Proposals are due three weeks before each commission meeting. Written proposals should be concise, with descriptions of the pest(s), the economic damage that results from the pest, a plan of action for research, and a timetable for implementation of the project. Individuals or groups soliciting support will be expected to give a brief (five-minute) presentation to the commissioners and to be prepared to respond to questions or concerns. Funding decisions have typically been made immediately following the question and answer period.

FEQL Advisory Board Holds Third Meeting

Dr. John J. Brown, Department of Entomology Chair, WSU

Ten of the sixteen Food & Environmental Quality Laboratory (FEQL) Advisory Board members met with FEQL faculty and staff members at Washington State University's Tri-Cities campus on April 29, 1999. Dean James Zuiches (College of Agriculture and Home Economics) initiated the meeting by giving the background of the FEQL and stating the need for an Advisory Board to foster cooperation between Washington, Oregon, and Idaho in their activities to address environmental quality issues.

Drs. Douglas Walsh, Carol Weisskopf, and Allan Felsot (Washington) joined Dr. Gregg Möller (Idaho) and Dr. Jeff Jenkins (Oregon) in describing Tri-State Cooperation on Interregonal Research Project #4 (IR-4) projects. Dr. Walsh discussed his field work with Ron Wight in support of IR-4 program goals. Dr. Weisskopf pointed out how results generated in one state benefited the other two. In addition to discussing his state's IR-4 residue reports, Dr. Möller described Idaho's efforts to train students in Good Laboratory Practices.

FEQL Advisory Board, April 29, 1999 (left to right): Royal Schoen, WSDA; Pete Fretwell (for Scott McKinnie), FarWest Fertilizer & AgriChemical Association; Don Abbot, WA Dept. of Ecology; Marilyn Perkins, League of Women Voters; Ron Wight, WSU; Austin Long, USFDA; Allan Felsot, WSU; Jeffrey Jenkins, OSU; Barbara Morrissey, WA Dept. of Health; Gregg Möller, U of I; Doug Walsh, WSU, Dean James Zuiches, WSU.

Advisory Board members expressed their interest in discussing legislative issues, staying apprised of FEQL activities, and being able to network with other professionals with common interests. The Advisory Board is still determining what is expected of them—should they be providing leadership or remain in an advisory capacity? Quarterly meetings of the Advisory Board will continue until a clear function is identified. The Advisory Board may become the strategic planning counsel for the FEQL. Dr. Richard Heimsch expressed a desire to have at least one meeting of the Tri-State IR-4 representatives annually in conjunction with a quarterly FEQL Advisory Board meeting to report and coordinate activities.

Dr. Carol Weisskopf gave a financial report for the laboratory. Drs. Walsh, Weisskopf, and Felsot reported on talks and tours they have conducted that increase the visibility of the FEQL. Sally O'Neal Coates reported the favorable reviews given to *Agrichemical & Environmental News* by a national evaluation team. Dr. Weisskopf announced her intentions of leaving the FEQL for personal and health reasons. She will be greatly missed! The next meeting of the FEQL Advisory Board was scheduled for late October, perhaps in conjunction with a Pesticide Issues Conference tentatively entitled "Pesticides, Salmon, and Other Endangered Species."

John J. Brown is a professor and Chair of the Department of Entomology at Washington State University in Pullman. He can be reached at (509) 335-5505 or ***brownjj@mail.wsu.edu****.*

Coming Soon to a Pesticide Label Near You

Page 9
Agrichemical & Environmental News
June 1999
No. 158

Dr. Doug Walsh, Agrichemical & Environmental Education Specialist, WSU

The Interregional Research Project #4 (IR-4) Food-Use Program has announced the successful granting by EPA of tolerance or exemption from tolerance for the following pesticides on the crops shown. Additionally, EPA's response to petitions to permit the continued use of off-patent products carbaryl and malathion has been positive. Indications are that data submitted for carbaryl and malathion is adequate to support re-registration.

Insecticides & Miticides	Trade Name	Crop	Registrant	Chemistry	Pests Controlled
carbaryl	SEVIN XLR PLUS	Okra	Rhone-Poulenc	Carbamate	Broad-spectrum insecticide.
formic acid gel	FOR-MITE	Honey Bee Hives			Varoa and tracheal mites.
imidacloprid	ADMIRE	Strawberry, Legume, Vegetables, Cucurbits	Bayer	Chloro-nicotinyl	Primarily effective against homopteran and heteropteran insects (aphid, whitefly, scale, etc.), beetles and grubs. Controls numerous pests resistant to insecticides. Very suitable for IPM programs.
malathion	CLEAN CROP; Malathion 57 EC	Strawberry, Raspberry, Blackberry, Chestnut, Walnut, Asparagus, Carrot, Pea (succulent), Spinach, Broccoli, Melon, Cabbage, Turnip, Okra, Mustard Greens Pear, Apricot, Mint, Peach, Mushroom	Cheminova USA	Organo-phosphate	Broad-spectrum insecticide/miticide: aphids, spider mites, scale insects, and other sucking, chewing, insects attacking fruits, vegetables, ornamentals, and stored products.
tebufenozide	CONFIRM	Mint, Caneberries, Blueberries, Cranberry, Turnip, Canola	Rohm and Haas	Diacyl-hydrazine (acts as an ecdysoagonist)	Controls only Lepidoptera larvae. Low environmental impact and soft on beneficial arthropods.
Fungicides	**Name**	**Crop**	**Registrant**	**Chemistry**	**Pests Controlled**
azoxystrobin	QUADRIS	Strawberry, Spinach	Zeneca	Strobilurin	Broad-spectrum suppression of plant diseases including Cladosporium, Venturia, Botryosphaeria, Mycosphaerella, Pyrenophora, Puccinia, Pyricularia, Plasmopara, Guignardia, Pseudopeziza, Alternaria, Sphaerotheca, Erysiphe, Leveillula, Pythium, Septoria, Uncinula, Pseudoperonospora, Didymella, Sclerotium, Colletotrichum, Mycosphaerella, Phytophthora, Rhynchosporium, Rhizoctonia, and many more.
fenbuconazole	INDAR	Blueberry	Rohm and Haas	Aralkyl triazole	Supresses Ascomycetes, Deuteromycetes, and Basidiomycetes.
fosetyl-al	ALIETTE	Blueberry	Rhone-Poulenc		Phytophthora, Alternaria and Downy Mildew.
Herbicides	**Name**	**Crop**	**Registrant**	**Chemistry**	**Pests Controlled**
clopyralid	STINGER	Cranberry	Dow AgroSciences		Controls selective post-emergence for broadleaf weeds.
pendimethalin	PROWL	Mint	American Cyanamid	Dinitroaniline	Controls most annual grasses and certain broadleaf weeds.
pronamide	KERB	Cranberry, Grasses Grown for Seed	Rohm and Haas	Amide	Pre or post-emergence selective herbicide for a wide range of grasses and certain broadleaf weeds.
Plant Growth Regulators	**Trade Name**	**Crop**	**Registrant**	**Chemistry**	**Pests Controlled**
copper ethyl-enediamine complex	INFERNO	Potato	Griffin		Plant Desiccant

Page 10
Agrichemical & Environmental News
June 1999
No. 158

Plant-Sucking Mites
Major Pests of Modern Food, Fiber and Ornamental Crops

Dr. Doug Walsh, Agrichemical & Environmental Education Specialist, WSU

The advances in production agriculture during the past half century have intensified crop damage from mite infestation. Van de Vrie et al. (1972) observed that outbreaks of mite populations were uncommon historically in agroecosytems where productivity languished far below the levels achieved in modern production agriculture. Mite populations stayed below observable levels due to natural regulation by predators, disease, and poor nutrition from low-quality host plants. However, Van de Vrie et al. went on to observe that mite populations often experienced outbreaks in agroecosytems where production levels were bolstered by the use of synthetic inputs including fertilizers and pesticides. When crop production is optimized (i.e., not limited by water, nutrients, or competition from weeds), the plants in production become an excellent food source for pests. Under these conditions, the developmental rate, fecundity, and lifespan of mites are increased and contribute to population outbreaks.

Significant Spider Mite Pests of Pacific Northwest Agriculture

A number of mite species are pests in the Pacific Northwest. Significant spider mite pests include two-spotted spider mite, strawberry spider mite, McDaniel spider mite, yellow spider mite, and European red mite (Mellot and Krantz 1997). Spider mites develop through several stages: egg, six-legged larva, and eight-legged protonymph, deutonymph, and adult. Males typically reach maturity before females,and will position themselves near developing quiescent females. When an adult female emerges, copulation will often occur immediately. Under optimal conditions, most mite species can develop from egg to adult in six to ten days. Egg laying by adult females can begin as soon as one or two days following maturity. Most spider mite species overwinter as mated adult females. An exception is the European red mite. It overwinters in the egg stage.

A Big Drain from the Feeding of Such Small Pests

At the microscopic level, significant quantities (relative to mite size) of plant juices pass through the digestive tract of spider mites as they feed on leaf tissues. McEnroe (1963) estimated this volume at 1.2×10^{-2} microliters per mite per hour. This quantity represents roughly 50% of the mass of an adult female spider mite. Liesering (1960) calculated that the number of photosynthetically active leaf cells that are punctured and emptied per mite at 100 per minute. In gut content studies of two-spotted mites, Mothes and Seitz (1981) observed only thylakoid granules inside their digestive tract following feeding. The thylakoid grana on which *T. urticae* focus their feeding are the key photosynthetic engines in plant cells. The grana consist of 45 to 50% protein, 50 to 55% lipid, and minute amounts of RNA and DNA (Noggle and Fritz, 1983). Water and other low-density plant cell contents are directly excreted (McEnroe 1963). In essence, spider mites “filter feed” the most nutritious cellular contents from leaf cells and excrete the less nutritious cell contents.

At the macroscopic level, damage from mite feeding can cause leaf bronzing, stippling, or scorching . For most horticultural crops, economic loss is caused by a drop in yield or quality due to reduction in photosynthesis.

Spider Mite Outbreaks are Promoted by Hot, Dry Weather

This common condition, also known as “summer,” occurs annually in most regions of production agriculture in the Pacific Northwest. Water stress, wind, and dust all contribute to the outbreak of mite populations. When mite outbreaks occur, chemical treatment can be used to suppress infesting populations.

Smothering Agents

Solutions containing petroleum-based horticultural oils, vegetable oils, or agricultural soaps can be applied to many crops. Spider mites and eggs are killed by suffocation when the oil or soap solution smothers them. Extreme care should be taken with the use of these types of products to limit the chances for phytotoxicity.

Organochlorines

Endosulfan and dicofol are two organochlorine miticides still available for use on many crops. Unlike many other

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...Plant-Sucking Mites, cont.

Dr. Doug Walsh, Agrichemical & Environmental Education Specialist, WSU

organochlorines, these two compounds are relatively non-persistent in the environment. These miticides interfere with the transmission of nerve impulses and disrupt the nervous system. Both products tend to demonstrate better pest control activities at warmer temperatures, but overuse has led to the development of tolerance in many pest mite populations.

Organophosphates

Many organophosphate pesticides have demonstrated substantial miticidal activity. Results from the 1940s demonstrated significant mite control with applications of parathion and TEPP. Spider mites are still listed as target pests on many organophosphate products. However, many mite populations have developed tolerance to the toxic effects of organophosphates.

Organotins

Miticides in this category were synthesized in the 1960s and 1970s and registered for commercial use in the 1970s. They were used extensively for their ability to quickly knock down spider mite populations. Fenbutatin-oxide has remained registered since the 1970s. Cyhexatin experienced a regulatory hiatus, but is now making a comeback for limited use on several crops. The efficacy of the organotin compounds is improved if they are used during periods of warmer weather. Overuse of cyhexatin during the mid 1980s led to the development of resistance (Allen 1988). Recent work by Dr. Elizabeth Beers of WSU Wenatchee's Tree Fruit Research & Extention Center demonstrates that populations of spider mites in tree fruits in Washington have regained susceptibility to cyhexatin.

Propargite

This product has been a stalwart compound since the 1960s, providing effective suppression of pest mites on a number of crops. Regulatory constraints have resulted in the manufacturer canceling several crop uses. Additionally, re-entry intervals have increased on a number of crops on which this compound is still registered.

Ovicides

Clofentazine and hexythiazox are selective ovicidal products. Spider mite eggs exposed to either compound fail to hatch. Both are selective and aid in the conservation of populations of beneficial arthropods. These products are typically used relatively early in the production season before mite populations reach outbreak conditions.

Antimetabolites

A number of new miticidal compounds have been developed within the past fifteen years. These include avermectins and pyroles. Pest mortality results from disruption of metabolism within nerve cells of pest mites. Abamectin, an avermectin, is a mycelial extract of *Streptomyces avermitilis*. This product has received registration on a number of horticultural crops in recent years, and several new registrations are pending. Pyridaben is registered for use on ornamentals and pears. It has been fast-tracked by the Environmental Protection Agency (EPA) for registration on several other horticultural crops. Chlorfenapyr is a synthetic pyrole that has proven extremely effective at suppressing populations of spider mites. Unfortunately, chlorfenapyr exhibits avian toxicity. Research will be required to develop use patterns that will minimize birds' exposure to chlorfenapyr residues.

Synthetic Pyrethroids

Fenpropathrin and bifenthrin are two synthetic pyrethroid insecticides registered for use to control spider mites on several horticultural crops. Spider mites have a well-documented history of rapidly developing resistance to pyrethroid insecticides, and resurgence of spider mite populations following pyrethroid application is typical.

Combating Miticide Resistance

Two-spotted spider mites have a history of rapidly developing resistance to miticides when a miticide is repeatedly applied to the same population. Alternating miticides that have different modes of action may reduce development of resistance to a specific miticide. Other techniques to discourage resistance include spraying only when necessary and treating only infested portions of the crop. Organophosphate, carbamate, and pyrethroid insecticide applications can induce spider mite outbreaks. If possible, avoid

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Plant-Sucking Mites, cont.

Dr. Doug Walsh, Agrichemical & Environmental Education Specialist, WSU

early-season insecticide application or apply insecticides that are less disruptive to beneficial arthropods. Careful selection and use of insecticides early in the season can potentially reduce the number of miticide applications required later in the season.

REFERENCES

Allen W. W., P. L. Colville, and K. H. Osborn. 1987. The two-spotted mite problem on California strawberries. The PinkSheet, Strawberry News Bulletin. California Strawberry Advisory Board. 87-3.

Leisering, R., Beitrag. 1960. Beitrag zum phytopatologischen Wirkungsmeechanismus von Tetranychus urticae. Pflanzenschutz. 67:525-542.

McEnroe, W. D. 1963. The role of the digestive system in the water balance of the two-spotted spider mite. Adv. Acarol. 1:225-231.

Mellot, J. L., and G. W. Krantz. 1997. Some common plant-feeding mites and mite predators in the northwestern United States. Pacific Northwest Insect Control handbook. Oregon State University

Mothes, U., and K. A. Seitz. 1981. Functional microscopic anatomy of the digestive system of Tetranychus urticae (Acari: Tetranychidae) Acarologia. 22:257-270

Noggle G. R., 1983b. The organization of plants, pp. 9-38. In Introductory plant physiology. G. R. Noggle and G. J. Fritz (eds.). Prentice Hall, Englewood Cliffs, New Jersey.

Van de Vrie, M., J. A. McMurtry, and C. B. Huffaker, 1972. Ecology of mites and their natural enemies. A review. III Biology, ecology, pest status, and host plant relations of Tetranychids. Hilgardia 41:345-432.

1999 Pesticide Container Recycling Schedule

DATE	TIME	LOCATION	CONTACT	PHONE
June 3	8 am to 10 am	Western Farm Serv., Davenport	John Massey	509-838-5007
	11 am to 1 pm	Western Farm Serv., Harrington	Jim Hurst	509-253-4311
	2 pm to 4 pm	Grange Supply Cenex, Odessa	Greg Luiten	509-982-2693
June 4	8 am to 10 am	Grange Supply Cenex, Ritzville	Dale Anderson	509-659-1360
	11 am to 1 pm	Rudy's Aviation, Lind	Rudy Fichtenberg	509-677-8858
June 7	8 am to 10 am	Wilbur Ellis, Mattawa	Al Hilliker	509-932-4988
	11 am to 1 pm	Cenex, Bruce Dealers, Othello	Lori Anderson	509-488-5261
	2 pm to 3 pm	B&R Ag. Chemical, Othello	Larry Hawley	509-488-6576
June 8	8 am to 1 pm	Othello Airport, Othello	Mark Conner	509-488-2921
	2 pm to Finish	D & S Crop Care, Warden	David Smith	509-349-7660
June 9	8 am to 11 am	Tom Dent Aviation, Moses Lake	Tom Dent	509-765-6926
	1 pm to 2 pm	Cenex, Royal City	Ted Freeman	509-346-2213
	2:30 to 4 pm	Saddle Mountain, Royal City	Mike Pack	509-346-2291
June 10	8 am to 11 am	Wenatchee Tree Fruit Station	Jeff Heats	509-622-1539
June 14	8 am to 10 am	Ag. Ent. Supply Inc., Cheney	Gary Cheney	800-782-7786
	12 noon to 2 pm	Wilbur Ellis, Waverly	Monte Bareither	509-283-2432
	3 pm to 5 pm	McGregor's, Tekoa	Charles Wedin	509-284-5391
June 15	8 am to 10 am	Wilbur Ellis, Oakesdale	Jerry Jeske	509-285-4511
	11 am to 1 pm	Western Farm Service, Rosalia	John Massey	509-924-9213
	2 pm to 4 pm	McGregor's, St. John	Rick Bafus	509-648-3218
June 16	8 am to 12 noon	Grange Supply, Colfax	Darrell Tyler	509-397-4353
June 17	8 am to 11 am	Simplot, Sunnyside	John Cullen	509-837-6261
	1 pm to 3 pm	Bleyhl Farm Service, Zillah	Ray Oversby	509-829-6922

Washington Pest Consultants Association organizes an annual series of collection dates and sites for empty pesticide containers. Dates and locations are subject to change; confirm with a telephone call to the number listed in the table before participating. For general questions, or if you are interested in hosting an event at your farm, business, or in a central location in your area, contact Clarke Brown at (509) 965-6809 or Roger Ours at (509) 930-6950.

CONTAINERS MUST MEET THE FOLLOWING CRITERIA:

- Rinsed—no residue remaining
- Majority of foil seal removed from spout (small amount on rim OK)
- Clean and dry, inside and out, with no apparent odor
- Hard plastic and slip-on lids removed
- Half-pint, pint, quart, one and two-and-a-half gallon containers accepted whole
- Five-, 30-, and 55-gallon containers accepted whole if lids and bails removed

Forest Industry Vibration/Noise Exposure Studies Under Way

Page 13
Agrichemical & Environmental News
June 1999
No. 158

Norm Herdrich, PNASH Outreach Coordinator

The forest products industry is a powerful economic presence in the Pacific Northwest. Although modern, mechanical methods are coming into use to harvest small-diameter trees, many workers are still exposed to hand-arm and whole-body vibration from a variety of hand tools and heavy equipment.

Vibration exposure in forestry workers has been associated with negative health effects such as Hand-Arm Vibration Syndrome (HAVS) in countries including Japan, Canada, Papua New Guinea, and Finland. HAVS can include a number of ailments, including Raynaud's Phenomenon of Occupational Origin and Vibration-Induced White Finger Syndrome. These maladies can force workers out of employment by preventing them from performing their normal job tasks. The literature concerning HAVS shows a large number of studies assessing the health effects of vibration exposure, but very little data is available on actual exposure levels in forestry workers. The current National Institute for Occupational Safety and Health (NIOSH) Research Agenda lists musculoskeletal disorders of the upper extremities as a priority, indicating that NIOSH recognizes the importance of disorders such as HAVS.

A study being supervised by Dr. Michael Yost, a researcher at the University of Washington (UW), will add to the existing exposure data by collecting task-based vibration measurements on forestry workers utilizing a variety of vibration-producing equipment. The vibration assessments performed will include hand-arm (segmental) vibration and whole-body vibration. The results will be compared to the Threshold Limit Values published by the American Conference of Governmental Industrial Hygienists, which encompasses both of these types of vibration. Noise exposure measurements will be taken simultaneously in order to estimate the degree to which vibration exposure levels may be predicted by noise exposure levels; this approach has received limited attention in the literature.

According to Dr. Yost, the task-based exposure assessment approach being used in this study, combined with multiple regression modeling, will allow researchers to identify work characteristics that promote elevated exposure levels. This study is expected to generate data that will also provide a basis for identifying potential exposure control measures.

Two timber companies are participating in the study. Rick Neitzal, a UW researcher, spent five days in April collecting field data on workers for one company. He collected twenty-one noise samples and eighty-two vibration readings, and expects to obtain at least this amount of data from the other company. He is collecting task- and tool-based information in association with the noise and vibration measurements, and will therefore be able to generate task- and tool-specific exposure levels following statistical analysis.

Neitzal has sampled work environments including a cutting/felling crew, a log-handling facility crew, and three log-yarding crews. Equipment studied includes several types of log yarders, log processors, log stackers, chainsaws, log shovels, and log trucks. Jobs monitored include hooktender, yarder operator, processor operator, truck driver, chokersetter, landing man, stacker operator, feller, and shovel operator.

In addition to collecting readings on noise and vibration, Neitzal has been observing the workers to assess how accurately they are self-reporting task performance and tool usage. The study started last October and is scheduled to end September 30 of this year.

The Pacific Northwest Agricultural Safety and Health Center (PNASH), funded by NIOSH, is one of eight such centers in the United States. The Center's mandate is to study occupational health and safety issues in farming, forestry and fishing in the four Region 10 states of Idaho, Washington, Oregon and Alaska. Dr. Richard Fenske is the Center Director, Dr. Matthew Keifer is Co-Director, and Sharon Morris is Associate Director. Adrienne Hidy is the Center's Administrator, and Marcy White is the Program Coordinator.

This article was prepared by Norm Herdrich, PNASH Outreach Coordinator. To obtain additional information, he can be contacted at (509) 926-1704, or e-mail him at ***normh@u.washington.edu****.*

Page 14
Agrichemical & Environmental News
June 1999
No. 158

Is It Soup Yet?

The Mysteries of Chemical Mixtures Revealed

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

Now Serving: A Chemical Soup

I wouldn't be a bit surprised if hundreds of millions of dollars were spent in the United States each year to monitor air, water, soil, and plants for chemical contaminants. The analytical frenzy started in earnest in the mid 1960s with programs expanding nearly exponentially as health concerns led to ever more regulations that led to almost full employment for analytical chemists. After so many years of monitoring, what do we now know? Chemicals synthesized by humans seem to be everywhere and exposure to multiple chemicals is inevitable. In essence, we live in a chemical soup.

...exposure to multiple chemicals is inevitable... we live in a chemical soup...

Compounds that seem to generate the most worry and consequently expenditures for monitoring and study include polychlorinated biphenyls (PCBs), dioxins (PCDDs), polyaromatic hydrocarbons (PAHs) and of course, pesticides of all kinds. Before we unnecessarily worry about the consequences of these exposures, we should be aware that toxicology and environmental chemistry have also evolved to supply the information needed to assess risks with more confidence than ever before. Many of the chemicals that have become fodder for newspaper headlines have now been around a long time. For example, PCBs—intensively used as insulating fluids in electrical transformers—were first marketed in the 1930s. Dioxins and polyaromatic hydrocarbons (PAHs)—never intentionally synthesized—are now known to be natural products of combustion processes. The most hazardous of pesticides, the organophosphate (OP) insecticides, have been around since the early 1950s.

A Soupy Dilemma

Despite human exposure to all of these compounds for at least several generations, we still lack data that definitively tie environmental and dietary levels of residues to any human ailments. One problem with the focus of many studies is that only one chemical at a time is under scrutiny. Yet the reality is exposure to many different compounds over the course of a day. The magnitude of this dilemma is illustrated by pesticide monitoring studies of food and water. The USDA Pesticide Data Program in 1996 found that of 5800 food samples analyzed, 20% had two different pesticides (13). The USGS NAWQ (National Ambient Water Quality) Program reported that more than 50% of all stream samples contained five or more pesticide compounds (8). About 25% of groundwater samples had two or more pesticides, most commonly found in shallow groundwater of both agricultural and urban areas.

Analytical chemists tend to refrain from judging the biological significance of their detections of mixtures of chemicals in water and food. Once the data are turned over to someone else for publication, however, a common theme recurs. The pesticide residues detected are almost always below the relevant regulatory health standard. Indeed, their concentrations are generally measured in parts per trillion and billion, environmental levels essentially without effect to most organisms. Nevertheless, the hazard may be greater than indicated because *mixtures* of chemicals could have adverse effects and these combinations have not been studied.

FQPA Stirs the Soup

The issue of exposure to multiple contaminants hits close to the heart of the as-yet-unimplemented mandate of the FQPA to cumulate exposure of pesticides having similar mechanisms of producing toxicity (See *AENews* Issues 143 and 156). The issue is not a new one. Early reports (6) of the enhancement of toxicity of the OP insecticide malathion by simultaneous exposure to another OP motivated the FDA (Food & Drug Administration) to issue a ruling requiring testing for interactions among OPs (9).

Today, testing under the FQPA is only required for a

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Is it Soup? Mixtures, cont.

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

single compound at a time. But that doesn't mean toxicological studies of mixtures haven't been conducted. The study of mixtures, although a molehill amidst the mountains of single compound research, has been going on quietly. I will unravel the mystery of chemical mixtures and present several case studies indicating that the soup may not be as hazardous as we think.

How Those Flavors Blend

Considering that plants produce biologically active compounds, including those with hormone activity mimicking estrogen as well as natural compounds toxic to predators, humans have always been exposed to a chemical soup. While we seem to worry a lot more about the biological activities of man-made compounds than plant compounds, the types of interactions eliciting biochemical and physiological effects are still the same.

Four interactions are possible between different compounds (3): independent effects, additive effects, antagonistic effects, or potentiation (see sidebar).

Know the Ingredients— Anticipate the Soup

Ideally, every new compound introduced into commerce would be tested in combination with all other compounds, including those plant compounds that are biologically active. Realistically, such a task would be impossible given the magnitude of all possible combinations. However, if we know all about how individual compounds work on a biochemical level, then we can predict how they may work when present in combinations with other chemicals.

Pharmacokinetics is the qualitative and quantitative description of the behavior of chemicals in the body. Important processes are absorption through epidermal tissues, transfer to the blood, distribution to all the organs, metabolism into other compounds, excretion, and reaction at vulnerable biochemical targets that result in toxicity. Computer models have been developed to aid prediction of chemical behavior based on measurements of just a few physiological parameters, as well as the properties of the chemical itself. Use of pharmacokinetic knowledge for different compounds allows predictions of what might happen when an organism is simultaneously exposed to two or more compounds.

The 4 Interactions Possible between Different Compounds

❶

Independent (or Neutral) Effects

Substances exert their own toxicity independently of one another. The toxicity of one substance does not affect the toxicity of a second substance.

❷

Additive Effects

Compounds having similar mechanisms of toxicity cause a response that is simply the sum of the effects produced by the individual compounds.

❸

Antagonistic Effects

One compound interferes with the toxicity of another compound resulting in a combined effect that is lower than expected from one compound alone.

❹

Potentiation (or Synergism)

Two compounds given simultaneously or close in time cause an effect that is greater than the sum of the two alone. One of the compounds may not cause a reaction at all, but when combined with another biologically active compound, it exhibits toxic effects.

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Is it Soup? Mixtures, cont.

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

For example, the toxicity of compound X is diminished when it is broken down by a certain enzyme because the concentration of chemical reaching the biochemical target site is reduced. If it is known that compound Y inhibits the enzyme that breaks down compound X, then simultaneous exposure to X and Y could result in greater toxicity of X. If the resulting toxic effect was greater than expected by adding the effects of X and Y alone, we would call the interaction potentiation or synergism.

Additivity describes the interaction where the combined effects of X and Y are no greater than expected by summing up their individual effects. Simple additivity would occur if X and Y reacted with the same biochemical target but neither interferes with the normal metabolism of the other. It is also possible that X and Y have completely different mechanisms of toxicity and do not interact with each other's detoxification enzymes. Then exposure to both compounds would have neither a synergized nor additive effect.

...if we know how individual compounds work...we can predict how they may work in combinations...

A Very Old Recipe—OP Soup

Early studies of potentiation among OP insecticides focused on malathion, which is probably the least toxic of this group. The acute oral toxicity of malathion, as measured by the dose lethal to 50% of test animals (LD_{50}), increased substantially when rats were also injected or fed EPN, an OP which is no longer registered (6). For example, the LD_{50} to rats of malathion or EPN alone was estimated to be 1400 milligrams per kilogram of body weight (mg/kg) or 65 mg/kg, respectively. When mixed together and simultaneously administered to rats, the LD_{50} for malathion and EPN fell to 167 and 6.6 mg/kg, respectively. In other words, the doses required to kill 50% of the animals had dropped by nearly a factor of 10. If malathion and EPN were only additive in their interaction, then the doses corresponding to the LD_{50} should have dropped by at most a factor of two.

Subsequent studies showed that potentiation between OP insecticides occurred only when one compound contained a certain chemical structure that made it susceptible to break down (detoxification) by a group of enzymes known as carboxyesterases. Malathion, once broken down by carboxyesterase, loses its toxicity. Malathion's toxicity could be potentiated by a second OP that was capable of inhibiting the activity of carboxyesterase (11). Thus, more malathion would remain in the body longer, causing greater toxicity.

The story of EPN and malathion shows how a knowledge of the basic biochemistry of biological reactions can lead to predictions of OP interactions. We now know that other types of esterase enzymes in addition to the carboxyesterases may be involved in detoxification of OP insecticides (12). Any compound that inhibits these additional esterases could potentiate the toxicity of another OP.

Knowing about OP insecticide pharmacokinetics can help with predictions of whether compound interactions will be neutral, additive, or potentiating, but estimations of risk must take into account the doses that cause interactive effects. These doses then must be compared to exposure of residues in water and food. An examination of the literature showing potentiating effects of OP insecticides in rats reveals that the effective doses are extraordinarily high relative to the daily intake of residues, even at the extreme end of consumption patterns. According to the Handbook of Pesticide Toxicology (9), "actual potentiation requires not only that the interacting compounds be present simultaneously or almost simultaneously but also that both be present at toxic or near-toxic levels."

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Is it Soup? Mixtures, cont.

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

Early studies revealed that even at sublethal levels where only activity of the target enzyme cholinesterase was inhibited without overt symptoms in the test animal, thresholds for an effect definitively existed (6). At best, most OP interactions are additive. A substantial number of interactions have been found to be less than additive (9).

Soup du Jour: Hormone Stew à la Mimics

The toxicological world has been abuzz with reports about chemicals of all kinds interacting with key components of the endocrine system. Because the endocrine system communicates via hormones with the nervous and immune systems, dysfunction in any one system can have far-ranging physiological consequences (see *AENews* Issues 122, 124, and 139). Reproductive function and development are the toxicological endpoints under intense scrutiny for endocrine effects.

We have known for quite some time that certain chemicals, both natural and synthetic, with and without chlorine, can mimic the natural hormone estrogen and more infrequently testosterone. Exposure to these mimics early in life has been hypothesized to affect normal development, possibly leading to a range of diseases from impaired fertility to reduced intelligence and altered behavior (5).

...concern over interactions among new kinds of synthetic chemicals is reasonable...

The various hormone mimics tend to be thousands to millions of times less potent than the natural hormones. For example, natural estrogen causes biochemical responses when present in plasma at parts per trillion levels. However, the cyclodiene insecticides endosulfan (Thiodan) and dieldrin (banned in 1974) barely register a reaction at levels of parts per million. Several years ago a report in the journal *Science* alarmed regulators with its observation of up to a 1600-fold increase in estrogenic activity for binary combinations of the pesticides endosulfan, dieldrin, toxaphene, and chlordane (2). Such results would portend the need to test mixtures for endocrine disrupting effects under the mandates of the FQPA.

The scientific method has a reputation for being a self-correcting process. True to this ideal, scientists from several laboratories tried but failed to duplicate the results of the *Science* report. At best, they could only show that interactions were additive, which is expected based on a common interaction with the estrogen receptor (1,7). Furthermore, their results clearly showed a threshold below which there was no effect, even with combinations of pesticides. The original report in *Science* was withdrawn by its authors one year after it was published because they themselves could not duplicate their own work (McLachlan 1997).

The concern that mixtures of hormone mimics might provoke a synergistic interaction was largely based on in-vitro studies—studies performed, essentially, in test tubes. Complementary studies working with live animals must also be conducted to verify results. The National Institute of Environmental Health Sciences has sponsored two-generation feeding studies to examine potential toxic effects on male and female reproduction (4). In two of the studies, breeding mice were fed three different doses of pesticide and fertilizer mixtures. The mixtures were chosen to represent the types of pesticides and fertilizer detected in ground water in California and Iowa. The studies examined general toxicity (whole body and organ weights of adults and offspring, mortality, food and water consumption, clinical signs) and reproductive toxicity (fertility, number of offspring per litter, reproductive organ weights, sperm numbers, and estrous cycle length). Although the highest concentrations were at least thousands of times

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Is it Soup? Mixtures, cont.

Dr. Allan S. Felsot, Environmental Toxicologist, WSU

greater than known human dietary intakes, the researchers concluded no effects of the mixtures on general toxicity nor on reproductive toxicity.

Caution: The Soup May Be Hot

Living in a chemical soup is not a recent development. Our food contains numerous chemicals with biological activities that go beyond mere nutritive value. But concern over interactions among new kinds of synthetic chemicals is reasonable. Given the number of possible combinations of all chemicals it is unrealistic to expect regulations to require testing of every potential mixture. At best, toxicologists can study the complete pharmokinetic processes, including biochemical mechanisms of toxic action, and then predict what effects might occur if chemicals are present in combination. With pesticides, at least, these kinds of studies are routine during the development stage.

Slowly but surely, experimental studies of various combinations of chemicals will be reported, increasing the accuracy of our predictions. Our chemical soup could be hot, but given historical gains in the health and longevity of humans worldwide, our cautious efforts to understand its ingredients has made it much more palatable.

REFERENCES

1. Arcaro, K. F., D. D. Vakharia, Y. Yang, and J. F. Gierthy. 1998. Lack of synergy by mixtures of weakly estrogenic hydroxylated polychlorinated biphenyls and pesticides. Environmental Health Perspectives 106 (Suppl. 4): 1041-1046.

2. Arnold, S. F., D. M. Klotz, B. M. Collins, P. M. Vonier, L. J. Guillette, Jr., J. A. McLachlan. 1996. Synergistic activation of estrogen receptor with combinations of environmental chemicals. Science 272:1489-1492.

3. Ballantyne B., T. Marrs, and P. Turner. 1991. General & Applied Toxicology. Chapter 1. Stockton Press, NY. p. 25.

4. Chapin, R. E., and R. A. Sloane. 1997. Reproductive assessment by continuous breeding: evolving study design and summaries of ninety studies. Environ. Health Perspectives 105 (Suppl. 1): 199-395.

5. Colborn, T., D. Dumanoski, and J. P. Myers. 1996. Our Stolen Future. Dutton, NY. 306 pp.

6. Frawley, J. P., H. N. Fuyat, E. C. Hagan, J. R. Blake, and O. G. Fitzhugh. 1957. Marked potentiation in mammalian toxicity from simultaneous administration of two anticholinesterase compounds. J. Pharmacol. & Exptl. Therapeutics 212:96-106.

7. Gaido, K. W., D. P. McDonnell, K. S. Korach, and S. H. Safe. 1997. Estrogenic activity of chemical mixtures: is there synergism? CIIT Activities 17(2): 1-7.

8. Gilliom, R. J., J. E. Barbash, D. W. Kolpin, and S. J. Larson. 1999. Testing Water Quality for Pesticide Pollution. Environ. Sci. Technol. 33(7): 164A-169A.

9. Hayes, W. J., and E. R. Laws, Jr., ed. 1991. Handbook of Pesticide Toxicology, Vol. 2. Academic Press, NY. pp. 954-957.

10. McLachlan, J. A. 1997. Synergistic effects of environmental estrogens: report withdrawn. Science 277:462-463.

11. Seume, F. W., and R. D. O'Brien 1960. Potentiation of the toxicity to insects and mice of phosphorothionates containing carboxyester and carboxyamide groups. Toxicol. Appl. Pharmacol. 2:495-503.

12. Su, M. Q., F. K. Kinoshita, J. P. Frawley, and K. P. DuBois. 1971. Comparative inhibition of aliesterases and cholinesterase in rats fed eighteen organophosphorus insecticides. Toxicol. Appl. Pharmacol. 20:241-249.

13. USDA Pesticide Data Program. 1997. Annual Summary Calendar Year 1996. USDA Agricultural Marketing Service. http://www.ams.usda.gov/science/pdp/download.htm

Dear Aggie

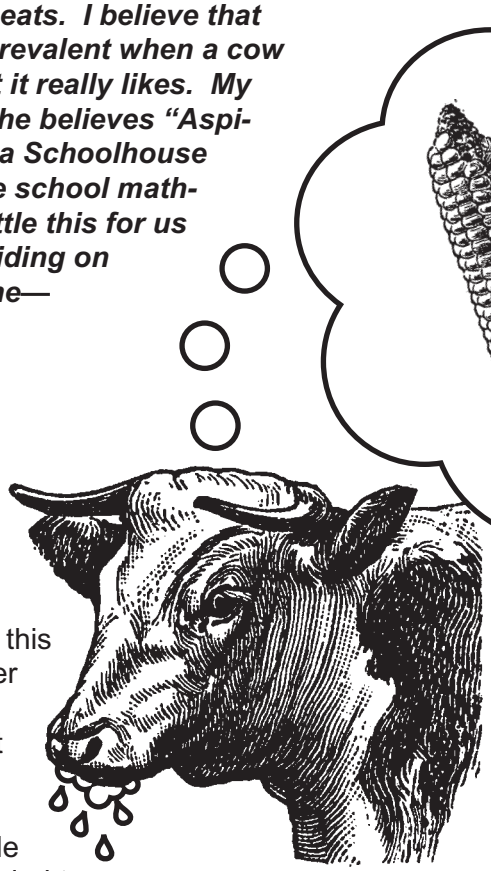
Providing answers to the questions you didn't know you wanted to ask

In contrast to the usually more sober contributors to the Agrichemical and Environmental News*, Dear Aggie deals lightheartedly with the peculiarities that cross our paths and helps decipher the enigmatic and clarify the obscure. Questions may be e-mailed to Dear Aggie at* ***dearaggy@tricity.wsu.edu****. Opinions are Aggie's and do not reflect those of WSU.*

Dear Aggie:

I recently had a discussion with a friend about grain-type tolerances. Specifically, we were talking about the definition of "aspirated grain fractions." I maintain that this is the foam sometimes emitted from a cow when it eats. I believe that this phenomenon is more prevalent when a cow eats some tasty morsel that it really likes. My friend was not convinced—he believes "Aspirated Grain Fractions" was a Schoolhouse Rock segment about middle school mathematics. Will you please settle this for us as we have a steak dinner riding on your response. Just sign me—

Foaming at the Mouth.



Dear F at the M,

Soooo sorry, but you are going to have to eat crow, not steak. "Aspirated grain fractions" is EPA lingo for "grain dust." Aggie had thought that this tolerance was in place to cover potential exposure of grain workers to dust, but this is not the case. Per a conversation with Carl Grable, a scientist with EPA's Fungicide-Herbicide Branch, this tolerance is intended to cover the residue in feed (and later in milk, meat, etc.) contributed from grain dust. In order to look at the total residue in animal feed, one must consider not only the residue in the grain but also that in the dust. Just remember, that for aspirated grain fractions

the **FORM**,
is not **FOAM**,
it's **DUST**.

Dear Aggie:

I was recently rifling through a scholarly text on hops, wherein the author kept referring to hop "bines," as though the plant on which the hop grows is called a "bine." I've never heard that word before. Other documents in my collection (let's say I have a fascination with malted grain products) say hops grow on a vine. What's up?

That Bine o' Mine

Dear Bine o':

Clever reader! While it might seem that spelling is not the scholarly author's forte, in fact "bine" is more correct than "vine" when referring to hop plants, although both terms are used. *The American Heritage College Dictionary,* 3 ed., defines "bine" as "the flexible twining or climbing stem of certain plants, such as the hop or woodbine," and the University of Vermont Extension System hops web pages (**www.uvm.edu/~pass/perry/hops.html**) differentiates "bine" from "vine" in that the former twines by climbing clockwise (following the sun), while the latter uses tendrils. Being an amateur etymologist, however, Aggie suspects that the origins of this weird word just might have something to do with a sleepy botanist's index finger slipping off the V key and onto the adjacent B.

Dear Aggie, cont.

from page 19

Dear Aggie:

What's this I hear about dissension among the once-harmonious ranks of TRAC, that EPA advisory subcommittee? Is it true that half a dozen members are...

Taking Their Ball and Going Home?

Dear Taking Their Ball:

'Tis true. But first, some background. A little over a year ago, the EPA received a message from the agricultural community that that the agency needed to use sound science to make decisions about the future of pesticide tolerances. Furthermore, science policies needed to be explicit and open to public comment. To promote a transparent decision-making process, the TRAC (Tolerance Reassessment Advisory Committee) was established to provide EPA with independent advice and counsel about all things related to tolerances, especially for the OP insecticides. EPA started putting many of its science policy documents on the Internet for public view and commentary. To ensure that TRAC was balanced in its perspective, its members were chosen from environmental and public interest groups; pesticide industry and trade associations; user, grower, and commodity organizations; pediatric and public health organizations; federal agencies, tribal, state, and local government; academia; and consumer groups. In short, TRAC included everything but the kitchen sink. With a group this diverse there were bound to be…shall we say…friendly differences. At the end of April those friendly differences exploded in protest as seven environmental, consumer, and public interest members resigned. Apparently, these groups think the agricultural industry has hijacked the FQPA with full collusion of the Clinton Administration. Other than a few bruises on the left arm of TRAC, however, the advisory process seems to be going forward. Aggie guesses that for some folks, a balanced discussion means either their way or the byway. (Source: Washington Post, April 28, 1999, page A23. For TRAC information see **www.epa.gov/pesticides/trac/**.)

Federal Register Excerpts

Jane M. Thomas, Pesticide Notification Network Coordinator

In reviewing the April postings in the Federal Register, we found the following items that may be of interest to the readers of *Agrichemical and Environmental News*.

In the April 7 Federal Register, EPA announced that the draft policy paper "Data for Refining Anticipated Residue Estimates Used in Dietary Risk Assessments for Organophosphate Pesticides" was available for comment. Comments on this policy should be submitted to EPA on or before June 7, 1999. (Page 16967)

In the April 7 Federal Register, EPA announced it is soliciting comments on a draft policy paper "Choosing a Percentile of Acute Dietary Exposure as a Threshold of Regulatory Concern." Comments on this document should be submitted to EPA on or before June 7, 1999. (Page 16962)

In the April 28 Federal Register, EPA announced that the agency was soliciting comments on how it should handle the registration of pesticide active ingredients (AI's) that are composed of chemical isomers. In particular, EPA is looking into how it how it will determine whether a particular isomeric pesticide is a new active ingredient or not. Comments on the information contained in this notice are due to EPA on or before June 28, 1999. (Page 22863)

Tolerance Information

Jane M. Thomas, Pesticide Notification Network Coordinator

Tolerance Information						
Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited		
				Yes/No	New/Extension	Expiration Date
propamocarb hydrochloride (fungicide)	4/7/99 page 16840	0.50 1.00 3.00	tomato tomato puree tomato paste	Yes	Extension	11/15/01
Comment: These time-limited tolerances are being extended in response to a request to again grant an emergency exemption for the use of propamocarb hydrochloride to control late blight in greenhouse grown tomatoes.						
tebufenozide (insecticide)	4/7/99 page 16850	3.00 1.00 10.00	berry (crop group 13) cranberry spearmint and peppermint tops	No	N/A	N/A
Trichoderma harzianum KRL-AG2 (microbial pesticide)	4/7/99 page 16856	exempt	see comment	N/A	N/A	N/A
Comment: This exemption applies when this ingredient is used as a seed treatment, on cuttings and transplants, or as a soil treatment and in certain foliar applications.						
clopyralid (herbicide)	4/12/99 page 17565	3.00	canola	Yes	Extension	7/31/01
Comment: This time-limited tolerance is being extended in response to EPA's again granting exemptions for the use of clopyralid to control weeds in canola in Minnesota, Montana, Idaho, North Dakota, and Washington.						
tebufenozide (insecticide)	4/14/99 page 18339	2.00 10.00 10.00 1.00 5.00	leaf petioles crop subgroup leafy greens crop subgroup leafy Brassica greens crop subgroup fruiting vegetables (except cucurbits) head and stem Brassica crop subgroup	No	N/A	N/A
pyriproxyfen (insecticide)	4/14/99 page 18333	0.20 0.02 0.80	pome fruits walnut apple pomace, wet	No	N/A	N/A
oxyfluorfen (herbicide)	4/14/99 page 18369	0.05	strawberries	Yes	Extension	4/15/01
Comment: This time-limited tolerance is being extended in response to EPA again granting Section 18 exemptions for the use of oxyfluorfen for weed control in strawberries in various states.						
glyphosate (herbicide)	4/14/99 page 18360	30.00 20.00 25.00 10.00 15.00 10.00 0.10 5.00	barley bran barley grain sugarbeet, dried pulp sugarbeet, roots and tops canola, meal canola, seed grain crops (except wheat, oats, grain sorghum and barley) legume vegetables (succulent and dried) group (except soybeans)	No	N/A	N/A
fluthiacet-methyl (herbicide)	4/14/99 page 18351	0.01	soybean seed	No	N/A	N/A
dimethomorph (fungicide)	4/14/99 page 18367	1.00 1.00 1.00 1.00	squash cantaloupe watermelon cucumber	Yes	Extension	9/30/01
Comment: These time-limited tolerances are being extended in response to EPA granting exemptions for the use of dimethomorph to control crown rot in cucurbits grown in Michigan and Georgia.						
cyromazine (insecticide)	4/14/99 page 18357	5.00	lima beans	Yes	Extension	12/31/01
Comment: This time-limited tolerance is being extended in response to EPA again granting an exemption for the use of cyromazine to control leafminers in California lima beans.						

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Tolerance Info, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

Tolerance Information

Chemical (type)	Federal Register	Tolerance (ppm)	Commodity (raw)	Time-Limited		
				Yes/No	New/Extension	Expiration Date
cyprodinil (fungicide)	4/14/99 page	5.00	strawberries	Yes	New	5/31/00
Comment: This time-limited tolerance is being granted in response to Section 18's being granted or requested for the use of cyprodinil to control gray mold in strawberries in South Carolina, Florida, Oregon, and Washington.						
cofentizine (insecticide)	4/19/99 page 19042	0.50	apples	No	N/A	N/A
		3.00	apple pomace			
fludioxonil (fungicide)	4/21/99 page 19484	2.00	strawberries	Yes	New	5/31/00
Comment: This time-limited tolerance is being issued in response to EPA either receiving a request for a Section 18 or granting an exemption for the use of fludioxonil to control gray mold in strawberries in Washington, Oregon, Florida, and South Carolina.						
sulfosate (herbicide)	4/28/99 page 22802	2.50	wheat bran	No	N/A	N/A
		0.75	wheat grain			
		35.00	wheat forage			
		85.00	wheat hay			
		1.50	wheat shorts			
		1.00	wheat straw			
		0.05	pome fruit			
		0.50	milk			
		0.50	liver of cattle, goat, hog, horse, and sheep			
		2.50	mbp of cattle, goat, hog, horse, and sheep			
fluroxypyr (herbicide)	4/28/99 page 22797	0.05	corn, sweet, K + CWHR	Yes	Extension	12/1/01
		2.00	corn, sweet, forage			
		2.50	corn, sweet, stover			
		0.05	corn, field, grain			
		2.00	corn, field, forage			
		2.50	corn, filed, stover			
Comment: These time-limited tolerances are being extended in response to EPA again granting emergency exemptions for the use of fluroxypyr to control volunteer potatoes in sweet corn and field corn grown in Oregon, Washington, Michigan, and Wisconsin.						
bifenthrin (insecticide)	4/28/99 page 22799	1.00	cucurbits	Yes	Extension	10/31/00
Comment: This time-limited tolerance is being extended in response to EPA granting exemptions for the use of bifenthrin to control whitefly and aphids in cucurbit crops in California, Texas, and Arizona.						
Beauveria bassiana (microbial pesticide)	4/28/99 page 22793	exempt	see comment	N/A	N/A	N/A
Comment: This exemption applies to all food commodities when this microbial pesticide is applied or used as ground and aerial foliar sprays for use only on terrestrial crops.						

Exemptions Explained

FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) Section 18 exempts states from the requirements of FIFRA when emergency conditions exist, which means that states can authorize a pesticide for use outside the normal registration parameters.

FIFRA Section 25(b) exempts a pesticide from the requirements of FIFRA, which means that EPA does not require it to be registered.

FFDCA (Federal Food, Drug, and Cosmetics Act) Section 408 establishes the method for petitioning EPA for a tolerance or an exemption from the requirement for a tolerance.

Page 23
Agrichemical & Environmental News
June 1999
No. 158

PNN Update

Jane M. Thomas, Pesticide Notification Network Coordinator

The PNN is operated by WSU's Pesticide Information Center for the Washington State Commission on Pesticide Registration. The PNN system is designed to distribute pesticide registration and label change information to groups representing Washington's pesticide users. The material below is a summary of the information distributed on the PNN in April.

Our office operates a web page called PICOL (Pesticide Information Center On-Line). This provides a label database, status on registrations and other related information. PICOL can be accessed on URL http://picol.cahe.wsu.edu or call our office, (509) 372-7492, for more information.

Federal Issues

Label Changes

◆ Rohm and Haas has revised the label for its Dimension Herbicide. The product, renamed Dimension Turf and Ornamental Herbicide, is now labeled for use on various landscape ornamentals.

Manufacturers Use Deletions

◆ In the April 14 Federal Register, EPA announced that it had received requests from several registrants to delete certain uses from various azinphos methyl products. If these requests are not withdrawn the deletions will become effective on October 12, 1999. Anyone wishing to retain any of these uses should contact the listed registrant. The registrants, products, and relevant uses are:

Gowan: Gowan Azinphos-M 50W: barley, oats, rye, wheat, apricot, artichoke, dry beans, and shade trees.

MicroFlo: Azinphos-Methyl 2EC: apricot, artichoke, barley, dry beans, oats, pasture grasses, rye, and wheat.

MicroFlo: Azinphos-Methyl 50W: artichoke, apricot, barley, dry beans, oats, rye, slash pine, and wheat.

MicroFlo: Azinphos-Methyl 50W Soluble: artichoke, apricot, barley, dry beans, oats, rye, and wheat.

Note that in the same notice, Makhteshim-Agan proposed to delete uses from its product Cotnion-Methy 50W, EPA # 66222-11. While this product is not registered under this name or number for use in Washington, it is registered as Sniper 50W, EPA # 66222-11-34704 by Platte. Because the proposed use deletions will eventually be required on the Sniper 50W label, it is included here.

Platte: Sniper 50W: apricot, artichoke, barley, dry beans, oats, grasses, grass mixtures, kiwi, rye, and wheat.

Manufacturers' Product Cancellations

◆ In the March 17 Federal Register, EPA announced that it had received a request from Bayer to cancel registrations for its remaining Morestan (oxythioquinox) products. In Washington, this action will result in the cancellation of registration for Morestan 4 Ornamental Miticide and Joust (a product registered by Olympic Horticultural Supply). Bayer has proposed that an existing stocks provision be in effect for 18 months from the date of cancellation. Anyone wishing to retain these registrations should submit their comments to Bayer by September 13, 1999.

Previously Bayer had requested cancellation of its registrations for Morestan 25WP and Morestan Solupak 25WP and all food uses. In Washington, however, two Morestan 25WP SLNs remain in effect: WA-900002 for use on hops and WA-850009 for use on apples and pears. Although these SLNs were not specifically addressed in this notice, it is anticipated that they will be cancelled as well.

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PNN Update, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

◆ In the April 14 Federal Register, EPA announced that it had received a request from ISK Biosciences to voluntarily cancel the registration for its herbicide 2 Plus 2 Turf Care. Unless this request is withdrawn by October 12, 1999, EPA will issue orders canceling this registration.

◆ In the April 14 Federal Register, EPA announced that it had received a request from ISK Biosciences to voluntarily cancel the registration for its fungicide Reach. Unless this request is withdrawn by October 12, 1999, EPA will issue orders canceling this registration.

Section 18 Specific Exemptions

On April 8 EPA issued a specific exemption for the use of Novartis' fungicide Mycoshield to control fire blight on apples. The exemption allows for the following:

- ◆ use on 15,000 acres in Adams, Benton, Chelan, Douglas, Franklin, Grant, Kittitas, Klickitat, Okanogan, Skamania, Walla Walla, and Yakima counties, and
- ◆ an expiration date of 8/1/99.

On April 13 EPA issued a specific exemption for the use of Brigade WSB to control weevils on raspberries. This exemption allows for the following:

- ◆ use on 8,500 acres,
- ◆ 2 applications per season,
- ◆ a 3-day PHI, and
- ◆ an expiration date of 8/10/99.

On April 16 EPA issued a specific exemption for the use of Capture 2EC to control aphids on canola. This exemption allows for the following:

- ◆ use on 30,000 acres,
- ◆ 2 applications,
- ◆ a 12-hour REI,
- ◆ a 30-day PHI, and
- ◆ an expiration date of 8/15/99.

On April 26 EPA issued a specific exemption for the use of Stinger to control Canada thistle on canola. This exemption allows for the following:

- ◆ use on 6,000 acres,
- ◆ a single application,
- ◆ a 72-day PHI, and
- ◆ an expiration date of 7/31/99.

On April 28 EPA issued two specific exemptions for the use of Rally 40WSP and Folicur 3.6F to control powdery mildew on hops. The exemptions allow for the following:

- ◆ use on 26,000 acres in Benton and Yakima counties,
- ◆ 4 applications at a minimum interval of 14 days for Folicur 3.6F,
- ◆ 8 applications at a minimum interval of 10 days for Rally 40WSP,
- ◆ a 48-hour REI for Rally 40WSP,
- ◆ a 14-day PHI for both Folicur 3.6F and Rally 40 WSP, and
- ◆ an expiration date of 9/22/99 for both exemptions.

Note that in the same Section 18 request that resulted in these specific exemptions, WSDA had also requested the use of Flint (trifloxystrobin) on hops. EPA's evaluation of this request is still ongoing.

Miscellaneous Regulatory Information

In the April 7 Federal Register, EPA proposed to cancel 206 tolerances. Included in this list are all outstanding tolerances for fonofos. In Washington, fonofos is registered via Zeneca's Dyfonate 4EC, Dyfonate II 15G, and Crusade 5G on the following crops: bean, beet, broccoli, Brussels sprout, cabbage, cauliflower, corn, dry bulb onion, lima bean, pepper, potato, sorghum, sugarbeet, tomato, mint, radish, strawberry, sweet potato, golf course, and turf. EPA is requesting that comments on this proposed action be submitted by June 7, 1999.

In the March 3 Federal Register, EPA announced that it had received requests from several registrants to terminate some or all uses for products containing chlorothalonil, dicofol, iprodione, propachlor, and vernolate. With the exception of vernolate, these requests have been submitted in response to additional data requirements and/or risk mitigation measures identified by EPA in the related REDs. The registrants

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PNN Update, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

of these chemicals prefer to cancel certain products or uses rather than generate additional data or implement certain mitigation measures. The chemicals and proposed cancellations are discussed below.

◆ chlorothalonil: Home lawn use deletion. This proposed deletion could potentially impact 18 labels currently registered in Washington.

◆ dicofol: Residential turf and ornamental use deletions. The products potentially impacted are: Dicofol 4EC, Dicofol 4E, Kelthane 35, Kelthane 50, and Kelthane T/O.

◆ iprodione: Deletion of all residential uses and herbaceous ornamental seed treatments. This has the potential to impact 14 products currently registered in Washington.

◆ propachlor: Dry flowable product deletion. No dry flowable formulations are currently registered in Washington.

◆ vernolate: Technical and all end use products deleted. No products containing this chemical are currently registered in Washington.

In the March 10 Federal Register, EPA announced that the reregistration eligibility decision (RED) had been issued for chlorine gas and was available for comment. EPA has determined that chlorine products registered for use in non-residential swimming pools, pulp and paper mills, and industrial food processing plants shall be reclassified as Restricted Use Pesticides. Chlorine products registered for use in drinking water, sewage, wastewater treatment, and residential swimming pools will remain classified for general use.

State Issues

New Registrations

◆ WSDA has registered a new plant growth regulator for use. The Agtrol product, TYPT Plant Growth Regulator, is labeled for use on apples, non-bearing pears, and non-bearing sweet cherries.

◆ WSDA has registered FMC's Aim Herbicide. This product is labeled for use on corn seed, field corn, popcorn, and corn silage.

◆ WSDA has registered three Fine Agrochemical plant growth regulators for use. The products, their active ingredients, and labeled usage sites are:

Falgro 4L and Falgro 20SP (gibberellic acid): blueberry, cherry, cucumber, golf course, grape, hop, lettuce seed crop, melon, non-bearing cherry, non-bearing peach, non-bearing strawberry, pepper, potato seed, prune, spinach, and flower.

Perlan (gibberellic acid, N-6 benzyl adenine): apple, non-bearing apple, non-bearing cherry, and non-bearing pear.

◆ WSDA has registered two Engelhard kaolin products. The products, M-97-0009 Kaolin and M-96-018 Kaolin, are labeled for use on the following sites: apple, apricot, bean, beet, blackberry, boysenberry, cherry, collard, crabapple, dewberry, eggplant, grape, horseradish, loganberry, nectarine, peach, pear, pepper, plum, potato, prune, quince, radish, raspberry, rutabaga, sugarbeet, tomato, and turnip.

◆ WSDA has registered Elf Atochem's fungicide Decco Salt No. 38. This product is labeled for post-harvest use on apples, pears, carrots, and potatoes.

◆ WSDA has registered two RX Veterinary insecticides. The products, Exit Insecticide and Exit II Synergized Formula Insecticide, both contain permethrin and are labeled for use on beef cattle, dairy cattle, and sheep.

◆ WSDA has registered Rohm and Haas' insecticide Confirm 2F. This product is labeled for use on walnuts for the control of codling moth, navel orange worm, fall webworm, and redhumped caterpillar.

◆ WSDA has registered Rhone Poulenc's Diva Fungicide. This product is labeled for use on carrots, onions, and potatoes.

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PNN Update, cont.

Jane M. Thomas, Pesticide Notification Network Coordinator

◆ WSDA has registered Rhone Poulenc's herbicide Sedagri Trifluralin 480. This product is labeled for use on the following crops: alfalfa, apricot, asparagus, barley, bean, broccoli, Brussels sprout, cabbage, canola, carrot, cauliflower, celery, collard, cowpea, cucurbit, dry bulb onion, field corn, flax, grape, green bean, green pea, hop, kale, kidney bean, kiwi, lima bean, mung bean, mustard, mustard seed crop, navy bean, nectarine, okra, pea, peach, pepper, pinto bean, plum, potato, prune, radish, safflower, sorghum, soybean, sugarbeet, sunflower, tomato, tree pulp production, turnip, walnut, and wheat.

◆ WSDA has registered two Rhone Poulenc insecticides. The fipronil products, Regent 80WG and Regent 4SC, are both labeled for use on field corn.

◆ WSDA has registered Rhone Poulenc's plant growth regulator Chipco Brand Proxy. This product is labeled for use on turf and golf courses.

Section 18 Crisis Exemptions

On March 2 WSDA issued a crisis exemption for the use of Roundup Ultra on glyphosate-tolerant canola. At the time the crisis exemption was issued a request for an emergency exemption had been submitted to EPA. Recently a Section 3 supplemental label has been issued that covers this use; therefore, the supplemental label supercedes the crisis exemption issued by WSDA and EPA has withdrawn the Section 18.

On April 28 WSDA issued a crisis exemption for the use of Switch 62.5WG to control gray mold fruit rot on caneberries. This exemption allows for the following:

- ◆ use on 9,000 acres,
- ◆ use in all Washington counties except: Mason, Pacific, Wahkiakum, Kittitas, Lincoln, Whitman, Columbia, Asotin, and Garfield,
- ◆ 4 applications (to change to 3 applications if the exemption for Elevate 50WDG is approved),
- ◆ a 12-hour REI,
- ◆ a 0-day PHI, and
- ◆ an expiration date of 9/10/99.

Section 24c Registrations

◆ On March 29 WSDA issued an SLN, WA-990015, for the use of Lorsban 4E on perennial grass seed crops to control billbugs and aphids. This SLN expires 12/31/04.

◆ On March 29 WSDA issued an SLN, WA-990016, to Zeneca for the use of its Quadris Flowable Fungicide to control rusts and powdery mildew on perennial ryegrass, fescues, bluegrass, and orchardgrass grown for seed. This SLN expires 12/31/03.

◆ On April 14 WSDA issued an SLN, WA-9900018, to Gowan for the use of its insecticide Savey 50WP to control European red mites and twospotted spider mites on apples. This SLN expires 12/31/99.

◆ On April 5 WSDA issued an SLN, WA-990017, for the use of Raptor Herbicide for weed control in alfalfa seed crops. The SLN expires 12/31/03.

◆ WSDA has issued two SLNs to Zeneca, WA-960012b and WA-960013b, for the use of its products Bravo Ultrex and Bravo Weather Stik to control mummyberry disease and anthracnose on blueberries. Both SLNs expire 12/31/03.

Section 24c Revisions

◆ On March 29 WSDA issued a revision to SLN WA-940002. This SLN provides for the use of Lorsban 4E on carrot seed crops to control cutworms and lygus bugs. The changes include the addition of a chemigation prohibition statement and a revision of the pollinator protection statement.

◆ On April 12 WSDA issued a revision to SLN WA-980012. This SLN had previously been issued to Platte Chemical for the use of its Simazine 90WDG to control annual weeds in cabbage grown for seed. The revision extends the expiration date from 12/31/98 to 12/31/04.

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Azoxystrobin Update

Page 27
Agrichemical & Environmental News
June 1999
No. 158

The following message from Zeneca was received from Pat Boss of the Washington State Potato Commission. Currently, azoxystrobin is registered for use in Washington by Zeneca as Abound, Heritage, and Quadris.

Azoxystrobin or Quadris is a new reduced risk early blight fungicide that was recently registered by EPA for use on potatoes. Please heed the below warning by Zeneca when using this product on potato fields that are growing near apple orchards, as it is phytotoxic to certain varieties of apples.

—Pat Boss
Washington State Potato Commission

Zeneca Position on Apple Phytotoxicity Induced by Azoxystrobin (Quadris)

James A. Frank, Fungicide Technical Business Lead

During the evaluation phase of azoxystrobin on apples, significant phytotoxicity was observed on apple foliage and fruit at normal use rates. Therefore, this crop was not selected as a potential development option. In 1997, this phytotoxicity was observed on apples in several locations in the US. The cause of damage was determined to be extremely low rates of azoxystrobin. Depending on the location, the chemical either drifted onto the trees from an application to an adjacent vineyard or was sprayed directly on the trees through a sprayer that had been used to spray grapes previously. The damage resembled that seen in research plots in England in the above-mentioned evaluation trials.

After a search of the global database on azoxystrobin and apples, the following varieties had been reported as sensitive to azoxystrobin:

McIntosh; Cox/Queen Cox/Cox's Orange Pippin; Bramley; Kent; Gala/Royal Gala; Spartan; Discovery; Summared (Mc. X G. Delicious); Worcestor Pearamin; Akane (Kougyokux W. Pearmain); Kizashi (Gala x Fuji); Warabi (McIntosh derived); Stark Gala; Molly Delicious; Starkspur Mac; Grimes; Courtland; Asahi; Summer Treat; Lurared; McCoun

There is a clear relationship between phytotoxicity and genetic lineage, as you can see from some of the parental information on Japanese varieties above. However, we do not fully understand this relationship and it is not possible to predict the response of an apple variety with certainty on the basis of its parentage. The crop safety is very 'all or nothing' with variety being the key factor that influences crop safety. Changes in environmental factors, formulation or time of year may be secondary influences on the crop safety response. The varieties presented here have documented phytotoxicity from the field; this does not mean that other varieties are safe to treat.

In order to prevent a repeat of the problems observed in 1997, the following statements have been added to the azoxystrobin label under the general use precaution section:

Azoxystrobin (Quadris) has been shown to be extremely phytotoxic to certain apple varieties. Azoxystrobin should not be applied where there is the possibility of spray drift reaching apple trees. Sprayers used to apply azoxystrobin not be used to spray apples.

Sprayer Contamination Issues

In a few instances there were carry-over contaminations where azoxystrobin was used in a sprayer that was subsequently used to spray sensitive apples. This situation is addressed in the last sentence above that appears on the label. Where growers have both apples and grapes this might necessitate the need for a second sprayer that would be dedicated to azoxystrobin, or sharing these dedicated sprayers with other growers. The carry-over is NOT specific to azoxystrobin. Many pesticides leave minute residues in sprayers. The problem is the ultra sensitive nature of certain apple varieties to azoxystrobin.

In all cases following the use of azoxystrobin

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(Quadris), a thorough cleaning of the sprayer should follow immediately after use. In routine cleaning, follow these procedures:

1) On the last sprayer load prior to cleaning ensure that the recirculation valve is open and that the tank is being well agitated.
2) Spray out or drain all of the liquid from the tank.
3) Clean out the strainer and if possible back flush the line into the spray tank.
4) Open the tank drain.
5) Using a hose rinse out the inside of the tank. Make sure that all of the loose solids are rinsed out through the tank drain.
6) Close the drain and partially fill the tank.
7) Recirculate the tank and check for the presence of suspended solids i.e. flakes.
8) If there are flakes repeat steps 2-7 until the tank is clean.
9) Once the tank no longer has flaked material in it, fill and add a tank cleaner. The best two in our tests were Neutral Clean Liquid and Incide-Out. Use the tank cleaner per the label instructions.
10) After using the tank cleaner check strainers and clean as necessary.

If a grower has used azoxystrobin and is planning to sell the sprayer, the following procedure may be used:
CAUTION DO NOT USE AMMONIA.

1) Follow steps 1-8 as outlined on the previous page.
2) If there is a strainer on the inlet to the pump check and clean as necessary.
3) Fill the tank _ full. Slowly add 8.4 pounds of lye(sodium hydroxide) per 100 gallons of final sprayer volume. We have used Red Devil Drain Opener (twelve 12 oz. cans per 100 gal.) successfully in the lab. DO NOT use drain openers, like Liquid Plummr which contain bleach (sodium hypochlorite.) Bleach can react with ammonia and ammonia-containing products to produce hazardous fumes. The lye should be added in small portions with mixing. This material is caustic and proper safety equipment should be worn.
4) Once all of the lye has been added, fill the tank to 95% full and recirculate for 1 hour. Allow to stand over night, recirculating occasionally.
5) While recirculating, add Tide Liquid Detergent (5 gal/100 gal of tank vol.) to the tank. If it foams excessively, a small amount of defoamer may be added. Allow to stand overnight with occasional recirculation.
6) Empty the tank by spraying through the nozzles. Check and clean strainers as necessary. Rinse the inside of the tank as thoroughly as possible. Try to avoid having the tank walls dry out. Flush water through the tank, lines and nozzle for at least 5 minutes and until clear.
7) Clean the nozzles and screens. Re-install the screens and nozzles.
Remove and replace spray lines as necessary.
8) Clean the fan and any external surfaces which could be sources of contamination
9) Fill and recirculate the tank for 1 hour with clean water.
10) Empty the tank. and check the inner lining of the tank. Re-coat as necessary.

While these procedures may be involved, if carefully followed they will remove the azoxystrobin from the tank so that it will not contribute to any carry-over problems.